

**Conference Proceedings of the  
7<sup>th</sup> Central European Conference on Regional Science (CERS)**  
*Flows of resources in the regional economy in the age of digitalisation*

**Sopron, 9 – 11 October 2019**





Flows of Resources in the Regional  
Economy in the Age of Digitalisation.  
Proceedings of the 7th CERS Conference

Editors

Zoltán Gál  
Sándor Zsolt Kovács  
Balázs Páger

Magyar Regionális Tudományi Társaság  
(Hungarian Regional Science Association)

Pécs, 2020

The publishing of this book was supported by National Cooperation Fund  
(NEA-KK-20-O-V-0287).



**Nemzeti  
Együttműködési  
Alap**



MINISZTERELNÖKSÉG



BETHLEN GÁBOR  
Alapkezelő Zrt.

Reviewers: Márta Bakucz, Kamila Borseková, Zoltán Hajdú, Réka Horeczki,  
László Jóna, Viktória Józsa, Slávka Klasová, Viktorie Klímová, Bálint Koós,  
Balázs Lengyel, Gábor Lux, Katalin Mezei, Zoltán Pámer, Márton Péti,  
Szilárd Rác, Oliver Rafaj, Viktória Szirmai, Viktor Varjú, Zsuzsanna Zsibók

English proofreading: Ildikó Egyed

Editors: Zoltán Gál, Sándor Zsolt Kovács, Balázs Páger  
CERS Institute for Regional Studies, Hungary

ISBN 978 615 5949 07 4

© Magyar Regionális Tudományi Társaság  
(Hungarian Regional Science Association)

# Content

Foreword	
<i>Zoltán Gál</i> .....	7

## Chapter 1 Factors of regional development

Additions for ex-post and ex-ante modelling of regional development paths	
<i>György Kocziszky, Dóra Szendi</i> .....	11
Corporate social responsibility, competitiveness and embeddedness	
<i>Adrienn Reisinger</i> .....	21
The rise of anti-system movement in lagging regions – case of Slovakia	
<i>Štefan Rehák, Oliver Rafaj, Tomáš Černěnko</i> .....	34
Differentiation of territorial and institutional capital in Poland. Cross-sectional and spatial context	
<i>Magdalena Michalak, Aleksandra Nowakowska, Elżbieta Antczak</i> .....	46
Awakening economic policy of Ukrainian regions: how to reshape mechanisms for organization and deblocking the discrete modernization?	
<i>Igor Dunayev</i> .....	58
Precarious employment in the EU countries – 21st century flexibility or misuse of labour force?	
<i>József Kárpáti</i> .....	71
Human Development and Socio-economic Changes in Romania in a Central and Eastern European Regional Context	
<i>Valér Veres</i> .....	79
Cohesion policy and regional development – the case of Slovakia	
<i>Eva Výrostová, Tomáš Výrost</i> .....	96
The strength of brand and its components. Theoretical model	
<i>Natallia Sidzko</i> .....	110
Distance Types of Scientific Collaborations in the Geographical Space	
<i>Zsófia Viktória Vida</i> .....	119
Cognitive proximity of the Universities and the Regions in Hungary	
<i>Miroslav Špurek</i> .....	132
Health economic factor and health behavior examination in Western Hungary	
<i>Beatrix Faragó, Ágnes Kovács Tóth, Csaba Konczos, Zsófia Pápai, Zsolt Szakály</i> .....	142
Industry 4.0 and reshoring investments – consequences for the Visegrád countries	
<i>Andrea Élteső</i> .....	156
Wikipedia statistics as a tool to find financial markets determinants: case of Russia	
<i>Dmitry Gladyshev, Anna Mingaleva, Valeriya Volkova</i> .....	173

Market selection effects in Russian regions: comparative analysis of Ural and Far Eastern Federal Districts <i>Andrey Pushkarev, Oleg Mariev, Natalia Davidson</i> .....	182
Key guidelines for the development and functioning of cities and municipalities in Serbia <i>Tamás Bakó, Szilárd Rác</i> .....	193
Hungarian cooperative banks and financial exclusion after new integration processes <i>Sándor Zsolt Kovács</i> .....	204

## Chapter 2

### Tourism and local development

Characteristics of Mobility in Danube Cruise Tourism – Accessibility of Tourism Attractions in Hungary <i>Melinda Jászberényi, Márk Miskolczi, András Munkácsy</i> .....	217
The Asgardia Project: An Intersection between Space Tourism and Smart City <i>Jhanghiz Syahrivar, Tamás Gyulavári, Muhammad Prima Putra</i> .....	228
Self-driving cars for tourists and consumers <i>Melinda Jászberényi, Katalin Ásványi, László Kökény, Jhanghiz Syahrivar, Tamás Gyulavári, Tamara Nóra Kesze</i> .....	239
Which are the main differences in the traditions and innovations on the festivals from regional aspects? Hungarian and Transylvanian festival analysis <i>Melinda Jászberényi, László Kökény</i> .....	251
Design of public buildings and spaces in European towns as a significant part of the territory's tourist image <i>Tatiana Bystrova</i> .....	260
Competitiveness factors in spas and health resorts in Hungary and adjoining regions <i>Márta Bakucz</i> .....	270
The Economic Role of Gastro-Festivals in Rural Regions <i>István Bottyán</i> .....	285

## Chapter 3

### Sustainable development in urban and rural areas

Effect of Brexit on rural development in Hungary, especially on agroforestry <i>Kinga Szabó, Diána Koponicsné Györke</i> .....	297
Urban Regeneration Processes and Their Consequences for the Urban Economic Base in Polish Cities <i>Ewa M. Boryczka</i> .....	308
How is the multidimensional perception of modern architectural objects associated with their surroundings? An example of Warsaw Ochota urban railway station <i>Aleksandra Nowakowska, Jagoda Guz, Edyta Łaskiewicz</i> .....	323

Vienna's gentle urban renewal programme – an option for European Small and Medium Sized towns? <i>Gerhard Hatz</i> .....	337
Territorial Capital-Based Approach to Land Use <i>Katalin Mezei, Szabolcs Troján, Nóra Gombkötő</i> .....	350
Characteristics of Community Supported Agriculture <i>Nóra Gombkötő, Katalin Mezei</i> .....	359
A general framework for the assessment of planning, implementing and monitoring Nature-based Solution projects <i>Alessandro Arlati, Anne Rödl, Jörg Knieling</i> .....	370
Urbanization Requirements Towards Road Pricing Acceptability – Preliminary Survey Results from Five Countries <i>Mohamad Shatanawi, Ferenc Mészáros</i> .....	383
Disruptive Mobility Trends: Impacts and Potentials for Urban Areas <i>Gabriel Ayobami Ogunkunbi, Ferenc Mészáros</i> .....	396
Contemporary Residential Structure and Future of Metropolitan Areas in V4 Countries <i>Lenka Maličká</i> .....	406
Comfortable City Environment on the Example of the Best Urban Practices in Ekaterinburg City <i>Viola Larionova, Natalia Stepanova, Ken Brown</i> .....	422
International models and best practices of regional development – an analysis from the perspective of the rural development of South Zala <i>Bence Cseke, Krisztina Keller, Zoltán Birkner</i> .....	437
The Impact of Foreign Direct Investment on Greenhouse Gas Emissions: Regional and Industrial Aspects <i>Natalia Davidson, Oleg Mariev, Denis Baev, Dmitry Gladyshev</i> .....	448
Adaptation is educated? Level of education beyond expectations and practices of farmers in adaptation to climate change <i>Mónika Hoschek, Nikoletta Németh</i> .....	457

## Chapter 4

### Geopolitical challenges and cohesion polic

Residential attitudes about the European Union in the Szécsény district <i>Judit Sági, István Engelberth</i> .....	469
Science Diplomacy of the EU members states in Israel – the Startup Nation – with a special regard to the V4 countries <i>Szabolcs Szolnoki, Árpád Papp-Váry</i> .....	478
The Comparative analysis of Russian Black Sea Maritime Strategy and Chinese South China Sea Strategy: the Geopolitical Challenges and their Implications in the Region <i>Hnin Mya Thida</i> .....	488

Direction and magnitude of migration within the EU on a multilateral basis <i>Mária Lakatos, Bálint Molnár</i> .....	502
Central and Eastern Europe in the 21st Century. From Geopolitical Buffer Zone to Geo-economic Bridge Region? <i>Ágnes Bernek</i> .....	517

## Chapter 5 Innovation and digital technology

The stereotypical link between gender and innovation <i>Versavel Teceleab Haile</i> .....	531
Does Internet Trigger Strict Liability? Stealthy Technologies v. Stealthy Regulations <i>József Kárpáti, Kinga Pázmándi, Kinga Pétervári</i> .....	542
Synchronization of transportation and enterprise resources with the emergence of autonomous road freight <i>Adrienn Boldizsár, Ferenc Meszáros</i> .....	557
Implementation of Electronic Monitoring of Accused and Convicted Persons in Central and Eastern Europe: obstacles and perspectives <i>Kamila Borseková, Jaroslav Klátik, Peter Krištofik, Peter Mihók</i> .....	567
Electronic monitoring of convicted and accused persons as a cost-effective way of punishing <i>Katarína Vitálišová, Peter Mihok</i> .....	585
Benefits and risks associated with the electronic monitoring of accused and convicted persons implementation from the community life point of view <i>Katarína Vitálišová, Anna Vaňová, Kamila Borseková</i> .....	596
Smart manufacturing in the Fourth Industrial Revolution: Trends and economic impacts <i>Coi Tran</i> .....	608
Enhancement of innovation collaboration via innovation vouchers <i>Viktorie Klímová, Vladimír Žitek</i> .....	618
On the Issue of Regional Innovation Networks Case Study of the Creation of Regional Innovation System in the Region of Northern Slovakia <i>Mária Rostášova, Tatiana Čorejová, Lucia Fúrová</i> .....	630
Possibilities of Using Process Approach to Design Model for Evaluating and Monitoring the Fulfilment of Selected University Tasks in a Regional Innovation System <i>Mária Rostášova, Tatiana Čorejová, Lucia Fúrová</i> .....	643
Digitalisation in Europe: How did Hungary perform on a European scale in the most recent years? <i>Bendegúz Richárd Nyikos</i> .....	659



## FOREWORD

The 7th Central European Conference in Regional Science (CERS) in Sopron (Hungary) was held with great success about a year ago (9–11 October 2019). 190 participants from 12 countries attended the conference. 160 presentations were allocated in 14 different sessions, including 8 special sessions.

Unfortunately, we had to face unprecedented challenges in 2020, with cancelled, missed and postponed conferences. Not to mention the lack of personal and professional conversations related to the conferences that were greatly missed this year, and these events could not really be made up for by online events. This, in retrospect, further enhances the importance of CERS and other similarly successful conferences.

This conference was an outstanding event in the 15-year history of the CERS, as it was the first time the conference was held outside Slovakia. The Hungarian Regional Science Association was honoured to organize this event jointly with the University of Sopron (Alexandre Lamfalussy Faculty of Economics). This successful conference was one the results of two decades of fruitful cooperation and the building of partnerships with the Slovak ERSA section, the founders of CERS. In the last 15 years, CERS has grown into one of the most significant conferences in regional science in Central Europe. The number of participants in the CERS is steadily increasing, similarly to the integration of Central and Eastern European researchers into the international community of regional science. A positive change has been observed especially among doctoral students and early career researchers.

This event helped us to realize the strategic goal of ERSA, which encourages the widening of cooperation between ERSA sections, in hopes of further deepening our good relations, for instance, with the German speaking and Polish ERSA sections. We believe, together with the other Central European sections of ERSA, that this conference in Sopron constitutes the first step in a long-lasting cooperation among the Central European communities in Regional Science.

*The theme of the conference was the “Flows of resources in the regional economy in the age of digitalization”.*

We were hosting four excellent keynote speakers who are internationally leading researchers in Regional Science: Andrés Rodríguez-Pose (Professor of London School of Economics), Alessandra Faggian (Professor of Gran Sasso Science Institute, Italy), André Torre (President of the ERSA, Professor of Agro Tech Paris) and Katarzyna Kopczewska (Professor and Vice-Dean at the Faculty of Economics, University of Warsaw).

The nearly 700-page-long conference proceedings volume provides an overview of the conference's presentations taking place in 29 parallel sessions, and will give you an idea of those thematically diverse sessions that you were unable to attend.

The volume consists of 5 chapters. The first part deals with different aspects of regional development, the second with the issue of tourism, and the third with the sustainable development of urban and rural areas. The fourth part touches upon the geopolitical and policy challenges facing the EU, while the last part deals with the issues of innovation and digitalisation.

I sincerely hope you will recall the nice memories associated with this conference as you read the proceedings. Furthermore, I am sure that this conference will be the first step in this long-lasting cooperation among the Central European communities in Regional Science, of which this volume is but a small building block.

Pécs, September 2020

Gál Zoltán  
HRSA president

# **Chapter 1**

## **Factors of regional development**



# Additions for ex-post and ex-ante modelling of regional development paths

GYÖRGY KOCZISZKY, DÓRA SZENDI<sup>1</sup>

**Abstract:** The external and internal influences on social and economic processes have set new challenges for the regions. As a result of it, some regions have started to develop, others have stagnated in their development levels, and others are losing from their positions year by year.

The authors in their research analyse the development paths in the 2005–2016 period in the case of the Hungarian NUTS-3 territorial units, and model the expected movements of the next four years (2020–2023).

**Key words:** regional development, ex-ante modelling, Hungary, NUTS3.

**JEL codes:** R11, R12

## 1. Introduction

Based on the recent research results, the regional development process can be considered as a non-linear, socially and regionally strongly embedded phenomenon. It is controversial namely, whether the regions' development paths follow an economic-social law or they are the results of chance (Krätke, 1995; Benedek, 2010).

Both effects can likely be seen in the developmental paths. As empirical studies have shown, in addition to the social, economic and geopolitical changes of recent decades, also the inherited capabilities have contributed to the continual improvement of the development levels of some regions in Europe, while others have been unable to adapt to the new challenges (Moulaert et al., 2013; Benedek, Kocziszky, 2015).

Nothing proves the interdisciplinary nature of development more than the fact that besides economists also the historians and sociologists put it in the topic of interest. In spite of the variety of publications, the literature today is still inconsistent in the action-mechanism of the regional development, in the causes of the developmental differences, and in the indices that quantify development. That is why a lot of theories are created, which are summarized briefly in the next Theoretical background part.

---

<sup>1</sup> GYÖRGY KOCZISZKY, DÓRA SZENDI University of Miskolc, Hungary, regszdor@uni-miskolc.hu

## 2. Theoretical background

From the literature, it is clear that several compact theories have been developed to explain economic growth and economic development. Almost every article makes a distinction between development and growth, but sometimes the literature still use it as a synonym, although it is generally accepted that GDP per capita is not the best measure of development. That is why the so-called alternative metrics – e.g. HDI (Human Development Index), HPI (Happy Planet Index), EF (Environmental Footprint), etc. – has been developed, each of which seeks to decrease the centrality of GDP with more or less success.

Following the initial work of Abramovitz (1986) and the works of Baumol (1986), Barro (1991), Barro and Sala-i-Martin (1992) and Mankiw et al. (1992) on inter-regional beta convergence, Sala-i-Martin (1996) studied sigma convergence in a model-based approach. Based on the beta convergence approach, less developed countries are growing faster in absolute terms towards a future stationary equilibrium, so there is a negative relationship between the initial level of development and the dynamics of growth. According to their studies, countries maintain a steady-state equilibrium for GDP growth, which may be consistent with a 2-3 per cent per capita GDP growth. In contrast, sigma convergence examines the dispersion of GDP between regions, so it analyses the reduction of income variance and the fairness of income distribution. Quah (1996) in his works has analyzed the club-convergence theory, and has made a statement that the GDP per capita of the nations is not converging to the same steady state path, but the values are clustering and in these groups, there is a convergence. That is why the regions are following different development paths. There is no consensus in the literature on the classification and qualification of regional development pathways. Taking into account the above, our specific classification defines four developmental pathways (*Table 1*).

Generally, the regions with improving competitiveness path (leaders), considering also the European comparisons, have a specific value added above the European Union's average (Benedek, Kocziszky, 2015). The regions with deteriorating competitiveness path are not able to catch up; their economic structure, knowledge intensity, income, and social relations show average patterns. In the case of the regions with a converging path, the employment level is increasing, both due to the emergence of working capital and to the social enterprises and social innovation (Kocziszky, Szendi, 2018). The regions with a peripheral path are improving their positions compared to themselves, but their absence from the centre areas remains a long-lasting process that has been going on for years. These are predominantly rural areas with low innovation and knowledge intensity, low-income level, and demographically disadvantaged areas.

**Table 1. Classification of the types of Hungarian areas based on the nature of the development path**

No.	Category	Characteristics
1.	improving competitiveness path (leaders)	<ul style="list-style-type: none"> <li>• high-quality IT applications (e.g. robots)</li> <li>• dynamic industries (e.g. nanotechnology, etc.)</li> <li>• high-technology innovation (Fintech, cloud-based network, smart growth)</li> <li>• higher than average R&amp;D&amp;I</li> <li>• fast economic growth</li> <li>• urban settlement network</li> <li>• creative industries</li> <li>• higher than average value added</li> <li>• high skill level</li> </ul>
2.	deteriorating competitiveness path (slowing)	<ul style="list-style-type: none"> <li>• high employment rate</li> <li>• average value added</li> <li>• traditional sectoral structure</li> <li>• predominantly urban region</li> </ul>
3.	converging path (emerging)	<ul style="list-style-type: none"> <li>• a high share of manufacturing</li> <li>• high employment rate</li> <li>• fast economic growth</li> <li>• knowledge application region</li> <li>• existing high-tech sector</li> </ul>
4.	peripheral path (lagging)	<ul style="list-style-type: none"> <li>• low share of employment in the creative industry</li> <li>• a lower employment rate and skill level</li> <li>• relatively poor in resources</li> <li>• declining health care</li> </ul>

Source: Own compilation.

### 3. Data and methodology

Economic growth is not synonymous with development, because economic development also takes into account other effects (such as living standards, quality of life, environmental effects, structural change, etc.). We have analysed the characteristics of the introduced four paths based on the situation of five indicators (knowledge intensity (KI), economic performance (EP), the region's infrastructural (INF) and income position (INP) and environmental footprint (EF)) and five macro-factors (*Table 2*). The role of this latter is to draw up their effect by the given components and regions. We have made a classification of the indicators based on their role in the development process (in which they are helping the process), and distinguished input, status, output and effect indicators.

**Table 2. Factors involved in the study**

Indicator code	No.	Indicator name	Data source
INPUT factors			
KI	1.	R&D expenditure of the county (% of GDP), (RD)	HCSO
INP	2.	amount spent on care for the elderly (HUF), (SOC)	HCSO
M	3.	GDP change (%), (GDP%)	HCSO
M	4.	change of gained EU funds (%), (TRAN)	HCSO
M	5.	budget deficit change (%), (BD)	HCSO
M	6.	change of the trade balance (%), (TB)	HCSO
M	7.	change of the inflation rate (%), (CPI)	HCSO
STATUS factors			
EP	8.	changes in the number of active enterprises per 100 people in the county (%), (ENT)	HCSO
EP	9.	employment rate in the county (%), (ER)	HCSO
EP	10.	unemployment rate in the county (%), (UR)	HCSO
INF	11.	share of roads in the county from its total territory (%), (RO)	HCSO
INF	12.	change in the number of Internet subscriptions per 1,000 inhabitants in the county (%), (INT)	HCSO
INF	13.	changes in the number of doctors per 10,000 inhabitants in the county (%), (DOC)	HCSO
INF	14.	population density (person / km <sup>2</sup> ), (PD)	Eurostat
INF	15.	number of hospital beds in operation per ten thousand inhabitants (pcs), (HOSP)	HCSO
INF	16.	resident per family doctor and paediatrician (pcs), (FAMDOC)	HCSO
INP	17.	young-age dependency rate in the county (%), (DEP)	Eurostat
EF	18.	changes in the amount of waste collected within the framework of a public service per 10 persons in the county (%), (WA)	HCSO
EF	19.	change in the ratio of green areas in the county (%), (GA)	HCSO
EF	20.	change of electricity consumption in the county (%), (EL)	HCSO
OUTPUT factors			
KI	21.	number of participants in higher education in the county (%), (HE)	HCSO
KI	22.	number of publications per 1000 people (Hungarian and foreign languages) (pcs), (PUB)	HCSO
EP	23.	gross domestic product in the county, GDP/capita (thousand Forint), (GDP)	HCSO
INP	24.	change in household income in the county (%), (INC)	HCSO
EFFECT factors			
INP	25.	risk of poverty in the county (%), (RP)	Eurostat

*Note:* HCSO – Hungarian Central Statistical Office.

*Source:* Own compilation.



When calculating the individual paths, we took into account the percentage change of factors, which was determined based on the following relationship:

$$\text{percentage change} = \frac{\text{actual value} - \text{base value}}{\text{base value}} * 100 \tag{1}$$

The model we have developed is integrative; on the one hand, it takes into account the trends over the past two decades, on the other hand, the actions announced by the government on NUTS-3 regions, as well as the rational expectations of the enterprises (based on the surveys of regional economic chambers). Factors considered in this case: automotive, IT, precision mechanics, transport infrastructure, construction projects planned by the end of 2021. ARIMA (Autoregressive Integrated Moving Average) model's goal is to predict future tendencies by examining the differences between values in the series (Box, Jenkins, 1989). The given modules can be calculated based on the following equations (Table 3).

Our survey covered the period from 2005 to 2016, and we have examined the 19 counties of Hungary and the capital (Budapest).

**Table 3. Calculation of the different modules**

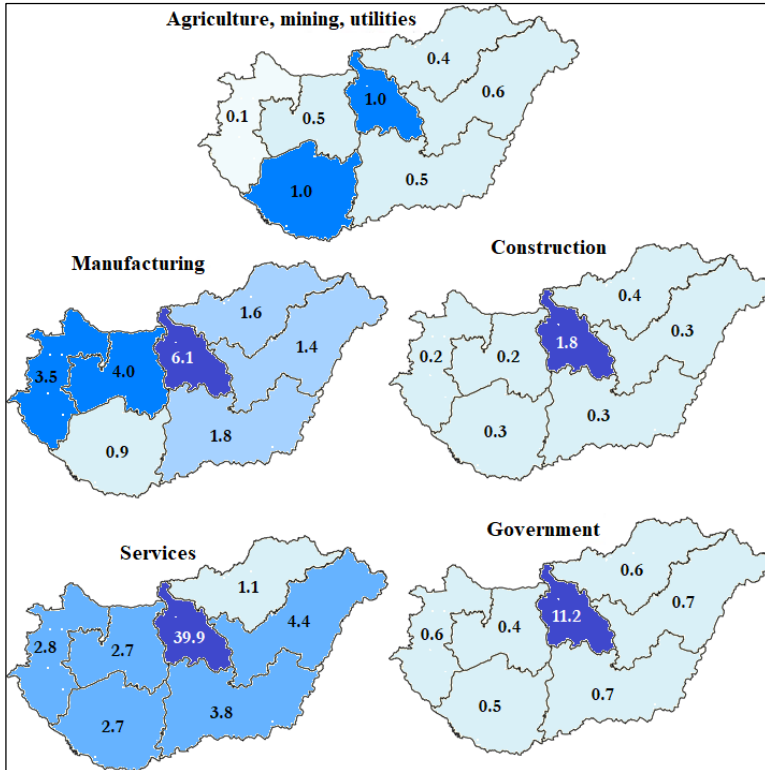
Module	Equation	Notes
Change in development	$\delta DEV_i(t) = f[\delta KI_i(t), \delta EP_i(t), \delta INF_i(t), \delta INP_i(t), \delta EF_i(t)]$	$DEV_i(t)$ : change in regional development (year / year,%); $t$ – time (year); $i$ – region number (1... n).
Knowledge intensity (learning, education, R&D, innovative milieu)	$KI_i(t) = f[GDP(t - t_0), TRAN(t - t_0), RD_i(t - t_0), HE_i(t - t_0), PUB_i(t - t_0)]$	
Economic performance	$EP_i(t) = f[GDP_i(t - t_0), ENT_i(t - t_0), ER_i(t - t_0), UR_i(t - t_0), CPI(t - t_0), TB(t - t_0)]$	
Infrastructure (capacity)	$INF_i(t) = f[RO_i(t - t_0), INT_i(t - t_0), DOC_i(t - t_0), PD_i(t - t_0), HOSP_i(t - t_0), FAMDOC_i(t - t_0), GDP_i(t - t_0)]$	
Income	$INP_i(t) = f[INC_i(t - t_0), RP_i(t - t_0), SOC_i(t - t_0), DEP_i(t - t_0), CPI(t - t_0), BD(t - t_0)]$	
Environment (footprint)	$EF_i(t) = f[WA_i(t - t_0), GA_i(t - t_0), EL_i(t - t_0)]$	

Source: Own compilation.

### 4. Results

On the one hand, the differences between the development paths of the counties were well outlined during the calibration, and on the other hand, the consequences of the different economic policies of the years 1995–2016 can be traced. While the development of the period 1995–2004 (the last year when Hungary accessed to the EU) was broken by the defective economic policy between 2004 and 2010 and the financial crisis of 2008, a substantial change started in the period of 2013–2016.

The construction and services sectors were severely affected by the financial crisis in 2008 (*Figure 1*), the knowledge intensity deteriorated proportionally, the number of students participating in higher education decreased also in the peripheral NUTS-3 regions with catching-up (converging) paths.



**Figure 1. The cumulated GDP growth contribution of NUTS2 regions (2004–2010)**

*Source:* Own compilation based on the HCSO data.

In our forecast, we started from the fact that the Hungarian economy is moving on a sustainable development path, inflation (CPI) moves permanently at 3 percent<sup>2</sup>, and the balance of trade is in a modest positive range. When drawing up EU grants, we took into account the grants that have already been made. For the seven-year programming cycle starting in 2021, we have calculated in the first year with the same ratio as of 2014 (assuming the framework remains unchanged) (*Table 4*).

**Table 4. Macro data (%) taken into account in forecasting**

Macro Data	Year			
	2019	2020	2021	2022
Inflation	2.9	3.0	3.0	3.0
GDP growth	3.5	3.0	3.0	3.2
Budget deficit in the % of GDP	-1.7	-1.6	-1.6	-1.6
Change of the trade balance	-0.7	0.8	0.9	1.0
Change in the use of EU funds	20.0	19.0	10.0	10.0

*Source:* Hungarian National Bank's inflation forecast and own expert estimate.

The forecasts for the next four years (2019–2022) show that the expected development rate of Győr-Moson-Sopron County exceeds that of the capital (Budapest), while the counties of the eastern part will remain below the average. The analyses underlie the following development paths (*Figure 2*): four NUTS-3 regions belong to the category of leaders (improving competitiveness path), the development path of four NUTS-3 regions is slowing down, eight counties are moving in a catching-up/converging path and four NUTS-3 regions are on a peripheral development path.

By the created ARIMA models we could conclude that the regions with initially higher development level could reach better positions in the long run based on the complex development index (*Figure 3*).

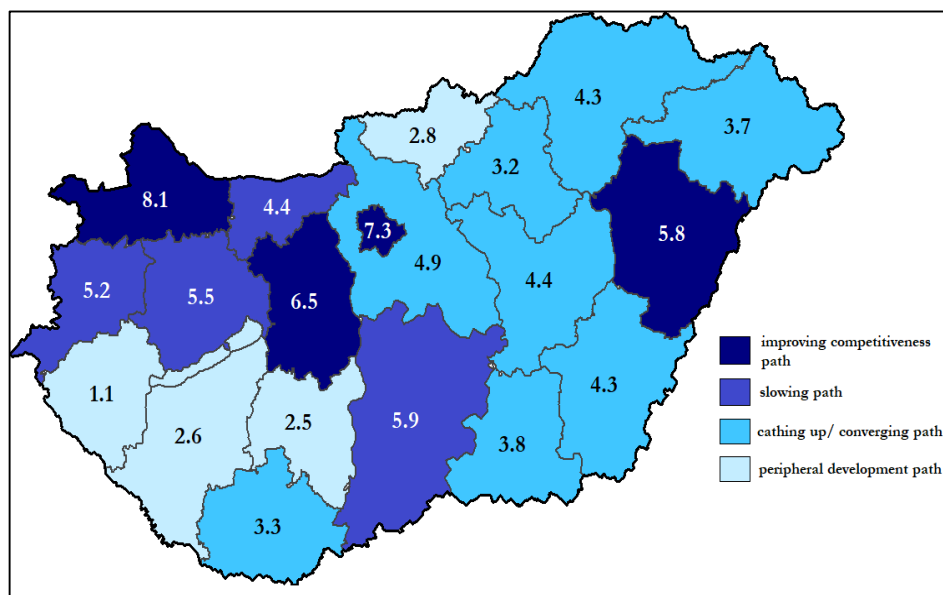
The examples show that the more developed Győr-Moson-Sopron county or the capital Budapest has better situation for the future (almost every component of the complex index shows further increase in the development level, except: knowledge intensity and income by both territories) compared to Borsod-Abaúj-Zemplén county. The B-A-Z county shows a significant decreasing tendency in the complex index until 2022, which is the result of the fact that except the economy and environment factors, every other will be decreasing in time.

<sup>2</sup> The inflation target (CPI) of the National Bank of Hungary is 3% ± 1%.

## 5. Conclusions

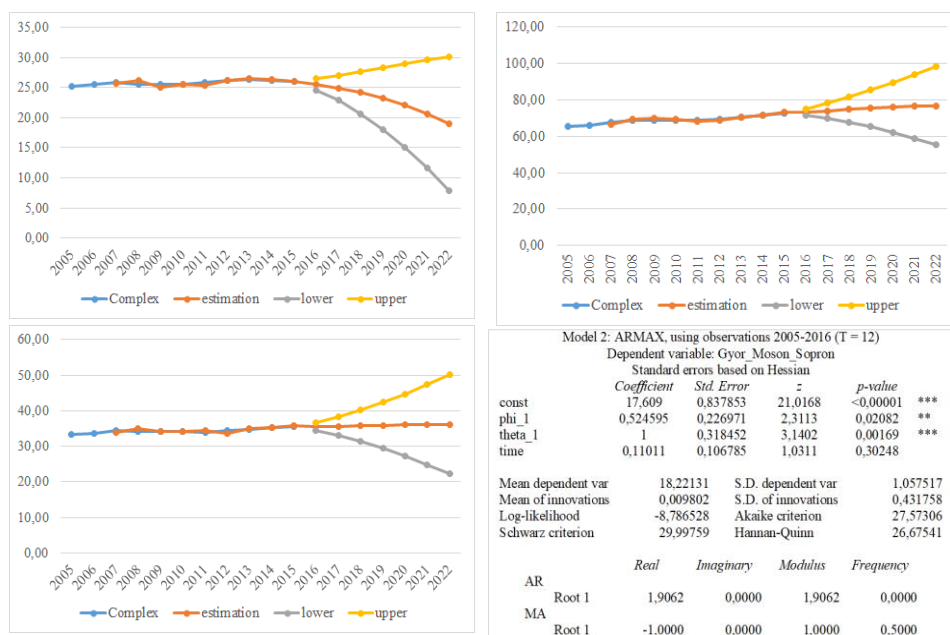
Over the past two decades, the economic growth in Hungary has given hope for economic convergence, especially as a result of the economic policy change that started after 2013, when the GDP growth rate was at around 2 percentage points above the EU average. However, the country's economic growth was realized with uneven territorial development.

According to the forecasts, the county of Győr-Moson-Sopron will be able to make the best progress, thus reaching the middle of the EU level. The position of Nógrád county is hardly changing among the Hungarian counties, leaving the most underdeveloped county of V4.



**Figure 2. Expected % change in the development level of the Hungarian NUTS-3 regions (2019–2022)**

*Source:* Own compilation based on the HCSO data.



**Figure 3. ARIMA models of some Hungarian NUTS-3 regions in case of the complex index (2005–2022)**

Notes: Left upper: Borsod-Abaúj-Zemplén county, right upper: Budapest, mid lower: Győr-Moson-Sopron county.

Source: Own compilation based on the HCSO data.

### Acknowledgements

“The described article/presentation/study was carried out as part of the EFOP-3.6.1-16-00011 “Younger and Renewing University – Innovative Knowledge City – institutional development of the University of Miskolc aiming at intelligent specialisation” project implemented in the framework of the Szechenyi 2020 program. The realization of this project is supported by the European Union, co-financed by the European Social Fund.”

### References

ABRAMOVITZ, M. 1986. Catching Up, Forging Ahead, and Falling Behind. In: *The Journal of Economic History*. Vol. 46, No. 2, pp. 385–406.  
 BAUMOL, W. T. 1986. Productivity Growth, Convergence, and Welfare: What the Long-Run Data Show. *The American Economic Review*. Vol. 76, No. 5, pp. 1072–1085.  
 Barro, R. J. 1991. Economic Growth in a Cross Section of Countries. In: *The Quarterly Journal of Economics*. Vol. 106, No. 2, pp. 407–443.

- BARRO, R. J., SALA-I-MARTIN, X. 1992. Convergence. In: *Journal of Political Economy*. Vol. 100, No. 2, pp. 223–251.
- BENEDEK, J. 2010. Genesis and Change of the Regions: Chance or Necessity? In: *Tér és Társadalom*, Vol. 24, No. 3, pp. 193–201.
- BENEDEK, J., KOCZISZKY, GY. 2015. Paths of convergence and polarization in the Visegrád countries. In: LANG, T., HENN, S., SGIBNEV, W., EHRlich, K. (eds.) *Understanding Geographies of Polarization and Peripheralization. Perspectives from Eastern Europe and Beyond*. Basingstoke: Palgrave/MacMillan. pp. 217–234.
- BOX, G. E., JENKINS, G. M. 1989. *Time series analysis: Forecasting and control*. San Francisco: Holden Day.
- KOCZISZKY, GY., SZENDI, D. 2018. Regional Disparities of the Social Innovation Potential in the Visegrad Countries: Causes and Consequences. In: *European Journal of Social Sciences Education and Research*. Vol. 12, No. 1, pp. 35–41.
- KRÁTKE, S. 1995. Stadt-Raum-Ökonomie: Einführung in aktuelle Problemfelder der Stadtökonomie und Wirtschaftsgeographie. In: WOLLMANN, H. (ed.) *Stadtforschung aktuell*. Band 53, Basel–Boston–Berlin, Birkhäuser Verlag.
- MANKIW, N. G., ROMER, D., Weil, D. N. 1992. A Contribution to the Empirics of Economic Growth. In: *The Quarterly Journal of Economics*. Vol. 107, No. 2, pp. 407–437.
- MOULAERT, F., MACCALLUM, D., MEHMOOD, A., HAMDOUCH, A. 2013. *The international handbook of social innovation. Collective action, social learning and transdisciplinary research*. Cheltenham, Northampton.
- QUAH, D. T. 1996. Empirics for economic growth and convergence. In: *European Economic Review*. Vol. 40, No. 6, pp. 1353–1375.
- SALA-I-MARTIN, X. 1996. The Classical Approach to Convergence Analysis. In: *Economic Journal*. Vol. 106, No. 437, pp. 1019–36.

# Corporate social responsibility, competitiveness and embeddedness

ADRIENN REISINGER<sup>1</sup>

**Abstract:** The paper investigates the relation among competitiveness, embeddedness and corporate social responsibility (CSR) through theoretical and empirical approach. The main research question is how the CSR activity can influence the regional and local embeddedness and the firm competitiveness of the family firms in a Hungarian city, Győr and around Győr. To get answers literature was reviewed and interviews were made with 20 family firms in and near the city of Győr during the spring and summer of 2019. The research is a part of a research project about the cooperation of the higher education institutions and companies. Family firms are chosen to be examined because nowadays the succession is a crucial topic among them and it is believed that CSR activity can help in this process.

**Key words:** corporate social responsibility (CSR), competitiveness, embeddedness, family firms

**JEL Classification:** M1

## 1. Introduction

The topic of corporate social responsibility (CSR) has been researched in various ways for the past decades thus the researcher of today has to face the challenge to find a theme which has not been researched yet or has been less researched in this field. In my study I examine the relation of CSR and two other concepts of growing importance and topicality, namely competitiveness and embeddedness. The theme is topical as CSR activity is increasingly considered as an everyday activity among companies, and by now it has become evident that this is not only the business of big companies, because the diverse, beyond-charity activity may as well characterise smaller, or even micro companies. However, it is a question whether this increasingly focused activity affects the operation and the competitiveness of the company and correlates with the issue of embeddedness.

In the study I examine the topic both theoretically and empirically. In the spring and summer of 2019 family firms from Győr and near Győr were interviewed within the frames of a project at Széchenyi István University in Győr (Hungary). The CSR is a small part of the project, which preliminary findings are introduced

---

<sup>1</sup> ADRIENN REISINGER, Széchenyi István University, Hungary, radienn@sze.hu

in the study. Family firms are considered as organisations where the family has an effective control over corporate decisions and the organisation itself contributes to the welfare of the family and to the evolution of its identity (Astrachan, Klein and Smyrniotis, 2005).

The first part of the study briefly introduces the definitions of CSR, competitiveness and embeddedness as well as the connection points of these three concepts. In the second part of the study the partial results of the qualitative research (interviews) are presented. It is important to emphasise that this is an ongoing research, therefore only the partial results are introduced in the present study.

## **2. CSR, competitiveness, embeddedness**

### **2.1 Concept of CSR**

The past decades have seen many definitions of corporate social responsibility, thus the comprehensive introduction of the concept is not an aim of the study, however, I introduce some definitions which briefly summarise the essence of the concept. The first approaches to CSR came up in the first half of the 20<sup>th</sup> century, but the definition occurred in Howard Bowen's book (Social responsibilities of the businessman) published in 1953. In this book the author emphasised the responsibility of businessmen in reaching social aims and values. In the 1960s and 1970s more and more critiques related to the concept of CSR came up, and it was Milton Friedman, economist, who criticised CSR the most. In his book of 1962 he discusses how a businessman can even know what needs arise in the society, which require help. Later, in an article of 1970, he writes that a company is an artificial person, thus its responsibility cannot be measured in a sense like that of a real person. Goodpaster and Matthews' article of 1982 (Can a corporation have a conscience?) meant the beginning of the interpretation of the term in its present sense. The next milestone was the pyramid model of Carroll (1991), in which four levels of corporate responsibility were distinguished. The message of the model is that the basic responsibility of companies is related to business, and further responsibilities are solely built upon this.

The concept of CSR spread at a rapid pace both in theory and in practice in the past decades, since more and more companies started to apply it in some form, and more and more pieces of research and studies dealt and still deal with the topic. It is common in the CSR definitions of recent years (e.g. McWilliams, Siegel, 2001; Whetten, Rand and Godfrey, 2002; Kotler, Lee, 2005; Angyal, 2009) that they see CSR as an activity within the frames of which the company is attentive to its business interests and profit meanwhile it behaves in an ethical



way, pays attention to its employees and supports within its capabilities local or even national issues and communities.

The question may arise what a company responsible for society does. There is no unified answer to this since the different pieces of research and literature identified various activities, and out of these the most general is donation and charity work. Based on theory and my previous empirical experience, CSR activities can be divided into the following two groups:

- Internal CSR: responsibility towards colleagues;
- External CSR
  - Responsibility for environmental issues, sustainability;
  - Helping those in need, promoting good issues (donation, sponsorship);
  - Support for volunteering;
  - Cooperations;
  - Other activities (e.g. making a presentation, providing discounted services).

The type of CSR activity of a company may be affected by several factors, inter alia:

- company size,
- type of ownership,
- activity,
- financial performance,
- location of operation,
- ownership attitude,
- etc.

One of the most determining factors is company size (Reisinger, 2018). Even in the English name of CSR, the word ‘corporate’ refers to that this type of activity is rather the activity of bigger companies. However, responsible behaviour does not depend on size, since, for instance, a small company can also be ethical and behave in a responsible way towards its employees apart from the fact that e.g. whether it supports local communities and groups in need. The only difference is that the bigger the company, the more the CSR activity is institutionalised and built into the corporate strategy and either a particular colleague or even a separate department comes into being to coordinate the activities. The type of ownership can also be a factor of importance, since it does matter whether e.g. it is a family firm or a multinational company, and it also matters how the owners and leaders of the company mean CSR activity and what motivates them. The issue of motivation leads us to the topic of CSR and competitiveness which is described in more details in subsection 2.4.

## 2.2 Competitiveness

As a result of the past years and decades, competitiveness now has enormous literature, however, in this chapter I only focus on some major aspects. Competitiveness can be interpreted in various ways as we can talk about the competitiveness of countries, industrial sectors and of organisations (companies) as well. The present study puts the emphasis on the competitiveness of companies.

What does the competitiveness of a company mean? When it comes to competitiveness, the most cited author is perhaps Porter, who defined the competitiveness of both nations, industrial sectors and companies. In connection with the latter, he wrote the followings (Porter, 1985: 4): "...the rules of competition are embodied in five competitive forces: the entry of new competitors, the threat of substitutes, the bargaining power of buyers, the bargaining power of suppliers, and the rivalry among the existing competitors."

According to János Varga (2017, 726), "...organisational competitiveness is the complex of those organisational potentials, which the firm can use and utilise to reach its aims, to realise profit and to meet consumer demands." Profitability is in the centre of Imre Lengyel's definition (2003), according to which a company is competitive if it can satisfy market needs. Czakó and Chikán (2007, 3) interpret competitiveness as it follows: "we see corporate competitiveness as the ability of the company to permanently provide consumers, while respecting the standards of social responsibility, with products and services that they are rather willing to buy than the competitors' products under conditions that ensure profit for the company. The condition for this competitiveness is that the company is capable of perceiving environmental and intra-company changes as well as adapting to these by meeting market competition criteria that are consistently more favourable than those of its competitors." This latter definition contains the term, social responsibility which refers to that if a company is competitive, it is socially responsible too. Meanwhile the question arises whether CSR activity may contribute to competitiveness; whether this question is relevant. I describe this topic in subsection 2.4.

## 2.3 Embeddedness

The conceptual system of embeddedness is quite new in corporate literature. It is not easy to define its meaning since on the one hand, it does matter what the size of the company is, and on the other hand, it also matters whether we approach the concept from a social, economic, natural or other point of view. In her book about the topic, Viktória Józsa (2019) basically writes about big companies' embeddedness, since the term can be interpreted primarily in their case: so how a big company (set up mainly through foreign direct investment) is able to get

integrated into the environment where it was set up or where it set up its subsidiary.

The situation is different in case of smaller companies or family firms, because there may be other reasons for choosing a seat. Thus, e.g. the owner of a family firm will obviously set up a company in the city/area where he lives, and this can be the deciding factor besides location factors; however, in case of a non-family firm location factors play the key role, but in another dimension than in case of a multinational company. To my mind, the setting up of a company *ab ovo* may involve the how the when and the wherefore of the question of embeddedness and regional, local engagement. It is the production which is basically important for a multinational company and the place only provides opportunity for this, while e.g. in case of a family firm, it is the spirit of the place that provides the extra factor because of which it can conduct an activity right there; furthermore, the family history is also a determining factor, that's why they may feel it is important to support the place, the area, as they may feel that they can provide something else to the local society besides job creation, products, and services.

## 2.4 CSR and competitiveness

Török (2002) distinguishes two CSR motives in his study:

- Remunerative or in other words interest-based responsibility: here the determining factors is whether the CSR activity will affect profitability.
- Autotelic or value-based responsibility: in this case, the own ownership or management goals are decisive and even such activities can be undertaken which do not affect profitability in a positive way.

Török's thoughts can be linked to the concept of competitiveness, since in the first case the company is engaged in CSR activity to be able to gain competitive advantage, whereas in the other case the aim is different, rather e.g. to provide help, which of course may have an impact on competitiveness, but this is not the focus. It is completely in alignment with external and internal motives identified by Graafland and his co-author (2012). With reference to more international pieces of research they state that one of the most significant external motives may be the increase in profits. Companies, by being engaged in CSR activity, may increase their popularity as CSR activity may make them different from other companies, they also may increase their sales, and all these may positively affect profit. Internal motive is principally based on the values of the owners and managers of the company, and if they are open to social processes, it will appear in the activity of the company as well.

Of course, it is also an important question what the companies think about the connectivity of CSR and competitiveness, and whether this connection can be interpreted in daily activities. In this regard, Szabó-Benedek (2014) highlights that

nowadays some CSR activities are the basic requirements of a competitive company, thus today it is not enough “just” to give work and pay, employees turn to firms with more demands e.g. appropriate working environment, innovative work, manifoldness, flexibility, training opportunities, which are all areas of CSR activity. It may also be an important question whether the increase in competitiveness can be a result of only some given CSR activities or CSR itself can be a competitiveness factor.

Based on the above, I think that there may be a connection between CSR and competitiveness by all means, and it does matter whether the company is active in the field of CSR to gain competitiveness, or because it is motivated by providing aid which may as well “incidentally” induce competitiveness. This thought may arise at all, because although earlier CSR was considered to be absolutely voluntary and not linked to profit, today the view is that CSR is not altruistic, so it is not a completely selfless activity as companies will engage in activities that will benefit them in some wise. Nevertheless, it may be different how openly and consciously company will do so. This is how Csonka et al. (2013, 182) think about it: “No firm can be expected to conduct any of its activities in a completely non-profit way, entirely casting away its profit maximisation and wealth growth goals.”

Thus, it can be stated that CSR activity can serve individual interests as well, e.g. a company supports education institutions because it needs appropriate labour supply, or it supports sport facilities so that its employees could be in good health so hopefully they can stay the employees of the company in the long run. There are several other examples, however, the message of this contexture is that it does not matter whether companies carry out CSR activities due to social pressure or for their own sake, the increase in the own corporate welfare also appears in some way besides the increase in social welfare. This also indirectly contributes to the increase in wealth since companies’ effective operation generates economic growth.

## 2.5 CSR and embeddedness

Bigger companies use CSR in higher rates to increase image and reputation, whereas for smaller firms, especially family firms, embeddedness to local communities, the admittance of local communities, is also an important aspect (Matolay, Petheő and Pataki, 2007 – cited by Balogh et al., 2014). “Embeddedness, in fact, gives the basic dimensions of responsibility: the conscious, responsible entrepreneur produces product, provides services, creates jobs, and does all these in a natural way for the sake of his own, well-understood interest and long-term survival by considering the interests of the parties concerned and

protecting the environment, since they are interdependent.” (Balogh et al., 2014, 21)

A related thought is that CSR activity primarily means local responsibility and activity, thus this activity strengthens local embeddedness as well. András and his co-author (2014) point out that today it is not the global thinking and local action which is important, but local thinking and action, since we cannot solve the problems of the world, however, if we aim to solve local problems and support local issues, it will sooner or later create a globally liveable world. Only local problems can be solved locally, not the global ones.

Complementing and reflecting on the above thoughts, to my mind, the issue of CSR and embeddedness can be approached from two directions:

- Does a company become locally, regionally embedded, because it is active in the field of CSR?
- Or does it carry out CSR activity locally, regionally, because it operates in the given area and is committed to enhance the quality of life of those who live there?

I think that both can happen in the life of a company. Nevertheless, the company size, its activity, the range of its activity, and the ownership attitude may highly influence the aspect on the basis of which local embeddedness, commitment and CSR are linked in a company. Furthermore, the more a company is part of the local community and economy, the more the local actors expect the company to help its environment in some form, with products, services beyond its main goals. The relation can be definitely strong in case of family firms, since in their case local bonding is *ab ovo* stronger because of the family ties, thus the need to support and help local community may be more powerful as well.

### **3. Family firms and CSR in Győr and around Győr**

#### **3.1 Methods**

I examine the issue of CSR, competitiveness, and embeddedness by means of interviews within the frames of the FIEK (“Center for cooperation between higher education and the industries at the Széchenyi István University”) programme of Széchenyi István University. I have the opportunity to research this topic in a research group within FIEK project. The research field of the group is “Corporate culture, regional embeddedness and international competitiveness among family firms”, and related to this we conducted interviews with companies in and near Győr, and the concept of CSR was a part of these interviews. Interviews were made between April and July, 2019 (by Prof. Dr. Márta Konczos-Szombathelyi university professor; Prof. Dr. Livia Ablonczy-Mihályka university professor, Dr.

habil Adrienn Reisinger associate professor; Csilla Polster PhD student), and a total of 20 interviews were made. The selection of firms was based on the need to be micro, small and medium-sized ones and to operate in a wide range of activities. The selected companies do not represent the family firms of Győr and near Győr, therefore we do not generalise our findings, we only make conclusions referring to the interviewed 20 companies.

The selected companies are all family firms operating in Győr or near Győr (*Table 1*), based on employment eight of them are micro, eight are small and four are medium-sized companies, and the majority of them were set up in the 1990s. They operate in the following fields of activity: construction industry, agriculture, engineering industry, oenology, processing industry, trade of clothing, printing industry, metal industry, and food industry. The interviews were made with the CEOs and owners of the firms.

**Table 1. Characteristics of the selected companies, n = 20**

Size	Number of companies	Date of establishment	Number of companies	Location	Number of companies
Micro	8	before 1990	5	Győr	15
Small	8	1990–2000	12	Near Győr	5
Medium	4	after 2000	3		

*Source:* Own table.

Referring to CSR topic, I had the research questions below, and the study presents the preliminary findings of the research.

- What CSR activity do the firms carry out?
- To what extent does CSR appear in corporate strategies?
- Is there a link between CSR and competitiveness?
- Is there a connection between embeddedness/commitment and CSR activity?

### **3.2 CSR activity of family firms in Győr and around Győr**

Without the need for completeness, the subsection introduces what CSR activity the selected companies carry out. I divided the activities into two large groups: internal and external CSR activities. The aim of introducing the activities is to make it visible how diverse the CSR activity of the companies is. It was previously mentioned that CSR activity is often identified with charity in everyday life, however, the present research – as well as several domestic and international ones – proves that in practice, irrespective of size and activity, firms carry out various,

and in many cases very creative CSR activities. Half of the selected companies reported internal CSR activity, and they are active in the following areas of responsibility towards their employees:

- Helping colleagues and/or their family members if they are in trouble, e.g. ensuring the annual fuel, financial support, loan;
- Team-building;
- Operating an own sports club;
- Providing accommodation for people coming from other regions;
- Preferential use of corporate resort;
- Buying own products at a discount;
- Flexible working hours;
- Common celebrations.

Some form of CSR activity was mentioned by all firms, moreover, some companies carry out a significant number of activities, but there are companies that although are active in only a few areas, these activities are regular. The following external CSR activities were identified:

- The CEO/owner is personally a member/manager of an organisation, represents a good case;
- Financial and material support to local civil organisations;
- Blood donation;
- In-company fund-raising to support a good case;
- Support of sport teams;
- Receiving student groups for plant visit, introducing the profession;
- Financial and professional support of university student groups;
- Environmental issues: commitments beyond legal obligations: e.g. solar cell, building insulation, modern heating, composting, active participation in TeSzedd (YouPick) campaign;
- Theatre season ticket for the employees, thus the support of both the theatre and the workers;
- Offering various residues to kindergartens and schools;
- Discounted service for local foundations, associations, kindergartens;
- Supporting a local kindergarten through “adoption”.

It is important to note that none of the companies has a strategy for CSR, but most of them have activities that have been traditionally held for many years and ad hoc requests are added to these. More companies emphasised that they do not aim to fulfil every request, they could not even do so, thus the main consideration is that the given support should be used properly, some kind of value creation should happen. Therefore, although there is no separate strategy for CSR, the

owners and/or the CEOs coordinate and in many cases carry out CSR activity based on specific ideas.

### **3.3 Relation between CSR and competitiveness, CSR and embeddedness**

The previous chapter illustrated how diverse CSR activities the selected family firms carry out. All but three companies stated that they could clearly image their CSR activities where the firm operates, and this is without exception the family's home since they operate in Győr or in a settlement near Győr (e.g. Győrújbarát), because the founding family member lived here when the firm was set up and since then the family has been living here. It is important for them to support those local, regional communities where they operate. On the one hand, it is important to produce quality products and provide high quality services, but on the other hand, also to help local communities in all forms and to support workers. Thus, they carry out CSR activity in the area because they are committed to the area and they think that their activities have already made them known and they have been embedded in the area. Interestingly, none of the firms said that their CSR activities would strengthen their regional embeddedness.

Two firms said that they could not interpret local, regional embeddedness, commitment, because their activity is not local but nationwide, thus even if they carry out CSR activity, its scene can be anywhere in the country. A firm did not provide information in this regard.

Unfortunately, only five companies provided usable information regarding the relation between competitiveness and CSR. Three firms out of these said that there was a clear link between their competitiveness and their CSR activities. In case of one firm CSR activity contributes to generating conscious and sustainable demand, which increases profitability, thus may increase competitiveness. Another firm mentioned that having information about CSR activity on their website might have a positive impact on their potential partners, and this may contribute to a successful bargain later or other actors may propagate the good reputation of the firm, however, it is important to add that they do not do so because of this, as it is only an added value of the CSR activity of the previous years. The CEOs of two companies reported that for them CSR is not an activity from which they expect, not even indirectly, higher profitability or higher competitiveness, they only do so because it is good to help, thus they do not even think of CSR as advertising.



#### 4. Conclusion

The aim of the study was on the one hand to examine the concept of corporate social responsibility, competitiveness and embeddedness in theory, and on the other hand, to explore practical aspects of the topic with the help of interviews made with family firms operating in Győr and near Győr. The concept of CSR and competitiveness as well as that of CSR and embeddedness have not been studied in the literature for a long time, therefore my aim was to give a review of the possibilities of connecting these terms. CSR and competitiveness can be related in two ways: the company either directly counts on the impact of CSR activity on the increase in competitiveness or it carries out CSR activity and its indirect effect on competitiveness may show up so in this case the intention to help comes first in terms of motivation. There is a link also between embeddedness and CSR, since a company will feel that it would like to help its environment if it is committed to the area, the place and is motivated by the ability to help its environment in other ways than its services and products.

The 20 interviewed family firms (the research was not representative) all carry out CSR activity, and in the study I presented how diverse and creative activities are carried out to help the people and the organisations in Győr and near Győr, what's more, for half of the companies it is also important to support the staff. Based on the responses of the 20 interviewed companies, I think that most of them are characterised by value-based CSR activity as there are several similar elements in their activities and assistance is in the centre of their motivation, however, despite the similarities, there are unique, firm-specific characters as well.

All but three companies carry out CSR activity in the area because they operate here, they are committed to help the society of the area, however, in case of two companies we can talk about nationwide activity, so local CSR activity is not a priority for them. Unfortunately, regarding competitiveness I could only evaluate the responses of five companies. The responses were diverse, there were companies that perceived an impact on CSR, but it is not in the centre of motivation, whereas other companies definitely barred that there might be a link between CSR and competitiveness, and the motivation here was also assistance.

The findings presented in this study are partial results, the research is still ongoing at the time of writing this study. The plans include finding additional firms for interviews as well as examining the topic more widely, e.g. by conducting focus group interviews. There are questions in the paper which are still open, further research can provide enough information to be able to answer them and also the relation between CSR and competitiveness as well as CSR and embeddedness can be more conceptualised based on further examination.

## Acknowledgements

The paper was supported by the “Center for cooperation between higher education and the industries at the Széchenyi István University (FIEK)” under grant number GINOP-2.3.4-15-2016-00003.

## References

- ANDRÁS I., RAJCSÁNYI-MOLNÁR M. 2014. Profit és filantropia. A CSR eszmetörténeti kérdései. In: *Civil Szemle*. Vol. 11, No. 2, pp. 5–23.
- ANGYAL, Á. 2009. Vállalatok társadalmi felelőssége, felelős társaságirányítás. Budapest: Kossuth Kiadó.
- ASTRACHAN, J. H., KLEIN, S. B., SMYRNIOS, K. 2005. The F-PEC scale of family inuence: construction, validation, and further implication for theory. In: *Entrepreneurship Theory and Practice*. No. 3, pp. 321–339.
- BALOGH E., BOGNÁR K., GYÖRI ZS., MUHI E., TARDOS K. 2014. *Jót s jól – Vállalati felelősségvállalásról kis- és középvállalkozásoknak*. Budapest: Országos Foglalkoztatási Közhasznú Nonprofit Kft.
- BOWEN, H. R. 1953. *Social responsibilities of the businessman*. No. 3. New York: Harper & Brothers.
- CARROLL, A. B. 1991. The pyramid of corporate social responsibility: toward the moral management of organizational stakeholders. In: *Business Horizons*. Vol. 34, No. 4, pp. 39 – 48.
- CSONKA, A., SZABÓ-SZENTGRÓTI, E., KÖMÜVES. Zs., SZABÓ-SZENTGRÓTI, G., BORBÉLY, Cs. 2013. Nyereséges vállalati működés vs társadalmi felelősségvállalás. In: *Acta Scientiarum Socialium*. No. 39, pp. 181–188.
- CZAKÓ, E., CHIKÁN, A. 2007. Gazdasági versenyképességünk vállalati nézőpontból – 2004–2006. In: *Vezetéstudomány*. Vol. 38, No. 5, pp. 2–8.
- FRIEDMAN, M. 1962. *Capitalism and Freedom*. Chicago: The University of Chicago.
- FRIEDMAN, M. 1970. The social responsibility of business is to increase its profits. In: *New York Times Magazine*. September 13, No. 32–33, pp. 122–126.
- GOODPASTER, K. E., MATTHEWS, G. B. 1982. Can a corporation have a conscience? In: *Harward Business Review*. January–February, pp. 132–141.
- GRAAFLAND, J. J., MAZEREEUW-VAN DER DUIJN SCHOUTEN, C. 2012. Motives for Corporate Social Responsibility. In: *De Economist*, No. 160, pp. 377–396.
- JÓZSA, V. 2019. *A vállalati beágyazódás útjai Magyarországon*. Budapest: Dialóg-Campus Kiadó.
- KOTLER, P., LEE, N. 2005. Corporate Social Responsibility: Doing the Most Good for Your Company and Cause. Hoboken, NJ: John Wiley & Sons.
- LENGYEL, I. 2003. *Verseny és területi fejlődés*. Szeged: JATE Press.
- MATOLAY, R., PETHEŐ, A., PATAKI, Gy. 2007. *Vállalatok társadalmi felelőssége és a kis- és középvállalatok*. Kutatás és tanulmány a Nemzeti ILO tanács részére. ILO.
- MCWILLIAMS, A., SIEGEL, D. 2001. Corporate social responsibility: A theory of the firm perspective. In: *Academy of Management Review*. Vol. 26, No. 1, pp. 117–27.
- PORTER, M. E. 1985. *Competitive Advantage – Creating and Sustaining Superior Performance*. New York: Free Press.
- REISINGER, A. 2018. Győri autóipari beszállító vállalkozások CSR tevékenysége öt vállalkozás példáján. In: *Tér-Gazdaság-Ember*. Vol. 6, No. 1, pp. 283–310.
- SZABÓ-BENEDEK, A. 2014. A CSR-gyakorlat vizsgálata a vállalatvezetői értékek és attitűdök tükrében. PhD-értekezés. Gödöllő: Szent István Egyetem.

- TÖRÖK, A. 2002. Az etikus vállalati magatartás és annak „filantróp csapdája”. In: *Közgazdasági Szemle*. Vol. 49, No. 5, pp. 441–454.
- VARGA, J. 2017. A szervezetek versenyképességének alapjai: a vállalati versenyképesség erősítésének lehetőségei. In: CSISZÁRIK-KOCSIR Á. (szerk.) *Vállalkozásfejlesztés a XXI. században*. Budapest: Óbudai Egyetem. pp. 725–743.
- WHETTEN, D. A., RANDS, G., GODFREY, P. 2002. What are the responsibilities of business to society? In: PETTIGREW, A. M., THOMAS, H., WHITTINGTON, R. (eds.) *Handbook of Strategy and Management*. London: SAGE. pp. 373–408.

# The rise of anti-system movement in lagging regions – case of Slovakia

ŠTEFAN REHÁK<sup>1</sup>, OLIVER RAFAJ<sup>2</sup>, TOMÁŠ ČERNĚNKO<sup>3</sup>

**Abstract:** In recent years, the rise of populism, extremism and the anti-establishment movements can be seen in many parts of the developed world. These trends can be seen mainly in lagging regions, places that have been overlooked by the public authorities in the long run. People in these regions are lacking opportunities to reach the average standard of living in their countries. This contribution focuses on the rise of an anti-establishment movement in Slovakia. Using cross sectional data from parliament elections in 2016 we explore role of local socioeconomic factors in the support of political party People's Party – Our Slovakia. This extreme right party was established in 2011 and it declares to build its mission on three core principles – national, Christian and social. Spatial analysis of the election results showed strong spatial concentration of its support in regions of central Slovakia, places which benefited significantly less from EU funds and state investment aid over the last couple of years. Regression analysis showed that the party gained higher support in regions with higher concentration of Catholics and a smaller share of the Hungarian minority. In addition, the party received higher support in rural and less densely populated regions with higher unemployment rate. Another important finding is that neither higher intensity of EU funding nor state investment aid had any significant effect on the political support for this party. From the political perspective, this contribution recommends to make more appropriate and suitable mix of development policies and increase the total investment into this lagging regions.

**Key words:** Anti-system parties, Radical right, Lagging regions, Slovakia

**JEL Classification:** O18, R11, R12

## 1. Introduction

In recent years, anti-systemic forces have been increasingly emerging in European countries. They have several features in common, but they are particularly linked by reinforcing anti-European sentiments, opposing the deeper political, economic and cultural integration of countries and they are against building and sharing

---

<sup>1</sup> ŠTEFAN REHÁK, Department of Public Administration and Regional Development, Faculty of National Economy, University of Economics in Bratislava, Slovakia, stefan.rehak@euba.sk

<sup>2</sup> OLIVER RAFAJ, Department of Public Administration and Regional Development, Faculty of National Economy, University of Economics in Bratislava, Slovakia, oliver.rafaj@euba.sk

<sup>3</sup> TOMÁŠ ČERNĚNKO, Department of Public Administration and Regional Development, Faculty of National Economy, University of Economics in Bratislava, Slovakia, tomas.cernenko@euba.sk

common values. Lately, these forces have been formed into political parties and have also become national decision-makers, what gave them opportunities to influence political life and the future of the whole society.

In current debate, terms such as anti-system, populism and extreme right are frequently used. These terms are used as synonyms, but differ in several characteristics. Anti-system movements are abiding by a belief system that does not share the values of the political order within it operates (Zulianello, 2017). According to Rydgren (2007), a party can be defined as being anti-system whenever it undermines the legitimacy of the regime it opposes. In addition, populism is a defining characteristic of the new radical right. According to the same author, extreme right parties distinguish by several factors. They often promote xenophobia, ethno-nationalism and sociocultural authoritarianism. Their program is directed toward strengthening the nation by making it more ethnically homogenous and by returning to traditional values. They accuse elites of putting internationalism ahead of the nation and putting their own self-interests ahead of interests of the people. There are several approaches that point to the main causes of the rise in anti-system movements. The approaches of economic choice theory can explain the rise in anti-system movements as a result of the frustration of voters who blame the current government for their economic backwardness and lack of job opportunities (Lewis-Beck, Stegmaier, 2007; Lewis-Beck, Nadeau, 2011). According to the assumptions of this approach, voters of the anti-system have many common demographic and socio-economic features, such as higher age, lower level of education, common religious belief or lower income, respectively lower wealth level. Dassonneville and Lewis-Beck (2018) further distinguish between the short-term and long-term forces that influence the decision-making of anti-system voters. For example, the short-term forces include corruption, crime or the current state of the economy, and the long-term forces include social structure, cultural identity or sympathy for political ideology. In the context of sympathizers of the anti-system, these are people who blame their negative situation for the unfavorable state of the economy, the high presence of corruption, the sense of loss or threat to cultural identity and elitism in government.

### **1.1 Results of previous empirical research**

An analysis of discontent in Europe (Dijkstra, Poelman and Rodriguez-Pose, 2018) showed that support for anti-system parties is particularly strong in rural regions that are economically backward without the ability to adapt to new trends. Moreover, their political support is higher in regions further away from economic centres, in regions with a higher proportion of the population over 65 years of age, and lower level of education and outmigration. The rise of anti-systemic movements in Europe has been described by several authors. For example, Ian

Gordon (2018) or Andrés Rodríguez-Posé (2018) pointed out regional inequalities that led Great Britain to Brexit and can be seen in other parts of Europe as well. In his contribution, Gordon pointed out the importance of the educational structure and occupational orientation of the population in the regions as factors that have a major impact on the increased support for Brexit. The results of the analysis showed that the less cosmopolitan regions with lower level of education and high proportion of workers in the manufacturing industry, were associated with a higher level of support. Rodríguez-Posé (2018) identified that regions that were largely neglected and overlooked by public authorities for a long time and were in spite of generous contributions from EU funds voted in favor of leaving the European Union. Fidrmuc with Hulényi and Tunalı (2019) and MacCann (2019) found that on voting for Brexit, EU money played virtually no role. However, Bachtrogler with Oberhofer (2018) on the other hand found that in the case of presidential election in France, EU money played a positive role in the election for a pro-European candidate.

A qualitative analysis of anti-systemic movements within Central European countries was conducted by Engler, Bartek, Pytlas and Deegan-Krause (2019). Their results showed that the anti-system parties in the region were different from those located in Western Europe. The difference is that, in contrast to the Portuguese, Spanish or Greek examples of parties that can be easily defined and characterized as anti-systemic, the Central European type is more difficult to categorize by a single specification. On the contrary to the western type, those in Central Europe pay less attention to the narrative or rhetoric about the social will or their communication is not aimed directly to the specific group of homogeneous voters. Tucker (2005) and Svačinová (2013) also pointed to similar features in the behavior of voters and the condition of economies in the regions of Central Europe. The first study showed these factors, such as ideological background, religiosity, the perception of the population on the evolution of economy or similar real growth during the observed time period in the post-communist period, and the second study showed similar factors during the period of accession of Central European countries to the European Union.

Anti-system movements have been operating in Slovakia for many years, but in recent years, as in other European countries, Slovakia has seen an increase in their support. Anti-system parties in Slovakia are represented mainly by parties in the far-right spectrum – the Slovak National Party (SNS) and the People's Party Our Slovakia (LSNS). The SNS was established in 1871 and within the political space promotes a modern way of developing traditional values of Slovakia – homeland, family, faith, national pride, responsibility and self-sufficiency. Embodiment of the new wave of extreme-right anti-system is represented by the People's Party Our Slovakia (LSNS), established in 2010. Its key goals include withdrawal from NATO and EU organizations, protection of the territory against

immigrants and establishment of militia against social system parasites. During 2013 and 2017, the chairman and founder of the party, Marián Kotleba, was elected as the chairman of the self-governing region of Banská Bystrica. Analysis of the development of anti-system support in Slovakia (Kluknavská, Smolík, 2016) and specifically in the region of Banská Bystrica (Mikuš, Guriňák and Máriássyová, 2013; Buček, Plešivčák, 2017), was previously done especially by political scientists, sociologists and geographers but until now, an economic view of the causes of their support was missing. Therefore, the aim of our paper is to map anti-system parties in Slovak regions and analyze factors that influence their support.

## 2. Data and used methods

We perform the analysis at the level of 79 districts, which represent the administrative unit (LAU1). Our dependent variable is the share of support for political parties in the 2016 parliamentary elections. For the classification of political parties in Slovakia we use Chapel Hill Expert Survey 2017 (Polk et al., 2017), which categorizes parties into 10 categories: Radical Right, Conservative, Liberal, Christian Democratic, Socialist, Radical Left, Green, Regionalist (*Table 1*). Here we conduct an analysis of political parties representing 95.74 percent of votes in elections. These are the parties whose results in the parliamentary elections exceeded the 5% quota required for entry into parliament. In addition, we are adding the two strongest long-term established political parties KDH and SMK, whose results were slightly below the threshold.

**Table 1. Categories of political parties in Slovakia according the Chapel Hill Expert Survey 2017**

Category	Political party	Share in 2016 parliamentary elections	Total
Radical right (TAN – traditional authoritative nationalist)	SNS	8,64	16,64
	Kotleba LSNS	8,04	
Conservative	OLaNO-	11,02	17,64
	NOVA	6,62	
	Sme Rodina		
Liberal	SaS	12,10	12,10
Christian	KDH	4,94	4,94
Socialist	Smer	28,28	28,28
Regional	Most-Hid	6,50	10,54
	SMK-MKP	4,04	
No family	Siet'	5,60	5,60
Other parties in total			4,26

Source: Own elaboration.

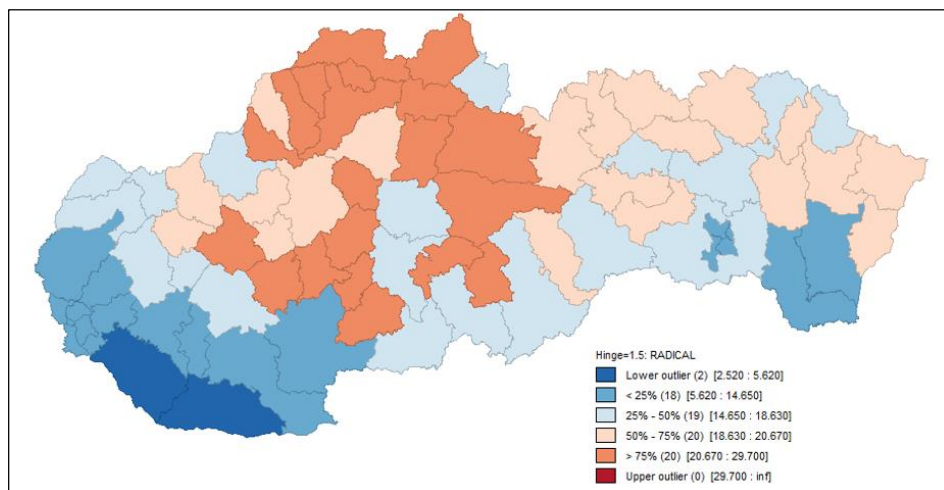
Our explanatory variables are two demographic variables – the proportion of minorities and the proportion of the faithful. These variables are usually decisive factors of political preferences in the political spectrum. A high proportion of minorities is associated with the support of regional parties and a low proportion of minorities with the support of nationalist parties. Regions with a higher proportion of believers tend to support Christian and conservative parties. We use the ratio of 20–24 year olds to examine the impact of the age structure of the population. Young voters often have different political preferences compared to older voters. In addition, we use two socio-economic indicators, namely the unemployment rate and the share of low-educated people (finished secondary school without GCSE and lower levels of education). These indicators are the main indicators by which we want to explore the role of the level of socio-economic development in support of radical right-wing parties. Finally, the indicator of the volume of European Structural and Investment Funds (ESIF) per capita captures the impact of EU cohesion policy. Cohesion policy in Slovakia represents up to 80 percent of public investment in Slovakia, so it is the main development policy instrument directed to lagging regions. The following table provides descriptive statistics for dependent and independent variables (*Table 2*).

**Table 2. Descriptive statistics**

Indicator	Min	Max	Mean	S.d.
Radical	2.52	28.68	17.72	5.07
Conservative	7.69	24.33	16.88	4.08
Liberal	3.34	29.60	10.77	5.87
Christian	0.57	14.87	5.06	2.84
Socialist	5.71	47.18	30.34	8.66
Regional	0.66	75.36	9.22	14.05
No family	1.98	14.88	5.43	1,78
Minority	3.00	78.00	17.61	15.20
Relig	7.72	95.40	67.36	14.34
Pop20-24	3.66	9.45	6.54	0.97
Unempl	4.67	27.42	11.41	5.24
Lowedu	18.45	48.08	38.65	6.64
Esifpc	4.96	18711.62	460.40	2135.04

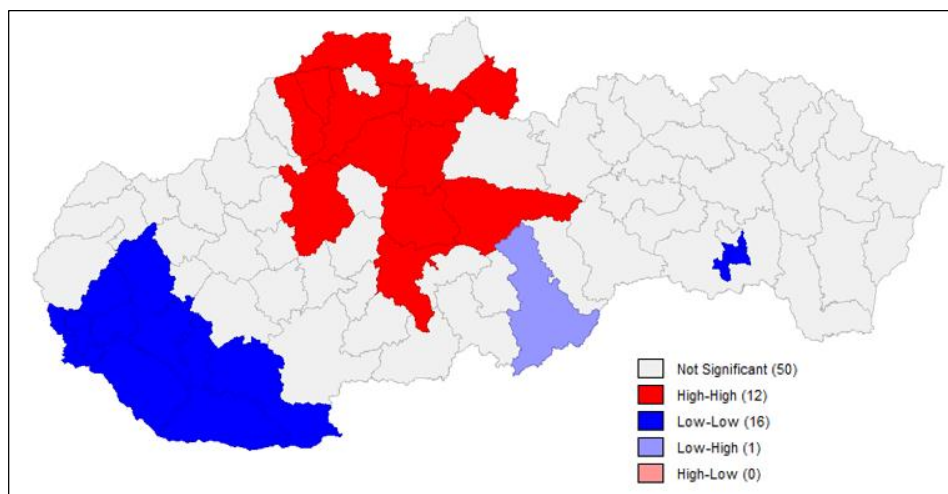
*Source:* Own elaboration.





**Figure 1. Map of the radical right support in Slovakia (2016)**

*Source: Own elaboration.*



**Figure 2 Spatial analysis (LISA) of the radical right support in Slovakia (2016)**

*Source: Own elaboration.*

## 2.1 Spatial analysis

Political support for the radical right is very heterogeneous in spatial sense. The measure of global spatial autocorrelation, the Moran's I value, is 0.624. It means that there are spatial clusters of high and low support. The highest support of the

radical right is in the central part of Slovakia and in the northeast of the country (*Figure 1*). Using the local spatial association analysis (LISA) we identified a local cluster with 12 districts (*Figure 2*). The support of the radical right is low in the southern districts of Slovakia, which are adjacent to Hungary and in the largest cities of Bratislava and Košice. The LISA analysis identified two clusters with 16 districts (*Figure 2*). Radical right has lowest support in the districts of Dunajská Streda and Komárno (*Figure 1*, dark blue color). The district of Rimavská Sobota is a local extreme, as there is significantly less support for the radical right than in the adjacent districts (*Figure 2*).

## 2.2 Regression analysis

Model 1 is our main model, the results of which we will analyse in more detail. We estimated Models 2–7 to compare the impact of socio-economic characteristics of the districts for different types of political parties.

**Table 3. Regression results**

	Radical	Conservative	Liberal	Christian	Socialist	Regional	Other
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Minority	-0.244***	-0.097***	-0.068***	-0.043**	-0.460***	0.953***	-0.017
Relig	0.013	-0.006	0.008	0.018	-0.352***	0.382***	-0.016
Pop20-24	1.081**	-0.111	-2.386***	2.390***	2.184***	-4.186***	1.053***
Unempl	0.289***	-0.241***	-0.189***	-0.016	0.148	-0.022	-0.088**
Lowedu	0.154**	-0.263***	-0.295***	-0.161***	0.625***	0.064	-0.142***
Ln_esifpc	-0.434	-0.300	1.409***	0.287	-1.452**	0.435	0.082
_cons	6.911*	34.049***	33.842***	-5.971**	28.965	-10.205*	6.041***
Adj R2	0.695	0.597	0.891	0.568	0.707	0.923	0.363
Log likelihood	-189.932	-183.698	-160.863	-157.687	-230.463	-216.157	-135.92
AIC	393.865	381.396	335.725	329.374	474.926	446.313	285.857
Moran I	0.475***	0.492***	0.169***	0.270***	0.195***	0.114**	0.048
N	79	79	79	79	79	79	79

Notes: \*\*\* p < 0.01, \*\*p < 0.05, \*p < 0.1.

Source: Own elaboration.

*Table 3.* explains 69.5 percent of the variability of the dependent variable. Four out of six variables are statistically significant. A higher proportion of minorities in the district is associated with lower support for the radical right parties. An increase in the proportion of minorities by 1 percentage point causes a decrease in the proportion of the radical right by 0.24 percentage points. A higher proportion of the religious population is not a significant predictor of support for the radical

right. Higher unemployment rate, lower education rate and higher share of young population in the district have a positive and significant impact on the support for the radical right. An increase in unemployment of 1 percentage point causes a 0.29 percentage point increase in support for the radical right. The increase in the share of low-educated people by one percentage point is associated with an increase in support of 0.15 percentage point. With a higher share of young people aged 20–24 years in the population by one percentage point, increases support by 1.1 percentage points. The higher intensity of ESIF in the region has no significant impact on the election results of the radical right. Text for spatial autocorrelation shows in the Model 1 is high (Moran's I 0.475) and highly significant. This suggests that the estimated coefficients are biased and we should use the spatial model. The results of the spatial autocorrelation tests are shown in *Table 4*.

**Table 4. Tests of spatial autocorrelation**

TEST	Coeff	Probability
Lagrange Multiplier (lag)	39.81	0.00000
Robust LM (lag)	6.50	0.00935
Lagrange Multiplier (error)	40.51	0.00000
Robust LM (error)	7.06	0.00631
Lagrange Multiplier (SARMA)	47.27	0.00000

*Source:* Own elaboration.

We used the procedure suggested by Anselin et al. (1996). Tests show that both the spatial autoregressive model and the spatial lag model are suitable models. We estimated two additional models (Model 1a and 1b).

The coefficients of the four variables in Model 1a are statistically significant. The coefficient of the share of minorities remained the same, but the coefficients of unemployment rate and the proportion of the young population are lower compared to Model 1. The impact of lower education turns to be not statistically significant. Overall, Model 1a's predictive power is higher. The results of the spatial lag model (Model 1b) are slightly different compared to Model 1 and 1a. The coefficient of the share of minorities is substantially higher. The coefficients of unemployment rate and education are lower than in Model 1. The age structure coefficient is not significant (*Table 5*).

Comparing the results of Model 1 with the results of Models 2–7 provides additional information on the impact of socio-economic and demographic factors on election results for individual parties. The proportion of minorities is statistically significant in 6 models. In all cases, a higher proportion of minorities is associated with lower political support for individual parties. It is not surprising that for political parties that represent the interests of the minorities (Model 6) the

**Table 5. Regression results OLS (Model 1) a Spatial error model (Model 1a) and Spatial lag model (Model 1b)**

	Radical	Radical (error)	Radical (lag)
	Model 1	Model 1a	Model 1b
Minority	-0.245***	-0.241***	-0.181***
Relig	0.013	-0.034	0.010
Pop20–24	1.081**	0.974**	0.522
Unempl	0.289***	0.205***	0.177***
Lowedu	0.154**	0.094	0.101***
Ln_esifpc	-0.434	-0.318	-0.297
Lambda		0.778***	
W_Radical			0.531***
_cons	6.911***	13.5807	2.856
Adj R2	0.695	0.866	0.832
Log likelihood	-189.932	-167.985	-172.129
AIC	393.865	349.97	360.259
Moran I (error)	0.475***		

*Source:* Own elaboration.

coefficient is positive. The influence of religiosity is relatively small in all models and is statistically significant only in models 5 (socialist) and 6 (regional). Socialist parties have less support in districts with a higher proportion of religious population while regional political have higher support in these districts. The unemployment rate is a statistically significant factor in four models. Higher unemployment rate is associated with higher support of radical right parties but lower support for conservative and liberal parties. The share of the population with lower education is statistically significant in six models. A high proportion of people with low educational levels are associated with the support of both radical and social parties. The educational level coefficient is much higher for social parties. A small share of low-educated people in a district is associated with the support of conservative, liberal, and Christian parties. The proportion of the population aged 20–24 is a statistically significant factor in six models. A higher proportion of young people is associated with greater support for both radical, Christian and social parties. However, the size of the coefficient is considerably lower for radical right. Financial support from the European Structural and Investment Funds is only a statistically significant factor for the voters of the liberal and social parties. Higher funding in the county is associated with the support of the liberal parties but lower support for the social parties.

### 3. Discussion and conclusions

The radical right parties are characterized by their nationally oriented program and appealing to traditional Christian values. Our analysis has shown that support for the radical right is high in regions with a low proportion of national minorities. However, the influence of religiosity on the support of the radical right has not been confirmed. A higher proportion of the young population is associated with higher support for the radical right. This may mean that the radical right ideology is attractive for first-time voters. We assume, that this indicates that this generation faces different challenges, which traditional political parties do not reflect. A comparison with the results of other parties shows that a higher proportion of the young population in districts is also associated with the support of socialist, Christian but not liberal parties, which is a surprising result.

Socio-economic factors are an important factor in the support for the radical right. Both higher unemployment rates and low education are an important factor in supporting the radical right in Slovakia. Despite the long-term decline in the unemployment rate in Slovakia, unemployment in several regions remains at high, above 15 percent. We can therefore confirm that ignoring long-term decline (or stagnation) of regional labour markets leads to the support of the radical right, what is consistent with findings of Rodríguez-Posé (2018) or of Dijkstra, Poleman, Rodríguez-Posé (2018). As the results for other political groups have shown, higher unemployment rates also mean a shift of political support from liberal and conservative parties. Surprisingly, higher unemployment rate is not associated with the support of socialist parties, which are traditionally a natural choice for this group of voters. A higher share of low-educated people is associated with the support of the radical right, but also of the socialist parties. This finding is consistent with findings of Lewis-Beck and Stegmaier (2007) or of Lewis-Beck and Nadeau (2011).

Regions lagging behind for a long time and regions facing structural changes are breeding ground of political instability in a country. The cohesion policy in Slovakia, which aims to support of catching up processes in these regions, is not effective in this respect. The volume of support in the districts of the Slovak Republic is not a significant factor of support for anti-system parties. This finding is consistent with the one from Fidrmuc, Hulényi, Tunali (2019) However, it is important to carry out a more detailed analysis, as the effect of cohesion policy may vary depending on the type of support. There may be a distinction between soft measures (eg education) and infrastructure investments.

## Acknowledgements

This paper was supported by Scientific and Grant Agency of the Ministry of Education, Science, Research and Sport of the Slovak Republic under the contract No. VEGA V-19-147-00.

## References

- ANSELIN, L. et al. 1996. Simple diagnostic tests for spatial dependence. In: *Region Science and Urban Economics*. Vol. 26, No. 1, pp. 77–104.
- BACHTRÖGLER, J., OBERHOFER, H. 2018. Euroscepticism and EU Cohesion Policy: The Impact of Micro-Level Policy Effectiveness on Voting Behavior. Working Paper No. 273. Department of Economics, Vienna University of Economics and Business.
- BUČEK, J., PLEŠIVČÁK M. 2017. Self-Government, Development and Political Extremism at the Regional Level: A Case Study from the Banská Bystrica Region in Slovakia. In: *Sociológia*. Vol. 49, No. 6, pp. 599–635.
- DASSONVILLE, R., LEWIS-BECK, M. S. 2018. A changing economic vote in Western Europe? Long-term vs. short-term forces. In: *European Political Science Review*. Vol. 11, No. 1, pp. 91–108.
- DIJKSTRA, L., POELMAN, H., RODRÍGUEZ-POSÉ, A. 2018. The Geography of EU Discontent. Working Papers 12/2018. Directorate-General for Regional and Urban Policy.
- ENGLER, S., PYTLAS, B., DEEGAN-KRAUSE, K. 2019. Assessing the diversity of anti-establishment and populist politics in Central and Eastern Europe. In: *West European Politics*. Vol. 42, No. 6, pp. 1–36.
- FIDRMUC, J., HULÉNYI, M. TUNALI, C. B. 2019. Can money buy EU love? In: *European Journal of Political Economy*. Published online July 2019.
- GORDON, I. R. 2018. In what sense left behind by globalisation? Looking for a less reductionist geography of the populist surge in Europe. In: *Cambridge Journal of Regions, Economy and Society*. Vol. 11, No. 1, pp. 95–113.
- KLUKNAVSKÁ, A., SMOLÍK, J. 2016. We hate them all? Issue adaptation of extreme right parties in Slovakia 1993–2016. In: *Communist and Post-Communist Studies*. Vol. 49, No. 4, pp. 335–344.
- LEWIS-BECK, M. S., NADEAU, R. 2011. Economic voting theory: testing new dimensions. In: *Electoral Studies*. Vol. 30, pp. 288–294.
- LEWIS-BECK, M. S., STEGMAIER, M. 2007. Economic models of voting. In: *The Oxford Handbook of Political Behavior*. pp. 1–25.
- McCANN, P. 2019. Perceptions of Regional Inequality and the Geography of Discontent: Insights from the UK. Paper for the UK2070 Commission. pp. 1–18.
- MIKUŠ, R., GURŇÁK, D., MÁRIÁSSYOVÁ, A. 2016. Analýza volebnej podpory Mariána Kotlebu ako reprezentanta krajnej pravice v krajských voľbách 2013. In: *Sociológia*. Vol. 48. No. 1, pp. 48–70.
- OESCH, D. 2008. Explaining Workers' Support for Right-Wing Populist Parties in Western Europe: Evidence from Austria, Belgium, France, Norway and Switzerland. In: *International Political Science Review*. Vol. 29, No. 3, pp. 349–373.
- POLK, J. et al. 2017. Explaining the salience of anti-elitism and reducing political corruption for political parties in Europe with the 2014 Chapel Hill Expert Survey data. In: *Research and Politics*. Vol. 4, No. 1, pp. 1–9.

- RODRÍGUEZ-POSÉ, A. 2018. The revenge of the places that don't matter (and what to do about it). In: *Cambridge Journal of Regions, Economy and Society*. Vol. 11, No. 1, pp. 189–209.
- RYDGREN, J. 2007. The Sociology of Radical Right. In: *The Annual of Sociology*. Vol. 33, pp. 241–262.
- SVAČINOVÁ, P. 2013. Ekonomické hlasování a odpovědnost vládních stran ve střední Evropě. In: *Středoevropské politické studie*. Vol. 15, No. 2–3, pp. 77–100.
- TUCKER, J. A. 2005. Regional Economic Voting: Russia, Poland, Hungary, Slovakia, and the Czech Republic, 1990–1999. Paper for the National Council for Eurasian and East European Research, Washington D.C. pp. 1–53.
- ZULIANELLO, M. 2017. Anti-System Parties Revisited: Concept Formation and Guidelines for Empirical Studies. In: *Government and Opposition*. Vol. 53, No. 4, pp. 653–681.

# Differentiation of territorial and institutional capital in Poland. Cross-sectional and spatial context

MAGDALENA MICHALAK<sup>1</sup>, ALEKSANDRA NOWAKOWSKA<sup>2</sup>,  
ELŻBIETA ANTCZAK<sup>3</sup>

**Abstract:** On the basis of a territorial paradigm of development the concept of territorial capital has been introduced to economic sciences. The literature on the subject lacks a clear definition of this notion, however in the classical interpretation, territorial capital consists of these elements of space that arise as a result of evolution and accumulation, interaction and synergy. It concerns traditions, social relations and connections, norms and principles of cooperation or a specific institutional environment. Territorial capital is strongly embedded in the local socio-economic structure. One of its key determinants is institutional capital, which may be understood as the whole of institutions which affect economic performance. Measurement of territorial capital poses many methodological and interpretative problems. In particular its intangible elements are difficult to quantify, and a local level of analysis, due to lack of data, is almost absent in the literature on the subject. The article attempts to quantify the territorial capital and assess its cross-sectional as well as spatial differentiation at four levels of data aggregation in Poland. The critical analysis of the literature on the subject and statistical methods (central tendency and variation measures) were applied.

**Key words:** territorial and institutional capital, territorialisation, cross-sectional and spatial differentiation, Polish districts, statistical analysis;

**JEL Classification:** C1, K1, O1, P00, R1

## 1. Territorial capital – reinterpretation of the factors of development

On the basis of a territorial approach to economic development the concept of territorial capital was introduced to economic sciences. It was first used in the OECD publication “Territorial Outlook” in 2001 in the context of methods of building competitive advantage of space (OECD, 2001). The key importance for the interpretation of this concept is presented by research and analysis of Italian

---

<sup>1</sup> MAGDALENA MICHALAK, Department of Regional Economy and Environment University of Lodz, Poland, magdalena.michalak@uni.lodz.pl

<sup>2</sup> ALEKSANDRA NOWAKOWSKA, Department of Regional Economy and Environment University of Lodz, Poland, aleksandra.nowakowska@uni.lodz.pl,

<sup>3</sup> ELŻBIETA ANTCZAK, Department of Regional Economy and Environment University of Lodz, Poland, elzbieta.antczak@uni.lodz.pl



and French economists (Camagni, 2009; Camagni, Capello, 2013; Perucca, 2014; Capello, Caragliu and Nijkamp, 2009; Torre, 2015; Fratesi, Perucca, 2014).

The notion of territorial capital has not been clearly interpreted in the literature on the subject and, depending on the approach, different definitions are proposed (Toth, 2015, 1327–1344; Zonneveld, Waterhout, 2005). In general, territorial capital includes both tangible and intangible elements, although the significance of the latter ones is crucial. These are resources of both public, private and mixed nature (Camagni, 2008). It is perceived as a type of capital whose characteristic feature is attachment to a given territory (territorialisation), although the effects of its use in the form of goods, services, technological solutions, local and regional brands, etc. may be subject to transfer on a supra-regional and international scale.

In the literature on the subject, it is widely recognized that the success of economic systems does not depend exclusively on the quantity and quality of tangible resources at their disposal. The wealth and complementarity of intangible resources, as well as the degree of their development, is gaining in importance. These elements are inseparable from location in a given place and embedded in local networks of relations, local culture and institutions. Mobilizing territorial capital by matching investments with the specificity and resources of a given place results in a higher rate of return on investment (OECD, 2001). Territorial capital generates higher profits for properly chosen investments and strengthens effects of the synergy between various entities and sectors of the economy (Territorial State And Perspectives of The European Union, 2011).

One of the dimensions of intangible territorial capital is institutional capital. It is related to social capital, or even indicated as its element (Camagni, 2008). According to this approach, the territory creates its own institutional space – it offers economic entities closeness resulting from mutual interactions leading to the co-creation of norms and principles, patterns of economic behaviour, habits and tendency to cooperate and participate in social life (Rodríguez-Pose, 2013, 1034–1047; Nowakowska, 2018, 5–23).

## **2. Institutions and their role in economic development**

During the last few decades economist have given increasing attention to the role of institutions in economic development.

In defining the concept of an institution a narrower and a broader approach can be found. In the light of the first one institutions have been primarily seen as constraints or restrictions. The first view was presented *inter alia* by North who defined them as constraints that human beings impose on themselves (North, 1990; in a similar manner for example Frey, 1997 or Williamson, 1993). However, as underlined by Paul, North went further in precision and broke the one-side view

of institutions as only constraints (Paul, 2009) and explained that they constitute the rules of the game that structure incentives in human exchange (North, 1990). They are created by society and embedded in this society. Many authors perceive less and less institutions as only constraints. According to Hodgson institutions can be defined as „durable systems of established and embedded social rules that structure social interactions” (Hodgson, 2006, 13). Crawford and Ostrom, on the other hand, define them as „enduring regularities of human action in situations structured by rules, norms, and shared strategies, as well as by the physical world” (Crawford, Ostrom, 1995, 582). They do not only limit, but at the same time enable human actions, and from their shape and content it follows what activities are allowed and which are not (Hodgson, 2006). Consequently, it can be stated that institutions are susceptible not only to constrain behaviour, but also to cause certain activities, acting as norms or patterns of behaviour.

Institutions can therefore be explained, in general terms, as established and prevalent rules that structure social relations. They affect human interactions through a system of various restrictions and standards. What is important institutions consists of these rules and norms which in case of non-compliance are, in principle, sanctioned, which makes actions that are contrary to what is demanded by valid rules and norms unprofitable.

The term „institution” tends, however, to be used in different ways by various authors. A wider definition can be also found in the literature, which places organizations next to rules, norms, and constrains within the notion of institutions. In this approach organizations are apprehended as a special type of institution (Coriat, Dosi, 2002; Morgan, 1997). According to this understanding the term “institution” covers not only rules of game (norms), but also organizations such as for example public – state or local – authorities, development agencies or business associations.

A distinction can also be made between formal and informal institutions. Informal institutions include in particular traditions, customs, moral values, religious beliefs (Pejovich, 1999, 166), while the formal ones comprise constitutions, laws, contracts and forms of government (North, 1991, 97; Kaufman, 2018, 387). The scope of this paper is however limited only to formal institutions.

### **3. Institutional capital in a local dimension**

Institutions have been devised by human beings to create a stable structure of human behavior and to reduce uncertainty in exchange (North, 1991, 97). They have the capability to structure political, economic and social interactions. As underlined by Platje rules of the game (i.e. institutions) in the form of enforced laws and regulations are a valuable asset to society (Platje, 2006, 224). This a

result of the fact that they give rise, in relations with other individuals or groups, to legitimate expectations regarding the behavior of these other entities. Working in this way institutions increase the predictability of the activities of individuals and groups and their results. In the economical sphere this results *inter alia* in a reduction of transaction costs related to operating in conditions of uncertainty, including risk insurance (see for example Roberts, Greenwood, 1997). In this approach institutions can be apprehended as economic resources, some of which present characteristics of capital as they can be a source of competitive advantage (Vargas-Hernández, Orozco-Quijano and Virchez, 2019, 2).

Taking this considerations into account, it can be stated that some institutions form a special type of capital, so-called institutional capital. There exist many definitions of this capital which differ depending on the scientific field in which institutional capital is studied. Some explanations built in the field of economic sciences seem to be particularly relevant in the context of studies concerning territorial capital. For example Garrabé defines institutional capital as „the whole of the formal and abstract institutions which constitute the inciting structure organizing the relations between individuals or organizations, within the process of economic and social production” (Garrabé, 2007, 127). According to Vicencio Meza institutional capital can be seen as the accumulation of rules of the game and their compliance mechanisms, which have a positive or negative impact on economic performance (Vicencio Meza, 2009, 9). Platje, on the other hand, defines institutional capital in more detailed way stating that it consist of the institutions, institutional governance and governance structures that reduce uncertainty and stimulate adaptive efficiency, the functioning of the allocation system and sustainable production and consumption patterns (Platje, 2008, 145).

The common points of most of the definitions of institutional capital is that it consists of institutions, as defined above, affects economic activities and, in principle, can allow to obtain economic benefits. Institutional space, built up territorially, creates a framework for the functioning of the economy and determines the ability of economic entities to enter into common projects. It constitutes a basis for coordination of activities, promotes exchange of information, cooperation processes, interactive and collective action.

However, in the context of territorial capital and institutional capital seen as one of its elements, it must be noted that most formal institutions, which are its components, are of a national and not regional or local character. In particular legal norms are most often issued at a national level and therefore their impact on economic processes is similar in all parts of the country. This concerns for example criminal, financial and labour law or fiscal regulations. What is more, many institutions understood as organizations – as provided for in the wider definition of institutions – whose actions affect situation of individuals, business activities, as well as competitiveness of the economy in general, are state ones. As

a consequence most empirical researches concerning institutions are limited to the national or even supranational level. There is however a certain spatial diversity of institutions – rules and norms – as some of them are created by territorial authorities. Moreover, what can also potentially differ is how these authorities govern and apply legal norms and to what extent the territorial (local and regional) norms remain in conformity with state regulations.

In the literature various dimensions of institutional quality and institutional capital are presented. The most common and, as it seems fundamental ones are rule of law, including for example equality before the law, enforceability of contracts, protection of property rights; government impartiality, control of corruption; voice and accountability; government effectiveness (Kaufman, Kraay and Mastruzzi, 2010, 1; Mamoon, Murshed, 2007, 1; Charron, Lapuente and Rothstein, 2013, 38).

These different dimensions are widely examined within the assessment of the quality of institutions and capital composed by these institutions in all the developed countries (see for example Lapuente and others, 2018; Vecchione, Gaetano and Nifo, 2015). Most of them, however, are strongly related to the national level institutions and relevant studies do not focus on territorial ones. Nevertheless, as it was mentioned above, there exist institutions of a local character the quality of which can be spatially differentiated. Despite the importance of these findings, studies concerning the quality of local institutions and institutional capital at this level are relatively underdeveloped. What is more, most of studies in this field are based on subjective and perception based measures.

#### **4. Results and Discussion**

In order to measure institutional capital and verify its spatial differentiation following indicators were chosen:

- European Funds for financing EU programs and projects in PLN obtained by the territorial units per capita (EUfunds) which indicates administrative efficiency and effectiveness of local authorities actions;
- share of area of land covered by valid local spatial development plan in total area of the territorial units in % (SMplans) which indicates stability and transparency of local law in the field of spatial planning and attention to spatial regime;
- the rate of detectability of the delinquents in ascertained crimes by the police in % (RDcrimes) which indicates efficiency of law enforcement bodies in given territorial units;
- complaints against inaction or excessive length of action of local self-government bodies considered justified by the self-government boards of

appeal (which are bodies competent to review complaints against decisions and actions of local self-government bodies in Poland) per 10,000 inhabitants (PCjustified) which indicates efficiency and speed of action of local authorities.

We used statistical information from Local Data Bank of Polish Central Statistical Office (CSO) and Local Government Appeal Boards (LGAB) for Poland for the period 2012–2017. The data were collected at NUTS-4 (Nomenclature of Territorial Units for Statistics) level and then aggregated to other spatial units. Thus, we had the following data: at NUTS-1: 6 cross-sections (regions – made up of provinces); at NUTS-2: 16 cross-sections (provinces); at NUTS-3: 72 cross-sections (sub-regions – made up of districts) and at NUTS-4 (LAU-1, Local Administrative Units): 380 cross-sections (districts). Finally, to perform the territorial heterogeneity of capital and institutional capital some statistical tools were applied, e.g. mean, standard deviation, coefficient of variation, range, quartiles and kurtosis. We focus on LAU-1 level, as these are the smallest geographical units for which data are available. *Table 1* compiles summary statistics of the main variables.

**Table 1. Summary statistics of the variables at NUTS-1 to NUTS-4 units over the period 2012–2017**

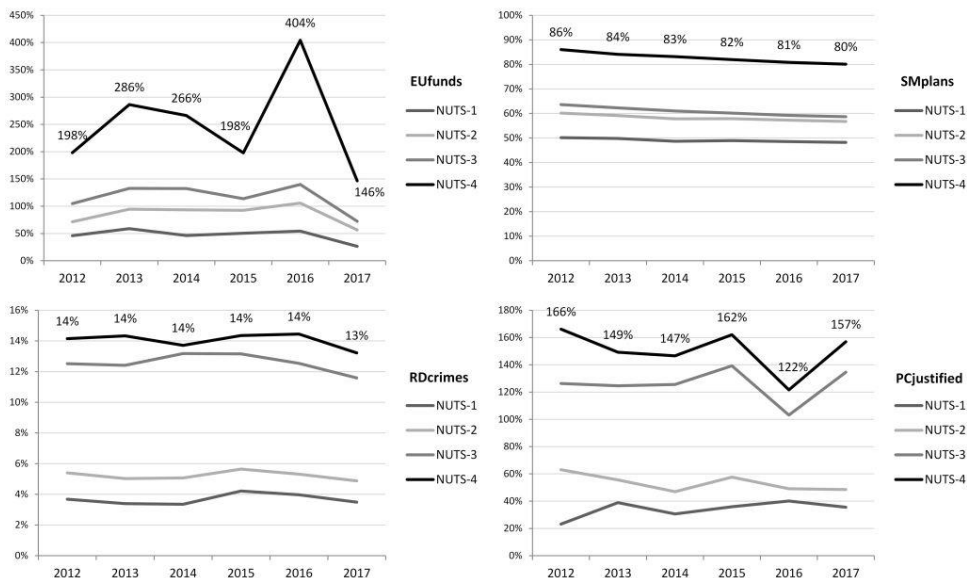
	EUfunds	SMplans	RDcrimes	PCjustified	EUfunds	SMplans	RDcrimes	PCjustified
	NUTS-1				NUTS-2			
Mean	18.3	34.6	73.0	0.31	19.0	34.8	73.4	0.31
Median	19.1	32.3	72.7	0.32	13.6	25.5	73.1	0.27
Min	6.7	17.8	70.1	0.16	2.1	11.4	66.9	0.07
Max	29.1	62.9	76.3	0.45	56.4	65.4	82.4	0.63
Range	22.3	45.1	6.2	0.29	54.4	54.0	15.5	0.56
Std. Dev.	9.0	17.5	2.7	0.10	16.4	19.1	3.8	0.17
CV	47%	49%	4%	34%	86%	58%	5%	54%
Skewness	-0.1	0.7	0.2	-0.2	1.3	0.7	0.7	-0.6
CS	0.03	0.1	0.2	-0.04	-0.3	0.5	-0.1	0.2
	NUTS-3				NUTS-4 (LAU-1)			
Mean	17.5	34.5	70.8	0.32	18.5	34.8	73.5	0.32
Median	10.0	31.7	72.2	0.19	43.8	28.7	9.1	0.48
Min	0.3	3.5	42.8	0.00	0.0	0.6	42.6	0.00
Max	98.7	90.4	86.7	2.30	467.8	101.1	95.7	4.39
Range	98.4	86.9	44.0	2.30	467.8	100.5	53.1	4.39
Std. Dev.	20.5	21.6	8.9	0.40	43.8	28.7	9.1	0.48
CV	116%	61%	11%	126%	250%	83%	12%	150%
Skewness	2.1	0.5	-1.2	3.0	6.4	0.6	-0.4	4.14
CS	0.4	0.2	-0.1	0.3	-5.1	-0.1	11.2	-1.9

*Note:* Std. Dev. – Standard Deviation; CV – coefficient of variation; CS – coefficient of skewness.

*Source:* Own elaboration based on data of CSO and LGAB.

From the data presented in the Table 1 it follows that the differentiation of the indicators of institutional capital is the higher the lower the level of data aggregation. The median values of all variables are the higher the more disaggregated data levels we looked at. Ranges of the analysed phenomena are also higher at more disaggregated units. Moreover, EUfunds, SMplans, RDcrimes and PCjustified have the largest relative variation at LAU-1 level. Distribution of most of the variables was right-skewed, especially at lower NUTS territorial levels. Most of districts have values of measurements visibly lower than mean at LAU-1 (NUTS-4) and higher than mean at higher level of aggregation. The scale of this asymmetry, measured by the absolute coefficient of skewness, is higher for EUfunds, RDcrimes and PCjustified and also at the district level.

Finally, from a regional perspective, districts are characterised by the largest spatial distortions in the capital and institutional capital. The values of all variables were characterised by the highest values of coefficients of variation at LAU-1 (Figure 1).



**Figure 1. Regional and local heterogeneity of capital and institutional capital measurements at different administrative levels (coefficients of variation)**

Source: Own elaboration based on data of CSO and LGAB.

To explore the intensity of spatial heterogeneity of capital and institutional capital, standard deviation maps were used.

In the years 2012–2017 in the following voivodships: Lubuskie, Wielkopolskie, Kujawsko-Pomorskie, Pomorskie, Warmińsko-Mazurskie and Małopolskie concentration of districts which have obtained the largest amount of EU funds per capita for financing EU programs and projects can be observed. On the other hand, urban districts and units located in the Podlaskie, Mazowieckie, Łódzkie and Zachodniopomorskie did not receive any EU funds at all. Nevertheless, in the territorial units in which the amount of EU funds was recorded above average, the lowest share of area covered by valid local spatial development plan was observed at the same time.

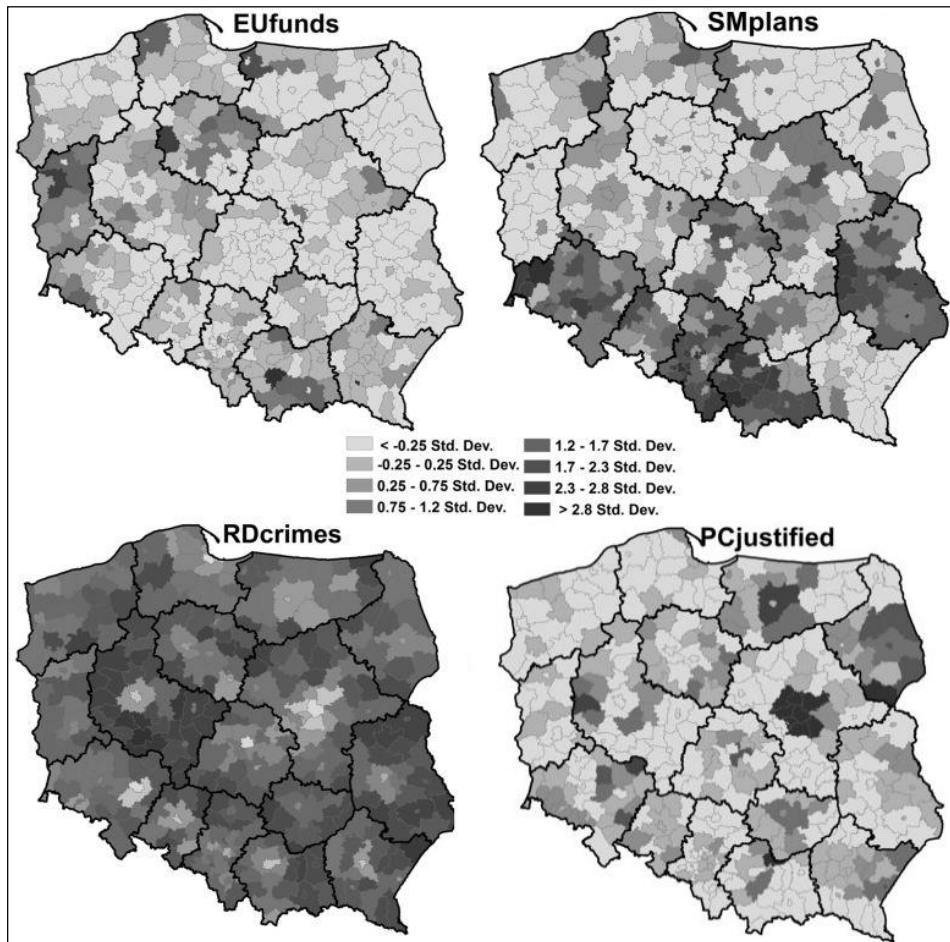
On the other hand, districts located in the Wielkopolskie, Świętokrzyskie and Kujawsko-Pomorskie voivodships are characterized by the highest detectability of the delinquents in ascertained crimes by the Police. In turn, the lowest effectiveness in detecting delinquents in ascertained crimes recorded in urban districts. Finally, the highest number of decisions of the self-government boards of appeal recognizing complaints against inaction or excessive length of action as justified per 10,000 population was issued in the district of Mazowieckie, Wielkopolskie, Podlaskie and Warmińsko – Mazurskie voivodships. It was also noted that the units located in the abovementioned voivodships have, on average, the lowest rate of the detection of delinquents in ascertained crimes.

The data presented on the maps below (*Figure 2*) confirm the thesis about the existing and growing local diversity of institutional capital.

## 5. Conclusions

In contrast to previous studies, this research represented the first attempt to quantify the territorial capital as well as to examine its cross-sectional and spatial differentiation at four Polish levels of data aggregation. From the presented data it follows that the cross-sectional differentiation of the indicators of institutional capital is the higher the lower the level of data aggregation. The mean values of all variables are the higher the more disaggregated regions we looked at, which may suggest strongly territorial character of institutional capital. Consequently, it can be concluded that analyzes concerning institutional capital carried out at regional level do not fully reflect the scale of its cross-sectional differentiation.

Moreover, the results of conducted research allow to identify two groups of determinants affecting institutional capital and its spatial differentiation: historical and cultural conditionalities and the size of the territorial entity.



**Figure 2. Regional distribution of variables at district level measured by standard deviation (mean values 2012–2017)**

*Source:* Own elaboration based on data of CSO and LGAB.

The efficiency and effectiveness of local authorities actions, quantified by the European Funds for financing EU programs and projects obtained by the LAU-1 is poorest in eastern and central Poland. This part of the country is homogenous in the low level of socio-economic development (activity) and is also one of the least developed in the European Union. This situation mainly results from external factors, e.g. the region's history. This region has historically possessed little wealth due to occupation, wartime and legislative mistreatment (Poland was partitioned in the 18th century among Russia, Prussia and Austria). The



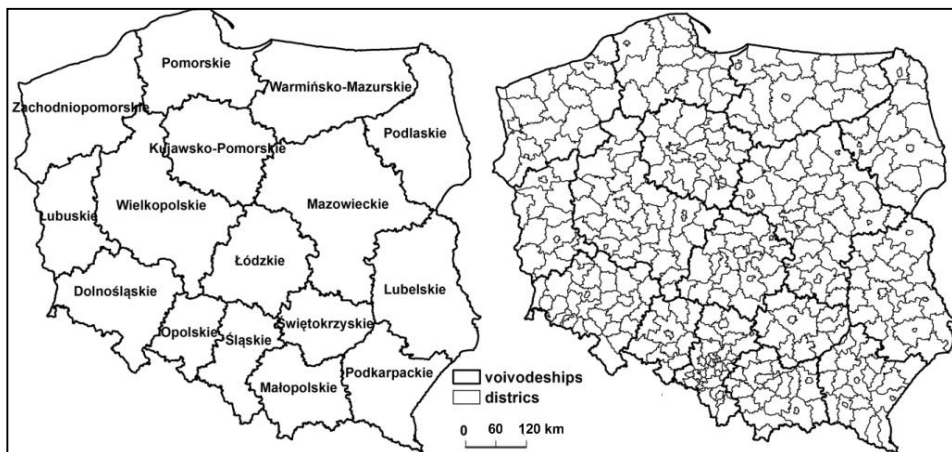
concurrency of various historical and political circumstances has led to lasting domestic interregional and intra-regional disparities.

Moreover, we found that the highest stability and transparency of local law in the field of spatial planning and attention to spatial regime remains in south-western part of the country. This indicates that local spatial development and landscape is an important component of cultural heritage of this region and the protection of spatial order has a particularly, long continuance, sensitive as well as valuable quality.

Finally, the outcomes indicate that in the context of the analysis of institutional capital what plays an important role is also the size of the entity, as well as the scale and intensity of accruing phenomenon. Large and complex territorial units, e.g. headquarters of voivodships or other big cities are characterized by lower efficiency of actions of public authorities. This can however result also from a large number of cases these authorities need to deal with compared to smaller entities.

As a consequence of the findings resulting from the presented study, the subject of our further research will be an analysis of the impact of institutions on local economic development.

## Appendix



**Figure A1. Territorial division of Poland—voivodeships (NUTS 2) and districts (LAU-1)**

*Source:* Own work.

## References

- ANTCZAK, E. 2016. Modelowanie rozwoju gospodarczego miasta. In: NOWAKOWSKA A. (ed.) *EkoMiasto# Gospodarka. Zrównoważony, inteligentny i partycypacyjny rozwój miasta*. Łódź: Wydawnictwo Uniwersytetu Łódzkiego.
- BRESSER, R. K. F., MILLONIG, K. 2003. Institutional Capital: Competitive Advantage In Light Of The New Institutionalism In Organization Theory. In: *Schmalenbach Business Review*. Vol. 55, No. 3, pp. 220–241.
- CAMAGNI, R., CAPELLO, R. 2013. Regional Competitiveness and Territorial Capital: A Conceptual Approach and Empirical Evidence from the European Union. In: *Regional Studies*. Vol. 47, No. 9, pp. 1383–1402.
- CAMAGNI, R. 2008. Towards a Concept of Territorial Capital. In: CAPELLO R., CAMAGNI, R. CHIZZOLINI, B., FRATESI, U. (eds.) *Modelling regional scenarios for the enlarged Europe*. Berlin: Springer.
- CAMAGNI, R. 2009. Territorial capital and regional development. In: CAPELLO, R., NIJKAMP, P. (eds.) *Handbook of Regional Growth and Development Theories*. Edward Elgar Publishing.
- CAPELLO, R., CARAGLIU, A., NIJKAMP, P. 2009. Territorial Capital and Regional Growth: Increasing Returns in Cognitive Knowledge Use. In: *Tinbergen Institute Discussion Paper*, Tinbergen Institute Discussion Paper 059/3, <https://papers.tinbergen.nl/09059.pdf> [22.08.2019].
- CHARRON N., LAPUENTE V., ROTHSTEIN, B. 2013. *Quality of Government and Corruption from a European Perspective. A Comparative Study of Good Government in EU Regions*. Edward Elgar Publishing.
- CORIAT, B., DOSI, G. 2002. The Institutional Embeddedness of Economic Change. An Appraisal of the 'Evolutionary' and 'Regulationist' Research Programme. In: HODGSON, G. (ed.) *A Modern Reader in Institutional and Evolutionary Economics*. Edward Elgar Publishing
- EUROPEAN COMMISSION. 2011. *Territorial State and Perspectives of The European Union* [https://ec.europa.eu/regional\\_policy/sources/policy/what/territorial-cohesion/territorial\\_state\\_and\\_perspective\\_2011.pdf](https://ec.europa.eu/regional_policy/sources/policy/what/territorial-cohesion/territorial_state_and_perspective_2011.pdf) [22.08.2019].
- FRATESI, U., PERUCCA, G. 2014. Territorial Capital and Effectiveness of Cohesion Policies: an Assessment for CEE Regions. In: *Investigaciones Regionales*. No. 29, pp. 165–191.
- FREY, B. S. 1997. A Constitution for Knaves Crowds out Civic Virtues. In: *Economic Journal*. Vol. 107, No. 443, pp. 1043–1053.
- GARRABÉ, M. 2007. *Economie sociale et développement*. Programme MED-TEMPUS <http://www.formder.iamm.fr>. [22.08.2019].
- HODGSON, G. 2006. What Are Institutions? In: *Journal of Economics Issues*. Vol. 40, No. 1, pp. 1–25.
- KAUFMAN, D., KRAAY, A., MASTRUZZI, M. 2010. *The Worldwide Governance Indicators: Methodology and Analytical Issues*. World Bank Draft Policy Research Working Paper <http://info.worldbank.org/governance/wgi/pdf/wgi.pdf> [22.08.2019].
- KAUFMAN, D. 2018. Formal institutions, informal institutions, and red tape: A comparative study. In: *Public Administration*. Vol. 96, No. 2, pp. 386–403.
- LAPUENTE, V., FERNÁNDEZ-ALBERTOS, J., AHUMADA, M., GONZÁLEZ, A., LLOBET, G., PARRADO, S., VILLORLA, M., GORTÁZAR, L. 2018. *The quality of institutions in Spain*. Círculo de Empresarios.
- MAMOON, D., MURSHED, M. 2007. *Want Economic Growth with Good Quality Institutions? Spend on Education*. Munich Personal RePEc Archive Paper, no. 3046 <http://mpra.ub.uni-muenchen.de/3046/> [22.08.2019].
- MORGAN, K. 1997. The Learning Region: Institutions, Innovation and Regional Renewal. In: *Regional Studies*. Vol. 31, No. 5, pp. 491–503.

- NORTH, D. 1990. *Institutions, Institutional Change and Economic Performance*. Cambridge: Cambridge University Press.
- NORTH, D. 1991. Institutions. In: *The Journal of Economic Perspectives*. Vol. 5, No. 1, pp. 97–112.
- NOWAKOWSKA, A. 2018. From Region to Territory: Reinterpretation of the Meaning of Space in Economic. In: *Gospodarka Narodowa*. Vol. 295, No. 3, pp. 5–23.
- OECD. 2001. *Territorial Outlook*. [http://www.oecd-ilibrary.org/urban-rural-and-regional-development/oecd-territorial-outlook\\_9789264189911-en](http://www.oecd-ilibrary.org/urban-rural-and-regional-development/oecd-territorial-outlook_9789264189911-en) [26.02.2019].
- PERUCCA, G. 2014. The role of territorial capital in local economic growth: evidence from Italy. In: *European Planning Studies*. Vol. 22, No. 3, pp. 537–562.
- PLATJE, J. 2006. An institutional capital approach to sustainable development. In: *Management of Environmental Quality: An International Journal*. Vol. 19, No. 2, pp. 222–233.
- PLATJE, J. 2008. Institutional capital as a factor of sustainable development – the importance of an institutional equilibrium. In: *Technological and Economic Development of Economy*. Vol. 14, No. 2, pp. 144–150.
- ROBERTS, P. W., GREENWOOD, R. 1997. Integrating Transaction Cost and Institutional Theories: Toward a Constrained-Efficiency Framework for Understanding Organizational Design Adoption. In: *Academy of Management Review*. Vol. 22, No. 2, pp. 346–373.
- RODRÍGUEZ-POSE, A. 2013. Do institutions matter for regional development? In: *Regional Studies*. Vol. 47, No. 7, pp. 1034–1047.
- SOBCZYK, M. 2010. *Statystyka opisowa*. Warsaw: BECK.
- SOKOŁOWICZ, M. 2015. *Rozwój terytorialny w świetle dorobku ekonomii instytucjonalnej Przestrzeń – bliskość – instytucje*. Łódź: Wydawnictwo Uniwersytetu Łódzkiego.
- TORRE, A. 2015. Theorie du developpement territorial. In: *Geographie, Economie, Societe*. Vol. 17, No. 3, pp. 273–288.
- TOTH, B. I. 2015. Territorial Capital: Theory, Empirics and critical remarks. In: *European Planning Studies*, Vol. 23, No. 7, pp. 1327–1344.
- VARGAS-HERNÁNDEZ, J. G., OROZCO-QUIJANO, E. P., VIRCHEZ, J. 2019. Institutional Capital on Trade-Marketing and Environmentally Sustainable Development Policy Making: A Research Model Based on Critical Analysis of NAFTA. In: *International Journal of Public and Private Perspectives on Healthcare, Culture, and the Environment*. Vol. 3, No. 2, pp. 1–21.
- VECCHIONE, G., NIFO, A. 2015. Measuring Institutional Quality in Italy. In: *Rivista Economica del Mezzogiorno*. Vo. 29, No. 1–2, pp. 157–181.
- VICENCIO MEZA, J. A. 2009. Capital Institucional y Desarrollo Económico: Una aproximación a la relación normativa-conductual en comunidades extranjeras. Empresarios Judíos en Chile. 1930–1970. Seminario de Grado Licenciado en Historia “Reglas, capacidades y redes en el desempeño económico De familias judías en Chile: 1930–2009” Universidad de Chile <http://repositorio.uchile.cl/bitstream/handle/2250/109876/Capital-institucional-y-desarrollo-economico.pdf?sequence=3&isAllowed=y> [22.02.2019].
- WILLIAMSON, O. E. 1991. Comparative Economic Organization: The Analysis of Discrete Structural Alternatives. In: *Administrative Science Quarterly*, Vol. 36, No. 2, pp. 269–296.
- ZONNEVELD, W., WATERHOUT, B. 2005. Visions on Territorial Cohesion. In: *The Town Planning Review*. Vol. 76, No. 1, pp.15–27.

# **Awakening economic policy of Ukrainian regions: how to reshape mechanisms for organization and deblocking the discrete modernization?**

**IGOR DUNAYEV<sup>1</sup>**

**Abstract:** Outline of topic. Understanding modernization as a periodic disturbance of a static equilibrium and the emergence of social conflict between the reality and the ideal, there is an urgent request for how to manage an unstable equilibrium. We need a certain modernization trajectory. The optimal level of governance for this is definitely believed the sub-national level. What does it mean for regional economic policy?

The key idea of the paper. On the governance level, we propose to consider two types of mechanisms – 1) the mechanisms of organization of the modernization process and 2) the mechanisms for de-blocking the modernization processes. Despite of they have some different reasons of origin, but one should design and implement them then synchronously. There can be numerous options and combinations, but new common rules are demanded.

Methodology. It's supposed to use an interdisciplinary approach. It will be based on an system analysis that isolates the system boundary, the system frame, the functional structure, the structure of relationships and a system stuff. It enables us to mark out: 1) the most significant “tension lines” in construction of that mechanisms of organization of modernization and mechanisms for de-blocking, 2) a group of systemic contradictions within these mechanisms.

Then, due to logical correlating two applied questions of “How is it in Ukraine?” with “How should it be?”, we would get a composition of clues for academicians and policy-makers who shape tomorrow day agenda of the regions of Ukraine, and perhaps even of Eastern European regions.

Empirical base. The second part of my presentation (applied questions “How is it in Ukraine?” and “How should it be?”) will be based on results of in-depth expert survey of Ukrainian experts and practitioners of regional development and regional governance (a pool of about 50 people). This survey is completely designed and being conducted by me as an author, it stands as important and indispensable part of my post-doctoral thesis. Its final results will be available since January 2017. Some of them will be published in leading journals.

**Key words:** modernization, Ukraine, regional policy, mechanism of regulation, economic policy, region

**JEL Classification:** O38, R58, R50

---

<sup>1</sup> IGOR DUNAYEV, Kharkiv regional institute of public administration of the National academy of public administration under the President of Ukraine, head of the Non-Governmental Organization “Research center of legal-economic solutions in the area of application of distributed ledger technologies”, Ukraine, Igor.dunayev@gmail.com

## 1. Introduction

Problems of renewal of sub-national economic policy have become the object of economic and regional studies relatively lately after shifting beyond the pertinent scope of the national governments. Ukrainian present-day regions have got the first opportunity to start their regional economic policy aimed to disclose their regional competitive advantages on national and international scales. The fact that the EU regions of appropriate NUTS-1 level have the long mastered way, and now they implement it in ‘smart specialization’ concept – it remains a frightening abyss for many Ukrainian counterparts. The dialectics and the pragmatic meaning of my report is that the Ukrainian regions are unable to repeat exactly the path that their Eastern European counterparts have gone: the world is changing too fast now.

Initially, my report *contains of three parts*: 1) methodological specifics, 2) empirical data from all-Ukrainian survey report, and 3) academic recommendations for policy-makers.

## 2. Methodological specifics

Before proceeding to discussion of the conceptual issues, it is necessary to define the key specific notions: (1) by modernization, a “growing capacity for social transformations” (Roxborough, 1998) is meant; and (2) by regional economic policy modernization, we mean “qualitative controlled social transformations of complex administrative and economic relations at the regional and interregional levels that manifest themselves in a different way depending on the system of values and priorities under specific historical conditions” (Dunayev, 2015, 19).

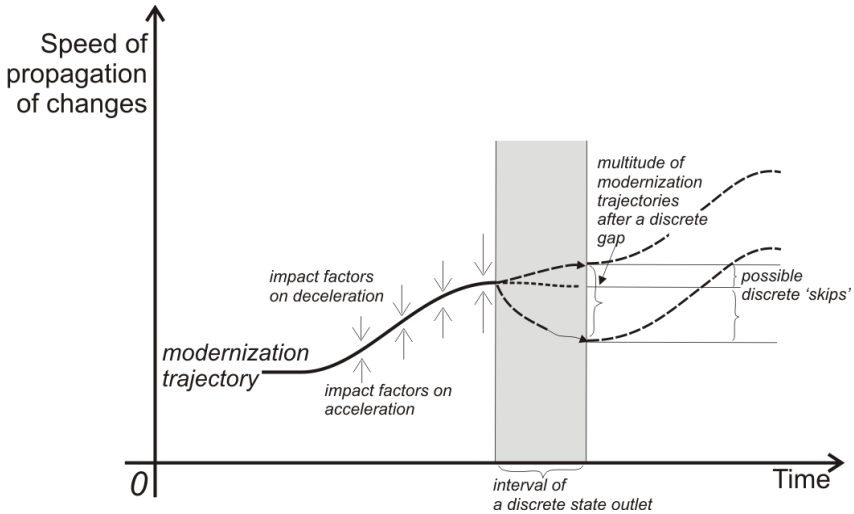
Then, the key idea of my approach points that on the governance level, that there are two types of mechanisms that are of different nature and different ways to manage. These are:

- 1) the mechanisms of organization of the modernization process, and
- 2) the mechanisms for de-blocking the modernization processes.

Despite of they have some different reasons of origin, but one should design and implement them then synchronously. There can be numerous options and combinations, but new common rules are demanded.

What does modernization process looks like? Let’s see it in a picture 1 (Image 1). One of its features is discreteness and discontinuity.

At the moment of the “unsteady equilibrium” destabilization, that is misbalance of influencing forces, a modernization trajectory is shifted along the propagation velocity axis. It is the point, prior to which endogenous contradictions between factors of different states – figuratively speaking “traditional” and “new” – are to manifest themselves most particularly (*See: Figure 1*).



**Figure 1. Discreteness in an abstract modernization process**

*Source:* The authoring.

Practically all the developing countries, in order to save time and extremely scarce political and financial resources, engage in “catch-up modernizations”. These do not appear as evolutionary processes, but rather as “destruction of trends established in the course of institutional and technological changes” (Barca etc., 2012). It means that modernization of this kind is characterized by mostly discrete shifts, also followed by knowingly discrete and controlled adaptation changes of institutions, including political ones. That is to say, we discern at least two manifestations of discreteness that may be asynchronous, which adds risk to public administration. However the key point is that both of them manifest a controlled discrete process. As it’s clear, any point of modernization balance (or imbalance) is always impacted by numerous factors.

It is important to say that imbalances resulting from domination of one group of factors, which accelerates or hinders modernization, can cause an appreciable shift in time the emergence of a new “unstable balance” (Muller, 2015) and affect the length of a new discrete “jump” towards changes (see Figure 1). For the purposes of modernization of regional economic policy it means that, subject to a strong political will for state reform implementation in Ukraine, the functional mechanisms for regulation of modernization processes that facilitate, at least organizationally, regaining of the desirable modernization trajectory and speeding up of movement along it are of great current interest. These promising mechanisms include:

1) *mechanisms for organization of modernization processes* (initiating and designing actions, streamlining, coordination, communication, collaboration and integration with other structures of all levels regardless of their geographic location). Their target vectors are:

- *shaping the network of centers for spatial dissemination of innovations*. In particular, infrastructure development that reduces economic remoteness (by the new economic geography theory), improvement of other factors (human capital and institutions), support for settlements that create and translate innovations to the periphery);
- *attainment of balance between the natural interests of the state, local government bodies, local business, and the public*;
- *pro-active and efficient response to changes of the structure and rate of growth of a regional socio-economic system*;
- *organizational mobilization of the reserves for the economic growth of a region and territorial communities located in it*;
- *integration of a publicly determined trajectory and available resources of regional development with external partners in international, inter-regional and private-corporate cooperation*.

2) *mechanisms for deblocking the modernization processes*, which is called forth by opposition (or sabotage) on behalf of certain pressure groups, lack of mutual understanding, institutional inability etc. These ones are originated by some reasons and factors for blocking any modernization process at the regional. And it basically lies in three following areas:

- *administrative area* – as a result of public disbelief in the reforms, continuity in procedures and transition (or loss) of power, inertness in treatment of changes, corruption and so on. These factors are conceptually based on social interaction theories; the concepts of organizational fields and institutional isomorphism (DiMaggio, Powell, 1983); a concept of ‘the strength of weak ties’ (Granovetter, 1973), related to social ties theory (Bourdieu, 1986; Coleman, 1988); a network relations concept etc.;
- *resource area*, which includes such blocking factors as lack of the key resources – financial, trust and inner consensus as to values and goals, staff, and accountability;
- *integration area* (blocking through a community’s isolationism and ignorance, disintegration and weak cooperation ties among regions).

### 3. Empirical data

In this part, I tried to find out more relevant reasons and outcomes of how an ability of regional economic policy Ukraine to change can be determined. It encompassed the relevant independently accomplished expert survey; it were continuing in February-March 2017. The survey has involved 44 experts from 14 regions of Ukraine and Kyiv city. In this paper, I am going to present some outputs and graphics.

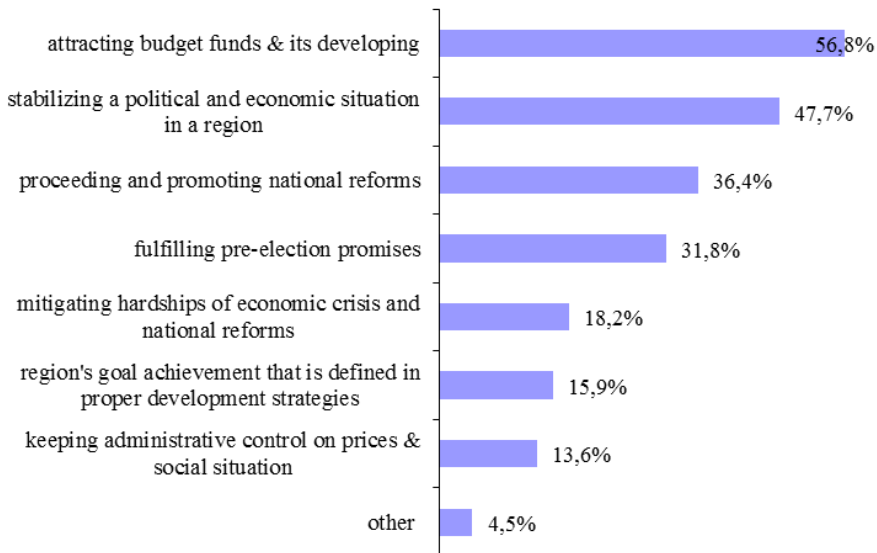
#### 3.1 Governance obstructions and guides in modernization transition of the regions to a decentralized development model

Logically, the objective of this section is to reveal main blockages and core guiding lines in governance seemed as objective factors accompanying the transition of regions towards a decentralized development model.

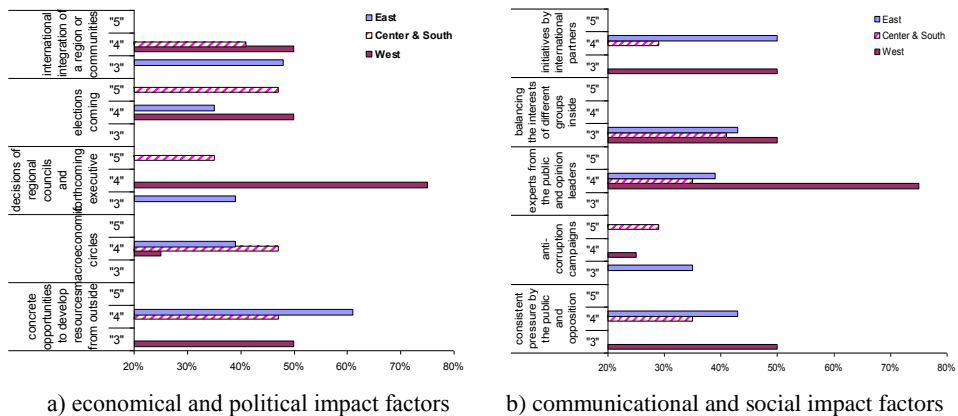
Concurrent Ukrainian reforms of local government, state regional policy, and administrative and territorial division are shifting gradually part of responsibility and focus of attention from the state level to the regional and local levels. However presently, the regional bodies of power are more targeted at “survival” and alleviating problems than at development prospects. As the results of the author’s expert polling prove (*Figure 2*), over a half of the respondents (56.8%) see ‘raising and application of budget funds’ as regional power structures’ targets, while 47% and 36% of the respondents emphasize ‘stabilization of politico-economic situation’ and ‘introduction and promotion of state reforms’ as well. Significantly, only 15.9% of experts recognize ‘achievement of development goals, defined by regional strategies’ of their regions as actual priorities in practice, although every region as far back as 2014–2015 got its own strategy and performance plan, which were to some extent synchronized with the system of state planning documents.

A regional perspective of evaluating the perception of the most powerful factors of overcoming inactivity (*Figure 3*) attests to the fact that there is an essential difference of expert perception. Experts that come from the eastern macroregion see the economic factors and those associated with a concrete measurable possibility as most effective. Experts from other Ukraine’s macroregions give priority to factors of the local political and integrative nature (*Figure 3a*). Consensus in the best expert evaluations from all the three macroregions was observed only in respect of two factors: ‘approaching elections’ as an impetus for their authorities’ activity and another dose of populism (*Figure 3a*) and ‘involvement of public experts’ (*Figure 3b*) as a guardedly optimistic factor.





**Figure 2. Experts' answers on the question “In fact, what the regional governments are oriented to?”, in %**



**Figure 3. Experts' evaluation of the most efficient impact factors enabling us to overcome inertia that were grouped by three Ukraine's macroregions (“East”, “West”, “Centre & South”) and were selected by the most rank obtained, in % for three most grades on 5-graded scale**

*Note:* the conditional macroregion “East” is formed by the experts from Kharkiv, Sumy, Dnipropetrovsk and Zaporizhia regions; the conditional macroregion “West” is formed by experts from Ternopil, Lviv, Zhytomyr and Rivne regions; the conditional macroregion “Center and South” is formed by experts from Kyiv city, Vinnitsa, Nikolayev, Odesa, Poltava, Kyiv regions and AR Crimea.

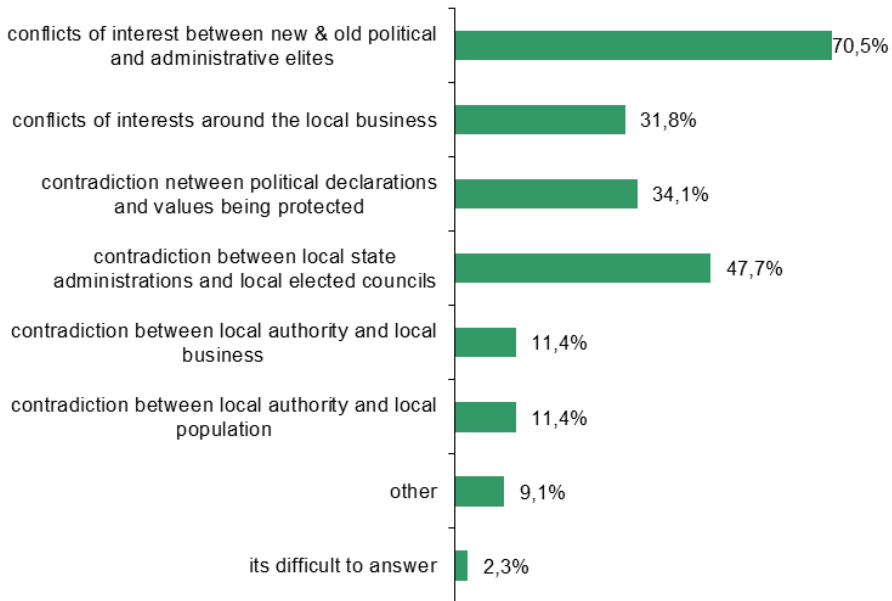
### 3.2 Decentralization and the “new normal” of the Ukrainian regions

A new normal component in Ukraine is a year-from-year escalation of “a discrepancy between the regions’ economic might and their social welfare and life quality indices” (*Support to Ukraine's regional development policy, 2013*) under large economic and social disproportions. The regions associate this situation with the sizable fluctuations of production output of the recent years, scarce internal resources and lack of opportunities to cope with the long-standing trends with little effort. For example, the polled experts have emphasized the difficulties of searching for resources to achieve the set goals of regional strategies (36.4%) and passivism of local administration and self-government staff (38.6%) (*Figure 4*). At the same time, some of researchers highlight a link between a weak regions’ crisis and “a substantial intellectual challenge requiring a profound rethinking of its causes, mechanisms of its evolving, and ways to curb it” (*Support to Ukraine's regional development policy, 2013*). This means that, apart from financial resources, there should also be the relevant staff, development technologies and strategies, soldered together within a strong value and ideological frame.



**Figure 4. Distribution of expert responses to the question: ‘What problems affect most considerably the regional power bodies’ adaptation to their enhanced role and responsibility in the course of decentralization?’, in %**

Decentralization reveals the hidden conflicts of interests between local elites, and between the branches and levels of local power i.e. state administrations and councils of different levels. This fact is supported by the results of the conducted expert polling, in which these types of conflicts are mentioned by majority of respondents (70.5% and 47.7% respectively; *Figure 5*).

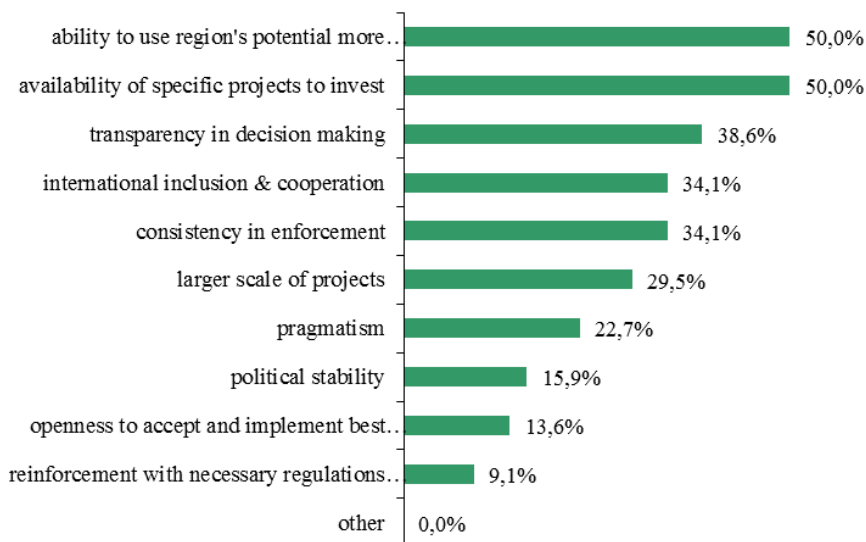


**Figure 5. Distribution of respondents' answers to the question "What contradictions and conflicts are most evident at the regional level during decentralization?", in %**

The conflicts are underlain by a variety of reasons, but their orientation is the same: perpetual fighting for influence and power. This problem complicates essentially the reaching of primary internal consensus at the regional level, which is why at the initial stages clear-cut processes and step-by-step guides are necessary to be built in the mechanisms for unblocking of modernization processes in the context of enhanced openness in public governance.

To meet the above-mentioned challenges effectively, the government and regional authorities must renovate the mechanisms and tools for regulation of regional development with an emphasis on strengthening institutions, improving their readiness to attract resources and use their own potential (*Figure 6*). Particularly, among other tasks, a special attention should be paid to preparation of specific projects, work on development of large-scale initiatives able to attract middle- and large-size investors or loan supplier; international involvement and

cooperation, openness and consistency in decision-making. If wasted, the reform time will by no means be made up through progress in isolated spheres – it is vital to deliver full-scale general changes.



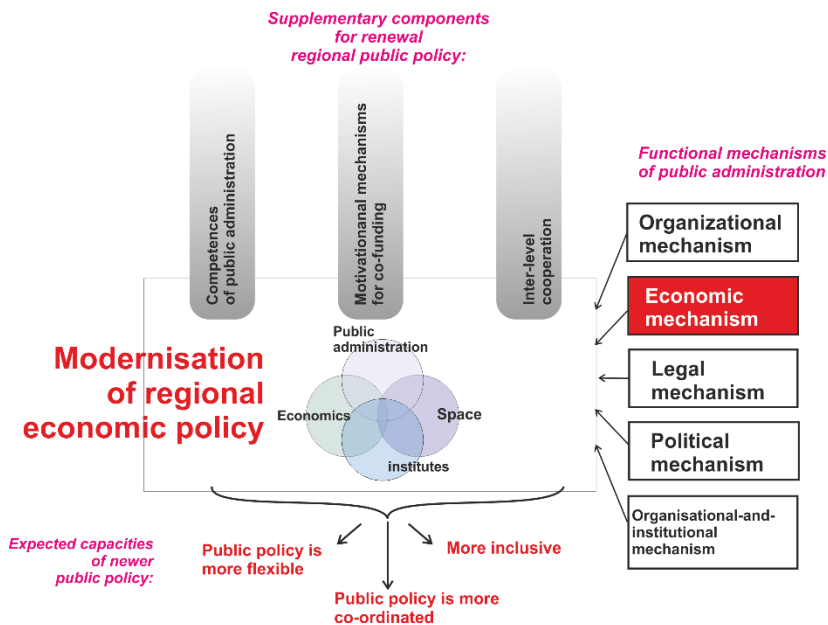
**Figure 6. Distribution of respondents' answers to the question: 'What parameters of the regions' economic policy and strategy, currently established by their councils and administrations, should be improved most significantly?', in %**

#### 4. Propositions

As an academic proposal, we can take a holistic approach to the development and coordination of several management mechanisms (*Figure 7*). On the one hand, these are

- 1) organizational ones, and on the other hand, and
- 2) these are unblocking mechanisms that are more social in nature.

Besides others, now I would like to highlight just the economic mechanism. So, indeed, the internal driver of the economic growth of the Eastern European and Ukrainian regions is their laying emphasis on continued decentralization processes and extension of the 'coordinated self-development' of regional and sub-regional socio-economic systems by introducing a proper system of incentives. This will be facilitated by certain supporting mechanisms and tools for choosing the most effective and persistent priorities of spatial and regional development. One of the key mechanisms is an economic mechanism.



**Figure 7. Reconciliation of strategic directions of regional modernization through organizational support**

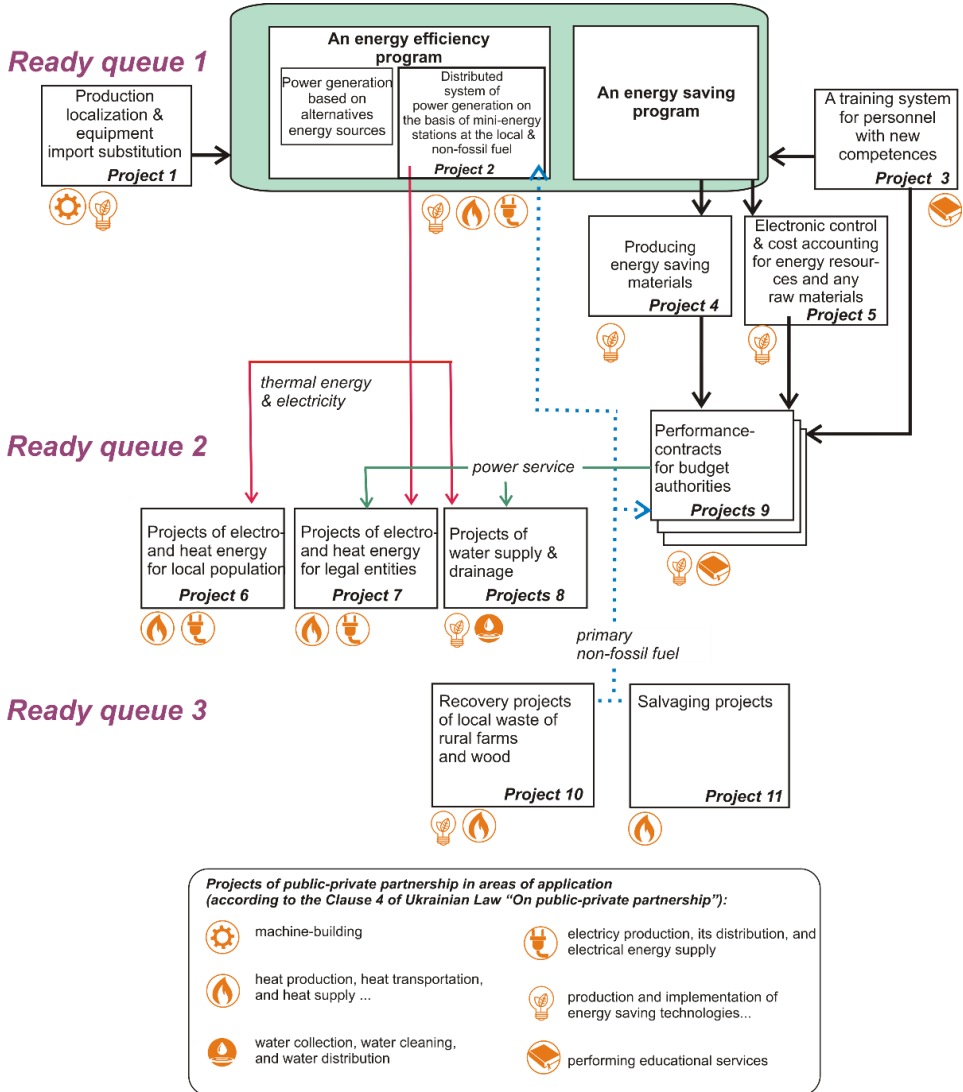
This mechanism is associated with formation of a sustainable regional infrastructure of attracting investments, establishment of an investment incentives system, internal regional system of economic risk mitigation.

The presented logic of priority methodological requirements to public authorities allows us to supply an example of an economic mechanism for REP modernization, based on the model investment program of public-private partnership “Municipal energy efficiency and energy saving” that was proposed by the author to Kharkiv regional state administration in 2017 (Figure 8) (Dunayev, 2018). It is the spheres of energy efficiency and energy saving that are the most challenging for the economic development, although they possess a colossal investment and modernization potential that could be used in Ukraine.

Taking into account the specificity of investment and power-coordination relations allowed to put methodological emphasis on the following:

- a) the vital need, first, for localization of modern manufacturing with import substitution of a part of the equipment and, second, updating of the local system of training of the personnel with the set competences;
- b) a certain sequence of support for the investment process through a step-by-step deepening of investment projects from the framework to the servicing and disposal of surpluses and waste. 11 specific groups of investment projects have been proposed and interconnected with a certain priority for

- two parallel public-private partnership investment programs for their formation and implementation at regional level and below;
- c) through coordination and power support with a cross-sectoral approach;
- d) further desirability of allocating appropriate clusters.



**Figure 8. A fragment of representation of the action of the economic mechanism of REP modernization by way of the “Municipal energy efficiency and energy saving” public-private partnership program**

## 5. Conclusion

1. Thus, a modernization transit to the decentralized model of regional development is accompanied, as before, by many unsolved problems. This postpones fulfillment of the goals of the state regional policy reform to a much later stage. In the opinion of the polled experts, a change of the economic agenda of the Ukrainian regions and their acquisition of a sufficient capacity for a full realization of their own potential and independent development will take longer than five years, but even that term may be not long enough for all of the regions to acquire the desired qualities.
2. The economic policy of the Ukrainian regions obviously lacks a sober assessment of the “corridor of opportunity”. Depopulation, accumulation of people in the regional centers, the Anti-terroristic operation on the Ukrainian Donbas, scarce financial resources for technological modernization of public facilities in local communities and other circumstances compel to rigidly focus on priorities. In view of an objective resource deficit, it would be premature to discuss the scale of realization of both state regional policy priorities and regional strategy priorities. The life of many regions calls for orientation to a pinpoint development of associated territorial communities and formation of a new network of local centers (regional polycentrism). The state infrastructural support to the most effective local projects, co-financed with business, should also be pinpointed, since it strictly complies with the project approach, understandable to foreign investors, and saves time.
3. Within the narrow “opportunity corridor”, it is desirable to rely on something that grows by itself. The Ukrainian regions have already formed their zones of growth on the basis of available competitive advantages. The increasing competition among the regions for human and investment resources is evidently underestimated, in spite of the fact that it is this competition, and not the plans of ministries or departments, which is going to determine the country’s spatial development, and the one who is more attractive to people and businesses will win.
4. A reasonable balance between the dirigist and the institutional and liberal approaches to regional economic policy has not been achieved in Ukraine yet. Awareness of the fact that the regional economic policy should be aimed at making the maximal use of competitive advantages of specific regions, coordination of regional strategies with the strategies of business, alleviation of the market failures by means of efficient redistribution is merely forming. But all that is only possible thorough a growth of human capital and a radical modernization of institutions, including public administration bodies.
5. Modern Ukraine does not repeat the fresh European stage and experience of regional policy-making: we have other institutions, we have other problems,

although the directions of change, goals and terms are synchronized with the current ones from the EU.

6. Target vector – for coordinated self-development of regions, with the proposal to formulate updated regional policies with a focus on coordination
7. The transition to a new model of public-management relations should be multilevel in character with the gradation of stages of mechanisms of formation of a new generation of regional economic policies and its subsequent implementation, and to assume constant monitoring and replacement of inefficient elements of mechanisms.

### Acknowledgements

This paper is benefited from useful suggestions made by anonymous referees as well as my close colleagues Mr. Igor Lysenko and Dr. Iya Degtyareva (both Ukraine). The author also thanks a number of conference participants and European discussants at the “Sapere Aude” (Stockholm, 2018) and Kharkiv regional institute of public administration (Kharkiv, Ukraine, 2017), as well as Kyiv- and Kharkiv-based experts and discussants while drafting strategic documents for the Kharkiv state regional administration in early 2017 yet.

### References

- BARCA, F., McCANN, PH., RODRIGUEZ-POSE, A. 2012. The case for regional development intervention: place-based versus place-neutral approaches In: *Journal of Regional Science*. Vol. 52, No. 1, pp. 134–149.
- BOURDIEU, P. 1972. *Esquisse d'une théorie de la pratique*. Genève: Librairie Droz.
- DiMAGGIO, P. J., POWELL, W.W. 1983. The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields. In: *American Sociological Review*. Vol. 48, No. 2, pp. 147–160.
- DUNAYEV, I. 2015. Modernization of regional economic policy: identification and semantic analysis of conceptual apparatus (origin in Ukrainian). In: *Odesa: Actual problems of public administration*. Vol. 4, No. 64, pp. 16–20.  
[http://www.oridu.odessa.ua/9/new\\_options/pdf/003/Dunayev.pdf](http://www.oridu.odessa.ua/9/new_options/pdf/003/Dunayev.pdf)
- DUNAYEV, I. 2018. Modernization logics and principles of designing a new generation of regional economic policies: findings for recent Ukraine and Eastern-European countries in transition. In: *Progress in Economics Research*. Vol. 41 / Edited monograph: ed. Albert Tavidze. New York: Nova Science Publ. pp. 53–90.
- GRANOVETTER, M. S. 1973. The Strength of Weak Ties. In: *The American Journal of Sociology*. Vol. 78, No. 6, pp. 1360–1380; doi:10.1086/225469.
- MULLER, M. 2015. Assemblages and actor-networks: rethinking socio-material power, politics and space. In: *Geography Compass*. Vol. 9, No. 1, pp. 27–41.
- ROXBOROUGH, I. 1988. Modernization Theory Revisited. A Review Article. In: *Comparative Studies in Society and History*. Vol. 30, No. 4, pp. 753–761.
- Support to Ukraine's regional development policy, 2013. “Regional development and state regional policy in Ukraine: a status and prospects in a context of global and European policy standards: Analytical report.”, Kyiv: EU SURDP.



# Precarious employment in the EU countries – 21<sup>st</sup> century flexibility or misuse of labour force?

JÓZSEF KÁRPÁTI<sup>1</sup>

**Abstract:** According to the very laconic statement by the International Labor Rights Forum: precarious workers are those who fill permanent job needs but are denied permanent employee rights. There is no standard definition of precarious employment, yet, but studies agree that these workers are subject to unstable employment, lower wages and more dangerous working conditions. They rarely receive social benefits and are often denied the right to join a union. European studies indicate that women, minorities and migrant workers are much more likely to fill these kinds of jobs. Permanent employment across a number of industrial sectors has shifted to precarious jobs through outsourcing, use of temporary employment agencies, and, in legal terms inappropriate classification of workers as “short-term” or “independent” contractors. Although all these can be interpreted as flexible solutions to ensure labour demand, being beneficial to employers and to some extent even for employees, it is clear that the majority of the affected workers do not choose these conditions for themselves as a flexibility advantage, but are forced to choose such less stable forms of employment to earn some money. This article examines the available labour force data and the occurrences of different employment conditions. The article will summarize the different provisions related to precarious employment in the European Union countries and also covers some economic aspects (different size and relevance of the phenomena), especially in those countries where specific groups of employees are highly exposed to uncertain working conditions.

**Key words:** precarious work, part-time employment, temporary employment agencies, labour rights, working conditions

**JEL Classification:** J21, J28, J60, J70, K31

## 1. Introduction

Security at work consist of several layers. The benefits of workers' rights developed gradually from the beginning of the 19<sup>th</sup> century, starting with the category of physical safety provisions at work. The first legislative acts entered into force in the industrialized Great Britain at the beginning of the 1800s in several turns: 1802, 1819, 1833, 1844 etc. (Nardinelli, 1980). The worldwide labour rights- and trade union movements of the 19<sup>th</sup> and 20<sup>th</sup> century resulted in

---

<sup>1</sup> JÓZSEF KÁRPÁTI, John von Neumann University, Faculty of Business and Economics, Hungary, karpati.jozsef@gtk.uni-neumann.hu

further development. Since 1919 the tripartite International Labour Organization (ILO) brings governments, employers and workers together in discussions on standards and good practices in labour law legislation and management questions (ILO, 2019). At the beginning of the new millennium, new areas of discussions emerged in the developed countries, moving from the traditional topics of granting elementary conditions for workers to a special focus on innovative, “alternative” working solutions and unusual forms of labour force contracting. A larger scale of a certain “job re-design” after the mid-1990s was implemented by companies and it was clearly identified by researchers as a risk for workers (Quinlan et al., 2001).

At least three main phenomena supported this kind of re-design. For earlier generations, the value of a workplace was often its stability. The development of an employee’s career often resulted in very steady, full-time career tracks for decades at the same company. In times of economic crises, these values were usually destroyed by the turbulent economic conditions. The ethos of a long-term, full-time job significantly diminished during the given time period in most of the developed countries. Where uncertain living conditions grow, new solutions also rise. The emergence of self-employed contractors, shift-workers, and, in some European countries, the fact that majority of female labour force was working as part-time employee (Franco-Winqvist, 2002) is not unusual anymore, but the growth of the “insecure” working conditions has reached a significant level already by 2000. The OECD stated that this is not an after-crisis phenomenon, since more than the half of newly established jobs between 1995 and 2008 were the results of such alternative solutions (OECD, 2017). As a second reason and explanation for the above, technical development made working opportunities more flexible at the same period of time, from the point of geographical location, office facilities and working hours. Younger generations of employees even started to seek for this kind of flexibility and addressed these conditions as their way of “freedom in life”. They agree easier with more unsafe employment conditions, however, this means they may start leaping between jobs also the same way easily. As a third emerging issue, the growing presence of unskilled labour force in developed countries gave employers the idea of inventing rather adverse conditions for their employment. To underline especially the risk of the third issue, Quinlan et al. state from their occupational health point of view, that “*studies found precarious employment was associated with a deterioration in occupational health and safety (OHS) in terms of injury rates, disease risk, hazard exposures, or worker (and manager) knowledge of OHS and regulatory responsibilities (Quinlan et al., 2011, 335)*”. Not to mention missing labour rights. This paper will give a short overview of the issue using data and studies from the European labour market.

## 2. Unusual working conditions in Europe

The term “precarious work” is used in several different interpretations across studies. The most limited approach identifies this issue as unsecure, unhealthy, risky and unstable working environment where rights and physical safety of employees are in danger. From a legal and economic point of view, this interpretation could go further, and the term “contingent work” is also used. The use of contract labour and precarious work seems to be the part of a global business strategy to cut labour costs and substitute “decent” work through labour market “flexibilization” or casualization. Therefore, we may consider that different agreements with “zero” working hours as the default, or “contractualized” service agreements between an enterprise and a labour force lending company and other similar solutions may all lead to an elevated level of risks for the involved labour force. This type of work is increasingly being used to replace direct, permanent jobs, allowing employers to reduce or even abandon their responsibility to workers. In such cases, the labour agreements are replaced by commercial service contracts between the former employer and the firm that provides the labour force. The entire ideology of labour law was based on permanent contracting and dismissal rules between an employer and its employees, and the mutual liability of them in such a longer-term relationship. This historical fundament is largely or completely missing in this frame of employment solutions, so labour law is also facing challenges there.

To have a broader view on the unsecure terminology of precarious work, in the frame of a European study by McKay et al. (McKay et al., 2012) a survey was carried out in 12 of the EU member states, and answers were collected from more than 260 subject matter specialists and civil organizations involved in labour issues. As a result, they created a broad term of precarious work, containing the elements indicated in the next *Table 1*.

We are able to state for first sight, that the upper four issues (missing rights, missing social protection and actual health and safety risk at work, insufficient income) are widely interpreted as precarious, while there seems to be a second group of still important, but less weighted factors (planning inability, instability, temporariness of work). The third group shows factors that were considered the least relevant, however, with some outliers concerning lack of training in Germany or being “non standard” in Greece. The sometimes very different judgements on elements are the results of different work traditions in countries. According to Eurostat, in 2010, the ratio of part-time employees for example in Bulgaria were only 2.2% of the total employed, while employees in the Netherlands with such conditions topped at 48.3% among EU member states (Koncz, 2012). After 2010, a significantly growing demand for additional workforce emerged at the European labour market. The needs were served mainly

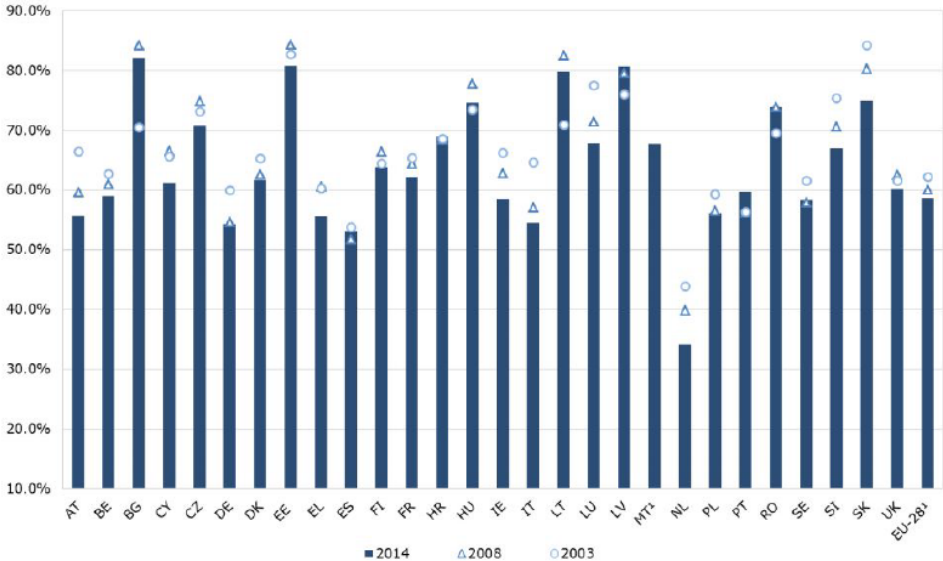
**Table 1. Elements comprising the ‘most precarious’ work in 12 Member States, surveyed in 2011, by country (%)**

	BU	FR	GE	GR	IE	IT	LA	NE	PO	ES	SE	UK
Unable to enforce rights	80	37	88	74	91	60	68	59	70	89	68	65
Absence of social protection	75	75	63	70	46	61	53	41	59	89	79	42
H&S risk	60	13	79	48	64	43	43	53	53	69	75	53
Insufficient income	55	75	88	65	64	43	21	70	53	77	46	62
Inability to plan	20	50	50	57	27	73	36	12	47	35	21	27
No stability	55	63	29	48	37	46	18	24	59	31	11	31
Temporary work	15	38	25	48	0	41	32	12	35	31	46	31
Unequal access to training	15	12	50	22	18	16	14	6	0	15	11	4
Non standard	20	0	13	57	0	13	3	0	0	15	7	8
Economically dependent	0	0	17	9	0	3	14	6	6	0	14	11

Source: McKay et al. 2012 p. 90, shaded cells are values over row average.

in three ways. First, the number of employed third-country labour force grew heavily. Eurostat data show that the increase of third-country (non-EU member state) workers aged 15–39 grew radically between 2006 and 2016, by additional two million persons, while the total number of employed in the age group has decreased by almost 600 thousand people in the so called Core10 EU member states (Artner, 2018). Offering additional advantages for women to return to the labour market received special attention in some countries, and finally, leading back the elder aged to active work became also a common sign of additional labour force demand. As an interesting effect, at the same time, the average healthy life-years of adults has decreased from 62,2 in 2010 to 61,5 in 2013 in European average (Artner, 2018). The increasing employment figures can be interpreted in a positive way, certainly, but they also easily camouflage the detectable erosion of working conditions and the growing importance of unusual or atypical employment.

In the EU average, the number of low-paid employees also grew between 2010 and 2016. A report to the European Parliament (EUPARL 2016) stated the main element of precariousness in the European labour market is still the low payment level in full-time jobs. As *Figure 1* shows below, full time jobs are still in majority,

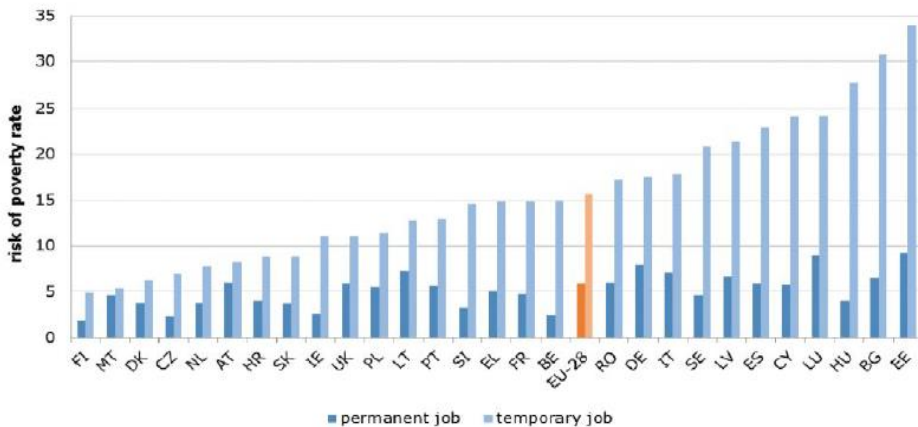


**Figure 1. Decreasing share of full-time open-ended employment in Europe based on 2003, 2008 and 2014 Labour Force Survey data**  
 Source: EUPARL 2016.

but in general, their share from the labour market has significantly decreased in all EU member states.

Low wages result in the so-called “*risk of in-work poverty*” which is a standard element of European Living Condition Statistics (EU-SILC). Eurostat data also showed that the relationship between the risk of in-work poverty and temporary jobs is many times higher. In those countries where the general level of wages is lower than the EU average, the exposure to such risks is the highest. 2014 data show that mostly southern and eastern countries are exposed to such risks. Luxembourg is a very unique exception, where the significant in-work poverty risk is the result of the large ratio of third-country, low-paid workers and the very high standard level of living costs in the country. *Figure 2* shows a comparison of EU member states.

Low pay is particularly prevalent for workers in the care, cleaning, hospitality and construction sectors. Other issues affecting vulnerable workers include lack of awareness of employment rights and lack of enforcement of these rights (for example, rights to claim unfair dismissal), and lack of collective, trade union support. Marx and Nolan state at the same time, that most low-paid workers in the EU do not live in households in financial poverty, but that it is individuals who live in a specific household configuration, such as a lone breadwinner with multiple children, who are more likely to suffer from in-work poverty: “Trends in



**Figure 2. In-work risk of poverty rate for permanent and temporary employees, 2014**

*Source: EUPARL 2016*

in-work poverty vary across countries, and in-work poverty is strongly associated not so much with low pay as with single-earnings and low work intensity at the household level, linking in turn to institutional settings and structures in the labour market, tax and benefit system and broader welfare state”. In terms of the minimum wage, they argue that this can usually only prevent single households from in-work poverty, but cannot prevent this in the case of family households with only one person working: “Even in countries where minimum wages are comparatively high they do not suffice to keep sole breadwinner household out of poverty, especially when there are dependent others or children” (Marx, Nolan, 2012, 38). As a strong example, the EU Parliament study stated that 15 per cent of employees in the United Kingdom earn less salary (on different contracting reasons) than the full-time minimum wage in force in the country (EUPARL, 2016). Involuntary part-time employment is one significant reason here. Eurostat data show that more than 60 per cent of part time workers in Italy, Greece, Spain and Bulgaria didn’t have a choice when entering part time jobs.

The picture is getting worse if we take a closer look at other elements of precarious working conditions. Fixed term contracts, job-sharing (when a full-time job is filled by two or more employees in part time agreement) and employment through temporary work agencies became a structural part of the labour market in several countries. Temporary work agencies move around 3.7 million people in the EU, where some of their employees do not even know what or where to work on the next day. The highest ratio of employees subject to such conditions applies to Slovenia (5.2%), the Netherlands (4.1%) and Spain (3%) while the lowest is in Norway (0.2%) and Hungary (0.3%) (Eurostat, 2018). The share of

fixed-term contracts (excluding apprenticeships and trainees) of total employment is at average about 7% in Europe and has not changed significantly in most countries (EUPARL, 2016, 97). The length of fixed term contracts is usually short. Most such contracts cover 3 or 6 months periods. A further element of precariousness is the existence of “zero working hours” contracts. In this case, the employer is not liable for giving effective work for the employee, thus also meaning that there is no obligation to pay a salary for the standby period. Cyprus, Malta, Finland, Sweden, Ireland and the United Kingdom apply this form of employment as a standard option (KBS, 2017). These working conditions give limited access to healthcare, limited participation in trade union movements and in general, they are considered more risky by the employees. There are more and more complaints on physical working risks as well, which are monitored from a healthcare-point of view.

A further phenomenon in some EU countries is the strongly growing number of persons working in a second job as well. In most developed member states like Germany or France, more than 2.3 million second jobs were officially established additionally, resulting in that currently about 7.5 million people in Germany have a low paid secondary job besides a “regular” job. There is a layer of employees where the people are not able to reach their expected standard of life in one single job (White, 2014). Changes in the officially reported working hours also occur. While the ratio of persons working full time, more than 44 working hours a week on EU28 level has decreased slightly (from an average of 38.2% to 37.1 between 2002 and 2016, in some countries the ratio of persons working during the weekends has strongly increased. Reasons for the latter are “commercialized” weekends: shopping and accessing other services is becoming a family fun activity, and, tourism.

### **3. Conclusion**

The European labour market shows several tendencies that can be considered as risky for the employees. We are witnessing a very strong and growing demand on the market while the solutions invented for the additional workforce supply seem to have mixed consequences. There is a growing risk of social exclusion which is the result of the growing number of low-paid jobs on the one hand, while the “alternative” forms of employment have less legal support on the other hand and grant less rights for workers against employer misuse. Current data show that although there is a kind of growing flexibility of employees, but it is hardly identifiable if this flexibility is a natural phenomenon in the circle of younger generation employees or it is an involuntary response to the worsening working conditions. It is worthy to examine the phenomena in several groups of countries

in the future, since the labour markets of member states show a few identifiable patterns, which are rather different from each other. The directions for future research should lead to: a deeper analysis of the elements of the definition of precarious jobs with inevitable focus on how the employees themselves think about their own working conditions. A stratification of countries could further detect the differences in the level of risks in the European Union.

## References

- ARTNER, A. 2018. Aggasztó tendenciák az Európai Unió munkaerőpiacán. In: *Statisztikai Szemle*, Vol. 96, No. 4, pp. 346–374.
- EUPARL – EUROPEAN PARLIAMENT 2016. Precarious Employment in Europe: Patterns, Trends and Policy Strategies, Directorate General for Internal Policies, IP/A/EMPL/2014-14 July 2016, PE 587.285
- EUROSTAT 2018 – Temporary Employment Agency Workers by Sex, Age and NACE Rev. 1.1 Activity, and Rev. 2 Activity. Online database. [http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfsa\\_qoe\\_4a6r1&lang=en](http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfsa_qoe_4a6r1&lang=en) and [http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfsa\\_qoe\\_4a6r2&lang=en](http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfsa_qoe_4a6r2&lang=en)
- FRANCO, A., WINQVIST, K. 2002. Statistics in focus – *Eurostat, Theme 3, 13/2002*.
- ILO 2019. About the ILO. *Information page of the International Labour Organization*, downloaded from the internet on 18.08.2019. <https://www.ilo.org/global/about-the-ilo/lang--en/index.htm>
- KBS – KEMMY BUSINESS SCHOOL 2017: A Study on the Prevalence of Zero Hours Contracts Among Irish Employers and Their Impact on Employees, 2015. University of Limerick. <https://www.labour.ie/download/pdf/studyontheprevalenceofzerohourscontracts.pdf> [Accessed 01.09.2019].
- KONCZ, K. 2012. Foglalkoztatási célkitűzések és a valóság. In: *Statisztikai Szemle*. Vol. 90, No. 2–3, pp. 165–187.
- MARX, I., NOLAN, B. 2012. In-work poverty. Growing inequalities' impacts. In: *GINI discussion paper*, 51, July.
- McKAY, S., JEFFERYS, S., PARAKSEVOPOLOU, A., KELES, J. (McKAY et al.) 2012. *Study on Precarious work and social rights, Carried out for the European Commission, Final Report*. Working Lives Research Institute – Faculty of Social Sciences and Humanities, London: Metropolitan University, United Kingdom
- NARDINELLI, C. 1980. Child labor and the factory acts. In: *The Journal of Economic History*. Vol. 40, No. 4, pp. 739–755.
- OECD – Organisation for Economic Co-Operation and Development 2017. Understanding the Socio-Economic Divide in Europe. Background Report, 26 January. <https://www.oecd.org/els/soc/cope-divide-europe-2017-background-report.pdf>
- RAVALLION, M. 1992. *Poverty comparisons: A guide to concepts and methods*. Washington, D. C.: The World Bank.
- WHITE, C. 2014: Are “mini-jobs” a responsible substitute for Canada’s temporary foreign workers? In: *Scotiabank Economics*. 15 August. <https://www.gbm.scotiabank.com/content/dam/gbm/scotiaeconomics63/mini-jobs.pdf>



# Human Development and Socio-economic Changes in Romania in a Central and Eastern European Regional Context

VALÉR VERES<sup>1</sup>

**Abstract:** This paper analyses economic and social changes and development in Romania after the 1989/90 regime change until 2017, focusing on the period since Romania's EU accession, in a Central and Eastern European context. The notion of social changes as development has been operationalised based on the component analysis of the Human Development Index, also supported by the UN and OECD, analysed according to components. Data sources: UNDP, EUROSTAT.

**Key words:** social change, development, Romania, Central and Eastern Europe

## 1. Introduction

Social change is a phenomenon that may be grasped from an interdisciplinary point of view. Several disciplines deal with it, especially with the question of when change may be regarded as qualitative „development”.

According to Mandelbaum, the concept of development always carries in it the concept of change, but change does not always mean „development”. Accidental changes are not regarded as development. At the same time, not every structured change may be regarded as development, either (for example, the regular changing of traffic light colours is not a structured change) (Mandelbaum, 1971, 43).

Measuring social development has undergone great development in German and Scandinavian literature where we may emphasise the names of Wolfgang Zapf, Erik Allard, and Joachim Vogel (Bukodi, 2001).

We use an approach to the interpretation of social development that coincides with the component approach also supported by the UN and OECD, according to which social relationships are analysed according to components (employment, economic growth, domestic relationships, life circumstances, medical care, level of education, etc., see Gáspár, 2012, 77–78). Since the 1980s, multiple research has been carried out on this issue in the wider region (Andorka–Harcza 1986). Social indicators develop in contender models both in the international and Hungarian context (Bukodi, 2001; Gedeon, 2004).

---

<sup>1</sup> VALÉR VERES, Babes-Bolyai University, Romania, veres.valer@ubbcluj.ro

During our research, we analyse the changes using different social and economic indicators – rates, according to the following components (economy and incomes, education and level of education, life expectancy and health status). There have been several attempts to compress different component indicators into a unitary indicator. The most successful one is the Human Development Index (HDI). This indicator is construed on the basis of indicators of the above-mentioned fields; it is a relatively simple indicator that has many flaws (Saisana, Saltelli and Tarantola, 2005), but it is worth using it, analysing it together with other indicators, as we shall demonstrate in the closing part of our study, summing up, ranking the tendencies that may be observed in different developmental dimensions.

During the evaluation of social indicators, we shall take into account two approaches: the first one is an international comparison to analyse Romania's situation from a Central and Eastern European (CEE in the following) perspective, and the second one is represented by the analysis of changes in time whereby we analyse the period since the regime change of 1989/90 according to components, with a special view to changes in Romania's position in the region.

In our analysis, we are seeking to answer two research questions. One refers to the dimensions in which changes have been more powerful in Romania, to determine when we can talk about social development with respect to Romania between 1990 and 2017. The other refers to the extent of developmental growth in Romania in a Central and Eastern European context and the role of EU integration in changing Romania's position within the CEE region.

*Methodology.* Methodologically, these components have been measured by means of different economic and social indicator data series, according to the dimensions of the Human Development Index: (1) economic and labour force market, (2) human capital and education indicators, (3) population change and health. The indicators used in the analysis, besides the HDI index and its components included additional indicators for each dimension (such as an increase in actual individual consumption, Gini index, employment in services, students in tertiary education, healthy life expectancy), and we also used bivariate and multivariate statistical methods. Two approaches have been applied: the first is an external comparison whereby we analyse the situation of Romania in comparison with Central and Eastern Europe, i.e. in a regional comparison, while the second one is the analysis of changes in time whereby we review the development changes that have taken place since Romania's EU accession, with a special view to Transylvanian regions and ethnicity, when data allow it.

## 2. Body of the Paper

### 2.1 Economy and incomes

According to the typology of King and Szelényi (2005), Romanian society after the regime change can be classified as capitalism “from the outside”, where the nomenclature originating in communism had a key role in privatisation (while Hungary has been classified into another type, i.e. manager-capitalism without capitalists (see also Eyal, Szelényi and Townsley, 1998).

In parallel, with the shrinking of industry, the rate of the active population decreased to 40% of the total population, while in rural environments this rate is even lower (38.5%, see Veres, 2015, 104; Benedek, 2006, 2015)

Analysing the economic situation, in 1990, but also in 1995, the value of GDP per capita was lower or similar to that registered in Romania (in PPP, 2011, year’s prices) in 8 of the 16 CEE countries and the Baltic states including Lithuania. Then, until 2001, Romania has gradually dropped behind as far as economic development is concerned compared to these countries (*see Table 1*).

Between 2001 and 2008, we could witness economic growth in Romania (which is also reflected by an increase in the HDI, see also Popescu-Ivan-Rat 2016). During the economic growth fuelled by the EU integration process (which became obvious after 2002), the volume of foreign investments had strongly increased, which could also be demonstrated by an increase of GDP and incomes: between 2000 and 2010 the value of GDP per capita at purchasing power parity had increased from 10250 USD to 17,355 USD (in reality, this extraordinary increase lasted until 2008, which was followed by recession for two years, first it was 7.1%, and then 1.9% in 2010 (Popescu, Ivan and Rat, 2016). Accordingly, the value of GDP per capita in Romania in 2010 (17,355 USD, PPP) was the same (again) as in Latvia and it was lower, but close to that of one group of the Visegrád and Baltic countries (Lithuania, Poland, Hungary) where GDP per capita at purchasing power parity was around 19-22000 USD. In the year 2015, the distance between Romania and the Visegrád and Baltic states became even larger, calculated in PPP \$, mirroring the level of year 2011 (*Table 1*).

Eurostat data illustrates the changes compared to EU 28 average from 1995 to the present. In Romania, the value of GDP per capita at purchasing power parity represented only 30% of the EU average in 1995, but back then, as seen in Table 2, it was close to the values of several other CEE countries (Latvia, Lithuania, Bulgaria). In Romania’s case, the value of the indicator had decreased until 2000 (to 26%, which was considered very low even at CEE level, including even the Western-Balkan region), then the value of the GDP had started to slowly increase even in a European context, but it only exceeded the value from 1995 in 2003. Then, until 2008, the Romanian GDP – exceeding the rhythm of other countries –

**Table 1. GDP per capita at purchasing power parity (2011 PPP \$) in CCE countries and in a few other countries, 1990–2015**

Country	1990	1995	2000	2005	2010	2015*	Country	1990	1995	2000	2005	2010	2015
Albania	4,303	3,899	5,165	7,046	9,374	10,397	Latvia		8,146	10,991	17,235	17,983	22,628
Belarus	8,084	5,275	7,300	10,851	15,703	16,621	Lithuania		9,229	12,023	18,273	20,782	26,397
Belgium	30,411	32,361	36,901	39,495	40,698	41,138	Moldova Rep.	6,440	2,596	2,329	3,318	3,925	
Bulgaria	9,284	8,434	8,945	12,531	15,262	16,956	Poland	10,140	11,150	14,640	16,987	21,457	24,836
Croatia		12,543	15,644	19,420	19,989	20,430	Romania	11,181	10,272	10,250	14,275	17,355	19,926
Czech Rep.	19,839	19,093	21,003	25,571	28,111	29,805	Russian Federation	20,639	12,813	14,051	19,326	23,108	23,895
Estonia		11,069	15,298	22,219	22,199	26,930	Serbia		7,167	7,741	10,568	12,301	12,863
France	29,424	30,823	34,773	36,393	36,742	37,306	Slovakia		12,876	15,242	19,490	24,504	27,394
Germany	31,470	33,850	36,979	37,924	40,665	44,053	Slovenia		18,245	22,494	26,683	28,388	28,942
Greece	21,070	21,641	25,300	30,108	29,259	24,617	Turkey						
Hungary		15,137	17,766	22,190	22,150	24,474	Ukraine	10,490	5,073	4,809	7,265	7,844	7,450

\*For some countries, the latest data was from 2015.

Source: UNDP, <http://hdr.undp.org/en/data/trends> (02.05.2018), own edition

remained 25% higher than the EU average, increasing to 51% of this average, then it stagnated until 2011 after which it started to increase again, reaching 63% of the EU average, which was again close to the value of some Visegrád and Baltic states at purchasing power parity. On the expenses side, by 2017, Romania has surpassed even Hungary by 1% (Veres 2018, 105–149). Between 2000–2010, the rate of GDP growth in the Baltic states and Slovakia was almost identical to that of Romania (18–24%), while Romania and a few other states had significantly improved their positions between 2010 and 2017 as well, by more than 10% (Romania by 12%), (*Table 2*).

States with an uncertain status from the point of view of EU accession that have still not become EU member states have not succeeded in significantly decreasing their lag behind the EU average since 2000. Although between 2000 and 2010 certain states had managed to improve their position by almost 10%, after that their situation did not change significantly (Albania, Serbia, Macedonia, Bosnia are at 28–37% of the EU average even currently, while Ukraine and Moldova do not even reach this level). Between 2010 and 2015, Turkey's position showed a significant improvement, and has been stagnating since (*see Table 2*).

We analysed the evolution of income inequalities in CEE countries and Romania. As already mentioned before, during the last decades, these inequalities have increased in several countries. The GINI coefficients of Romania, and countries with a smaller GDP per capita in 2000, such as Bulgaria, Latvia and Lithuania had increased between 2000 and 2017, in Romania by 5.7%, from 29 to 35, reaching 37 in 2015. In Bulgaria, it increased from 25 to 40, while in the Baltic states it was already 30 in 2000, as high as 34 in Latvia. However, in the Visegrád countries, except Poland, where the GINI coefficient is around 30, the value of the indicator is around 25–26 and it has not exceeded beyond 30 since 2015 either (*see Table 3*).

Inasmuch as incomes are concerned, significant differences may be noticed even from a territorial point of view, between Romanian counties and regions as well. While in the period following EU accession, based on EUROSTAT data, Romania's GDP per capita had risen by 40% between 2007 and 2016, this increase was very different in Romania's various regions and counties and the already significant territorial differences had further increased. The increase in counties with an income indicator above 10,000 EUR per capita has remained relatively stable, but it varies from county to county. Constanta county showed the highest increase (57%), followed by Brasov (39%), Timis (33%) and Cluj (28.7%). On the whole, regions from across the Carpathians (35–46) have exceeded the rate of increase of Transylvanian counties (29–31) by approx. 7–10% on average and the South-Eastern region with its centre in Constanta has registered the highest rate of development. The rate of increase, however, was very unequal among counties. Certain low income counties have registered an enormous increase (Giurgiu 90,

Ialomița 67, Călărași 65, Tulcea 61, Bucharest 55, Vaslui 49 and Maramures by 45%). Except for one, these are Southern counties, located mostly in Muntenia. The other counties from Moldova have also increased their rate to a degree equivalent to the national average, indeed, from a very low level (Iași, Neamț, Vrancea) while Prahova, Dolj, Gorj and Olt counties have registered a 40% increase during this period. Except for Ilfov county, where it seems that the global economic crisis has caused recession for over 10 years, the lowest increase has been registered by counties with a Hungarian population. In Bihor, Harghita, Covasna counties, the rate of increase of GDP per capita was only between 10 and 18%. Only Arges county registered such a low increase (*Table 4*).

**Table 2. GDP per capita at purchasing power parity, as percentage of the EU average, CEE countries and a few other countries (EU28=100), 1995–2017**

	1995	2000	2005	2010	2015	2017	Change 1995–2017
European Union	100	100	100	100	100	100	0
EU (15 countries)	117	116	113	110	109	108	–9
Belgium	125	124	121	120	118	117	–8
Bulgaria	33	28	37	44	47	49	16
Czech Republic	76	71	79	83	87	89	13
Germany	131	122	118	120	124	123	–8
Estonia	35	42	60	65	75	77	42
Greece	85	86	93	85	69	67	–18
France	115	115	111	108	105	104	–11
Croatia	46	48	56	59	59	61	15
Latvia	31	35	50	53	64	67	36
Lithuania	33	37	53	60	75	78	45
Hungary	51	53	62	65	68	68	17
Poland	43	47	50	62	68	70	27
<b>Romania</b>	<b>30</b>	<b>26</b>	<b>35</b>	<b>51</b>	<b>56</b>	<b>63</b>	<b>33</b>
Slovenia	75	80	87	83	82	85	10
Slovakia	48	50	60	74	77	77	29
North Macedonia	•	27	28	34	36	37	10*
Albania	•	17	21	29	29	29	12*
Serbia	•	25	32	36	36	37	12*
Turkey	41	42	43	52	65	65	<b>24</b>
Bosnia-Herzegovina	•	•	25	29	30	32	–

\*Change 2000–2017.

Source: Eurostat: <http://appsso.eurostat.ec.europa.eu/nui/setupDownloads.do> [02.05.2018].

**Table 3. Income inequalities, GINI coefficient (\*100), in EU member states from CEE and in a few other countries, 1995–2017**

	1995	2000	2005	2010	2015	2016	2017	Change 2000–2016
EU	•	•	30.6	30.5	31.0	30.8	•	
Euro area	•	•	29.4	30.2	30.8	30.7	•	
Belgium	29	30	28.0	26.6	26.2	26.3	26.0	–3.7
Bulgaria	•	25	•	33.2	37.0	37.7	40.2	12.7
Czech Republic	•	•	26.0	24.9	25.0	25.1	•	0
Denmark	20	•	23.9	26.9	27.4	27.7	27.6	7.7
Germany	29	25	26.1	29.3	30.1	29.5	•	4.5
Estonia	•	36	34.1	31.3	34.8	32.7	•	–3.3
Greece	35	33	33.2	32.9	34.2	34.3	•	1.3
France	29	28	27.7	29.8	29.2	29.3	•	1.3
Croatia	•	•	•	31.6	30.4	29.8	•	–
Latvia	•	34	36.2	35.9	35.4	34.5	34.5	0.5
Lithuania	•	31	36.3	37.0	37.9	37.0	•	6
Hungary	•	26	27.6	24.1	28.2	28.2	28.1	2.2
Poland	•	30	35.6	31.1	30.6	29.8	•	–0.2
<b>Romania</b>	•	29	:	33.5	37.4	34.7	35.1	5.7
Slovenia	•	22	23.8	23.8	24.5	24.4	•	2.4
Slovakia	•	:	26.2	25.9	23.7	24.3	•	–1.9
Finland	•	24	26.0	25.4	25.2	25.4	25.3	1.4
Sweden	•	•	23.4	25.5	26.7	27.6	•	–
United Kingdom	32	32	34.6	32.9	32.4	31.5	•	–0.5
North Macedonia	•	•	•	•	33.7	33.6	•	–
Serbia	•	•	•	•	38.2	38.6	•	–
Turkey	•	•	•	43.5	41.9	:	•	–

Source: Eurostat: <http://appsso.eurostat.ec.europa.eu/nui/setupDownloads.do> [02.05.2018].

## 2.2 Educational situation and the evolution of the educational level

Education and the educational level of the population are important dimensions of the analysis of human development, which depend on the structure and functioning of the educational system to a great extent.

In time, the indicators used to analyse the level of development characteristic to the educational dimension change as HDI components. Instead of the gross aggregate indicator for the rate of literacy and enrolment, we used the planned and

**Table 4. GDP per capita at current prices (EUR), Romanian counties, 2007, 2016**

Region/ County	2007	2016	Increase 2007–2016 (%)	Region/ County	2007	2016	Increase 2007–2016 (%)
<b>Romania</b>	<b>6,159</b>	<b>8,617</b>	<b>39.9</b>	Galati	4,594	5,800	26.2
<b>Nord-Vest</b>	<b>5,855</b>	<b>7,586</b>	<b>29.6</b>	Tulcea	4,033	6,493	61.0
Bihor	6,182	6,822	10.3	Vrancea	3,677	5,266	43.2
Bistrita- Nasaud	4,945	6,298	27.4	<b>Sud - Muntenia</b>	<b>5,035</b>	<b>6,820</b>	<b>35.4</b>
Cluj	8,218	10,577	28.7	Arges	6,926	7,650	10.5
Maramures	4,223	6,152	45.7	Calarasi	3,203	5,289	65.1
Satu Mare	4,594	6,060	31.9	Dâmbovita	4,735	5,965	26.0
Salaj	4,890	6,673	36.5	Giurgiu	3,015	5,752	90.8
<b>Centru</b>	<b>6,213</b>	<b>8,025</b>	<b>29.2</b>	Ialomita	3,574	5,973	67.1
Alba	6,666	8,415	26.2	Prahova	6,363	9,087	42.8
Brasov	7,273	10,127	39.3	Teleorman	3,621	4,747	31.1
Covasna	4,986	5,888	18.1	<b>Bukarest- Ilfov</b>	<b>14,332</b>	<b>20,538</b>	<b>43.3</b>
Harghita	5,019	5,709	13.7	Bucuresti	14,864	23,174	55.9
Mures	5,475	6,828	24.7	Ilfov	10,839	10,056	-7.2
Sibiu	6,890	9,216	33.8	<b>Sud Vest- Oltenia</b>	<b>4,647</b>	<b>6,276</b>	<b>35.0</b>
<b>Nord-Est</b>	<b>3,864</b>	<b>5,258</b>	<b>36.1</b>	Dolj	4,679	6,445	37.7
Bacau	4,325	5,568	28.7	Gorj	5,943	8,274	39.2
Botosani	3,186	4,184	31.3	Mehedinti	3,869	4,865	25.7
Iasi	4,664	6,563	40.7	Olt	3,646	5,001	37.1
Neamt	3,627	5,100	40.6	Vâlcea	5,113	6,489	26.9
Suceava	3,906	4,837	23.8	<b>Vest</b>	<b>6,788</b>	<b>8,945</b>	<b>31.8</b>
Vaslui	2,595	3,875	49.3	Arad	6,394	8,619	34.8
<b>Sud-Est</b>	<b>5,059</b>	<b>7,385</b>	<b>46.0</b>	Caras-Severin	4,887	6,467	32.3
Braila	4,952	6,075	22.7	Hunedoara	5,930	6,541	10.3
Buzau	4,044	5,691	40.7	Timis	8,589	11,476	33.6
Constanta	7,316	11,484	57.0				

Source: Eurostat: <http://appsso.eurostat.ec.europa.eu/nui/setupDownloads.do> [02.05.2018].



the attained educational level, which is basically an indicator measured by the number of years spent with studying. All these indicators, however, greatly reflect the extent to which school education at different levels has become general, i.e. the extent to which it has developed into mass education, and the extent to which young people are continuing their education according to different age groups. Therefore, first we consider it important to analyse the development of the educational system and the process of massification in secondary and higher education.

The expansion of education has an impact on the employment rate of the population and thus it plays an important role in the transformation of the economic and social structure. Since 1990, enrolment numbers in secondary and higher education have increased year by year in Romania. Within secondary education, the number of high-school places, together with vocational classes, had slowly reached the number of general school graduates, thus in the 2000s, it was possible to decrease the rate of early school leaving between educational levels (Veres 2015, see also Kertesi, Köllő, 2006).

The mean years of schooling is a basic indicator of the educational dimension of the HDI. Basically, if there are no direct data, it is estimated based on the rate of different school level graduates and the number of school years for a given educational level. In 1990, this indicator was around 7–9 in most countries, around 11–13 by 2015/2017, except in Turkey and Albania where it was around 8–10 in 2017. In Romania, the value of the schooling indicator was around 9 in 1990, which was considered high back then. Since then, it has slowly increased by one year every 10 years, but in 2017 – with 11 years – it was a little bit behind most of the Baltic and Visegrád countries where the value of the indicator was above 12 years. Between 1995 and 2017, i.e. in 27 years, the value of the indicator had only increased by two years in Romania, while in several CCE countries it had increased by more than three years (*Table 5*, see also Andor, Liskó, 2000).

With the expansion of higher education, in Romania, the number of university students increased by 127.6% from 1992 to 2002, to 563991 students, while between 2002 and 2011 it increased by another 15.2%, to 649955 students. Between 2002 and 2011, the number of secondary school students started to increase again, with a value of 21.2 at the national level. This increase is not explained by a change in age group counts, but expansion: an increasing number of young people are enrolled in high schools offering baccalaureate (see Veres 2017, 201–202).

Overall, it may be stated that beginning in 1990, social and economic changes had brought about significant labour market changes in Romania, the demand for physical work decreased, the number of positions requiring routine intellectual work increased, therefore the prestige of vocational training not offering baccalaureate depreciated and the demand for baccalaureate and higher educational

degrees increased, which had an impact on the educational level of the entire society. However, participation in education did not happen with equal chances: only a very small percentage of those living in rural areas, especially those with Roma origins could obtain a higher education degree (see also Csata, 2004).

**Table 5. The mean years of schooling in CEE countries and a few other countries, 1990–2015**

Country	1990	1995	2000	2005	2010	2015	2017	Increase 1990–2017
Albania	7.4	8.0	8.5	8.8	9.1	9.6	10.0	2.6
Belarus	–	8.5	8.9	9.3	12.0	12.0	12.3	–
Belgium	9.4	9.7	10.0	10.6	11.2	11.4	11.4	2.0
Bulgaria	8.9	9.3	9.5	10.2	10.6	10.8	11.8	2.9
Croatia	6.0	7.3	9.4	9.7	10.8	11.2	11.3	5.3
Czech Republic	10.9	12.1	12.9	13.1	12.3	12.3	12.7	1.8
Estonia	9.3	10.5	12.0	12.0	12.0	12.5	12.7	3.4
France	7.1	8.8	9.8	10.4	11.0	11.6	11.5	4.4
Germany	8.8	9.7	10.5	12.3	13.0	13.2	14.1	5.3
Greece	7.9	8.2	8.6	9.8	10.2	10.5	10.8	2.9
Hungary	8.7	10.3	10.2	10.8	11.7	12.0	11.9	3.2
Latvia	7.6	8.9	9.5	12.3	11.9	11.7	13.0	5.4
Lithuania	9.0	9.9	10.7	11.7	12.3	12.7	12.7	3.7
Moldova Republic	8.0	8.6	9.0	10.4	11.1	11.9	11.6	3.6
Poland	9.8	10.5	11.1	11.3	11.7	11.9	12.3	2.5
<b>Romania</b>	9.0	9.5	9.9	10.1	10.6	10.8	11.0	2.0
Russian Federation	9.2	10.0	11.3	11.6	12.0	12.0	12.0	2.8
Serbia	8.0	8.8	9.4	10.2	10.4	10.8	11.1	3.1
Slovakia	10.8	11.4	10.3	10.8	11.6	12.2	12.5	1.7
Slovenia	10.9	11.2	11.6	11.4	11.8	12.1	12.2	1.3
Turkey	4.5	4.8	5.5	6.0	7.2	7.9	8.0	3.5
Ukraine	9.1	10.0	10.7	11.2	11.3	11.3	11.3	2.2

Source: UNDP, <http://hdr.undp.org/en/data/trends> [02.05.2018].

### 2.3 Population change, life expectancy

Of the demographic indicators, life expectancy at birth is mainly used to measure social and economic development. This reflects the actual state of mortality from the point of view of the entire population, given that the distorting effect of age structure may be filtered out, thus it indirectly also reflects the health status of the population, as well as the way of life that contributes to a long life (food culture, alcohol consumption, physical activity, etc.). As pointed out by T. Rotariu (2003,

2012), after 1990, life expectancy at birth in Romania increased by only half a year for men and by 1.1 years for women between 1990 and 1999, which lags behind the increase registered by Western and Central European countries (see also INS 2013). During this period, however, as we could see, the situation of the country showed no improvement with respect to several other indicators either, such as, for example, GDP per capita. After the turn of the millennium, beginning with 2000, the value of the indicator was 74.2 years for women and 67.3 for men. Then, in the following 10, then 15 years we could witness a significant increase: more than 5 years for both sexes.

In a CEE context, in 1990, average life expectancy at birth calculated for both sexes was 69.5 years in Romania, which was the same as the values for Hungary, Latvia and Estonia and it only lagged behind the other countries of the region by one year, while in some states of the Soviet Union this value was even lower (Russia, Moldova K. 67–68 years). As compared to major Western European countries (Germany, France, Belgium), the backlog was almost 5 years in 1990. As we could see, the value of the Romanian indicator had improved by only one year by 2000, then by another 4 years by 2015, almost reaching 75 years. In 2000, of the older EU member states, only Latvia and Estonia had a lower or similar life expectancy as Romania, Bulgaria and Hungary were one year ahead, the other CEE countries joining the EU were several years ahead of Romania and the above mentioned Western European countries were even 7–8 years ahead. In 10 years, average life expectancy at birth in Romania showed a 3.3 years rise from this low value from year 2000 to 73.8 years by 2010. Overall, between 1990 and 2017, the Romanian HDI increased by 6.1 years, which at CEE level may be considered an average performance. The Visegrád countries and Slovenia in particular showed an increase that was approximately one year higher, while the increase was lower in other countries. With the value from 2017 of 75.6 years, Romania has slightly improved its position within the EU, slightly outpacing Lithuania, Latvia and Bulgaria and coming very close to (by half a year) Hungary (76 years), but slightly lagging behind Slovakia (77.0) and significantly lagging behind (by 2–3 years) the other Visegrád countries which are also forerunners inasmuch as other indicators are concerned (Poland 77.8, Czech Republic 78.9), while the backlog is almost seven years on average as compared to larger Western European countries (Germany, France, 81 years, *Table 6*). There are significant differences between men and women in every country. In 2015, the life expectancy of Romanian women was 79 years and 71.5 years for men. The biggest difference between the sexes was measured in Russia (approx. 10 years) and the smallest in several Western European countries (e.g. Italy, Sweden, 4 years). A greater difference between the sexes is observed if average values of life expectancy are lower; there are larger differences between the sexes, especially in the countries of the former Soviet Union (see Veres, 2018).

**Table 6. Average life expectancy at birth in CEE countries and a few other countries, every 5 years, 1990–2017**

Country	1990	1995	2000	2005	2010	2015	2017	Increase 1990–2015
Albania	71.8	72.2	74.2	75.9	76.9	78.0	78.5	6.7
Belarus	70.6	68.3	67.4	68.4	70.2	71.5	73.1	2.5
Belgium	75.8	76.8	77.8	78.9	80.0	81.0	71.3	−4.5
Bulgaria	71.3	70.9	71.4	72.5	73.5	74.3	74.9	3.6
Croatia	72.3	73.7	74.8	75.5	76.6	77.5	77.8	5.5
Czech Republic	71.8	73.1	74.7	76.1	77.6	78.8	78.9	7.1
Estonia	69.4	68.7	70.4	72.6	75.3	77.0	77.7	8.3
France	76.6	77.7	78.8	80.1	81.4	82.4	82.7	6.1
Germany	75.4	76.5	77.9	79.2	80.2	81.1	81.2	5.8
Greece	76.6	77.8	78.5	79.4	80.2	81.1	81.4	4.8
Hungary	69.3	70.0	71.8	73.3	74.5	75.3	76.1	6.8
Latvia	69.1	67.8	69.7	71.1	72.8	74.3	74.7	5.6
Lithuania	70.7	69.8	71.0	71.4	72.1	73.5	74.8	4.1
Moldova (Republic)	67.6	66.9	67.0	67.8	69.8	71.7	71.7	4.1
Poland	70.9	71.8	73.7	75.0	76.3	77.6	77.8	6.9
<b>Romania</b>	<b>69.5</b>	<b>69.5</b>	<b>70.5</b>	<b>72.3</b>	<b>73.8</b>	<b>74.8</b>	<b>75.6</b>	6.1
Russian Federation	68.0	66.0	65.1	65.8	68.6	70.3	71.2	3.2
Serbia	71.5	71.8	72.1	72.8	74.0	75.0	75.3	3.8
Slovakia	71.2	72.1	73.3	74.2	75.4	76.4	77.0	5.8
Slovenia	73.2	74.5	75.9	77.6	79.4	80.6	81.1	7.9
Turkey	64.3	67.0	70.0	72.5	74.2	75.5	76.0	11.7
Ukraine	69.8	67.9	67.3	67.5	69.3	71.1	72.1	2.3

Source: UNDP, <http://hdr.undp.org/en/data/trends> [02.05.2018].

## 2.4 The evolution of social and economic development based on the HDI

Based on the HDI as a complex indicator, we are able to synthetically analyse the rate and rhythm of growth during the last 25 years. Romania's HDI had dropped during the 1990s from 0.700 in 1990, which represented a rather good position at the time, or it stagnated, in 1993 it dropped to 0.677 and it only reached the level of 1990 (0.703) in 1999. Afterwards, a fast increase followed in Romania and in 10 years it almost attained the value of 0.80. However, since 2010 it has been stagnating. After the global economic crisis, the rhythm of growth has slowed

down in many countries, but in the meantime, in most CEE EU member states it has started to increase again after 2012. For example, Hungary started from the same HDI index in 1990, showing a moderate increase in the following years, reaching a value of 0.74 by 1995 and a value of 0.769 by 2000. After 2000, however, the rhythm of growth had slowed down in Hungary, especially after 2005, therefore Hungary became the last among the Visegrád and Baltic countries and EU members joining in 2004. Overall, Romania improved its HDI by 11% (0.11) between 1990 and 2017, which is similar to a few CEE EU member states, such as Slovakia, Lithuania, the Czech Republic, it is slightly lagging behind a few countries, such as Poland, Hungary, Latvia, Estonia, where the HDI increased between 12–15%, while non-EU member CEE countries, except for Turkey and Albania (which showed very low initial levels, 0.57 and 0.63, respectively), categorically lag behind inasmuch as growth is concerned, with a growth rate between 0 and 7% during the analysed period (*Table 7*).

If we analyse Romania's development between 1990 and 2017 in an international context, we are also able to see an increase of 11% in a period of 27 years. It was 0.802 in 2015 and 0.811 in 2017, which represented the 50–52<sup>th</sup> place at global level, while CEE countries with a higher HDI level were at the 28–45<sup>th</sup> place. In 1990, Romania's HDI was the same as the indicators for Bulgaria, Hungary, Latvia and Ukraine (0.70, i.e. 70%), which at the time was only 1% lower than the values for Poland and Serbia. In 1990, a few countries had already a lower HDI value than Romania (Albania, Belarus, Croatia, Moldova and Turkey). As compared to 1990, of the countries with a similar or lower HDI, by 2015/2017 Romania has outpaced all those that did not join the EU, such as the Ukraine, Albania, Belarus, Moldova and Turkey. Furthermore, it has the same value as the EU member Bulgaria, but it lags behind the new EU member Croatia. In 2015 and 2017, Turkey's HDI was lower than Romania's HDI, but if we look at the growth rate, Turkey improved its indicator by 21% as compared to Romania's 11% during the analysed 27 years. Of the CEE countries, both the so-called Visegrád countries and the Baltic countries have undergone a more successful development, registering an increase of 12–14% in the value of the HDI, which is slightly higher than the Romanian value. Most countries started from a lower level and there was no decline in the 1990s similar to Romania.

Finally, a cluster analysis model was built, using the HDI component indicators and some other variables: GDP/capita, Gross enrolment ratio-schools (%), Mean years of schooling, Expected years of schooling, Life expectancy at birth, Labour force participation rate, Unemployment rate (same results for the HDI components, too). According to the results, we can see the changing configuration of the countries between 1995, 2005 and 2015. According to dendrograms, in 1995 Romania was in the same group with Estonia and Poland. In 2005, after the depression of the 1990s, it was grouped closely with Bulgaria and Serbia. But after

9 years of EU accession, Romania was closely associated with Croatia, and, at the second level, with Hungary and Latvia, the less developed Baltic and Visegrad countries, and the distance from non-EU countries increased (*Figure 1*).

**Table 7. The value of the HDI (Human development index) in CEE countries and a few other European countries, 1990–2017**

Country	1990	1995	2000	2005	2010	2015	2017	HDI Rank (2017)	Increase 1990–2017
Albania	0.635	0.628	0.662	0.696	0.738	0.764	0.785	68	0.150
Belarus*	–	0.655	0.681	0.723	0.787	0.796	0.808	53	–
Belgium	0.805	0.851	0.873	0.865	0.884	0.896	0.916	17	0.111
Bulgaria	0.700	0.702	0.713	0.75	0.775	0.794	0.813	51	0.113
Croatia	0.669	0.695	0.749	0.783	0.808	0.827	0.831	46	0.162
Czech Republic	0.761	0.785	0.821	0.847	0.861	0.878	0.888	27	0.127
Estonia	0.728	0.722	0.781	0.822	0.838	0.865	0.871	30	0.143
France	0.779	0.825	0.849	0.87	0.882	0.897	0.901	24	0.122
Germany	0.801	0.834	0.86	0.892	0.912	0.926	0.936	5	0.135
Greece	0.760	0.774	0.801	0.85	0.86	0.866	0.870	31	0.110
Hungary	0.703	0.741	0.769	0.802	0.821	0.836	0.838	45	0.135
Latvia	0.703	0.674	0.728	0.807	0.81	0.83	0.847	41	0.144
Lithuania	0.731	0.702	0.757	0.807	0.826	0.848	0.858	35	0.127
Moldova K.	0.652	0.594	0.597	0.648	0.672	0.699	0.700	112	0.048
Poland	0.712	0.738	0.784	0.803	0.829	0.855	0.865	33	0.153
<b>Romania</b>	<b>0.700</b>	<b>0.686</b>	<b>0.708</b>	<b>0.755</b>	<b>0.798</b>	<b>0.802</b>	<b>0.811</b>	<b>52</b>	<b>0.111</b>
Russian Federation	0.733	0.700	0.720	0.754	0.785	0.804	0.816	49	0.083
Serbia	0.714	0.694	0.709	0.739	0.757	0.776	0.787	69	0.073
Slovakia	0.738	0.75	0.763	0.793	0.829	0.845	0.855	38	0.117
Slovenia	0.767	0.782	0.824	0.858	0.876	0.89	0.896	25	0.129
Turkey	0.576	0.604	0.653	0.687	0.737	0.767	0.791	64	0.215
Ukraine	0.706	0.664	0.673	0.716	0.734	0.743	0.751	88	0.045

\*1995–2015

Source: UNDP, <http://hdr.undp.org/en/data/trends> [02.05.2018]

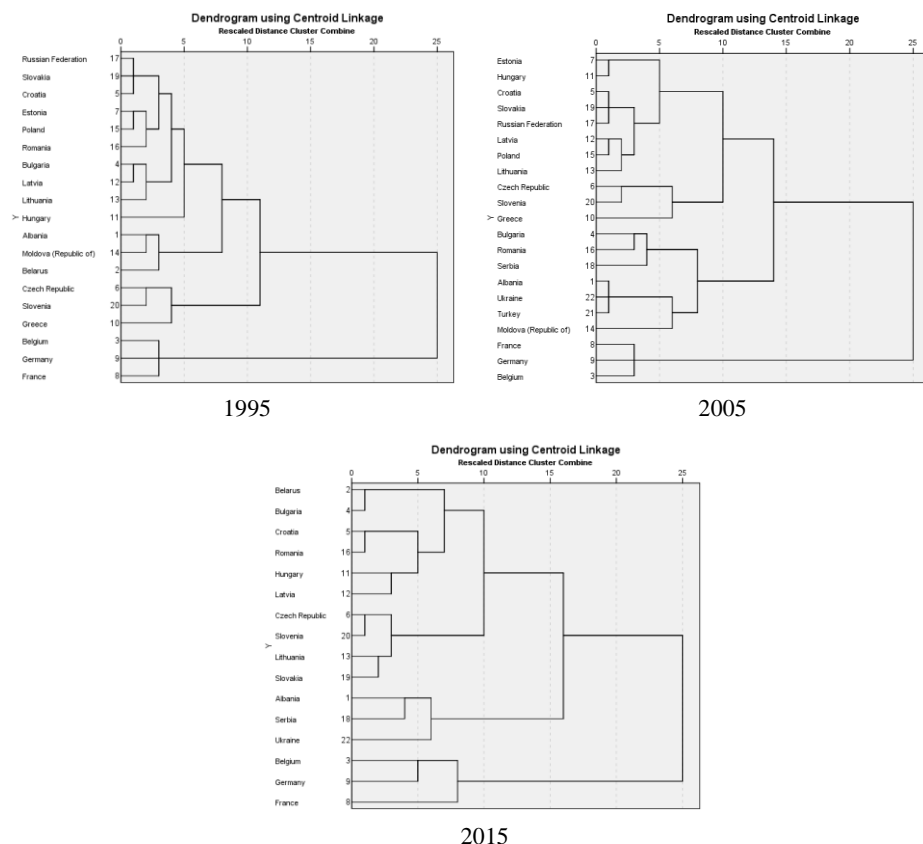


Figure 1. Dendrograms of Cluster analysis, groups of CCE countries 1995, 2005, 2015

### 3. Conclusions

Based on most indicators, inasmuch as Romania's social and economic situation is concerned, very different tendencies may be witnessed during the different periods.

During the first decade (1990–1999), changes were pointing towards a decline with respect to most indicators, the national income had decreased, the educational indicators or life expectancy had not significantly improved and Romania's position had deteriorated in European rankings, falling behind the so-called Visegrád countries. During the second decade of the transition (2001–2010), changes were already unequivocally pointing at growth and development, but there were also changes that could be attributed to an increase in social problems (increase of inequalities), which were partly formed as by-products of some other phenomena that could be considered significant social or economic problems.

As for the improvement of lifestyle, the average life expectancy at birth has increased at an acceptable rate even in a CEE context (by 3–4 years), which reflects a moderate improvement in lifestyle, standard of living and the quality of healthcare services, as well as the degree and way of access to them. But even in this respect, inequalities between the countries have persisted, especially as far as locality types and regions/counties are concerned: the indicators for counties of the economically faster developing big cities with a more developed healthcare infrastructure have improved significantly.

After the global economic crisis, from 2010 to 2017, Romania's indicators were stagnating in several dimensions. The increase in GDP per capita was weakly reflected in the level of economic structure and employment, furthermore, the stagnation in terms of education and standard of living was also reflected in the aggregate HDI, which showed a significant improvement in Romania between 2010–2015, while in most CEE EU member states, it showed a minimum 1–2% increase.

Overall, it may be stated that in Romania, the EU accession process and EU membership have increased the rhythm of social and economic development. As compared to non-EU member states, since 2007, Romania's indicators have improved to a relatively greater extent than those of non-EU member states, except for some isolated situations (for ex. in the case of Turkey), and they have also improved since 2010, while before EU accession, especially in the 1990s, such improvement could not be demonstrated at all or in every case.

Summing up, as compared to CEE countries, Romania falls significantly behind most Visegrád countries in every respect (Czech Republic, Slovakia, Poland), while compared to other countries, the differences have decreased (Hungary, Croatia) or Romania's advantage has increased (Bulgaria, Serbia, Macedonia, Ukraine, Moldova).

## Acknowledgements

This work was supported by a grant of the Romanian Ministry of Research and Innovation, CNCS–UEFISCDI, project number PN-III-P4-ID-PCCF-2016-0084, within PNCDI III, implemented by Babes-Bolyai University Cluj-Napoca.

## References

- ANDORKA, R., HARCSA, I. 1986. *A magyar társadalom modernizációja hosszú- és rövid távon, társadalmi jelzőszámokkal mérve, 1870–1984*. Szociológiai Műhelytanulmányok 1. Budapest: MK. Közgazdaságtudományi Egyetem Szociológiai Tanszék.
- ANDOR, M., LISKÓ, I. 2000. *Iskolaválasztás és mobilitás*, Budapest: Iskolakultúra.



- BENEDEK, J. 2006. A romániai urbanizáció jellegzetességei az utolsó évszázad során. In: HAJDÚ Z., GYÖRI, R. (ed.) *Kárpát-medence: települések, tájak, régiók, térsztruktúrák*. Budapest–Pécs: Dialóg Campus, pp. 77–101.
- BENEDEK, J. 2015. *A társadalom térbelisége és térszervezése. A romániai regionális egyenlőtlenségek társadalomföldrajzi vizsgálata*. Kolozsvár: Egyetemi műhely.
- BUKODI, E. 2001. Társadalmi jelzőszámok – elméletek és megközelítések. In: *Szociológiai Szemle*. No. 2, pp. 35–57.
- CSATA, ZS. 2004. Iskolázottsági esélyegyenlőtlenségek az erdélyi magyar fiatalok körében. In: *Erdélyi Társadalom*. Vol. 2, No. 1, pp. 99–132.
- EYAL, G., SZELENYI, I., TOWNSLEY, E. 1998. *Making Capitalism without Capitalists: The New Ruling Elites in Eastern Europe*. London–New York: Verso Books.
- EUROPEAN COMMISSION 2011. Migrants in Europe. Brussels: The EU, p.18.  
[http://epp.eurostat.ec.europa.eu/cache/ITY\\_OFFPUB/KS-31-10-539/EN/KS-31-10-539-EN.PDF](http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-31-10-539/EN/KS-31-10-539-EN.PDF) [Accessed 20.03.2014].
- EU 2013. Report on Demography. Eurostat News release, 49. (<http://ec.europa.eu/eurostat>)
- GÁSPÁR, T. 2012. A társadalmi-gazdasági fejlettség mérési rendszerei. In: *Statistikai Szemle*. Vol. 91, No.1, pp. 77–92.
- GEDEON, P. 2004. Társadalmi változás vagy társadalmi evolúció? In: *Szociológiai Szemle*. No. 2, pp. 3–26.
- INS 2013 Recensământul populației și al locuințelor din România, la 20 octombrie 2011, vol I. Populație – Structură demografică, Bukarest: INS.
- KERTESI, G., KÖLLŐ, J. 2006. Felsőoktatási expanzió, „diplomás munkanélküliség” és a diplomák piaci értéke *Közgazdasági Szemle*, Vol. 53, No. 3, pp. 201–225.
- KING, L. B., SZELENYI, I. 2005. Post-Communist Economic Systems. In: SMELSER, N. J., SWEDBERG, R. (ed.) *The Handbook of Economic Sociology*. Princeton–New York: Princeton University Press – Russel Sage Foundation (first edition:1994), pp. 205–229.
- MANDELBAUM, M. 1971. *History, Man, & Reason. A Study in Nineteenth Century Thought*. Baltimore and London: The John Hopkins University Press.
- POPESCU, L., IVAN, V., RAT C. 2016. The Romanian Welfare State at Times of Crisis. In: SCHUBERT, K., VILLOTA, P., KUHLMANN, J. (eds.) *Challenges to European Welfare Systems*. Springer International, pp. 615–645.
- ROTARIU, T. 2003. Demografie și sociologia populației. Iași: Polirom.
- ROTARIU, T., VOINEAGU, V. 2012. Inerție și schimbare. Iași: Polirom.
- SAISANA, M., SALTELLI, A., TARANTOLA, S. 2005. Uncertainty and Sensitivity analysis techniques as tools for the quality assessment of composite indicators. In: *Journal of the Royal Statistical Society*. Vol. 168, No. 2, pp. 307–323.
- VERES, V. 2015. *Népességszerkezet és nemzetiség*, Kolozsvár: Egyetemi kiadó.
- VERES, V. 2017. A romániai magyarok oktatási esélyegyenlőtlenségei és a felsőoktatási expanzió, a népszámlálások alapján. In: PUSZTAI G., MÁRKUS ZS. (eds.) *Szülőföldön magyarul. Iskolák és diákok a határon túl*. Debrecen: Egyetemi Kiadó.
- VERES, V. 2018. Társadalmi-gazdasági változás és fejlődés Romániában, közép- és kelet-európai kontextusban, 1990–2017 között. In: *Erdélyi Társadalom*. Vol. 16, No.1, pp. 105–149.

# Cohesion policy and regional development – the case of Slovakia

EVA VÝROSTOVÁ<sup>1</sup>, TOMÁŠ VÝROST<sup>2</sup>

**Abstract:** Since the accession of the Slovak Republic to the EU, 15 years have passed during which the EU Cohesion Policy and its instruments have contributed to the development of Slovak regions. The dependence of public sector investments on EU funds is relatively large in Slovakia. These funds have a positive impact on economic growth and employment; however, regional disparities have increased slightly within 2007–2013. An analysis by KPMG has shown that without the use of cohesion policy resources, these regional disparities would be even more significant. Our previous analysis of the distribution of EU cohesion policy funding for 2007–2013 across Slovak NUTS 3 level regions revealed that the distribution of obtained EU cohesion policy funds and co-financing from state budget for regional projects does not follow the socio-economic situation of Slovakia's regions. This paper focuses on the possible approaches to the analysis and modeling of EU Cohesion policy expenditure 2007–2013 on district level within Slovakia, considering the methodology of classical and spatial econometrics. The LAU 1 level has the advantage in a sense that it allows for the analysis of the spatial distribution of EU funds more closely, even though using smaller regional classification may also lead to discrepancies induced by commuting. We will use several indicators of regional development, as GDP per capita is not available at the district level in Slovakia.

**Key words:** EU funds, cohesion policy, spatial allocation, districts

**JEL Classification:** R12, R58

## 1. Introduction

The aim of the EU Cohesion policy is defined as “reducing disparities between the levels of development of the various regions and the backwardness of the least favoured regions” (Article 174 Consolidated version of the Treaty on the functioning of the European Union). EU Cohesion policy promotes economic, social and territorial cohesion within the EU. This focus on less developed regions and convergence objective has been modified with the Lisbon Strategy. Svoboda (2016) describes this process as ‘Lisabonisation’ of Cohesion policy, which is

---

<sup>1</sup> EVA VÝROSTOVÁ, Faculty of Public Administration, Pavol Jozef Šafárik University in Košice, Slovakia, eva.vyrostova@upjs.sk

<sup>2</sup> TOMÁŠ VÝROST, Obchodná fakulta, Ekonomická univerzita v Bratislave, Slovakia, tomas.vyrost@euba.sk

becoming the general European investment policy. Even though the focus lies primarily on endogenous growth in all regions and their competitiveness (Vanolo, 2010), the principle of concentration of resources is still focused on the less developed regions and countries (as is the in case of Cohesion fund). According to Ex Post Evaluation of Cohesion Policy Programmes 2007–2013, 82% of funding was allocated to operational programmes under the Convergence Objective. The overall allocation of ERDF and CF to convergence regions was 1527 EUR per capita on average over the period, compared to only 91 EUR in the Competitiveness regions (European commission, 2016).

Allocation of Cohesion policy funding to member states is based on regional and national prosperity and unemployment and computed by the so-called Berlin method, which was introduced in 1999 and has evolved with each programming period to reflect new challenges and policy objectives (European Court of Auditors, 2019). Main indicator affecting allocation is GDP per capita in PPS in NUTS 2 regions, as well as other factors such as regional population, coefficient for national prosperity (measured by GNI) and unemployment. In case of Objective 2 of the Cohesion policy 2007–2013 (Regional competitiveness and employment) there are also other criteria with less weight such as number of jobs needed to reach an employment rate of 70%, number of employed people with a low educational level and low population density (Council regulation (ES) 1083/2006). These official allocation criteria are not sufficient determinants for explaining the final distribution of structural funds. Allocation process is influenced by economic criteria as well as other criteria such as political situation within a country (Bodenstein, Kemmerling, 2012) and region relations between various layers of governance (Bouvet and Dall'erba, 2010), securing co-financing to the EU funds (Dall'erba, 2005), capacity to attract and use the funds (Camaioni et al., 2013), interaction between the Commission and the national and regional plans and priorities agreed in Operational programmes (Crescenzi, 2009), administrative capacity of the recipient sub-state authorities (Milio, 2007).

Spatial allocation of EU funds is usually studied at NUTS 2 or NUTS 3 level (e.g. Hájek et al., 2012; Crescenzi, 2009; Bouvet, Dall'erba, 2010; Dellmuth and Stoffel, 2012; Charron, 2016). The main reason is the availability of statistic data for the evaluation of regional development, political and other factors. The spatial analysis at lower levels such as at LAU 1 are rare (e.g. Novosák et al., 2017 in case of Czech Republic, Sloboda, 2007 and Michálek, 2014 in case of Slovakia) because data are not available from Eurostat and therefore the national sources must be used.

Several studies explore the connection of policy, EU funds allocation and regional development: e.g., Zubek and Henning (2016) focus on the impact of local government performance and spillovers as determinants of regional fund absorption, noting its positive impact. Sternberg (2012) shows empirical evidence

for a relationship between entrepreneurial activities and EU regional policies. Mohl and Hagen (2010) explore various panel data approaches to the relation of EU structural funds as a promoter of regional growth, including system GMM and spatial panel models. Veiga (2012) directly examines the determinants of the assignment of EU funds to Portuguese municipalities, highlighting not just normative objectives, but also political motivation as an influencing factor for the distribution of funds by the national government across municipalities.

Our previous analysis of the distribution of EU Cohesion policy funding for 2007–2013 across Slovak NUTS 3 level regions revealed that the distribution of obtained EU Cohesion policy funds and co-financing from state budget for regional projects does not follow the socio-economic situation of Slovakia's regions. We expect that there are larger differences in Cohesion policy funds allocations across the LAU 1 regions in Slovakia. The LAU 1 level has the advantage in sense that it allows for the analysis of the spatial distribution of EU funds more closely, even though using smaller regional classification may also lead to discrepancies induced by commuting.

Within this paper we analyse all projects within 2007–2013 programming period, including national projects and projects of technical assistance. We consider the spatial distribution to be based on the location of applicant, although we are aware that the place of project implementation may be different. This analysis is preliminary and will be followed by analysis based on the location of project implementation.

The aim of this paper is to identify the determinants of spatial allocation of the approved project applications of the EU funds at the district level in Slovak Republic. We would like to investigate whether the socio-economic development of the districts influences the spatial allocation of the applicants and the EU funds spent in 2007–2013 programming period.

## **2. Analysis of Cohesion policy implementation at district level in Slovakia**

In this paper, our objective is to explore the relationship of regional characteristics with respect to EU funding during the 2007–2013 period. We follow the National strategic reference framework (NSRF), the main document governing the allocation within the structural funds and the Cohesion fund in the Slovak republic. We analyse the overall regional distribution of the structural funds – Objective 1 and 2 of the National strategic reference framework (2007) within the period 2007–2013 based on the location of applicant. The spatial analysis of EU funds is conducted at LAU 1 level in Slovakia, which is represented by 79 districts. As the two largest cities of Bratislava and Košice are divided into 5

respectively 4 districts, we have merged the data of them together, so the analysis is performed at 72 spatial units (70 + Bratislava and Košice), which we call districts.

## **2.1 Descriptive analysis of the spatial allocation of EU Cohesion policy funding in Slovakia during 2007–2013**

Slovakia belongs to countries that are heavily dependent on EU funds. According to European Commission (2014) during the period 2011–2013 Slovakia has the highest share of ERDF, ESF and Cohesion Fund allocations and national co-financing in total public investment (more than 80%). The overall EU commitment for the Slovak Republic within the Cohesion policy in the period 2007–2013 was 11.48 billion EUR, excluding the funding for Cohesion policy Objective 3 (0.227 billion EUR). Slovakia was able to use 97.14% of these sources as of August 31, 2016 (Ministry of finance, 2016). 82% of contracted amount of money was actually spent.

As of June 30, 2016, 13.606 billion EUR was allocated including national co-financing from state budget, out of which 140 mil. EUR were spent on JEREMIE initiative, which we did not include into our analysis (The Government Office of the Slovak Republic, 2016). Total amount of EU funds including co-financing from state budget was 13.466 billion EUR allocated into 10 899 projects. According to our calculations, the success rate in project acceptance was 44.6%, with the highest value in Bratislava region (regional projects without technical assistance have success rate of 50.7%). This may be caused by lower competition in project submission, because Bratislava region as the only NSRF Objective 2 region has a separate Operational programme (“Bratislava region”), and separate priority axes in operational programmes common to Objective 1 and 2 of EU Cohesion policy for 2007–2013. Some other factors might include higher quality of submitted projects, which might be due to the closeness to the managing authorities and better options to consult the submissions (Výrostová, 2016).

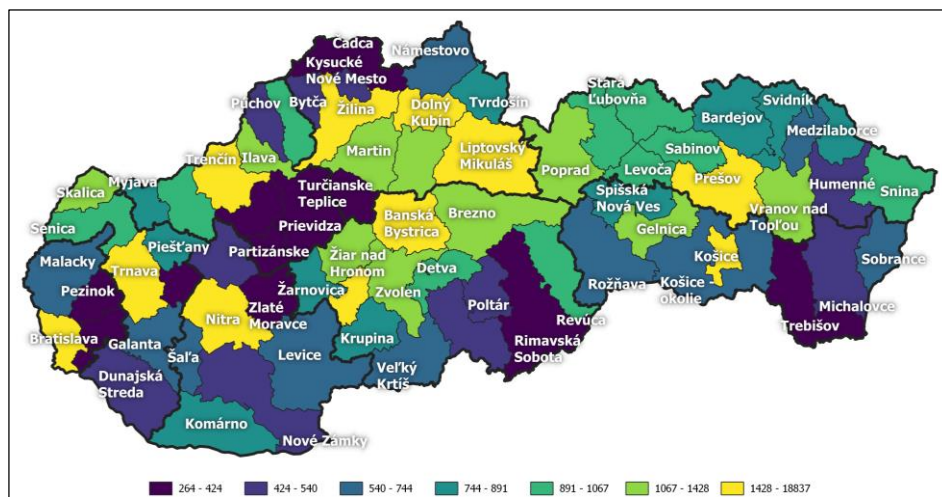
Implementation of Cohesion policy in Slovakia is centralized, as all 11 operational programmes within National strategic reference framework (includes Cohesion policy Objective 1 and 2) were centrally managed by several ministries or the Prime Minister’s Office with the seat in Bratislava. Only some competencies within Regional operational programme were transferred to self-governments since 2007.

Spatial allocation of project applications is strongly influenced by geographic concentration of state agencies in the capital. The highest number of projects (2228) were approved for the applicants from Bratislava, with total amount of almost 8 billion EUR. Even though these agencies apply for the funds, many of the projects were realized at other regions, which can be identified in case of

regional projects, which represents around 70% of total projects. The spatial allocation of national projects is difficult to obtain. In *Figure 1*, we can see that districts with the seat of self-government or large city have the highest Cohesion policy funds allocation per capita based on the location of an applicant. Only one of the less developed districts – Banská Štiavnica – has received notably higher amount of EU funds per capita (second highest after Bratislava). Less developed districts which are localised in the south and eastern Slovakia were less successful in receiving project money from Cohesion policy sources.

When we look at the applicant's successfulness in less developed districts (unemployment rate higher than Slovakia average) we can see that their average EU funds allocation is a little bit lower than the average allocation in Slovak Republic without Bratislava. There is also higher variance between less developed districts; while some of them were very successful (e.g. Banská Štiavnica, Prešov, Žiar nad Hronom or Gelnica), others show low EU funds per capita based on applicant location.

The results from the correlation and regression analysis (*Table 1*) shows that the distribution of funding – including co-financing (FUND) on the district level – does not follow the level of development of the districts measured by the unemployment rate.



**Figure 1. Spatial allocation of funding**

*Source:* Authors, based on the data from the Government Office of the Slovak Republic (2016).

**Table 1. Summary statistics of EU Cohesion policy funding including state budget co-financing**

	Average EU funds per capita	Maximum EU funds per capita	Minimum EU funds per capita	Standard deviation	Correlation between EU funds per capita and unemployment rate
72 districts	1 227.44	18 836.84	264.18	2 254.14	-0.228
71 districts (Bratislava is omitted)	979.42	5 730.58	264.18	813.30	-0.101
31 less developed districts*	951.85	5730.58	356.11	929.33	-0.194

\*We consider less developed district as a district with unemployment rate higher than Slovakia average. For our analysis, we have calculated the unemployment rates as average of 2003–2007 (5 years before projects within analysed programming period started). From 2015 the government focused its attention to less developed districts. Their identification is based also on unemployment rate, but differently calculated. As of June 19, 2019, the list of less developed regions contains 20 regions, which form a subset of less developed regions identified in 2007 by our analysis.

*Source:* Authors' calculations, based on the data from the Government Office of the Slovak Republic (2016) and Statistical office of the Slovak Republic.

## 2.2 Data description

As can be seen from the previous section on the distribution of funds, any analysis on the district level of Slovakia is necessarily heavily influenced by a single outlier representing the capital city of Bratislava. It is only natural for Bratislava to behave differently, for several reasons – on one hand, Bratislava has a separate operations programme with constrained legibility of applications, but on the other hand many applicants for funding represent institutions based in Bratislava, even though the specific projects to be implemented may be related to the operations of these institutions in other Slovak regions. Excluding Bratislava region from the set of applicants under analysis thus may reduce the bias inherent in the analysis. The dataset thus consists of 70 Slovak districts, plus the city of Košice.

The approach to the quantification of the relationship of regional development and funding during the 2007–2013 period is based on publicly available data on the district level, compiled primarily by the Statistical Office of the Slovak republic, National bank of Slovakia and Central Office of Labour, Social Affairs and Family.

The analysis is exploratory in nature – thus, instead of testing an underlying assumption on the relationship, the objective is to determine the local variables

with observable relationship to funding. Our approach was thus based on compiling the most complete dataset on the district level, which would be used for the selection of the most significant variables.

The dependent variable in our analysis is in all cases represented by the overall funding of projects in a specific district. The information on funding was compiled from the list of all projects within the programming period in Slovakia. The funding was attributed to district based on the official seat of the applicant and then aggregated. This approach has obvious shortcomings, in that the seat of an institution or a company does not necessarily imply spending in the same region, but as more detailed information is not publicly available, this choice makes for the best proxy under such constraints (we are presently working with relevant institutions to obtain more detailed data on the spending within the financed projects). We analyze the total funding, consisting of both EU funds and national co-financing, as we are interested in the overall financial effect attracted by the projects.

The objective of the constructed models is to determine, whether the funding allocation may be explained by specific attributes and properties at the district level. To characterize the regions, we use 25 variables measured on the district level.

First, National strategic reference framework 2007–2013 in Slovakia is based on the principle of territorial concentration. According to document of Ministry of construction and regional development (2007) certain municipalities (33.65% of total number of municipalities) are identified as “innovation and cohesion growth poles”. These poles should be the accelerators of development, which were constructed in accordance with the polycentric concept of the settlement development in Slovakia (ROP, 2013). Variable POLE represents the share of the district’s population living in such poles. Other variables include the level of unemployment (UNEMP), average wage (WAGE), population density as a proxy for overall attractiveness and intensity of agglomeration (DENS), the amount of foreign direct investments within the district (INVEST), inward and outward migration flows (MIG\_IN and MIG\_OUT), the number of economically active population (ACTIVE), number of personal enterprises as a proxy for entrepreneurship (ENT), the number of small and medium-sized enterprises (SMALL) and the proportion of employees in mentally challenging occupations (MENT). Health and socially oriented indicators include the average life expectancy (AGE), infant mortality rate (INFA), number of medical facilities for adults (DOCT\_ADLT) and children (DOCT\_CHILD), number of classes in pre-school (S\_CHILD), basic schools (S\_BASIC) and secondary schools (S\_SEC) and the number of recipients of social benefits in need (BENEF). Housing development is represented by the number of completed new flats (FLATS). Environmental aspects is taken into account by measuring solid particulates (EM\_PART), sulfur oxides (EM\_SULF),



nitrous oxides (EM\_NITR) and CO2 (EM\_CO2) and number of households connected to the sewer system (SEWER).

All variables have been expressed in terms of intensity per inhabitant, with the exception of those already in relative terms (e.g. UNEMP) and the pollution variables, which are expressed in terms per square kilometer. To avoid artifacts in the data and reduce the effect of possible singular swings, all variables represent five-year averages spanning the years 2003–2007 directly preceding the program period (we included the year 2007, as there was practically no funding granted in 2007 and first project were financed in 2008 in Slovakia). This choice was made to allow for the interpretation, on whether the state of regional development on the district level was consistent with the policy objectives in the programming period.

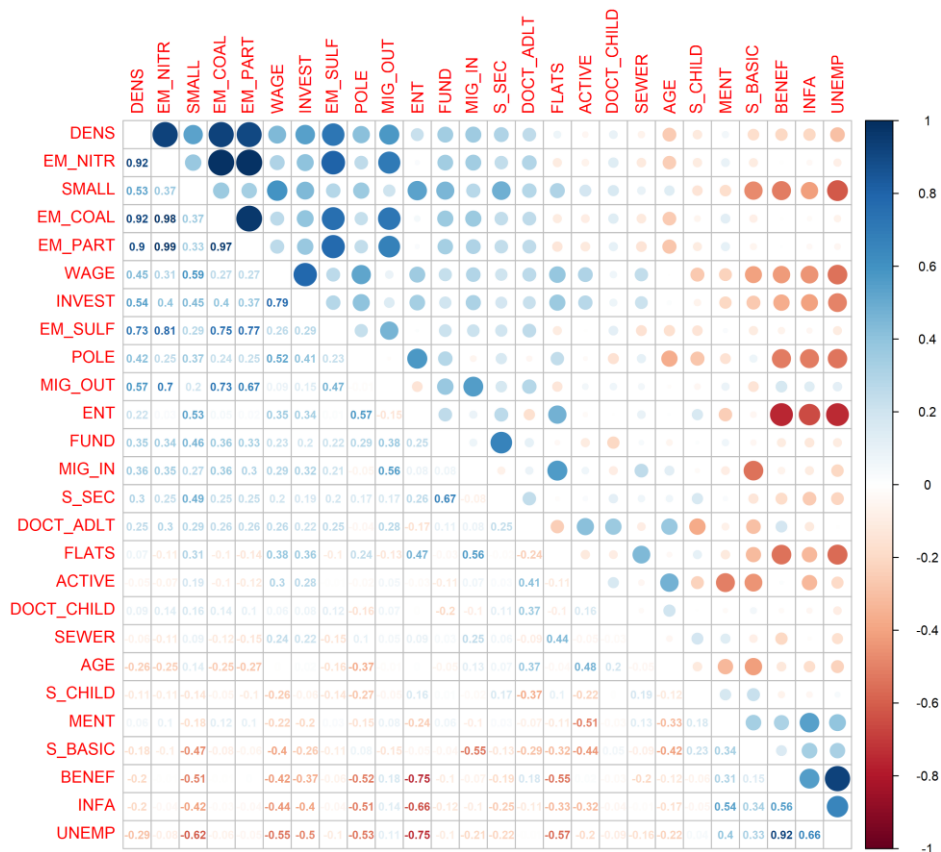


Figure 2. Correlation matrix

Source: Authors' calculations.

**Table 2. Simple (univariate) and full regression models for Cohesion policy funding**

	Simple regressions				Full model		
	Estimate	<i>t</i> -stat	<i>p</i> -value	<i>R</i> <sup>2</sup>	Estimate	<i>t</i> -stat	<i>p</i> -value
(Intercept)					-3 844.00	-0.52	0.60
POLE	2 175.11	2.48	0.02	0.08*	517.50	0.36	0.72
UNEMP	-13.43	-0.85	0.40	0.01	25.12	0.55	0.59
WAGE	2.92	1.99	0.05	0.05	1.41	0.65	0.52
DENS	2.54	3.09	0.00	0.12	-3.90	-1.71	0.09
AGE	-30.33	-0.42	0.67	0.00**	95.21	1.16	0.25
INFA	-36.89	-1.01	0.32	0.01*	-20.79	-0.42	0.68
EM_PART	96.64	2.92	0.00	0.11	-312.20	-1.75	0.09
EM_SULF	23.88	1.84	0.07	0.05*	-12.35	-0.68	0.50
EM_NITR	50.36	3.02	0.00	0.12	195.50	1.28	0.21
EM_CO2	5.85	3.22	0.00	0.13	3.66	0.35	0.73
SEWER	1 200.35	0.25	0.80	0.00**	-2 973.00	-0.73	0.47
INVEST	74.33	1.68	0.10	0.04*	48.30	0.77	0.44
FLATS	-15 665.43	-0.27	0.79	0.00**	46 140.00	0.49	0.63
MENT	1 482.79	0.53	0.60	0.00**	-589.70	-0.23	0.82
DOCT_ADLT	1 270 568.00	0.91	0.37	0.01*	-1 306 000.00	-0.93	0.36
DOCT_CHILD	-5 013 961.00	-1.70	0.09	0.04	-8 619 000.00	-3.48	0.00**
MIG_OUT	122 914.60	3.37	0.00	0.14	125 900.00	1.95	0.06
MIG_IN	16 322.17	0.64	0.52	0.01**	-49 880.00	-0.96	0.34
S_BASIC	-62 903.03	-0.36	0.72	0.00**	189 000.00	0.86	0.40
S_CHILD	71 826.77	0.09	0.93	0.00***	-773 800.00	-0.89	0.38
S_SEC	669 017.70	7.41	0.00	0.44	544 100.00	5.07	0.00***
BENEF	-4 364.43	-0.85	0.40	0.01	5 852.00	0.44	0.67
ACTIVE	-3 044.38	-0.88	0.38	0.01*	-6 593.00	-1.76	0.09
ENT	15 282.56	2.16	0.03	0.06	8 476.00	0.85	0.40
SMALL	84 168.26	4.29	0.00	0.21	61 450.00	2.17	0.04*

*Note:* Individual univariate regressions (left) and the full model (right). For the full model, the  $R^2$  was 0.7517 and the adjusted  $R^2$  was 0.6137. For the simple regressions, the Bonferroni-adjusted  $p$ -value is 0.002 at 5% significance level.

*Source:* Authors' calculations.

*Figure 2* shows the correlation between the dependent variable (FUND) and all the explanatory variables used in the study. There are several notable clusters showing stronger dependence between variables – in the top left corner, we see strong positive correlation between the variables for various form of pollution, but also population density and outward migration. On the right, personal enterprises (ENT) are negatively correlated with the number of people on benefits, infant mortality and unemployment. These three variables also form a strongly correlated cluster in the lower right. As for the dependent variable (FUND), the only noticeable correlation is with S\_SEC, the number of classes in secondary schools. Even though somewhat surprising at first glance, the relationship is easily explained by the fact that the secondary schools, notably grammar schools aiming to prepare the students for universities are located mostly in the regional capitals (or capitals of higher regions), and thus are indicative of regions receiving larger portion of the funding.

*Table 2* (left) presents the univariate relationships of the explanatory variables to the amount of funding (the dependent variable is explained solely by a constant and a single regressor). As we aggregate the funding for the whole programming period for each district (the effects of the projects are long-term, and it is thus not reasonable to analyze annual changes), we face a problem with a large number of regressors with respect to the sample size of 71 districts.

We take into account the problem in the following manner. First, we estimate individual regressions of single explanatory variable versus the funding. We see several significant variables. However, when we apply the Bonferroni correction for multiple comparisons, conservatively accounting for the larger number of comparisons made, the only significant results are for emissions EM\_CO2, outward migration (MIG\_OUT), number of classes in secondary schools (S\_SEC) and number of small and medium sized enterprises (SMALL).

The individual regressions however might hide a lot of information, as they provide only a very narrow view on the relationship and interaction with respect to the dependent variable. There is therefore a need to use all the variables in a fully specified model, which is shown on the right side of the table 2. Here, only number of medical facilities for children, number of classes in secondary schools and number of small and medium-sized enterprises remains significant. This model is however also not satisfactory, as it contains rather large number of regressors given the sample size. We have therefore performed a stepwise regression to construct a parsimonious model, keeping only the relevant variables.

The results of the stepwise regressions are depicted in *Table 3*. The regressors remaining in the model are not highly correlated (*see Figure 2*), providing for a valid specification. The only remaining and statistically significant variables in this model include number of classes in secondary schools (S\_SEC), outward migration (MIG\_OUT), number of small and medium-sized enterprises (SMALL)

and the number of classes in basic schools (S\_BASIC). The only variable negatively related to the funding is number of medical facilities for children (DOCT\_CHILD).

**Table 3. Reduced and spatial regression analysis for EU cohesion policy funding**

	Reduced OLS model		Bootstrap conf. int. (95%)		Corresponding spatial lag model	
	Estimate	p-value			Estimate	p-value
(Intercept)	-959.80	0.18	-2 128.0	761.2	-913.60	0.19
S_SEC	539 377.10	0.00***	92 114.1	846 194.5	538 809.37	0.00
DOCT_CHILD	-8 514 889.40	0.00***	-14 590 949.9	-1 506 957.0	-8 540 782.31	0.00
MIG_OUT	90 834.60	0.00***	38 230.0	196 508.2	90 762.40	0.00
SMALL	55 950.00	0.00**	-6 703.0	96 604.6	55 977.95	0.00
S_BASIC	333 344.40	0.01**	107 872.0	550 294.9	334 206.99	0.00
rho					-0.04	0.76

*Note:* The reduced OLS model (left), bootstrap confidence intervals for the regression coefficients (middle) and corresponding spatial lag model (right). For the reduced model, the  $R^2$  was 0.6595 and the adjusted  $R^2$  was 0.6333.

*Source:* Authors' calculations.

The presented results might be subject to some skepticism, as any use of stepwise regressions might be suspect to the presence of data-snooping bias. Therefore, we have also constructed confidence intervals for the regression coefficients based on 10,000 bootstrap resamples from the original data, yielding the results in the middle portion of the table. As can be seen, all variables except the number of small and medium sized enterprises remain significant. To test for possible spatial effect, a spatial lag model has also been estimated, leading to very similar estimates (right), with the results of the LR test unresponsive of the presence of spatial effects on the district level.

### 3. Conclusion

The paper analyzes spatial allocation of the overall EU funding with co-financing from state budget in the Slovak Republic. We were able to identify several determinants of Cohesion policy funding allocation at district level, namely number of classes in secondary and basic schools, outward migration, number of small and medium-sized enterprises and number of medical facilities for children. Other variables, especially unemployment rate was not confirmed to be the determinants for spatial allocation of EU funds at the district level.

The presented analysis has several weaknesses, such as the fact that the spatial distribution of applicants may be influenced by other factors, such as political situation, ability to secure co-financing to the EU, capacity to attract and use the funds, administrative capacities, corruption and others, which were not analysed within this paper. Further analysis ought to be based on the allocation of EU funds on the place of the implementation of the project. Only this more precise information may lead to the conclusion, whether the resources spent are truly focused on the less developed districts. As higher EU fund spending per se does not guarantee an improvement in the situation of a region, the analysis of the effectiveness of these funds is also necessary.

### Acknowledgements

This work represents part of the project VEGA no. 1/0153/18.

### References

- BODENSTEIN, T., KEMMERLING, A. 2012. Ripples in a Rising Tide: Why Some EU Regions Receive More Structural Funds than Others. In: *European Integration online Papers (EIoP)*, vol. 16, article 1. Available at: <http://eiop.or.at/eiop/texte/2012-001a.htm>. DOI: 10.1695/2011007.
- BOUVET, F., DALL'ERBA, S. 2010. European regional structural funds: How large is the influence of politics on the allocation process? In: *JCMS: Journal of Common Market Studies*. Vol. 48, No. 3, pp. 501–528.
- CAMAIONI, B. et al., 2013. How rural is the EU RDP? An analysis through spatial fund allocation. In: *Bio-based and Applied Economics*. Vol. 2, No. 3, pp. 277–300.
- CENTRAL OFFICE OF LABOUR, SOCIAL AFFAIRS AND FAMILY. *Sociálne dávky*. Available at: [https://www.upsvr.gov.sk/statistiky/socialne-veci-statistiky/2011.html? page\\_id=312199](https://www.upsvr.gov.sk/statistiky/socialne-veci-statistiky/2011.html? page_id=312199)
- CHARRON, N. 2016. Explaining the allocation of regional Structural Funds: The conditional effect of governance and self-rule. In: *European Union Politics*. Vol. 17, No. 4, pp. 638–659.
- Consolidated version of the Treaty on the functioning of the European Union. Official Journal of the European Union. 9.5.2008.
- COUNCIL REGULATION (ES) 1083/2006 of 11 July 2006 laying down general provisions on the European Regional Development Fund, the European Social Fund and the Cohesion Fund and repealing Regulation (EC) No 1260/1999. *Official Journal of the European Union*.
- CRESCENZI, R. 2009. Undermining the principle of concentration? EU development policies and the socio-economic disadvantage of European regions. In: *Regional Studies*. Vol. 43, No. 1, 111–133. <https://doi.org/10.1080/00343400801932276>.
- DALL'ERBA, S. 2005. Distribution of regional income and regional funds in Europe 1989–1999: an exploratory spatial data analysis. In: *The Annals of Regional Science*. Vol. 39, No. 1, pp. 121–148.
- DELLMUTH, L. M., STOFFEL, M. F. 2012. Distributive politics and intergovernmental transfers: The local allocation of European Union structural funds. European Union In: *Politics*. Vol. 13, No. 3, pp. 413–433.

- EUROPEAN COMMISSION, 2014. Investment for jobs and growth. Promoting development and good governance in EU regions and cities. Sixth Report on economic, social and territorial cohesion. Brussels.
- EUROPEAN COMMISSION, 2016. Ex Post Evaluation of Cohesion Policy Programmes 2007–2013, focusing on the European Regional Development Fund (ERDF) and the Cohesion Fund (CF). August 2016. Brussels. Available at: [https://ec.europa.eu/regional\\_policy/sources/docgener/evaluation/pdf/expost2013/wp1\\_synth\\_report\\_en.pdf](https://ec.europa.eu/regional_policy/sources/docgener/evaluation/pdf/expost2013/wp1_synth_report_en.pdf)
- EUROPEAN COURT OF AUDITORS, 2019. *Rapid case review Allocation of Cohesion policy funding to Member States for 2021–2027*. March 2019. [https://www.eca.europa.eu/Lists/ECADocuments/RCR\\_COHESION/RCR\\_COHESION\\_EN.pdf](https://www.eca.europa.eu/Lists/ECADocuments/RCR_COHESION/RCR_COHESION_EN.pdf)
- HÁJEK, O., et al. 2012. Regionální disparity a financování regionální politiky – některé poznatky z České republiky. In: *Politická ekonomie*. Vol. 60, No. 3, pp. 330–348.
- KPMG, 2015. Available at: <http://www.nsr.sk/sk/hodnotenie/programove-obdobie-2007---2013/>
- MICHÁLEK, A. 2014. Disparity v alokácii a čerpaní zdrojov s dôrazom na marginálne regióny Slovenska. In: *Geografický časopis*. Vol. 66, No. 3, pp. 269–286.
- MILIO, S. 2007. Can administrative capacity explain differences in regional performances? Evidence from structural funds implementation in southern Italy. In: *Regional Studies*. Vol. 41, No. 4, pp. 429–442.
- MINISTRY OF CONSTRUCTION AND REGIONAL DEVELOPMENT, 2007. *Zoznam pôlov rastu pre Národný strategický referenčný rámec na roky 2007–2013*. Rozhodnutie ministra výstavby a regionálneho rozvoja SR č. 3/2007 zo 6. júna 2007.
- MINISTRY OF FINANCE OF SR, 2016. *Informácia o čerpaní EÚ fondov k 31.08.2016*. 14.9.2016. [cit. 2016-09-21]. Available at: <https://www.finance.gov.sk/Default.aspx?CatId=84&NewsID=982>
- MOHL, P., HAGEN, T. 2010. Do EU structural funds promote regional growth? New evidence from various panel data approaches. In: *Regional Science and Urban Economics*. Vol. 40, No. 5, pp. 353–365.
- NATIONAL BANK OF SLOVAKIA. *Priame zahraničné investície*. Available at: <https://www.nbs.sk/sk/statisticke-udaje/statistika-platobnej-bilancie/priame-zahranicne-investicie>
- NATIONAL STRATEGIC REFERENCE PROGRAMME, 2007. Available at: <http://www.nsr.sk/download.php?FNAME=1210870605.upl&ANAME=NSRR290607.zip>
- NOVOSÁK, J. et al. 2017. Structural funding and intrastate regional disparities in post-communist countries. In: *Transylvanian Review of Administrative Sciences*, No. 51 E/2017, 53–69.
- ROP, 2013. *Regional operational programme*. Available at: [www.nsr.sk](http://www.nsr.sk)
- STATISTICAL OFFICE OF THE SLOVAK REPUBLIC, 2019. *Datacube*. Available at: <https://slovak.statistics.sk/>
- STERNBERG, R. 2012. Do EU regional policies favour regional entrepreneurship? Empirical evidence from Spain and Germany. In: *European Planning Studies*. Vol. 20, No. 4, pp. 583–608.
- SVOBODA, D. 2007. *Kam smerujú eurofondy na Slovensku?* Bratislava: Konzervatívny inštitút M.R. Štefánika. Available at: <http://www.monitoringfondov.eu/article.php?cal=2007-08-21-kids>
- SVOBODA, T. 2016. *Efektívnosť využívání strukturálnych fondů EU. Vybrané právnické aspekty*. Spisy Právnické fakulty Masarykovy Univerzity. Edice Scientia, svazek č. 577. Brno: Masarykova univerzita.
- THE GOVERNMENT OFFICE OF THE SLOVAK REPUBLIC, 2016. *Zoznam prijímateľov finančných prostriedkov z fondov EÚ v PO 2007–2013*. Stva k 30.6.2016. Zdroj: ITMS. Available at: [http://www.nsr.sk/download.php?FNAME=1476084825.upl&ANAME=zoznam-16\\_06\\_30.xls](http://www.nsr.sk/download.php?FNAME=1476084825.upl&ANAME=zoznam-16_06_30.xls)

- VANOLO, A. 2010. European Spatial Planning Between Competitiveness and Territorial Cohesion: Shadows of Neo-liberalism. In: *European Planning Studies*, Vol. 18, No. 8, pp. 1301–1315.
- VEIGA, L. G. 2012. Determinants of the assignment of EU funds to Portuguese municipalities. In: *Public Choice*. Vol. 153, No. 1–2, pp. 215–233.
- VÝROSTOVÁ, E. 2016. Spatial allocation of EU cohesion policy funding in Slovakia for 2007–2013. In: KLÍMOVÁ, V. a ŽÍTEK, V. (eds.) *XIX. mezinárodní kolokvium o regionálních vědách*. Sborník příspěvků. (Čejkovice 15.-17.6.2016). Brno: Masarykova univerzita, s. pp. 130–138.
- ZUBEK, N., HENNING, C. 2016. Local government, spatial spillovers and the absorption of EU structural funds. In: *Journal of Agricultural Economics*. Vol. 67, No. 2, pp. 368–397.

# The strength of brand and its components. Theoretical model

NATALIA SIDZKO<sup>1</sup>

**Abstract:** Strategic brand management is one of the most powerful means by which to compete in the conditions of a globalizing economy, the significance of which continues to increase. The proper management of a company's brand name is able to solve financial and marketing problems, save resources, and protect future earnings. In this context, many heads of companies and marketing departments prefer to have a brand instead of operating by modern sales and marketing technologies.

The strength of brand is an indicator of brand management effectiveness and it is considered a key-factor of success in a recent study. The aim of this research is to find ways to improve brand management, to build a strong brand model and further techniques of brand development.

This paper gives the definition of such concepts as brand, brand equity, brand loyalty, strength of brand, and brand strategy. An existing model of brand equity, consumer behavior and analyses made in previous research in the area of strategic brand management were used. In ongoing research the results of studies of respected scientists such as Aaker, Keller, Ginsberg, Webster, Shoker, Mayer were widely used. The study is based on research of the largest Belarusian brand "Euroopt", whose strength is taken as the absolute value. The information base for calculations is a result of marketing research conducted in Belarus by method of questionnaire with survey estimates of respondents' opinion on a Likert-type scale.

The methods of economic analysis, marketing survey, Pearson correlation and principal component analysis (PCA) are applied. The created model is reliable and can be used as a basis for future research and as a guide for marketers, brand-managers or other skilled persons in the strategic brand management area.

**Key words:** brand, strength, trust, reputation, perceived quality.

**JEL Classification:** M – Business Administration and Business Economics; Marketing; Accounting; Personnel Economics

## 1. Introduction

Sunanda K. Chavan offers the definition of brand as: "...a consistent, holistic pledge made by a company, the face a company presents to the world. It serves as an unmistakable symbol for products and services. It functions as the "business card" a company proffers on the competitive scene to set itself apart from the rest."

---

<sup>1</sup> NATALLIA SIDZKO, Girne American University, Poland, [nominy-f@mail.ru](mailto:nominy-f@mail.ru)



Successful brand management is able to support a company's sales, resolve financial issues and ease other problems. The aim of managers in this case is to create loyalty among customers and stimulate their positive behavior. Loyalty and consumers' behavior can be influenced by brand image, quality, advertisements, etc. Managing a strong brand is building and managing strong brand equity. Brand is a part of company's capital, and brand equity can be understood as a complex of brand parameters responsible for, among others, brand recognition, attractiveness and visual identity or through relationships with customers. The true value of brand lies outside the company in customers' minds. Brand awareness, image, trust and reputation, all painstakingly built up over the years, are the best guarantee of future earnings.

In order to research the strength of brand and strong brand managing processes, several dimensions need to be studied. These are brand equity, customer behavior, brand loyalty, building relationships with customers and strategy formation process.

Aaker and Keller provide an informational basis of brand and its equity, Webster described general role of brands in marketing, Macinnis D. explained some behavioral aspects. The informational basis of commitment and loyalty are provided by Ogba and Tan. A fundamental scientific basis for brand management was provided by respected authors such as as Fredrick Webster, Aaker, Kotler, Thomsom, Gilsberg, Hulbert, Oliver and Shoker. The main definition of brand is provided by Sunanda K. Chavan of the American Marketing Association. The role brand plays was also broadly described by William Stuard.

Brand is a set of mental associations, held by the consumer, which add to the perceived value of a product or service. It is able to increase profits, which is why many companies wish to establish a brand, rather than using a variety of marketing and sales techniques. Aaker's brand equity model concludes that the strength of the brand can be examined from a position of equity strength and the relationship with customers. This is based on his belief in the concept that true brand value lies in the customer's mind, which has been supported by other scientific research. Acting on elements of brand equity it is possible to generate positive customer behavior and improve brand strength.

Strength of brand is difficult to measure especially taking into consideration the fact that it determined by relationships with customers. The main brand strength indicator is financial value, second only to brand value (equity). There are various brand equity measurement techniques that can be used for strength estimation. Brand equity is a multi-dimensional concept and a complex phenomenon, some dimensions of which have been empirically tested in the literature. Among several brand equity models in the literature, the one constructed by Aaker was chosen because of its simplicity and practicality, as well as the popularity of the model in branding research. Positive customer-based brand equity, in

turn, can lead to greater revenue, lower costs, and higher profits; it has the ability to command higher prices, attract customers and improve the effectiveness of marketing communications.

Brand loyalty as a brand equity dimension, is responsible for satisfaction and re-purchase intention. Aaker (1991) defines brand loyalty as “the attachment that a customer has to a brand.” Brand awareness is “the ability for a buyer to recognize or recall that a brand is a member of a certain product category” (Aaker). Customer behavior is a comprehensive concept influenced by several external and internal factors which should be taken into consideration in building relationships with customers. Brand association, brand image, brand loyalty, and perceived quality have a significant impact on consumers’ intentions to purchase products. Marketers should carefully consider the brand equity components when designing their branding strategies.

The purpose of this paper is to find ways to improve brand management and the main aim is the building of a strong brand model. The study’s purpose is to find indicators that influence the power of the brand, estimate the importance of them, examine the relationship between the elements of equity and find mechanisms of customer loyalty formation. Positive brand trust, reputation and attachment lead to a deeper relationship with customers and can bring greater earnings in the future. There are three broad categories to understanding brand strength: strength of brand based on observing current performance, brand strength based on accessing the relevant beliefs, associations and attitudes of the consumers’ mind, and brand strength based on estimating the brand’s future performance and profit streams. Brand strength can be measured by equity and consumer behavior (current purchases, future purchases, perception and others indicators of customer attraction). The overall customer attraction to the brand is loyalty. Two core elements of strong brand are emotional and practical values, which are second to strong brand equity and a deep relationship with customers.

## **2. Body of Paper**

### **2.1 Conceptual framework**

A conceptual model is developed and demonstrated in *Figure 1*. The model shows that the strength of brand is influenced by trust; perceived quality influences trust directly. Strength is indirectly influenced by perceived quality, which has an impact on brand preference and brand reputation.

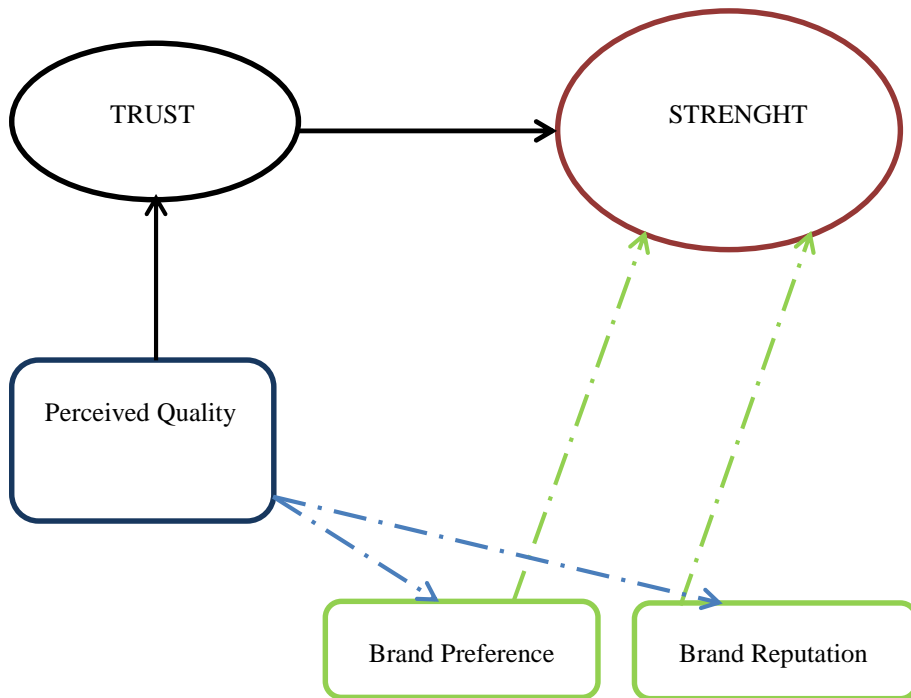


Figure 1. Theoretical model

## 2.2 Hypothesis

Taking into consideration the results of previous studies it is possible to suggest that indicators of positive consumer behavior and elements of equity are interdependent. Trust has an effect on strength of brand, which in turn has an effect on reputation.

The following interconnections were hypothesized:

1. Brand equity has a positive effect on strength of brand (accepted)
2. Relationship with customers has a positive effect on strength of brand (accepted)
3. Brand awareness positively influences brand attachment (A1-1), brand reputation (A1-2) and brand preference (A1-3)
4. Brand association has a positive effect on brand attachment (B1-1) and brand preference (B1-2)
5. Brand loyalty has a positive effect on brand trust (C1)

6. Perceived quality has a positive effect on brand reputation (E1-1), satisfaction (E1-2), preference (E1-3) and trust (E1-4)
7. Brand trust has a direct effect on strength (F1), indirect (F)
8. Brand attachment (C2), brand reputation (C3), brand satisfaction (C4) and brand preference (C5) have a positive effect on brand loyalty.

### **2.3 Research method**

To prove the hypothesis, the EUROOPT brand was chosen for analysis as an example of one of the strongest brands on the market. The brand EUROOPT is the most well-known retail network in Belarus. It started in 2001 with a small number of stores in the capital. Today the stores number more than 300 across all cities of the republic. EUROOPT is known as the greatest importer and trade operator in Belarus. Since 2006 the network has followed a policy of low prices, customer-oriented marketing and growth of the network. In 2011 the brand won a governmental competition and was awarded the status of “Brand of the Year 2011”, going on to receive the awards for “Brand of the Year 2012”, and “Best Brand”, continuing to retain its position among existing competitors. Since 2013 the company has continued to improve the quality of its service and HR standards, to strengthen its reputation, and to take part in charitable activities.

Customers were asked to answer 50 questions related to different strength indicators of brand (A – Brand awareness, B – Brand associations, C – Brand loyalty, D – Brand image, E – Brand quality, G – Brand attachment, K – Brand reputation, L – Brand satisfaction, M – Brand preference and N – Brand trust). The questionnaire was distributed among 75 respondents, 68 of which answered all questions which then went through data processing – the response rate was 91%. 89% of respondents (60 persons) were female, aged over 25. The above opinions were measured by requesting respondents to indicate on a Likert-type scale, anchored on “1= to a very low extent” through “5 = to a very great extent”, according to their agreement and disagreement with a series of statements that characterize the factors for brand strength. The questions measure different variables.

To analyze the data, the SPSS Statistics program (AMOS) was used and a Pearson correlation matrix was built. IBM SPSS Statistics is an integrated family of products that addresses the entire analytical process, from planning to data collection, to analysis, reporting and deployment. SPSS Statistics is loaded with powerful analytic techniques and time-saving features to help quickly and easily find new insights into data. Several features of SPSS were used including descriptive analysis, analysis of averages, meanings and standard deviation, and Pearson correlation.

The following research steps were then conducted:

1. An average mark for each question from each group of questions was calculated (*Table 1*):

**Table 1. The average mark for each question**

№	A	B	C	D	E	G	K	L	M	N
1	3,78	2,86	3,74	3,03	3,74	3,57	2,81	3,06	2,97	3,01
2	3,16	3,04	4,35	3,30	3,35	4,06	3,18	4,03	2,84	2,76
3	3.76	3.09	3.74	3.60	3.19	2.72	2.94	3.57	2.53	2.85
4	3.17	3.65	3.79	3.53	3.93	2.93	2.61	3.09	3.01	2.63
5	3.38	3.72	3.59	3.09	4.03	3.07	3.56	3.15	3.01	3.25

2. Using the features of SPSS Statistics, an average mean of each function (from A to N) was described and standard deviation was calculated (analysis of averages): respondents gave the highest mark (3.84) to item C (Brand loyalty), a slightly lower mark to item E (Brand image), Item A (Awareness) and item D (Quality) received an average mark of 3.45 and 3.31 respectively. Items B and G (Association and Attachment) received almost equal marks of approximately 3.27. The lowest mark was given to item M (Brand preference). The mark for item N (Trust) was not high at 2.9.

Taking into consideration information about average marks it is possible to say that customers are loyal to the brand EUROOPT, and that the brand is attractive for consumers. From the consumers' point of view, the brand is characterized by quality of service. The indicators of trust and preference are not so high which can be explained by the instability of the economic environment, under the conditions of an economic crisis.

3. A Pearson correlation matrix (*Table 2*) (one-side) was built (correlation means and validity for each item are shown).

The highest correlation was found between E and M items. That means that Perceived quality has a positive effect on Brand preference (Hypothesis E1-3 accepted). EN correlation was 0.378. Quality has a positive effect on Trust (Hypothesis E1-4 accepted). EK= 0.113 means Quality has a positive influence on Reputation (Hypothesis E1-1 accepted). Hypothesis E1-2 was not accepted. Quality has no effect on Brand Satisfaction. CL correlation was 0.849 – meaning that Satisfaction has a positive effect on Loyalty (C4 was accepted). The mean of CG correlation is one of highest – Brand Attachment has a positive effect on Loyalty (C2 was accepted). C1, C3 and C5 were not accepted. DL correlation is 0.294. Brand image has a positive effect on Satisfaction, but not on Trust (Hypothesis D1-1 was accepted, D1-2 was not). The correlation between B and K is 0.266, B and M is 0.454. The effect of Brand association on Reputation and Preference (B1-2 was accepted, B1-1 was not). It was found that Brand association

has a positive effect on Trust. AN correlation shows a positive effect of Brand awareness on Trust. According to correlation data, Trust has a positive influence on Brand Reputation and Preference. (findings). The hypotheses of group A were not approved.

**Table 2. A Pearson correlation matrix**

	A	B	C	D	E	G	K	L	M	N
A	<b>1</b>	<b>-,555</b>	<b>-,503</b>	<b>-,147</b>	<b>-,294</b>	<b>-,290</b>	<b>-,142</b>	<b>-,270</b>	<b>-,454</b>	<b>,385</b>
		,166	,194	,407	,316	,318	,410	,330	,221	,261
B	<b>-,555</b>	<b>1</b>	<b>-,417</b>	<b>,125</b>	<b>,694</b>	<b>-,507</b>	<b>,266</b>	<b>-,411</b>	<b>,454</b>	<b>,137</b>
		,166	,242	,420	,097	,192	,333	,246	,221	,413
C	<b>-,503</b>	<b>-,417</b>	<b>1</b>	<b>,127</b>	<b>-,525</b>	<b>,778</b>	<b>-,009</b>	<b>,849*</b>	<b>-,139</b>	<b>-,538</b>
		,194	,242	,420	,182	,061	,494	,035	,412	,175
D	<b>-,147</b>	<b>,125</b>	<b>,127</b>	<b>1</b>	<b>-,478</b>	<b>-,512</b>	<b>-,469</b>	<b>,294</b>	<b>-,609</b>	<b>-,739</b>
		,407	,420	,420	,208	,189	,213	,316	,138	,077
E	<b>-,294</b>	<b>,694</b>	<b>-,525</b>	<b>-,478</b>	<b>1</b>	<b>-,162</b>	<b>,113</b>	<b>-,787</b>	<b>,898*</b>	<b>,378</b>
		,316	,097	,182	,208	,397	,428	,057	,019	,265
G	<b>-,290</b>	<b>-,507</b>	<b>,778</b>	<b>-,512</b>	<b>-,162</b>	<b>1</b>	<b>,175</b>	<b>,506</b>	<b>,267</b>	<b>-,055</b>
		,318	,192	,061	,189	,397	,389	,192	,332	,465
K	<b>-,142</b>	<b>,266</b>	<b>-,009</b>	<b>-,469</b>	<b>,113</b>	<b>,175</b>	<b>1</b>	<b>,246</b>	<b>,066</b>	<b>,736</b>
		,410	,333	,494	,213	,428	,389	,345	,458	,078
L	<b>-,270</b>	<b>-,411</b>	<b>,849*</b>	<b>,294</b>	<b>-,787</b>	<b>,506</b>	<b>,246</b>	<b>1</b>	<b>-,555</b>	<b>-,344</b>
		,330	,246	,035	,316	,057	,192	,345	,166	,285
M	<b>-,454</b>	<b>,454</b>	<b>-,139</b>	<b>-,609</b>	<b>,898*</b>	<b>,267</b>	<b>,066</b>	<b>-,555</b>	<b>1</b>	<b>,223</b>
		,221	,221	,412	,138	,019	,332	,458	,166	,360
N	<b>,385</b>	<b>,137</b>	<b>-,538</b>	<b>-,739</b>	<b>,378</b>	<b>-,055</b>	<b>,736</b>	<b>-,344</b>	<b>,223</b>	<b>1</b>
		,261	,413	,175	,077	,265	,465	,078	,285	,360

It was found that trust is important in strength formation. Elements of equity have an impact on trust and trust has an effect on the relationship with customer indicators. The Indirect effect of Trust on Strength of brand does take place. (Hypothesis F was accepted, F1 was not). The main interconnections are shown (Table 3) on the model (Figure 1). The matrix of components is positively determined. In a new orthogonal coordinate system built with the main components, the tree correlation interconnection found in Pearson correlation (AN, BM, DL) have been found again.

Co-variation between analyzing components is positive, which allows for conclusions about the reliability of model (Table 4).

**Table 3. Components matrix**

	Main components			
	1	2	3	4
A	,022	-,501	-,829	-,247
B	,638	-,082	,591	,486
C	-,769	,590	,244	-,044
D	-,527	-,652	,482	,254
E	,921	,169	,320	-,143
G	-,352	,876	-,095	-,315
K	,262	,527	-,356	,726
L	-,854	,364	-,027	,370
M	,702	,502	,366	-,348
N	,646	,228	-,670	,287

**Table 4. Matrix of co-variation of components**

	Components			
	1	2	3	4
A	,006	-,197	-,386	-,183
B	,161	-,032	,275	,360
C	-,194	,232	,113	-,033
D	-,133	-,257	,224	,188
E	,233	,066	,149	-,106
G	-,089	,345	-,044	-,233
K	,066	,208	-,166	,537
L	-,216	,143	-,012	,274
M	,177	,197	,170	-,258
N	,163	,090	-,312	,213

### 3. Conclusion

A strong brand model built on the basis of Pearson correlation shows an inter-connection of brand equity forms and elements of relationships with customers and the influence of them on the strength of brand. The current strength of the brand was taken as the absolute meaning. Analyzing elements of the model and the influence on strength it is possible to say that Image, Loyalty and Awareness are more important for strength of brand. Brand image, as the most important element of the construct, has the most significant influence on the strength of brand. It creates a visual identity for customers, which they know and are reminded of, and it influences recognition and satisfaction which leads to loyalty. Loyalty has the strongest positive effect on strength. Loyalty determines consumer behavior and re-purchasing (current and future). Loyalty is a key-element in building long-term relationships with customers.

Awareness is important for strength because it is able to influence trust. Trust has an influence on reputation, preference and indirectly on strength. Most of the brand strategies are based on trust improvement as a means to build long-term relationships with customers. Quality is a less important element of equity on its own, but it does have an influence on trust, preference and reputation. Brand quality improvement is one of the ways to build a strong brand in the long-term. Quality of product/service can add to the brand value and help to build relationships as well.

Brand preference is influenced by associations, quality and trust. Trust is a central element of the construct. It is responsible for long-term relationships, for building loyalty and creating consumer commitment. Trust is some kind of

guarantee of a brand's performance. A build model provides the opportunity to understand the interconnection of equity elements, to see the mechanism of strength creation and improvement and to find the best way to increase brand strength. So, brand strength is directly dependent on consumer confidence or trust, which depends on perceived quality; one of elements of brand equity. Trust has a direct impact on elements of consumer behaviour such as brand preference and brand reputation, which have an indirect effect on strength.

The model built as a result of this research can be used as theoretical framework for future research. But, due to the fact that the model obtained from the study was built on the example of a specific brand (the power of the brand was taken as an absolute value), some errors or inaccuracies in the results of the study are possible.

## References

- AAKER, D. 1996. *Building Strong Brands*. New York, NY: Free Press.
- AFSAR, B. 2014. Effect of perceived price, image, quality and trust on consumers' buying preference. In: *The Journal of economics and business research*. No. 1, pp. 18–21.
- CHAN, C. 2013. Brand Equity. In: *The Words and Views on March*, 6
- GOAILL, M. M., PERUMAL, S., NOOR, N. A. 2013. The Moderating Effect of Strength of Manufacturer's Brands on the Relationship between Retailer's Relationship Satisfaction and Commitment: A Theoretical Model. In: *The International Review of Management and Marketing*. Vol. 3, No. 3, pp. 93–101.
- KELLER., K., AAKER, D. 1992. The effects of sequential introductions on brand extensions. In: *The Journal of Marketing Research*. Vol. 29, pp. 37–49.
- LINTON, I. 2018. Brand Loyalty's Influence on Consumer Behavior. In: *The Demand Media*: <http://smallbusiness.chron.com/brand-loyaltys-influence-consumer-behavior-18048.html>
- LIN, M.-Q., LEE, B. C. Y. 2012. The influence of website environment on brand loyalty: brand trust and brand effect as mediators. In: *The International Journal of Electronic Business Management*, Vol. 10, No. 4, pp. 308–321.
- MAHDAVINIA, S. H., JALILVAND, M. R., SAMIEI, N. 2011. The Effect of Brand Equity Components on Purchase Intention. An Application of Aaker's Model. In: *The International Business and Management*, Vol. 2, No. 2.
- Materials of International Journal of Electronic Business Management. 2012. Vol. 10, No. 4
- PANDISIVA, S., PANDIAN, S. 2014. Factors influencing on buyer behavior towards laptop in dindigul district. In: *The International Multidisciplinary Research Journal*. Vol. 4, No. 4.
- CHAVAN, S. K. 2007. Branding: a function of strategy. In: *Golden research thoughts*
- SASIKALA, D. 2013. Brand asset valuator-measuring brand value. In: *The International Journal of Social Science & Interdisciplinary Research*. Vol. 2, No. 6, pp. 133–138.
- SMITH, D. J., GRADOJEVIC, N., IRWIN, W. S. 2014. *An Analysis of Brand Equity Determinants: Gross Profit, Advertising, Research And Development*. Palm Beach Atlantic University.



# Distance Types of Scientific Collaborations in the Geographical Space

ZSÓFIA VIKTÓRIA VIDA<sup>1</sup>

**Abstract:** Research collaboration networks is a widely analysed area. The number of co-authored papers and the number of average authors show a growing tendency. Numerous factors influence the coming into existence of research collaboration networks. The greater the distance is between actors, the less likely they will engage in collaboration. According to the literature we isolated three main distance types: geographical, social and cognitive. The geographical distance is the physical distance in kms between actors, the social distance is the similarity between actors along social and economic factors, whereas the cognitive distance can be described as the similarity of researchers' knowledge base.

In this study we investigated the relation between social and cognitive distance at the authors' level where scientific collaborations emerge and we analysed their appearances in geographical space. We determined: 1. how we can measure social and cognitive distance between authors 2. what cognitive distance contains 3. what the appearance of social and cognitive distance on maps is like. We compared a SSH and a Science field analysing WoS records in Physical Geography and Economics between 2010-2014, which had at least one author with a Hungarian affiliation. We caught social distance through co-authorships and we determined cognitive distance via the extension of the bibliographic coupling (BC), namely the author bibliographic coupling analysis. During the extension the references of one paper are assigned to all authors of the paper.

Since we project references from papers to authors, there are two possibilities for a pair of authors to have a common reference: 1. the two authors are co-authors so both of them get the common reference 2. the two authors are not co-authors but they use the same reference because of their common research interest. In this study we separate these two cases. We call the first case social component. We determine it through co-authorship networks. The second case is called pure cognitive component. This component can sign potential future collaborations. We call the total of the two cases, the results of the author bibliographic coupling, entire cognitive similarity.

We determined similarity matrices. The social component derived from co-authorship networks, entire cognitive similarity was determined via author bibliographic analysis. The pure cognitive component was the absolute value of the subtraction of entire cognitive similarity and social similarity. Then we created networks from the similarity matrices. We proved the separation of the social and pure cognitive component through the dataset using QAP correlation.

---

<sup>1</sup> ZSÓFIA VIKTÓRIA VIDA, Dept. of Science Policy and Scientometrics, Library and Information Centre of the Hungarian Academy of Sciences, Hungary, [vida.zsofia@konyvtar.mta.hu](mailto:vida.zsofia@konyvtar.mta.hu); [vida.zsofi@gmail.com](mailto:vida.zsofi@gmail.com)

Finally, we projected the networks into the geographical space, in both analysed science fields. We found that the social and cognitive relations of Hungary were realized with geographically near countries and with countries which have a high publication emission and high citation indicators at international level. We also found a West-oriented attitude in the case of pure cognitive connections rather than in the case of social connections. We saw that the two scientific fields had similar patterns even though there were a stronger social component because of the more frequent collaboration in Physical Geography.

**Key words:** research collaboration networks, scientific collaborations, co-authorship, cognitive similarity, social similarity, bibliographic coupling.

**JEL Classification:** O30, D83, D85

## 1. Introduction

Creating new scientific knowledge is realized more and more often in research communities. According to de Solla Price (1979) the structure of research has changed after the Second World War, namely the concept of *little science* would have been substituted by *big science*. The features of big science are e.g. the increased number of researchers and publications, the existence of projects across country borders and the beginning internationality of science. This changed research environment helps researchers to become participants of scientific collaborations (Beaver, 2001).

The investigation of research collaborations dates back to the 1960s, and it is still a widely researched area (de Solla Price & Beaver, 1966; Katz & Martin, 1997). Its importance is shown by the fact that the ratio of co-authored publications has a continuous growing tendency, as does the average number of those participating in the realization of the single publications (Katz, 1994; Melin, Persson, 1996; Glänzel, Schubert, 2004; Sonnenwald, 2007).

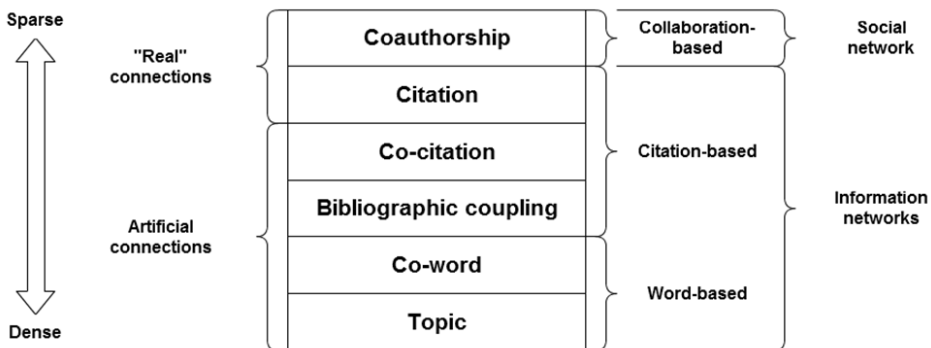
These scientific collaborations are not randomly organised. Their formation is controlled by many factors. The factors that influence the realization of scientific collaborations can be conceived as distinct dimensions. Along a single dimension, the distance between two actors becomes a measurable unit. The smaller the distance is between two actors, the greater the similarity is between them. In most cases, this helps the formation of collaborations (e.g. Paier, Scherngell, 2011). However, it is important to underline that zero distance, that is, full similarity, often impedes collaboration (e.g. Wuyts et al., 2005). According to the relevant literature I categorize these proximity factors into three main groups: geographical, social and cognitive distance.

The *geographical distance* is the physical distance in kms between actors. Several researchers studied the role of geographical distance in collaboration (e.g.

Zitt et al., 2000; Boschma, 2005; Frenken et al., 2009; Hoekman et al., 2010; Acosta et al., 2011).

The *social distance* means the similarity of actors along social and economic components, like linguistic, cultural aspects (Narin et al., 1991; Zitt et al., 2000), cultural factors (Acosta et al., 2011). Frenken et al. (2009) used social proximity as an extension of researchers' relationships, Baldi (1998) approached it using citations between researchers, while White et al. (2004) used collaboration. These relations show "real" connections between actors (*Figure 1*).

The *cognitive distance* can be defined as the similarity of researchers' knowledge base (Frenken et al., 2009). It can be measured with the similarity between actors via artificial connections (*Figure 1*), such as co-citation (Small, 1973; Boyack, Klavans, 2010; Yan, Ding, 2012), bibliographic coupling (Kessler, 1963; Jarneving, 2007; Boyack, Klavans, 2010; Yan, Ding, 2012), co-word or topic detection analyses (Boyack et al., 2005; Jarneving, 2007; Yan, Ding, 2012). These artificial connections however have an important role in facilitating real connections.



**Figure 1. Viewing scholarly networks from different perspectives**

Source: Yan and Ding, 2012, 1331.

According to the collaborating actors the following aggregation levels can be determined: authors, institutions, regions, countries, or the analysed document level: papers, journals.

In this study we investigated the relation between social and cognitive distance at the author level where scientific collaborations emerge; furthermore, we analysed how these connections are collocated in geographical space. Our questions are: 1. How can we measure social and cognitive distance between authors? 2. What does cognitive distance contain? 3. How do social and cognitive distance of collaborations appear on geographical maps?

We compared a SSH and a science field analysing WoS records in Physical Geography and Economics (Vida, 2016) between 2010–2014, which had at least one author with a Hungarian affiliation. We studied the concept of social distance through co-authorships. Collaborations are analysed usually via co-authorships because of its measurability although it is known that the two things are not the same (Luukkonen et al., 1993). In this study by ‘collaboration’ we mean only co-authorship.

We determined cognitive distance via the extension of the bibliographic coupling (BC), namely author bibliographic coupling analyses, since we worked on the author level. BC shows the number of common references between papers (Kessler, 1963; Ikpaahindi, 1986). If two publications use the same references we may think that they investigate similar questions, thus they are in cognitive relation. At the same time, as Martyn (1964) and Tagliacozzo (1967) show, this cognitive relation is only a supposition because we do not know if the two references refer to the same thing in the two texts. Nevertheless, Kessler (1965) evidenced the usability of BC to theme detection.

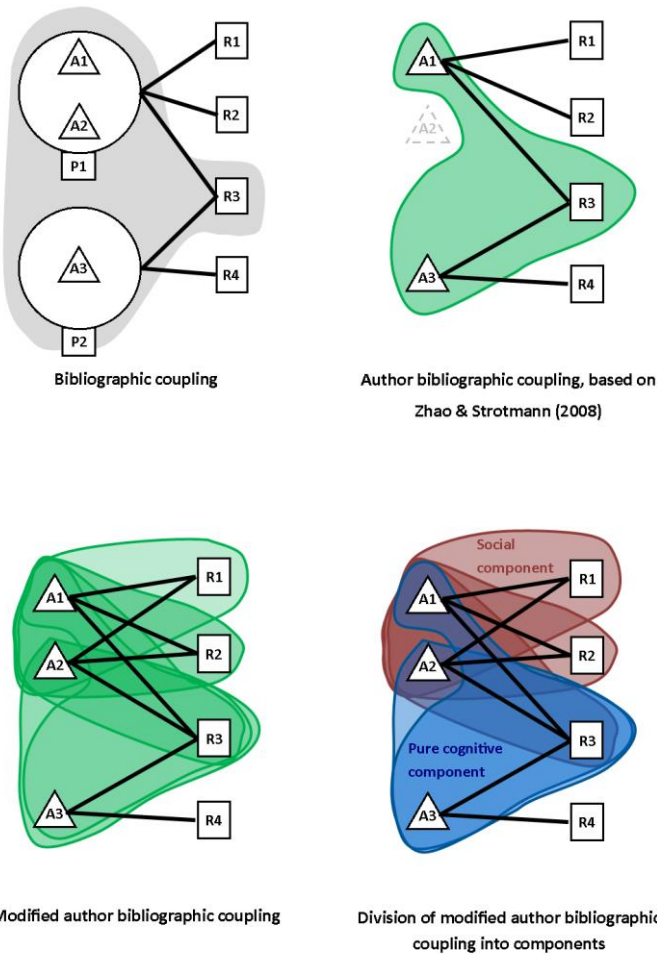
We describe the projection of BC to author level and we answer our first and second questions with the introduction of a conceptual model about the contents of cognitive distance. After that, we show the dataset and methods. Finally, in our findings we test the validity of the model via analysing our dataset and the appearance of social and cognitive distances of collaborations on geographical maps.

## **2. The relation of social and cognitive distance via author bibliographic coupling – a conceptual model**

As we said, to determine cognitive distance between authors we used *author bibliographic coupling*. This method is the extension of BC and it shows common references between authors. Earlier Zhao and Strotmann (2008) used it in their studies, but while they extended the shared references between papers to the shared references between authors their extension concerned only the first author of the papers. Contrarily, in our study we did not use such a limitation. We reconsidered the scheme as Radicchi et al. (2009) used in their author co-citation model.

On *Figure 2* we can see the extension of BC, applied by me to all authors of a paper. On the figure, *P* stands for publications, *A* for authors and *R* for references. On the top left part of *Figure 2* we can see that publications *P1* and *P2* are bibliographically coupled by *R3*. When we project this case to the author level we see the relation between authors via references. Whereas Zhao and Strotmann (2008) investigated the phenomenon only on first authors (top right part of *Figure*

2), we included all authors of a paper (bottom left part of *Figure 2*). In this case *A1* and *A2* are bibliographically coupled on the author level via *R1*, *R2*, *R3* because of their co-authorship: we called this component *social component*. On the other hand, *A3* is bibliographically coupled on the author level both with *A1* and *A2* via *R3*. This is because of the cognitive relationship of the authors, we called this *pure cognitive component* (bottom right part of *Figure 2*). So, we can see the double content of cognitive distance between authors; the social component by co-authorships, and the pure cognitive component by a cognitive relation without co-authorships.



**Figure 2. Projection of bibliographic coupling on the author level**  
P: publication, A: author, R: reference

Essentially, pure cognitive distance identifies potential future collaborations, since those authors, who are close to each other on this dimension, study the same science area but are not yet connected by co-authorship. Obviously, since the empirical part of the study examined a time span of only five years, it is possible that the authors identified in the pure cognitive category have already published a co-authored paper before the beginning of the period.

### 3. Data and methods

For testing our concept, the separation of social and pure cognitive distance within cognitive distance, we analyzed WoS records of two fields with cited references between 2010–2014 which contained at least one Hungarian author. The examined two fields are an SSH field, Economics, and a Science field, Physical Geography. This choice gives the chance to compare our findings between SSH and Science. To determine fields, the Web of Science Categories (WCs) were used. We collected papers not only from a single WC but from WCs which are in strong relation with Economics or Physical Geography. Thus, we get a similar sized dataset in the two fields (*Table 1*). To obtain the groups we clustered the WCs via journal and WC co-occurrence matrices and used hierarchical clustering (Vida, 2016). The chosen WC groups are:

Economics:

- Agricultural Economics & Policy;
- Business, Finance;
- Economics.

Physical Geography:

- Geography, Physical;
- Geosciences, Multidisciplinary;
- Imaging Science & Photographic Technology;
- Remote Sensing;
- Engineering, Geological.

**Table 1.** Size of dataset – Hungarian articles between 2010–2014 in two fields

	<b>Economics</b>	<b>Physical Geography</b>
Number of articles	722	653
Number of articles with cited references	470	644
Number of authors	704	2294

From now on, Economics means the group of Economics and Physical Geography means the group of Physical Geography.

We analyzed those records which contained cited references (CR), a necessary thing for author bibliographic coupling. CRs were given in higher rate in Physical Geography than in Economics.

Determining social and cognitive distances we used similarity matrices. The higher the cell content was, the lower the distance was between two authors.

We set up an adjacency matrix via author bibliographic coupling and we determined the similarity between authors with Salton's Cosine similarity (Hamers et al., 1989; Nguyen, Bai, 2010). The higher the cell content was in the similarity matrix, the more common references were there between authors. The values of the cells were between 0 and 1. This was the *entire cognitive similarity matrix* which contained both components (the bottom of *Figure 2*).

As we saw in the bottom right part of *Figure 2*, the social component derives from co-authorship. Thus, in determining *social distance*, we described the co-authorship with similarity matrix using Salton's Cosine similarity.

Determining *pure cognitive distance*, first we obtained the pure cognitive similarity matrix by subtracting the social component similarity matrix from the entire cognitive similarity matrix. Then we used absolute value of the results.

All the similarity matrices can determine a network, where the authors are the nodes and the similarity values are the edges. So, we created three weighted and undirected networks from the three similarity matrices. Then we compared them via the attributes of the networks and via Quadratic Assignment Procedure (QAP) correlation. Finally, we projected the networks on geographical maps. For the calculation we used R (R Core Team, 2015; Csardi, Nepusz, 2006; Meyer, Buchta, 2015).

#### 4. Findings

The created similarity networks determined weighted and undirected networks, where the nodes are the authors and the edges are the similarity values. In all the networks the nodes are the same.

In *Table 2* we see the main attributes of the networks. In the cognitive networks we can observe a higher number of relations: these relations came from the similarity of cited references so these relations were artificial connections, whereas the social networks contained real connections because these derived from co-authorships. The density values showed similar attributes with the social networks being the least dense. However, all density values were very low.

In the corpus of the present study the ratio of co-authored papers in Physical Geography and Economics was respectively 89% and 61%, whereas the average number of co-authors of a paper was 6 and 3. In the case of all the three distance types there were much more edges in Physical Geography.

**Table 2. The main attributes of the networks**

		Economics	Physical Geography
<b>Entire cognitive network</b>	# nodes	704	2294
	# edges	5145	67282
	density	2,0792	2,5582
<b>Social network</b>	# nodes	704	2294
	# edges	1347	16351
	density	0,5443	0,6217
<b>Pure cognitive network</b>	# nodes	704	2294
	# edges	4874	61157
	density	1,9696	2,3253

To validate the model, that is, to prove the difference between social and pure cognitive components, we used QAP correlation.

In both scientific fields there was a strong connection between the entire cognitive network and the social network, whereas pure cognitive networks had weak connections with both entire cognitive and social networks. After filtering social relations, the pure cognitive network showed a weak relation with the entire cognitive network in both cases (*Table 3*). The QAP correlation showed a more powerful presence of the social component within entire cognitive distance. From this point of view, the two examined science fields presented a similar picture, even if the social component was a bit stronger in the case of Physical Geography. This might be explained with the bigger frequency of co-authorship in this field.

To investigate the appearance of social and cognitive distance in geographical space we projected the social and cognitive networks on geographical maps, thus connecting inner and outer spaces. Instead of authors the relations were presented between cities, based on the affiliation of authors. We did not aggregate the network: the lines representing edges were projected one above the other, so the presence of a line shows at least one established connection between authors of two different cities.

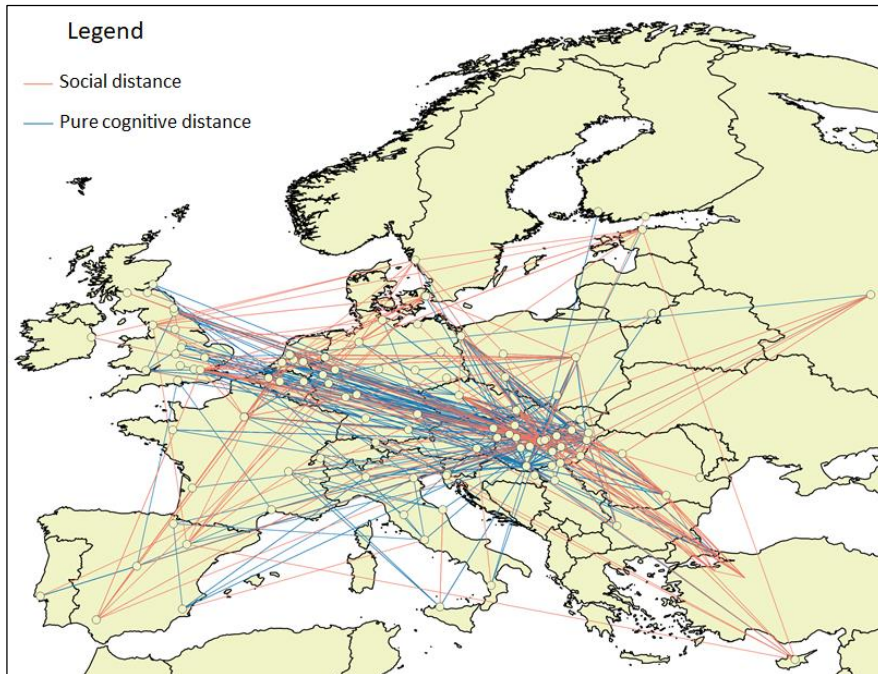
**Table 3. Results of the QAP correlation**

Economics	Entire cognitive network	Social network	Pure cognitive network	Physical Geography	Entire cognitive network	Social network	Pure cognitive network
Entire cognitive network	1	0.9872	0.3170	Entire cognitive network	1	0.9896	0.3280
Social network	0.9872	1	0.2375	Social network	0.9896	1	0.2564
Pure cognitive network	0.3170	0.2375	1	Pure cognitive network	0.3280	0.2564	1



The relations of social and cognitive networks covered almost the whole world. In this study we show only relationships within Europe, since without the connections with the United States the strongest relations were here.

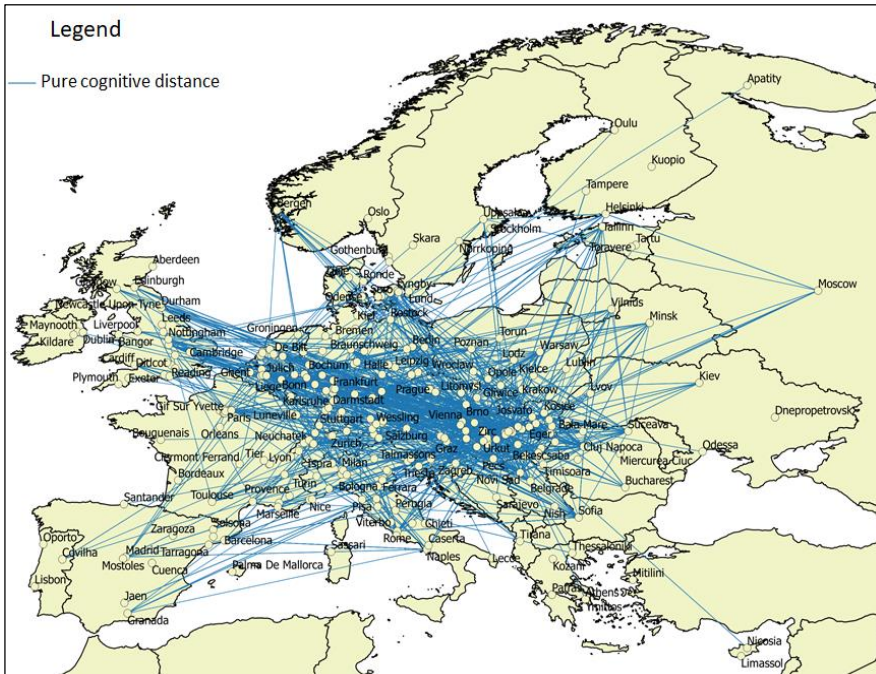
In *Figure 3* we see the edges with weights above median of social and pure cognitive networks within Europe in the fields of Economics. The clustering effect of the networks accounts for relations between two non-Hungarian cities.



**Figure 3. Edges of social and pure cognitive networks with weights above median within Europe in the field of Economics**

The more important social connections covered almost all countries of Europe. Our country's main collaborating partners were Germany, the United Kingdom, Belgium, the Netherlands and the neighbors of Hungary, e.g. Romania. In the aspect of cognitive relations we got a west-oriented connection. This means that Hungarian and Western European researchers used similar literature.

In the case of pure cognitive networks this orientation towards West was present only in the strongest 10 percent of the relations in the fields of Physical Geography (*Figure 4*).



**Figure 4. The strongest 10% of relations in the pure cognitive network in the field of Physical Geography within Europe**

## 5. Conclusion

In this study we investigated scientific collaborations from the aspect of the distance between the actors which has an important role in their formation. According to the literature we distinguished three types: geographical, social and cognitive distance. We analysed the author level where these relations are established.

The social distance was studied via co-authorship networks and the cognitive distance was analysed via BC on the author level, with author bibliographic coupling. During the projections to the author level we kept all the authors of a publication. Using author bibliographic coupling we found two reasons for the similarity of references between two authors:

1. the two authors are co-authors, so the co-authored papers' cited references appear for both authors (*social component* of cognitive distance);
2. the two authors are not co-authors but their research area is close to each other so the used references are similar (*pure cognitive component* of cognitive distance).

In this study we separated the social component of cognitive distance from the pure cognitive distance.

We used QAP correlation to prove the separation of the two components. Our findings proved that pure cognitive distance between authors can show a different picture from entire cognitive distance because of the filtering of the social factor. With the help of pure cognitive distance, we can sign potential future collaborations.

During the projection of the social and cognitive dimensions into geographical space, in both analysed science fields, the social and cognitive relationships of Hungary were realized on one hand with geographically near countries, on the other hand with countries with a high publication emission and high citation indicators at international level. A typically West-oriented attitude was clearly visible in the case of pure cognitive connections rather than in the case of social connections. The two scientific fields showed similar patterns although the more frequent collaboration caused a stronger social component in Physical Geography.

## References

- ACOSTA, M., CORONADO, D., FERRÁNDIZ, E., LEÓN, M. D. 2011. Factors affecting inter-regional academic scientific collaboration within Europe: The role of economic distance. In: *Scientometrics*. Vol. 87, No. 1, pp. 63–74.
- BALDI, S. 1998. Normative versus social-constructivist processes in the allocation of citations: A network-analytic model. In: *American Sociological Review*. Vol. 63, No. 6, pp. 829–846.
- BEAVER, D. D. 2001. Reflections on scientific collaboration (and its study): past, present, and future. In: *Scientometrics*. Vol. 52, No. 3, pp. 365–377.
- BOSCHMA, R. 2005. Proximity and innovation: a critical assessment. In: *Regional studies*. Vol. 39, No. 1, pp. 61–74.
- BOYACK, K. W., KLAVANS, R., BÖRNER, K. 2005. Mapping the backbone of science. In: *Scientometrics*. In: 64, No. 3, pp. 351–374.
- BOYACK, K. W., KLAVANS, R. 2010. Co-citation analysis, bibliographic coupling, and direct citation: Which citation approach represents the research front most accurately? In: *Journal of the Association for Information Science and Technology*. Vol. 61, No. 12, pp. 2389–2404.
- CSARDI, G., NEPUSZ, T. 2006. The igraph software package for complex network research. In: *InterJournal, Complex Systems*. Vol. 1695, No. 5, pp. 1–9.
- DE SOLLA PRICE, D. J., BEAVER, D. 1966. Collaboration in an invisible college. In: *American Psychologist*. Vol. 21, No. 11, pp. 1011–1018.
- DE SOLLA PRICE, D. 1979. *Kis tudomány – nagy tudomány*. Budapest: Akadémiai Kiadó.
- FRENKEN, K., HARDEMAN, S., HOEKMAN, J. 2009. Spatial scientometrics: Towards a cumulative research program. In: *Journal of Informetrics*. Vol. 3, No. 3, pp. 222–232.
- GLÄNZEL, W., SCHUBERT, A. 2004. Analysing scientific networks through co-authorship. In: MOED, H. F., GLÄNZEL, W., SCHMOCH, U. (rds.) *Handbook of quantitative science and technology research*. Dordrecht: Springer. pp. 257–276.
- HAMERS, L., HEMERYCK, Y., HERWEYERS, G., JANSSEN, M., KETERS, H., ROUSSEAU, R., VANHOUTTE, A. 1989. Similarity measures in scientometric research: the Jaccard index versus Salton's cosine formula. In: *Information Processing & Management*. Vol. 25, No. 3, pp. 315–318.

- HOEKMAN, J., FRENKEN, K., TIJSEN, R. J. 2010. Research collaboration at a distance: Changing spatial patterns of scientific collaboration within Europe. In: *Research Policy*. Vol. 39, No. 5, pp. 662–673.
- IKPAAHINDI, L. [SCHUBERT, A. ford.] 1986. An overview of bibliometrics: its measurements, laws and their applications [A bibliometria és a tudománymetria mérési módszerei, törvényei és alkalmazásai]. In: *Kutatás-fejlesztés, Tudományszervezési tájékoztató*. Vol. 26 No. 3–4, pp. 279–294.
- JARNEVING, B. 2007. Bibliographic coupling and its application to research-front and other core documents. In: *Journal of Informetrics*. Vol. 1, Vol. 4, pp. 287–307.
- KATZ, J. S. 1994. Geographical proximity and scientific collaboration. In: *Scientometrics*. Vol. 31, pp. 1, pp. 31–43.
- KATZ, J. S., MARTIN, B. R. 1997. What is research collaboration? In: *Research policy*. Vol. 26, No. 1, pp. 1–18.
- KESSLER, M. M. 1963. Bibliographic coupling between scientific papers. In: *Journal of the Association for Information Science and Technology*. Vol. 14, 1, pp. 10–25.
- KESSLER, M. M. 1965. Comparison of the results of bibliographic coupling and analytic subject indexing. In: *American Documentation*. Vol. 16, No. 3, pp. 223–233.
- LUUKKONEN, T., TIJSEN, R., PERSSON, O., SIVERTSEN, G. 1993. The measurement of international scientific collaboration. In: *Scientometrics*. Vol. 28, No. 1, pp. 15–36.
- MARTYN, J. 1964. Bibliographic coupling. In: *Journal of Documentation*. Vol. 20, No. 4, pp. 236–236.
- MELIN, G., PERSSON, O. 1996. Studying research collaboration using co-authorships. In: *Scientometrics*. Vol. 36, No. 3, pp. 363–377.
- MEYER, D., BUCHTA, C. 2015. *proxyc: Distance and Similarity Measures. R package version 0.4-15*. <https://CRAN.R-project.org/package=proxyc>
- NARIN, F., STEVENS, K., WHITLOW, E. 1991. Scientific co-operation in Europe and the citation of multinationally authored papers. In: *Scientometrics*. Vol. 21, No. 3, pp. 313–323.
- NGUYEN, H. V., BAI, L. 2010. Cosine similarity metric learning for face verification. In: *Computer Vision—ACCV 2010*. Springer Berlin Heidelberg. pp. 709–720.
- PAIER, M., SCHERNGELL, T. 2011. Determinants of collaboration in European R&D networks: empirical evidence from a discrete choice model. In: *Industry and Innovation*. Vol. 18, No. 1, pp. 89–104.
- R Core Team 2015. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL <https://www.R-project.org/>
- RADICCHI, F., FORTUNATO, S., MARKINES, B., VESPIGNANI, A. 2009. Diffusion of scientific credits and the ranking of scientists. In: *Physical Review E*. Vol. 80, No. 5, 056103.
- SMALL, H. 1973. Co-citation in the scientific literature: A new measure of the relationship between two documents. In: *Journal of the Association for Information Science and Technology*. Vol. 24, No. 4, pp. 265–269.
- SONNENWALD, D. H. 2007. Scientific collaboration. In: CRONIN, B. (ed.) *Annual Review of Information Science and Technology*, Vol. 41 (pp. 643–681), Medford (NJ): Information Today.
- TAGLIACOZZO, R. 1967. Citations and citation indexes: A review. *Methods of Information in Medicine*. Vol. 6, No. 3, pp. 136–142.
- VIDA, Z. V. 2016. “Scientific Collaborations” at the Level of Countries – A Case Study: A “Hard” Physical Geography and a “Soft” Economics Science Field. In: *Deturope*. Vol. 8, No. 3, pp. 224–246.
- WHITE, H. D., WELLMAN, B., NAZER, N. 2004. Does citation reflect social structure?: Longitudinal evidence from the “Globenet” interdisciplinary research group. In: *Journal of the American Society for Information Science and Technology*. Vol. 55, No. 2, pp. 111–126.

- 
- WUYTS, S., COLOMBO, M. G., DUTTA, S., NOOTEBOOM, B. 2005. Empirical tests of optimal cognitive distance. In: *Journal of Economic Behavior & Organization*. Vol. 58, No. 2, pp. 277–302.
- YAN, E., DING, Y. 2012. Scholarly network similarities: How bibliographic coupling networks, citation networks, cocitation networks, topical networks, coauthorship networks, and cword networks relate to each other. In: *Journal of the American Society for Information Science and Technology*. Vol. 63, No. 7, pp. 1313–1326.

# Cognitive proximity of the Universities and the Regions in Hungary

MIROSLAV ŠPUREK<sup>1</sup>

**Abstract:** Through their relations with industry and government, universities generate (and disseminate) new knowledge, a vital input for the regional innovation. To transfer the knowledge effectively, some level of cognitive proximity between the university and the ‘non-university’ actor is a must. By cognitive proximity I refer to the extent to which organizations (or institutions) share the same knowledge base. People are, of course, expected to learn more from each other when the cognitive distance is little rather than large. Aim of the article is to measure the cognitive proximity between the universities and the other, non-university actors in regions of Hungary. The main database is provided by OECD and their REGPAT Patent data. First step is to identify the university owned and university invented patents. Second step is to develop a technique, to measure the extent to which these patents are cognitively proximate. Desired outcome would be the matrix of cognitive proximities within and between the regions. Such matrix, for instance, could be used to estimate the optimum level of cognitive proximity between the universities and its regions matters for the innovation.

**Key words:** university, cognitive proximity, regional innovation system

**JEL Classification:** O30, C02, C55, C80

## 1. Introduction

Contemporary trends in social science and economics delineates various aspects of innovation. Fagerberg, Mowery and Nelson (2004), in their book, had used famous poem “*The Blind Men and the Elephant*” to describe what may happen when different observers approach the same phenomenon from rather different starting points. The blind men approach the elephant’s side and finds it to be “*very like a wall*”. The one checking its leg concludes that it is a tree. By substituting the innovation for the elephant and the social scientist for the blind men, they’ve acknowledged that the innovation is complex phenomena. Its complexity has not been neglected in the literature and many differing concepts, or so called “*blind men*”, now overlap. The fact that the innovation cannot be produced in isolation (Doloreux, 2002) is common denominator of these concepts and implicitly, justifies studies that approaches the innovation from the other than the firm’s

---

<sup>1</sup> MIROSLAV ŠPUREK, University of Economics in Bratislava, Slovakia,  
miro.spurek@gmail.com

perspective. Regional innovation system theory (Cooke et al., 1998) emphasizes that each region forms a system of components, such as universities and firms, that systematically engage in interactive learning. This theory assesses the innovation as the outcome of not only entrepreneurial activity, but as the outcome of activities that are intertwined with the other components of a region.

Universities, in fact, are key elements of regional knowledge infrastructure. It is not only that they supply the labor market by educated and specialized workers but do also create knowledge and contribute to the knowledge base of its regions. Knowledge creation and learning, in general, is critical to the competitive advantage of regions (Boschma, 2005). In this respect, much had been written on the impact of proximity. People are expected to learn more from each other when the cognitive distance is little rather than large. By cognitive proximity I refer to the extent to which organizations share the same knowledge base. If, the components of the regional innovation system are cognitively proximate, it is expected that they learn from each other and augment the overall knowledge base of its region. Such behaviour may result into self-reinforcing learning effects in regional economies. Components that are cognitively distant, may not be able to achieve the state of sustainable collective learning. It is also expected that proximate actors interact much more than those, that are cognitively distant. The more the components of regional system interact, the more they learn and the more they innovate. However, there is also a critical assessment emphasizing that too much proximity may have negative impacts on innovation, due to a problem of lock-in, implying a lack of openness and flexibility (Boschma, 2005). The more open a system is for impulses from outside, the less the chance of being locked in from promising new paths of development that emerge outside of the system (Fagerberg, 2004). Therefore, it is essential for regional innovation system to attain and preserve cognitive proximity amongst its own components, but to not neglect the interaction with more distant actors, eventually residing in other systems.

This paper measures the extent to which, one component of the system is cognitively proximate with its own system. Primary interest is to assess how well universities fit into their environment, which consists of multiple component's interactions, mainly firms but also a government. Such environment is also known in the literature as a Triple Helix Model (Etzkowitz, Leytesdorff, 1997). To do so, the focus is put on similarity of patents between those applied for by universities and those applied for by firms or government. This is done on NUTS 3 level of regions in Hungary and the results of this study, taking in to account their coherence with the other regional macroeconomic statistics, might be a vital input for further quantitative work.

Patents had been chosen as main proxy to estimate the overall trends in cross-disciplinary direction of research conducted at the universities and in the regions.

The university patenting is nowadays much more significant than decades ago. Yet, the fact that universities have not been always patenting their inventions does not imply that they hadn't been active in their research agenda and had not taken part in the interactive learning processes inside their regions. In fact, they have been active in patenting but had not applied for the patent themselves. Many academic inventors had collaborated in commercial research, government research institutes or applied for patents themselves. In both cases, the trend of patenting universities was obviously much more significant in countries of western Europe than those of the east. This study aims for patent applications applied for directly by Hungarian universities and identifies the ones applied for by individuals, that have been working or doing research at the university, at the time of their patent application.

The suitability of patents for innovation studies had not been mentioned in lines above. To get the invention patented, inventor must provide patent office with the detailed description of invention, his name, address, ... It is also plausible that patented inventions are going to be introduced on the market and if not directly, they might be cited in those that are going to be introduced. Once the invention is revealed to the public and competition, inventor seeks legal protection to catch benefits from his inventions and gain competitive advantage. Most importantly, data for patents are available in readable form. On the other side, patented invention does not have to be successful on the market. Second, the patented invention does not necessarily consist of scientific knowledge. Third, inventors may limit their patent applications to only a subset of their discoveries. They most likely seek legal protection when a patent raises a meaningful barrier to imitation, when the invention will not quickly become obsolete, and when few alternative "natural" defenses protect the knowledge (Levin et al., 1987 in Sorenson et al., 2006). It follows from above and is in line with contemporary critics, that (A) patents represent rather invention than the innovation. Some patents are simply never introduced on the market, but there have been cases throughout the history that contradicts. "*Scientists have long known that expanding gases absorb heat, thus cool whatever they contact, but the gas refrigerator is an invention of the twentieth century*" (Nelson, 1959). (B) Some patents contain only very little or none, scientific knowledge and don't inevitably strengthen the existing knowledge base. Yet it does not preclude them from having significant economic impact, such as patents for zipper, safety razor, potato chips or cornflakes. (C) Firm may also decide not to patent and for instance, hide its knowledge inside the complex product. Thus, the actual proximities of universities and their regions are unknown, whatsoever the proximities calculated in this paper might be a good estimate and a starting point to evaluate their proximity in more, case specific detail.



## 2. Identification of university-owned and university-invented patents

The first stage of the paper was to identify the patents that have been assigned to universities either directly, through the university patent application (university owned patents) or indirectly, through the algorithm that have paired the academic inventors with their patents (university-invented patents). “*OECD, REGPAT database, July 2019*” is subject to the identification stage for both, university-owned and university-invented patents, and is extensively used in further stages of the paper. The identification stage for university owned patents is done solely in SQL query in PostgreSQL. First, we’ve got the list of universities in Hungary<sup>2</sup>. Second, from such list of university names we construct a set of keywords, for which we search in table “*Patent applicants to the EPO*”. The rows that had shown, at least, a partial match between the column “*Applicant’s name*” and one of the keywords, have been marked as university owned patents. 150 unique patent applications applied for by, approximately, 40 universities have been found. Each application is located at one region and universities own, on average, 0.77 of their patents while the rest is co-owned by the other organizations (patent could be also owned by co-authorship of two or more universities). Third, the join has been created between the tables “*Patent applicants to EPO*” and “*List of EPO Inventors*”, based on the common application identification number of a university owned patent (the application id is available for both tables). Thereafter, the inventors of university owned patents have been identified in the inventors table. 687 unique inventors have been assigned to 150 university owned applications. In fact, 715 of unique rows in inventors table have been marked as university owned rows.

Recently conducted studies have shown that majority of patents in Europe are assigned outside of the university (Thursby et al. 2009 in Dornbusch et al., 2012). As we will see, this might not be true for Hungary and the rest of eastern Europe. The methodology used here is very similar to one introduced by Dornbusch et al. (2012). First, for the university-invented patents, we capture every individual active in university research who publishes in scientific journals. We use the list of universities obtained in previous step as input for automatized searches of academic articles in Scopus<sup>3</sup> database. Due to a specific nature of Scopus webpage and to limitations that accompanied the download of large amounts of data, it was inevitable to develop tool that would be able to do multiple steps, numerous times in few scenarios. Automatized data collection tool for Scopus webpage has been created in R (Rstudio), using “*RSelenium*” package for interactive web browsing.

---

<sup>2</sup> European Tertiary Education Register (ETER project) available at: <https://www.eter-project.com/#/home>

<sup>3</sup> SCOPUS available at <https://www.scopus.com>

Since the data were available for download in readable (csv\*) form, the robot did not extract any information from the HTML code of a website and is no “*web-scraping*” tool. Given list of universities (obtained in previous step) the robot had started automated searches. The data such obtained, contains detailed information on academic articles published in journals and presented at the conferences, such as author’s name, name of the article, name of the journal (conference), year of the publication (conference), author’s affiliation (university), correspondence address, funding information, ...

After obtaining the data, the next step was to format them in a way that is readable for matching algorithm that has been developed. The role of the algorithm was to identify the rows in the patent database “*List of EPO Inventors*” that corresponds to rows in Scopus database. The rows that had been labeled as university-invented patents, had to pass three matching criteria: (A) the match on the names of the patent inventor and paper author, (B) the match on co-location of patent inventor and the author (postcode, if available, otherwise name of the city), (C) publication of an article occurring within two-year time window after the patent was filed for the first time (priority year). 162 unique patent applications, 147 distinct inventors and, in total 178 unique rows in patent database List of EPO Inventors had been labeled as university-invented patents. In total, 883 unique rows had been labeled as university either owned or invented (10 rows overlap between the two groups).

The rest of the inventor database (located in Hungary) had been labeled as “*other*” component (5284 unique patents, 13651 distinct inventors and 17060 unique rows of List of EPO Inventors).

### 3. Measuring cognitive proximity

To measure the cognitive proximity, international patent classification (IPC) nomenclature is used. The methodology proposed here have its inspiration in recent proximity studies, for instance by Angue, Ayerbe and Mitkova in 2013. First step was to prepare the data into desirable format. Another join in SQL has been created between the both groups of patents (university group and the other group) and the table “*List of IPC classes and selected dates*” (OECD, REGPAT database, July 2019). Each patent application number has been paired with its classifications (IPC). IPC divides the patents into over 68000 distinct sub-domains and has a hierarchic structure. Each patent has its own main code along with sub-codes that refine the description. For the purposes of this paper, the classification was simplified into eight main classes – (A) human necessities, (B) performing operations and transporting, (C) chemistry and metallurgy, (D) textiles and paper,

(E) fixed constructions, (F) mechanical engineering, lighting, heating, weapons, blasting, (G) physics and (H) electricity.

The principle of measuring proximity of patents involves associating each region with a vector summing up its technologies and comparing with a vector of the other region (or group). Each region is divided into two – university and the other. Thus, 42 vectors had been constructed – 21 vectors for regions assigned to university group and 21 vectors assigned to other group (21<sup>st</sup> region summarizes patents that hadn't contain information on inventor's address or NUTS code). The vector breaks down region's patents into the 8 IPC sections (there are eight coordinates for each vector, each coordinate summarizes the number of times that region's patents had been classified into particular IPC class). It then follows that two regions have much closer patent portfolios when their vectors show the same proportions of occurrences in IPC classes. Thus, it is not the magnitude of the vectors that we are interested in, but rather their relative direction. If vectors are co-linear, that means they present the same relative proportions of patents for each of the class. The overall number of patents is not crucial – if two vectors show same proportions, direction of vectors is identical. The overall number of patents (or number of IPC occurrences) changes only the magnitude of the vector, not its direction and thus has no effect on proximity thereafter measured. In other words, region may possess identical technological skills between the university and the other component, owning simply  $\beta$  times more patents (always in the same domain). To measure the proximities, cosines of the angle between the two vectors are considered, as originally suggested by Jaffe in 1986. Since the number of patents held per level is always positive or nil, the cosines calculated are either 0 or 1:

- “0” corresponds to two completely different patent portfolios;
- “1” corresponds to co-linear vectors and thus to identical patent portfolios.

The calculation comprises two stages: (1) to fill in the vectors of the  $p$  IPC codes for  $n$  regions we want to compare (matrix  $M_{np}$ ), (2) to calculate the proximity of patent portfolios owned by regions  $i$  and  $j$  (matrix  $P_n$ ). The proximity  $P$  is calculated as follows:

$$P(i, j) = \frac{M(i) * M(j)}{\|M(i)\| * \|M(j)\|}$$

where  $M(i)$  is the vector of  $i$ th line of  $M$ . Matrix  $M$  has eight columns (IPC) and 42 rows (regions). The matrix  $P$  gives all the proximities measured between the regions taken two by two and thus, calculation yields a symmetrical matrix of 42 columns and 42 rows.

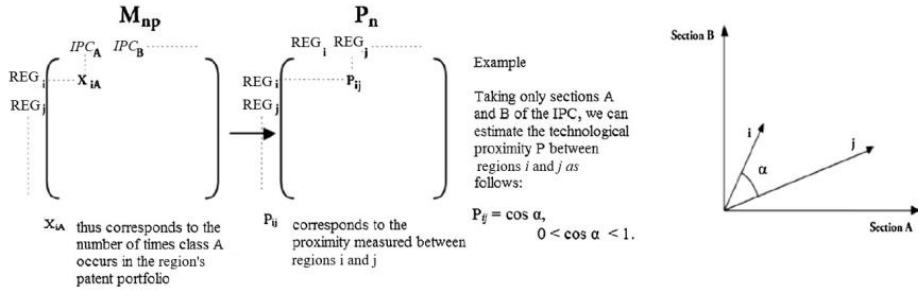


Figure 1. Measure of proximity between patent portfolios

### 4. Results

This part briefly presents the results obtained using the method outlined above. Resulting matrix P is in the form of identity matrix. In fact, values in bottom left triangle are mirrored in the upper right triangle. Whatsoever, the matrix is simply too large to display and is partially outlined in *Table 1*. It contains the proximities between the universities (rows) and their regions (columns). Thus, movement on the diagonal line shows the intra-regional proximities between the universities and its regions. These diagonal values are also displayed on *Figure 2*. Universities seem to be cognitively proximate and well connected with its regional environment in Budapest, Veszprém, Baranya, Csongrád, Hajdú-Bihar and Szabolcs-Szatmár-Bereg.

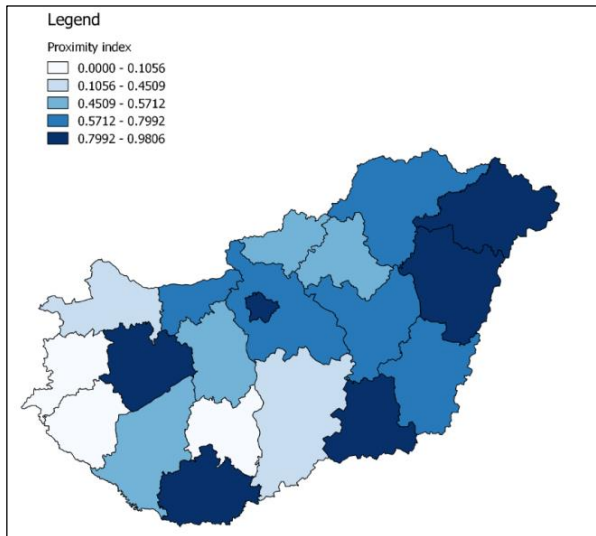


Figure 2. Cognitive proximities between universities and their regions

Table 1. Proximity matrix

	O_HUJ01	O_HUJ02	O_HUJ11	O_HUJ12	O_HUJ13	O_HUJ21	O_HUJ22	O_HUJ23	O_HUJ31	O_HUJ32	O_HUJ33	O_HUJ34	O_HUJ35	O_HUJ36	O_HUJ37	O_HUJ38	O_HUJ39	O_HUJ40		
U_HUJ01	0.9521	0.9681	0.9126	0.9055	0.9484	0.8740	0.8901	0.8144	0.9263	0.8998	0.9556	0.7201	0.9567	0.9810	0.9231	0.5572	0.8711	0.9164	0.9323	
U_HUJ02	0.7551	0.7422	0.5655	0.8666	0.8851	0.7109	0.6198	0.4983	0.7130	0.7881	0.7681	0.5902	0.7202	0.7874	0.8671	0.8579	0.8361	0.2943	0.5286	0.7238
U_HUJ11	0.7353	0.7292	0.5712	0.8881	0.8828	0.7322	0.6271	0.5166	0.6033	0.7183	0.7678	0.6395	0.7124	0.1947	0.8574	0.8155	0.3334	0.5157	0.7012	0.9367
U_HUJ12	0.6404	0.6147	0.4446	0.7892	0.8071	0.6122	0.4889	0.3598	0.4763	0.6147	0.6590	0.5148	0.5916	0.1010	0.5887	0.7600	0.7537	0.1852	0.3826	0.6162
U_HUJ13	0.7295	0.7001	0.5060	0.8458	0.8711	0.6657	0.5699	0.4267	0.5789	0.6832	0.7484	0.5618	0.6721	0.1551	0.6853	0.8268	0.8300	0.2327	0.4836	0.7099
U_HUJ21	0.0749	0.1370	0.3063	0.4179	0.2089	0.3931	0.3775	0.4166	0.1638	0.2459	0.2487	0.7483	0.1886	0.3750	0.0543	0.2178	0.0478	0.6812	0.1771	0.0511
U_HUJ22	0.0014	0.0016	0.0464	0.0122	0.0000	0.0510	0.0000	0.0000	0.0894	0.0124	0.0243	0.0000	0.0000	0.0000	0.0000	0.0000	0.0041	0.0000	0.0496	0.0089
U_HUJ23	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
U_HUJ31	0.9270	0.9180	0.8991	0.6594	0.7886	0.6825	0.8130	0.7159	0.9700	0.7697	0.8902	0.5171	0.8796	0.4210	0.9295	0.8242	0.8474	0.4425	0.9234	0.9274
U_HUJ32	0.6265	0.7118	0.7765	0.3276	0.4128	0.5060	0.6964	0.7342	0.6910	0.4872	0.5377	0.3129	0.7199	0.3094	0.5679	0.5253	0.4567	0.5847	0.7867	0.3658
U_HUJ33	0.1609	0.3147	0.4040	0.1052	0.0637	0.3140	0.3556	0.5378	0.1844	0.1599	0.1056	0.1169	0.3681	0.0548	0.0206	0.2100	0.0086	0.4713	0.3074	0.0420
U_HUJ34	0.9509	0.9302	0.9042	0.8151	0.8969	0.7770	0.8452	0.7227	0.9740	0.8549	0.9652	0.6854	0.8931	0.4572	0.9549	0.9053	0.9151	0.4854	0.9016	0.9580
U_HUJ35	0.4442	0.4784	0.4938	0.8138	0.6514	0.6818	0.5959	0.4492	0.4168	0.5655	0.5943	0.9084	0.5069	0.3606	0.3966	0.6303	0.4905	0.6561	0.3713	0.4106
U_HUJ36	0.8791	0.8711	0.8654	0.8878	0.8948	0.8075	0.8815	0.7502	0.8988	0.8261	0.9404	0.8834	0.8543	0.5219	0.8838	0.8850	0.8617	0.6731	0.8469	0.8808
U_HUJ37	0.9674	0.9438	0.9042	0.8595	0.9309	0.7956	0.8843	0.7419	0.9788	0.8670	0.9837	0.7558	0.9120	0.5016	0.9760	0.9278	0.9428	0.5535	0.9146	0.8568
U_HUJ38	0.6161	0.6271	0.5296	0.8297	0.7815	0.7031	0.5423	0.5012	0.5313	0.6591	0.6911	0.6077	0.6194	0.1861	0.5391	0.7794	0.6770	0.2875	0.4053	0.5747
U_HUJ39	0.8692	0.8323	0.6548	0.8915	0.9533	0.7321	0.6949	0.5297	0.7492	0.7809	0.8700	0.6182	0.7952	0.2487	0.8429	0.9149	0.9414	0.3069	0.6567	0.8602
U_HUJ40	0.8353	0.8646	0.7299	0.8438	0.8810	0.7785	0.7531	0.6773	0.7253	0.7570	0.8111	0.5910	0.8532	0.2250	0.7512	0.9033	0.8460	0.4509	0.6928	0.7769
U_HU330	0.8587	0.9017	0.8655	0.9182	0.9057	0.8791	0.8518	0.8130	0.8317	0.8352	0.9002	0.7732	0.8991	0.3769	0.7810	0.9459	0.8320	0.6046	0.7699	0.8047
U_HU333	0.9935	0.9844	0.9051	0.8873	0.9672	0.8256	0.8863	0.7566	0.9662	0.8756	0.9883	0.7087	0.9524	0.4158	0.9730	0.9751	0.9747	0.5211	0.9747	0.9403
U_HUZZZ	0.2196	0.2728	0.4417	0.4845	0.3112	0.4685	0.4945	0.5088	0.3234	0.3507	0.3992	0.8014	0.3144	0.4469	0.2113	0.3228	0.1753	0.7330	0.3335	0.2038

**Table 2. Regions of Hungary**

<b>NUTS 3</b>	<b>Region</b>	<b>NUTS 3</b>	<b>Region</b>	<b>NUTS 3</b>	<b>Region</b>
HU101	Budapest	HU223	Zala	HU321	Hajdú-Bihar
HU102	Pest	HU231	Baranya	HU322	Jász-Nagykun-Szolnok
HU211	Fejér	HU232	Somogy	HU323	Szabolcs-Szatmár-Bereg
HU212	Komárom-Esztergom	HU233	Tolna	HU331	Bács-Kiskun
HU213	Veszprém	HU311	Borsod-Abaúj-Zemplén	HU332	Békés
HU221	Győr-Moson-Sopron	HU312	Heves	HU333	Csongrád
HU222	Vas	HU313	Nógrád	HUZZZ	Hungary - not regionalised

## 5. Conclusion

This paper offers detailed view on cognitive proximities between the universities and the regions in Hungary. At first, it has explained the methodology for identifying and collecting the data for university owned and invented patents. The tools such developed may be used without any extensive effort to collect the data for other European countries as well.

It is reasonable to expect, that regions with higher values of proximity should perform well in learning and innovation. Our calculations identified regions in which, universities conduct research in same areas and proportions, as rest of its local economy. Without the doubt, this is desirable output for any innovation system since cognitive proximity facilitates the cooperation and interaction of its own components. Regions that have no or weak cognitive connection with its university component have been identified as well. Whether we aim for well or poorly performing regions, further work is a must before we derive conclusions. First, the outcomes of our calculations should be paired with the other regional statistics on innovation and macroeconomics. Second, the relationship between the cognitive proximity and the innovation is, we assume, not linear. Thus, for some regions it might be beneficial to lose some of the cognitive proximity. Having combined both propositions, then desired outcome of further work could be the estimate of the optimal levels of cognitive proximity in different types of regions.

## Acknowledgements

This work was supported by the Slovak Research and Development Agency under the contract No. VEGA V-19-147-00

## References

- ANGUE, K., AYERBE, C., MITKOVA, L. 2013. A method using two dimensions of the patent classification for measuring the technological proximity: an application in identifying a potential R&D partner in biotechnology. *Springer Science + Business Media New York*.
- BOSCHMA, R. 2003. Proximity and Innovation: A Critical Assessment. In: *Regional Studies*. Vol. 39, No. 1, pp. 61–74.
- COOKE, P., URANGA, M. G., ETXEBARRIA, G. 1998. Regional Systems of Innovation: An Evolutionary Perspective. In: *Environment and planning A: Economy and Space*.
- DOLOREUX, D. 2002. What we should know about regional systems of innovation. In: *Technology in Society*. 24, No. 3, pp. 243–263.
- DORNBUSCH, F., SCHMOCH, U., SCHULZE, N., NADINE, B. 2012. *Identification of university-based patents: a new large-scale approach*. Fraunhofer Institute for Systems and Innovation Research ISI.
- ETZKOWITZ, H., LEYDESDORFF, L. 1997. Introduction to special issue on science policy dimensions of the Triple Helix of university-industry-government relations. In: *Science and Public Policy*. Vol. 24, No. 1, pp. 2–5.
- FAGERBERG, J., MOWERY, C., NELSON, R. R. 2005. *The Oxford Handbook of Innovation*. Oxford University Press, ISBN 978-0-19-926455-1
- JAFFE, A. B. 1986. Technological opportunity and spillovers of R&D: Evidence from firms' patents, profits and market value. In: *American Economic Review*. Vol. 76, No. 5, pp. 984–1001.
- NELSON, R. 1959. The Simple Economics of Basic Scientific Research. In: *Journal of Political Economy*. Volume 67.
- SORENSEN, O., RIVKIN, J. W. FLEMING, L. 2006. Complexity, networks and knowledge flow. In: *Research policy*. Vol. 35, No. 7, pp. 994–1017.

# Health economic factor and health behavior examination in Western Hungary

BEATRIX FARAGÓ, ÁGNES KOVÁCS TÓTH,  
CSABA KONCZOS, ZSÓFIA PÁPAI, ZSOLT SZAKÁLY<sup>1</sup>

**Abstract:** The basis of the research is the individual image of health and the individual and social health behavior which are supported by healthcare and the health economy.

The main areas of this sector are covered by the effects of lifestyle, physical activity, fitness and performance measurements and physical rehabilitation procedures. The research project emphasizes not only health preservation, but also health promotion and it has an impact on lifestyle, health consciousness and changes in health behavior. The main research topic is: impact assessment of preventive, diagnostic and rehabilitation procedures, health behavior, lifestyle in relation to health market products. A questionnaire was conducted as the quantitative method. The sample was collected from students of Health and Sports Science Faculty. In the research it was discovered that sport as a health factor has a major place for recreational students, whereas in nursing and midwifery medicine health has reached a lower level and mental health is more pronounced. In a health-conscious way of life, the results show a positive trend, as positive elements of health such as self-confidence are displayed, but a professional, stronger commitment and behavioral patterns are needed. The level of education of the students should be transformed so that the acquired knowledge can guide their actions in their future work, incorporating their behavior. These can only be achieved as a result of a long process that has precedence over the pre-tertiary stage of life. If one builds up an adequate fund at a young age (elementary and secondary school), then higher education can add something to this established knowledge.

**Keywords:** health care, prevention, lifestyle, health economy, health consciousness

**JEL Classification:** I12, I21, I15

## 1. Introduction

The large-scale developmental tendencies of the economy can be achieved on the basis of innovation. In an era's economic, social life the Kondratyev (1980) cycles, that is the K-waves play a determining role, which can be as short as 10-15 years, or as long as 40–60 years. The Kondratyev cycles are based on the

---

<sup>1</sup> BEATRIX FARAGÓ, ÁGNES KOVÁCS TÓTH, CSABA KONCZOS, ZSÓFIA PÁPAI, ZSOLT SZAKÁLY, Széchenyi István University, Faculty of Health and Sport Sciences, Hungary, farago.beatrix@sze.hu



recession, the economic crisis, or even the social tension that determine the new conjuncture cycle. We are currently experiencing a new cycle in which researchers are exploring the way for innovations that determine the lifestyle of the next decades (Kondratyev, 1980) The actuality of research is founded upon the growth of the average age of the population in recent decades in the developing countries. Lifestyles of the population are characterized by fundamentally positive life scenarios, which nevertheless may entail numerous civilization damaging effects. New civilization diseases have emerged and the frequency of non-communicable diseases has increased significantly. It is crucial to address the health problems associated with the change in the new cycle, which are caused typically by cardiovascular problems, overweight, obesity, diabetes, insufficiency of physical activity. In the early stages of illness, the latent symptoms are creating a false health image. The task of healthcare is to use procedures that are able to diagnose diseases early in this phase. The path to improving the health and quality of life of individuals and communities can be achieved by favorably influencing health determinants. Assessing the public health behavior of the population is a part of primary prevention. In the prevention processes, the attitude of the population in connection with physical activity is decisive, this can be seen in health preservation and development (Konczos et al., 2010; Konczos, Szakály, 2007; Gritz, 2006). Promotion of a healthy lifestyle and its impact on socio-economic, environmental and personal factors belong to the concept of health preservation. One form of health-conscious behavior is individual, which shows up in counseling, education, clinical intervention, and the other is a community form that appears in the improvement of health, social, cultural, natural and technical conditions (Simon, 2002; Ottawa Charta, 1986). Some research proves that university students who have a high level of general self-efficacy and attach importance to a healthy lifestyle tend to adopt exercise behavior (Ersöz et al., 2017). Healthcare is one of the future megatrends of environmental technologies, besides nano/biotechnology, which is the driving force behind the next cycle (Allianz Global Investors, 2010). Preventive health behavior is the main determinant of the megatrend of health. Healthy humans and their resources are the most important driving force in the economy. Our research is about economic, social processes and it can identify effective directions for health care, prevention, and diagnostic procedures. Our introduces the domestic well-developed urban environments where health orientation guidelines are designed based on which we can develop effective preventive, diagnostic procedures in health-conscious behavior. Based on the surveyed health image, we present the concept of health in the economic and social environment as quality of life. The results of our research may contribute to a better understanding of global megatrends with an impact on individual, economic and social conditions.

## **2. Health as an economic factor – The idea of Health in the European Union and Hungary**

The development of a healthy attitude has gone through several transitions. The development of natural science in the 18th and 19th centuries and the mass production of industrialization created conditions for urban life in which physical health and hygienic factors came to the fore. In the 20th century, health meant a lack of disease, resulting in a bio-medical approach to health. The WHO adopted the accepted definition of health in 1946, highlighting the aspects of the bio-social, bio-psycho-social model of health. According to the WHO, “Health is a state of complete physical, mental and social well-being, not just lack of illness.” WHO has further developed the definition of health in 1984 and this definition is used today. “Health is the extent to which an individual or group can accomplish its aspirations and meet its needs, change the environment or cope with it. Health can, therefore, be regarded as the resource of everyday life rather than its purpose” (WHO, 1984). In the 19th century, the state of health is interpreted as an exemption for the ability to perform, to feel well-being and to exonerate the risk factors of the disease and premature death (Tringer, 2002). The interpretation of health has undergone considerable development through a lack of disease through holistic approaches to the complex, multi-dimensional understanding of health. The essence of health is the interpretation of the individual, the consumer's knowledge and its particular application. The researches concerning the emergence of health dimensions investigated only the physical dimension (79%) (Hawks et al., 2008). The essence of the complex handling of health dimensions is that each factor affects the other, and interventions in one area appear in other areas as well. These relationships can be seen in terms of emotional well-being and the state of the cardiovascular system (Williams et al., 1999), furthermore, the contribution of the social dimension to the expected health consequences of diseases such as cancer, cardiovascular diseases (Callaghan, Morrisey, 1993; Uchino et al., 1996). It appears as a positive effect of social support on health behavior, optimism, self-esteem (McNicholas, 2002). Negative correlations can be found for spirituality and depression (Nelson et al., 2002) and eating disorders (Hawks et al., 2003). People obtain higher levels of spiritual growth, health responsibility, exercise, nutrition and interpersonal relations subscales of Health Promotion LifeStyle Profile than participants who exercise for a short time (Ersöz, 2018). The Determinant factor of the national standard of living is national identity which is a crucial part of an emotionally healthy society, which sport is a part of (Györi Szabó, 2012) serving as a model for national health behavior. Lifestyle characteristics appear as a national economic factor in preserving and optimizing the health of the population. Lifestyle changes were generated by the industrial and economic development of societies, which resulted not only in a

decrease of working time and regular physical activity, but an increased frequency of “civilization” diseases (Antal, 2007). Labour is a key element of economic resources, thus retaining the ability to work and increasing the number of years of health is a significant factor. Based on data from Eurostat (2014), life expectancy in Hungary lags behind the European Union average. The number of years in health is growing, citizens are active until the age of 60, free of physical illness that permanently reduces their ability to work. The expectancy of age at birth was 71,6 years, the number of years in health 59,2 years, and 78,7 years for women – 60,5 years on average. The Hungarian population does not pay enough attention to the physically active way of life, in contrast with other countries of the civilized world (Gósi, 2018). In 2014, only every 9th Hungarian performs physical exercise according to WHO recommendations (Health Report, 2016). Hungary still represents the 20th century’s perceptions of health as the lack of illness (58%) relegating the role of body-soul-spiritual harmony (41%) to the second place and healthy living to the third place (32%) (Bernáth, 2012). The situation is similar in the subjective judgment of the state of health in terms which the Hungarian population lags behind the EU average. Nearly 70% of the EU average places the highest value on its positive state of health, the same among the Hungarian population being 57.6% (Eurostat, 2014).

### **3. Sport and health at economic and social efficiency**

International companies in the global market treat the impact of culture on the region as a competitive advantage in which sport can be seen as a social threat that has an impact on society and the nationwide economy (Faragó et al., 2018). In the research of corporate efficiency the elements of knowledge, learning, and knowledge transfer have appeared (Konczosné, 2014). If we want to develop the economy, society or an individual area we should concentrate on health and sports as well. Expert training in a sport or employment and financing of sports show a favorable picture, which improves the job market and also the training of professionals (Gósi, 2017). Health status in childhood has a positive impact on learning abilities that are emerging as an economic factor (Kollányi, Imecs, 2007). For the development of sports attitudes and behavior, specialists consider the early stages of sports socialization to be of paramount importance. The main influencing factors are the socialization of sport, the influence of the family, educational institutions, contemporary groups and the media (Faragó, 2015). Sport is not only recognized for its economic utilization in society but also is an effective tool for women's inclusion and women's role in sports is becoming much less stereotypical (Béki, 2017), which also addresses the social problem of discrimination and equal opportunities. This trend also represents the direction of the European Union.

Health and Sport are effective tools for addressing gender and other social differences and are suitable for the integration of minority groups (Faragó, 2014). Researches in the field of sports and health also cover the labor market, as the economic efficiency of healthcare is shown in this area. A lot of the tests investigate the health of prospective professionals (Szakály et al., 2016) because the health and sports professionals will play a decisive role in the proper development of health care and lifestyle. The process for improving Hungarians' lifestyles should be based on increasing life expectancy, which is a motivating factor for self-development and self-education. In the context of health status and economic performance we can witness a two-way mechanism of action. On the one hand, the improvement of the economic situation will result in an improved state of health, but it may be the case if the state of health is higher, economic performance will be more efficient. A healthy person can work efficiently, is more productive, and spends more time on the job market than patients. Health appears as a capital type in the economy similar to physical capital, technological capital and knowledge capital. Increasing the state of health and life expectancy by a year entail four percent increase in GDP (Kollányi, Imecs, 2007).

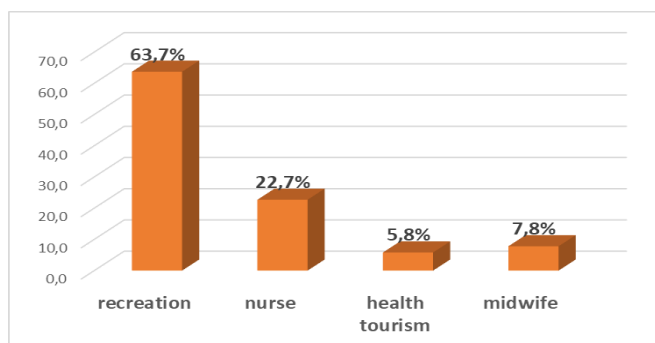
#### **4. Methods and sample**

Higher education is a determining area for the 18–24 age group. Their professional careers are based on science education, but higher education also plays a key role in the development of their health care. The professional pattern is crucial for educating a healthy lifestyle, and form the lifestyle, values, habits, and attitudes. This area is of particular importance if they continue their studies in the field of health and sport science. The knowledge of health development and recreation organizers will be developed in the holistic approach to health, in which the place and role of health education, the development of health promotion and the habitual system of healthy lifestyles are decisive factors. Education covers the health care responsibilities, health as a resource, engaging in commitment to health value. Based on previous research experience, students of health and sports sciences have a cardio-respiratory system and risk factors for obesity, which will lead to adverse changes in the state of health. The problem is further exacerbated by the fact that the key tasks of specialists in education will be the development of health education and healthy lifestyles (Szakály et al., 2003). Health behavior and prevention are the main guidelines in the research. The research will show the level of health-conscious behavior patterns among the students of the Faculty of Health and Sport Science. The level of their health-conscious behavior is very important because they are going to be the determining lifestyle developers in Hungary. A further issue is the primary prevention in the population, reflecting

their health behavior, and secondary prevention in the light of their health care and health-enhancing activities. This current research is the basis for planning for further research in which health care and health awareness have been examined first and foremost. As a method of this research was used a questionnaire completed by students of the Faculty of Health and Sport Science. The number of elements was 154 students and the range of the age was among 18–23 years. The results of the questionnaire are analyzed in a pilot study. The sampling target group was developed taking into account the size of the sample and the sampling procedures.

## 5. Results

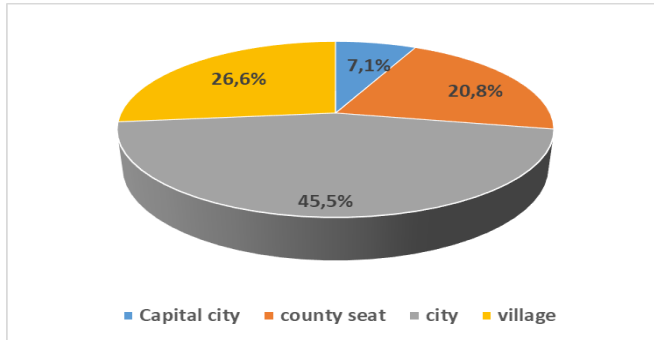
Based on the results of the questionnaire survey, we can characterize the students' health and the subjective judgment of their state of health. The gender distribution (N=154) was not equal in this research. In the sample the ratio of females was 70% and that of males was 30%. In terms of the distribution of students participating in the sampling procedure, the dominance of recreational students is evident, which corresponds to the number of students in the Faculty of Health and Sport Sciences (*Figure 1*).



**Figure 1. Examined students per department**

Source: Own editing.

The proportion of residents from the city is 45.5%, and the village is 26.6% in the sample. The county seat is 20.8%, mainly in comparison with the city, while the capital city represents the smallest ratio in the survey, with 7.1% (*Figure 2*).

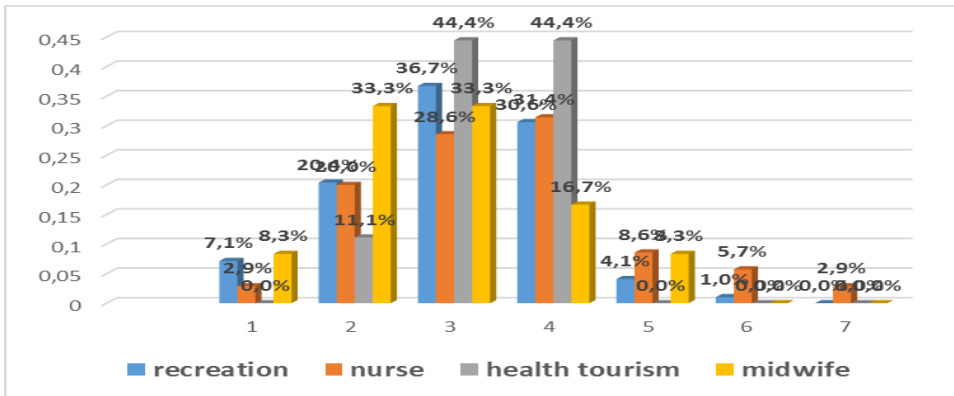


**Figure 2. Residence in the sample**

Source: Own editing.

We have analyzed students’ responses by examining the possible differences in perfection in the field of health promotion and health consciousness.

The first issue was focused on satisfaction with residential health services. In this subject, the nurses and health tourism students have expressed their highest satisfaction, while recreation and midwifery students considered them to be mediocre (*Figure 3*).

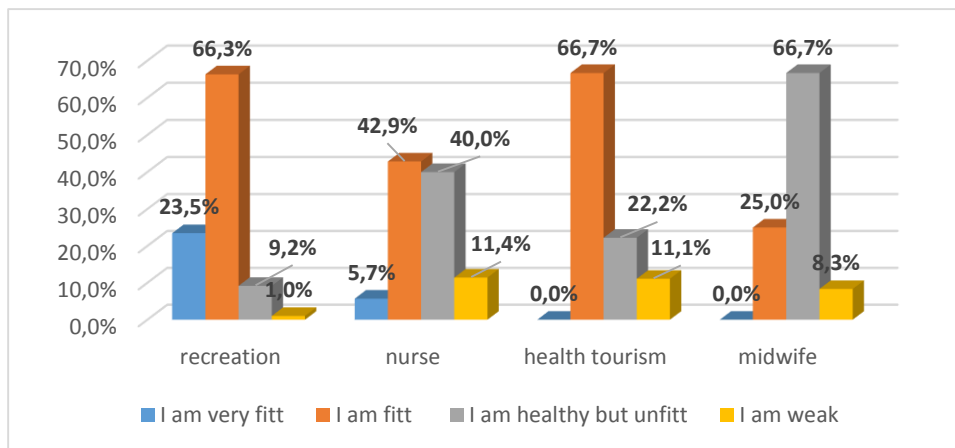


**Figure 3. Satisfaction with the place of residence healthcare**

Source: Own editing.

Concerning local sporting facilities, all the courses were clearly considered to be good. Concerning recreational opportunities, it is clear that recreational (36.7%) and health tourism (44.4%) students considered only good recreational opportunities, indicating that recreational opportunities are not well known among students in the area of recreation and tourism. This is an important part of the

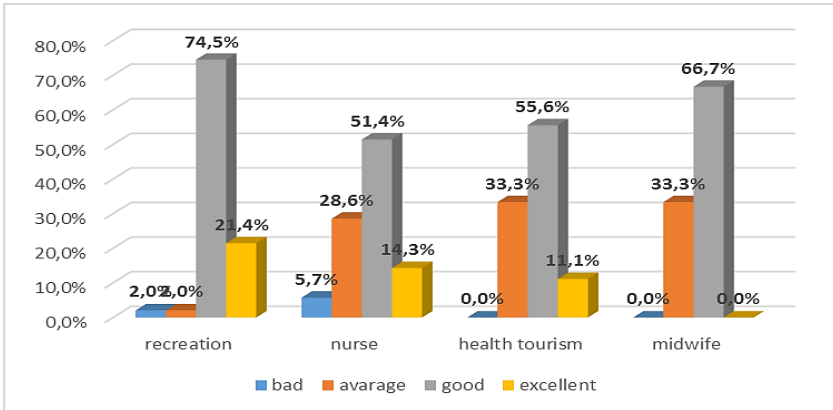
information that indicates the lack of knowledge about presenting opportunities for recreational sports and also defines the direction of development. The possibility of free health screening was considered by health tourism (22.2%) and nursing (25.7%) students at the local level, which also indicates the professional orientation. Significant health-related factors were indicated by the highest number of markings on healthy eating, noxious passion and social and mental well-being, while physical exercise only received average ratings. In the case of recreational students, the most passive passion was received most of the markings (68.4%). This is also the case for nurses, but values are significantly higher (88.9%). Among healthcare (82.9%, 66.7%) and midwifery (66.7%, 50%) students, mental well-being and healthy eating are the most important factors in health. In the field of fitness training the professional orientation was strong, in which the students of recreation were most impressed with the “very hard” judgment (23.5%) (Figure 4).



**Figure 4. Evaluation of fitness status by course**

*Sources: Own editing.*

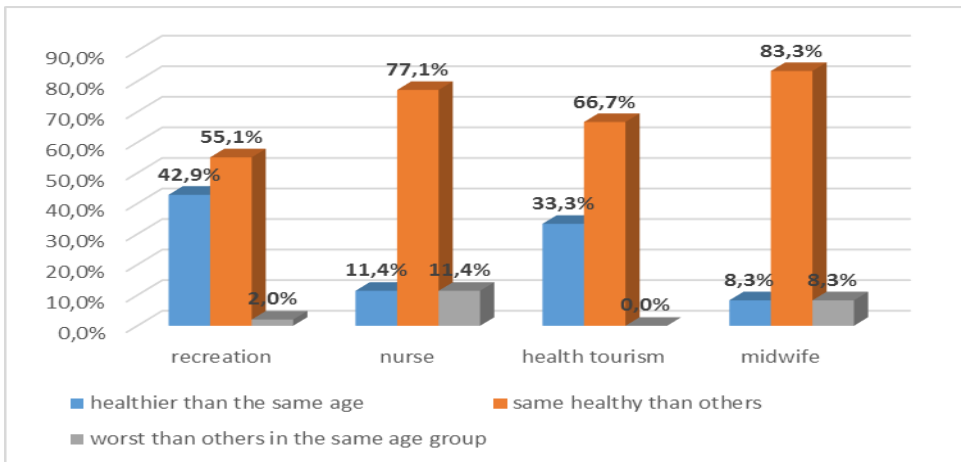
Answers to the next question concerning the health status are surprising. Among the 18 and 24 year- old students, “good” health status was markedly highest, while “excellent” value had a lower proportion (recreation 21.4%). In light of professional orientation, this result is interesting as it is expected that “excellent” health will be valued highest among young students in healthcare. Students need to be strengthened in the assessment of health and health awareness (Figure 5).



**Figure 5. Evaluating health status by course**

Source: Own editing.

Health image related to the health of similar age groups was also compared. In this field, recreational students considered themselves healthier compared to their peers (42.9%). This also indicates a professional orientation and reflects the representation of the professional field. Healthcare was evaluated with a similar judgment by those with a similar age in the other groups. Regarding professional orientation, this question does not represent a strong health outlook in addition to the recreational students (*Figure 6*).



**Figure 6. Health image compared to a similar age**

Source: Own editing.



The issue of health care, in response to the question “How much does it take to protect her health?”, respondents (16.3%) and healthcare specialists (11.1%) rated the “very much” answer, their health awareness was demonstrated. The highest ratio of nursing students was the average health care (65.7%) “When I can not deal with my health enough, that is because...” The completion of the questionnaire was clearly determined by the time factor for each degree. Time management can be an opportunity for prospective professionals to develop their health consciousness.

## 6. Conclusion

Health consciousness for preventive purposes also entails raising the standard of living for the national economy and the population. The pursuit of quality of life is no longer a luxury, it needs to be an essential activity. The holistic approach to health encompasses physical and mental well-being in the 21st century. With the improvement of the quality of life, the number of healthy years can be increased, and life expectancy at birth can be longer. Compared to the Western European countries, the health status of the Hungarian population is still low, its development is being investigated by more and more researches that can help to catch up. The aim of our research was to reveal the attitudes of prospective health and lifestyle of practitioners and in their health and health care, which has a significant impact on the health consciousness of the population as an example. Based on our survey, we could see different areas with a significant development of the image of health and we could measure the level of health consciousness of the individual professional groups by analyzing the specializations. In the research it was discovered that sport as a health factor has a major place for recreational students, whereas in nursing and midwifery medicine the health level has reached a lower level and mental health was more pronounced. In a health-conscious way of life, the results show a positive trend, as positive elements of health such as self-confidence are displayed, but a professional, stronger commitment and behavioral patterns are needed. Health as an economic factor plays a key role in employment, as healthy employees participate in the maintenance of the nation as an economic factor. A health-conscious lifestyle, the increase of health behavior are a national interest, its effects are complex and indirectly reflected in the improvement of the lifestyle of the population. The further direction in the research is the impact assessment of preventive, diagnostic and rehabilitation procedures, health care, lifestyle in healthcare products. The test covers the assessment of health screening tests, fitness tests, and the market demand for other diagnostic tests that help strengthen employee health prevention awareness. Higher education is the ultimate level of education where recreational, health, physical education and

sports, through their teaching and learning process, can be used to create a sense of value and attitude for a healthy lifestyle. A well-motivated, mentally and physically well-mannered intellectual will be able to construct and translate constructive life-spanning, which includes the tasks of health preservation. The resulting pattern of lifestyles is carried by individuals throughout their lifetime (Takács, 1991). With the abovementioned special tasks, the level of education of the students should be transformed so that the acquired knowledge can guide their actions in their future work, incorporating their behavior. This can only be achieved as a result of a long process that has precedence over the pre-tertiary stage of life. If an adequate basis is established at a young age (elementary and secondary school), they can build on them in higher education.

The appearance of health care and health awareness is a priority for prospective professionals in the field of health and sports as the influence of future generations on health is decisive. The survey includes participation in preventive screening tests which do not show large differences with average annual participation in biennial examinations. In the case of disease attitudes, we have found positive results, the disease feeling did not appear among the students. The consequences of the lack of health have shown a clear picture of the negative labor market, economic and social impacts. A fully-fledged response was born to the preventive effectiveness of a healthy lifestyle. The students' health is moderate and good. The development of health behavior and health awareness emerging from the results prove to be a priority task which, concerning the pursuit of a healthy lifestyle, enhances the social health image of students who work in the field and exemplifies their behavior. In a further study induced by our research, we would like to assess the diagnostic and fitness tests that the population needs and explore whether the results of the diagnostic and fitness tests may change the public health habits of the population. In the latter survey we intend to examine whether the intervention program may change the health habits of the population. We also seek to understand how the procedures for health promotion and health promotion proposed for rehabilitation, therapeutic purposes, appear in the lifestyle of the population. Are there differences in the health consciousness of the population before and after diagnostic and fitness tests and before and after intervention? Further research will be carried out using basic measurements (cross-sectional) and one or more retrospective (longitudinal) follow-up measurements. Assuming homogeneity of the groups, the effect of the dependent variables is examined by comparing the results of two groups: the experimental group or control group with distinction (Fábián, Zsidegh, 1998). Interventions will be applied to the experimental groups between measurements. Intervention: in some parts of the test sample, learning about undergraduate training, theoretical and practical knowledge, and the procedures described and designated for others in the field of health preservation and development. The sample of continuing research will be

corporate adults (20–50 years of age) and older people (over 60 years). Additional tests are based on diagnostic procedures: spiroergometric (power diagnostic) measurements will be performed.

### Acknowledgement

Establishment of Sport- Recreation- Health Management Cooperational Research Network, project ID: EFOP-3.6.2-16-2017-00003 provided assistance in the work of the Research Group of the Faculty of Health and Sport Sciences of Széchenyi István University.

### References

- ANTAL, E. 2007. Civilizációs betegségek: Mit tehetünk Ellenük? [Civilization Diseases: What Can We Do Against It?] In: *Élelmiszer, Táplálkozás és Marketing*, Vol. 4, No. 1, pp. 37–40.
- BÉKI, P. 2017. Sztereotípiák a sportban, avagy a női sport létjogosultsága napjaink magyar társadalmában [Stereotypes in sports or the legitimacy of women's sports in today's Hungarian society]. In: *Acta Academiae Paedagogicae Agriensis Nova Series: Sectio Sport*. No. 44, pp. 171–189.
- ERSÖZ, G. 2018. *Examinations of University Students' Health Behaviour with Regard to Exercise Stage of Change*. International Conference on Medical Fitness and Corrective Exercise, 28–30 September, Istanbul, Turkey.
- ERSÖZ, G. CANLI, U. IŞIK, Ö., YILDIRIM, İ., ERSÖZ, Y. 2017. Examinations of University Students' Health Behaviour and General Self-Efficacy With Regard To Exercise Stage of Change, *World Congress of Sport Sciences Researches*, pp. 371–372, 23–26 November, Manisa / Turkey
- FÁBIÁN, GY., ZSIDEGH, M. 1998. *A testnevelési és sporttudományos kutatások módszertana*. [Methodology of physical education and sports research]. Budapest: Magyar Testnevelési Egyetem.
- FARAGÓ, B. 2014. Sporttal az integrációért [Sports for integration]. In: Perényi Sz. (ed.) *A mozgás szabadsága! A szabadidősport társadalmi, gazdasági és egészségügyi megközelítései: elméletek és kutatási eredmények a gyakorlat szolgálatában*. Debrecen: Debreceni Egyetem Gazdaságtudományi Kar, pp. 264–268.
- FARAGÓ, B. 2015. *Éltsportolók életpálya modelljei* [Lifelong models of athletes]. Budapest: Campus Kiadó.
- FARAGÓ, B., BÉKI, P., KONCZOSNÉ, SZ. M. 2018. Athlete and Successful Career in the Competence Matrix. In: Tibor János Karlovitz (ed.) *Some Recent Research from Economics and Business Studies*. Štúrovo, Szlovákia, 2018.01.22–2018.01.23. Komárno: International Research Institute, pp. 73–80.
- GÓSI, ZS. 2017. Atipikus foglalkoztatási formák sportszervezeteknél [Atypical forms of employment in sports organizations] *Köztes Európa: Társadalomtudományi Folyóirat: A Vitek közleményei*. Vol. 9, No. 1–2, pp. 137–145.
- GÓSI, ZS. 2018. Magyarországi iskolarendszer alapú sporttámogatások. Sport, tanulás, karrier. [Hungarian school system based sports grants. Sports, learning, career]. In: *Neveléstudomány: Oktatás Kutatás Innováció*. Vol. 6, No. 2, pp. 44–60.

- GRITZ, A. 2006. Az egészségfejlesztés kompetenciái a XXI. században [Competences for Health Promotion in the 21st Century]. In: *Egészségfejlesztés*. Vol. 48, No. 3, pp. 3–9.
- GYÖRI SZABÓ, R. 2012. Identity and Soccer in Corsica. In: *Soccer & Society*. Vol. 13, No. 1, pp. 36–55.
- HAWKS, SR., GOUDY, MB., GAST, JA. 2003. Emotional eating and spiritual well-being: A possible connection? *American Journal of Health Education*. Vol. 34, No. 1, pp. 30–33.
- HAWKS, SR., SMITH, TS., THOMAS, HG., CHRISTLEY, HS., MEINZER, N., PYNE, A. 2008. The forgotten dimensions in health education research. In: *Health Education Research*. Vol. 23, No. 2, pp. 319–324.
- KOLLÁNYI, ZS., IMECS, O. 2007. Az egészség-befektetés. Az egészségi állapot hatása a gazdasági teljesítőképességre és az életminőségre. [Health Investment. Impact of health status on economic performance and quality of life]. Budapest: DEMOS Magyarország Alapítvány.
- KONCZOS, CS. SZAKÁLY, Zs. 2007. Az ifjúság fizikai aktivitásának jellemzői, az életstílus befolyásolása, a fizikai aktivitás tudatos alkalmazása [Characteristics of physical activity of youth, influencing lifestyle, conscious use of physical activity]. In: *Magyar Sporttudományi Szemle*. Vol. 8, No. 2, pp. 39–46.
- KONCZOS, CS., KARATH, SZ., SZAKÁLY, ZS., KIRÁLY, T. 2010. Kollégiumi hallgatók egészség-magatartásának vizsgálata egyetemisták körében. [Examining the health behavior of college students among university students] In: LÖRINCZ I. (szerk.): *Tanulmánykötet Nyugat-Magyarországi Egyetem Apáczai Csere János Kar*, Győr, pp. 596–601.
- KONCZOS, CS. 2006. Meg kell tanulnunk egészségtudatosan élni! [We must learn to live healthily] In: KELLER, M., SIMÁNDI, SZ. (ed.) *Tanul a társadalom*. Budapest: MTA Pedagógiai Bizottsága.
- KONCZOSNÉ, SZ. M. 2014. Tehetség-és motivációs modell kidolgozásának kérdései a Tudományos és Művészeti Diákkör kapcsán. [Questions about developing a talent and motivational model for the Science and Art Student Circle] In: MÉSZÁROS, A. (ed.) *A felsőoktatás tudományos, módszertani és munkaerőpiaci kihívásai a XXI. században*. Győr: Széchenyi István Egyetem, pp. 68–81.
- KONDRATYEV, ND. 1980. A gazdasági fejlődés hosszú hullámai [Long waves of economic development]. In: *Történelmi Szemle*, Vol. 23, No. 2, pp. 241–269.
- McNICHOLAS, S. L. 2002. Social Support and Positive Health Practices. In: *West J Nurs Res*. Vol. 24, No. 7, pp. 772–87.
- NELSON CJ., ROSENFELD B., BREITBART W., GALIETTA, M. 2002. Spirituality, religion, and depression in the terminally ill. In: *Psychosomatics*. Vol. 43, No. 3, pp. 213–220.
- SIMON, T. 2002. Az egészség értéként való megismertetése és elfogadtatása [Introducing and Accepting Health as a Value]. In: *Egészségfejlesztés*. 43, No. 4, pp. 145–146.
- SZABÓ, S. 2016. *Egészségorientált táplálkozási szokások és a fogyasztói magatartás kapcsolata*. [Health-Related Dietary Behaviors and Consumer Behavior Relationships]. Doctoral dissertation. Kaposvár: Kaposvári Egyetem Gazdaságtudományi Kar.
- SZAKÁLY, ZS., IHÁSZ, F., KIRÁLY, T. 2003. A testalkat, a testösszetétel és az aerob teljesítményvizsgálatok tapasztalatai férfi főiskolai hallgatóknál [Exercise of body fat, body composition and aerobic performance tests for male college students]. In: *Magyar Sporttudományi Szemle*. Vol. 4, No. 1, pp. 30–32.
- SZAKÁLY, ZS., LISZKAI, ZS., LENGVÁRI, B., JANKOV, I., BOGNÁR, J., FÜGEDI, B. 2016. Physique, Body Composition and Aerobic Performance of Male Teacher Education Students. *Studia*. In: *Universitatis Babeş-Bolyai Educatio Artis Gymnasticae*. Vol. 61, No. 2, pp. 59–71.
- TAKÁCS, F. 1991. Iskolai testnevelésünk a szociológia tükrében [Our physical education in the mirror of sociology]. In: *TF közleményei*. No. 2. (Melléklet) pp. 3–50.

- TRINGER, L. 2002. A mentális betegségek megelőzésének és ellátásának korszerű szemlélete [A modern approach to the prevention and care of mental illnesses]. In: *Orvostovábbképző Szemle*. Vol. 9, No. 1, pp. 12–21.
- UCHINO, BN., CACIOPPO, JT., KIECOLT-GLASER, JK. 1996. The relationship between social support and physiological processes: a review with emphasis on underlying mechanisms and implications for health. In: *Psychological Bulletin*. Vol. 119, Vol. 3, pp. 488–531.
- WILLIAMS, R., KIECOLT-GLASER, J., LEGATO, MJ., ORNISH, D. POWELL, LH., SYME, SL., WILLIAMS, V. 1999. The impact of emotions on cardiovascular health. In: *The Journal of Gender-Specific Medicine*. Vol. 2, No. 5, pp. 52–58.

## Decisions

- Jakarta's Declaration (1997) Egészségmegőrzés a XXI. Században. NEVI
- WHO (1946) Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference. New York, 1946. június 19–22.
- WHO (1984): Discussion Document on the Concept and Principles of Health Promotion. Copenhága, 1984. július 9–13.

# Industry 4.0 and reshoring investments – consequences for the Visegrád countries

ANDREA ÉLTETŐ<sup>1</sup>

**Abstract:** After the 2008 crisis, the issue of reshoring previously outsourced production has been raised in parallel to reindustrialization and competitiveness discourses. This article clarifies the definitions of reshoring, backshoring and nearshoring, while enumerating the possible motivations for them (eg. higher-than-expected labour or transport costs, strategic decision-making, insufficient product quality). Automation and robotization (parts of the ‘Industry 4.0’ concept) can provide a push in the global production chain for various forms of ‘shoring’. This can be highly relevant for the Visegrád countries, given their high-levels of integration into global production chains. This article addresses reshoring impacting the Visegrád countries finding evidence on backshoring from them and nearshoring to them. Changing location advantages of the region are also evaluated such as the readiness for Industry 4.0. One major conclusion is that the creation of a pool of skilled labour with cognitive skills is essential.

**Key words:** reshoring, Visegrád countries, Industry 4.0

**JEL Classification:** F21, F23, L23

## 1. Introduction<sup>2</sup>

With the widespread fragmentation of production and increasing globalisation, offshoring became a popular company strategy in the nineties. In the last decade, however, more and more companies that had previously offshored production stages, have started bringing them (wholly or partly) back to their home regions (Kinkel, 2012; de Backer et al., 2016). This reshoring activity implies from a geographical point of view: backshoring, which is the relocation back to the home country of the firm, and nearshoring (Bals, Kirchoff and Foerstl, 2016), which is the relocation to a closer (neighbouring) country (Di Mauro et al., 2018). This paper discusses these two aspects of reshoring analysing the role of Visegrád countries.

---

<sup>1</sup> ANDREA ÉLTETŐ, Institute of World Economics, Cers, Hungarian Academy of Sciences, Hungary andrea.elteto@rtk.mta.hu

<sup>2</sup> The article is partly based on Éltető (2019) prepared in the framework of the research project no. NKM 2019-76 titled “Hungary and Estonia – Strongly Connected to Global Value Chains.”

The term „Industry 4.0” stems from Germany (Hannover Fair opening speech 2011)<sup>3</sup> where a government high-tech strategy was adopted to promote the utilisation of new technologies at the companies. According to Rüßmann et al., (2015) Industry 4.0 has nine pillars (big data, autonomous robots, simulation, horizontal and vertical system integration, industrial internet of things, cybersecurity, cloud, additive manufacturing and augmented reality). The question of this article is whether the application of Industry 4.0 or its elements enhances backshoring and nearshoring and what are the consequences for the Visegrád countries. There is a considerable literature on reshoring and on Industry 4.0 separately and much less literature on combining the two topics but there are hardly any research concerning the prospects of Central European economies in this respect. This research gap is to be filled by this paper. Automation is usually most intensively applied in the automotive and the electronics sector, where foreign investment and globally connected production are significant in the Visegrád countries.

Apart from the relevant literature review, available statistics, national and international press information are analysed. Two interviews were also conducted in Hungary to complement available information.

I found that backshoring from Visegrád economies has not been a mass phenomenon yet, but indeed there have been some cases. There are also examples of nearshoring to the Visegrád region in order to shorten the global supply chain of producers. Being a large economy, most cases of both backshoring and nearshoring can be found in Poland. Adaptation of Industry 4.0 (robotization, automation, digitalization) in the Visegrád countries region is realized mostly by foreign investors, stimulated by the shortage of labour in the region.

The structure of the paper is the following: first general motives for reshoring are described, then available data are analysed regarding the Visegrád countries. In the second part the risks and readiness for Industry 4.0 in the region are examined.

## 2. Motives for reshoring

Several different backshoring motivations have been proposed in the literature. Some consider it as a *correction of managerial errors* like insufficient planning and knowledge on the offshore location (Kinkel and Maloca, 2009), miscalculation or underestimation of full costs. Others point to *changes in the offshore or home country environment*, such as the rising costs in Asia, or the lower costs of energy in the West (Martínez-Mora and Merino, 2014; Simchi-Levi et al., 2012). Scholars also have argued that backshoring may follow from the inability of firms

---

<sup>3</sup> [http://www.wolfgang-wahlster.de/wordpress/wp-content/uploads/Industrie\\_4\\_0\\_Mit\\_dem\\_Internet\\_der\\_Dinge\\_auf\\_dem\\_Weg\\_zur\\_vierten\\_industriellen\\_Revolution\\_2.pdf](http://www.wolfgang-wahlster.de/wordpress/wp-content/uploads/Industrie_4_0_Mit_dem_Internet_der_Dinge_auf_dem_Weg_zur_vierten_industriellen_Revolution_2.pdf)

to solve complex challenges created by offshore production (Manning, 2014). Backshoring has also been associated with *consumers' pressures on companies*, stemming from perceived higher quality of western productions ("made in" effect). An important motive of reshoring is *flexibility, the proximity to the market and to R&D centers* (de Backer et al., 2016). Thus the communication between departments can be uninhibited, the design and manufacturing teams are operating in the same facility without a linguistic, cultural or geographic gap (Brandon-Jones et al., 2017). The reshoring investment decision can also be the *product of a crisis*, shrinking profit and demands in the home country (Tate, 2014). *Political stimulating programs*, national sentiment have also induced reshoring, mainly to the US. A detailed enumeration and groupings of reshoring motives can be found in Di Mauro et al., (2018) and Młody, (2016). Reshoring to Europe, however, should be well planned: Iozia and Leiriao, (2014) name the strong euro, low productivity, high social and energy costs as barriers to reshoring and call for incentives in taxation, revitalisation of industrial districts and support to R&D among others.

A further important reshoring motivation has emerged in the past years: the *growing automation, digitalisation of manufacturing*. The internet of things, sensors, robots, data analytics and artificial intelligence transform the production of goods and services. This may erode the labour cost advantage of emerging countries as labour costs will represent a smaller share of total costs. Thus, it will not be worth offshoring and reshoring can be favoured. There are some case study and survey evidence on the connection between reshoring and automation (see later) and there is also some econometric experiment. This latter is described in Krenz et al. (2018) who found evidence for a connection between reshoring and automation (density of robots) within countries and within manufacturing sectors<sup>4</sup>. Ancarani, Di Mauro, and Mascali (2019) discuss that different competitive priorities of a firm can require different strategies of Industry 4.0 adoption in reshored production. If cost competition is a priority than application of such technologies can be useful, but if the "made in" motivation dominates, this can weaken incentives to invest in advanced technologies.

---

<sup>4</sup> An increase of robots (per 1000 workers) by one unit in the manufacturing is associated with an increase of the reshoring activity by 3.5 percent. Reshoring is measured here at a macroeconomic level by the growing difference between domestic and foreign inputs in production (taken by WIOD database). The reshoring measure shows by how much domestic inputs increased relative to foreign inputs compared to the previous year.



### 3. Evidence on reshoring

There is no worldwide database on reshoring. The European Union collects certain data and there are country-specific databases (in the USA<sup>5</sup> and in Italy for example). There is a „restructuring events” database of the *European Restructuring Monitor*<sup>6</sup>. It contains data on major restructuring events reported in the principal national media in each EU member state since 2002. In order to be included in the database, an individual case must involve the announced loss or creation of at least 100 jobs, or employment effects affecting at least 10% of a workforce of more than 250 people. There are several types of restructuring including bankruptcy, closure, relocation, offshoring/delocalisation, outsourcing. Dima (2018) analyses the restructuring monitor’s relocation data between 2002 and 2015 and shows that Poland figures as an important destination for reshoring, and all the operations related with the country are of nearshoring type. Among other such frequent destinations are Romania, Hungary, Czech Republic and Slovakia. Germany is a relevant destination for reshoring events and here backshoring is also frequent.

A narrower database is the *European Manufacturing Survey* (EMS) 2015 that includes 2,120 manufacturing firms from Austria, Germany and Switzerland with at least 20 employees. The EMS measures backshoring with a question if the firm has relocated production activities from own affiliates or from suppliers back to the home country during 2013 and 2014.

The mentioned databases can show mostly the quantity and trends of reshoring. Regarding the motives in detail we can rather rely on surveys, studies, interviews and press information. Based on these we can have certain “country case studies” illustrating the major reshoring economies.

In this paper I analyse the data of the *European Reshoring Monitor*. It developed from an inter-university database (*Uni-Club MoRe Back-reshoring data set*)<sup>7</sup>. It collects information on individual reshoring cases from several sources (media, press, scientific literature) and maintains a regularly updated online database. Active data collection for the reshoring monitor began in February 2016 and some earlier reshoring cases (2014–15) have been identified from earlier data collection activities. Data collection ended in December 2018<sup>8</sup>. The monitor also contains an online database of reference material on reshoring (articles, reports). In the description of each case there are some words also on the motives of reshoring. The reshoring cases show that the European countries that

---

<sup>5</sup> <http://reshorenw.org/news/>

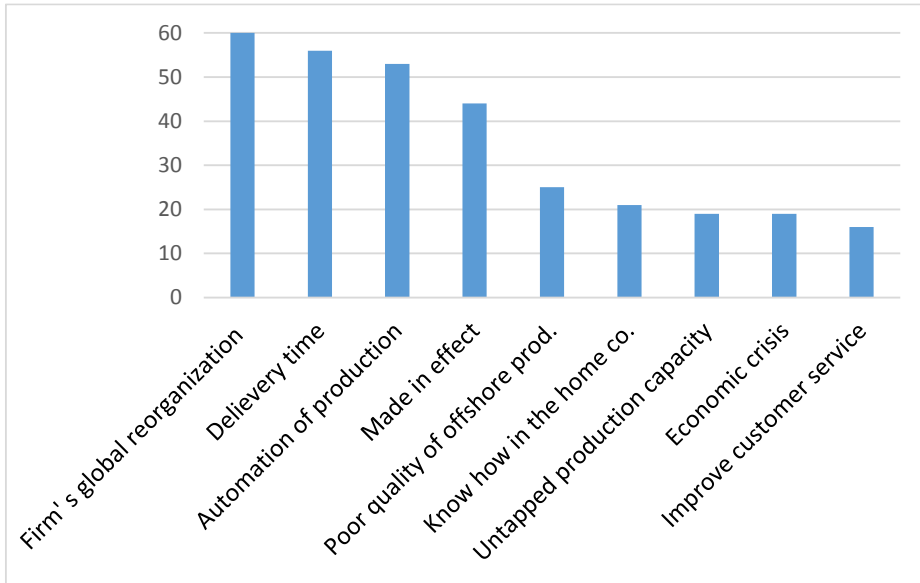
<sup>6</sup> <https://www.eurofound.europa.eu/observatories/emcc/erm/factsheets>

<sup>7</sup> <https://www.eesc.europa.eu/resources/docs/fratocchi.pdf>

<sup>8</sup> <https://www.eurofound.europa.eu/publications/report/2019/reshoring-in-europe-overview-2015-2018>

most actively reshore are the UK, Italy, France, Skandinavian economies and Germany.

*Figure 1* shows the most important motives declared by reshoring companies in the European Reshoring Monitor database. Automation of production is the third most important reason.



**Figure 1. Motives of reshoring**

*Source:* Compilation from European Reshoring Monitor (2014–2018).

There are 23 backshoring cases from the Visegrad countries (15 from Poland, 4 from the Czech Republic, 4 from Slovakia, see *Table 1*). The most often mentioned reason here (9 times) for backshoring is „automation of production process”. Other motives like „delivery time”, „proximity to suppliers”, „firm’s global reorganization”, „streamlining of supply chain”, „greater flexibility”, „logistic costs” all can be considered as one group concerning more efficient supply chain management. This kind of reasons were mentioned 16 times (in certain cases together with automation). As a third kind of motive „poor quality of offshored production” was mentioned 4 times.

Regarding the home countries it is only one case when backshoring from the Visegrád area took place to Germany, but there are 5 cases to Norway, 4 cases to Denmark, 3 to the UK and 2 to Finland. There is one backshoring to Spain (from the Czech Republic) and one to Poland (from Slovakia).

**Table 1. Summary of reshoring cases concerning the V4 countries 2014–2018**

	Backshoring from V4	Backshoring to V4	Nearshoring to V4
No. of cases	15 from Pol 4 from CZ 4 from SK	6 to Pol 1 to SK	4 to Pol 2 to SK 1 to HU
Automation as reason	9	0	1

*Source:* Compilation from European Reshoring Monitor.

If labour factors deteriorate in the region, certain investors can be motivated to reshore or move to other regions from here. There are examples of replacing labour-intensive and not automable functions from Hungary to cheaper countries.<sup>9</sup>

Backshoring of previously offshored production can take place also if the mother company is from the Visegrád countries. There are seven such cases, six backshoring to Poland (from China, Slovakia, Serbia, Germany, Sweden) and one to Slovakia (from the Czech Republic). We cannot find automation as a motive here.

Considering nearshoring to the Visegrád countries, German companies proved to be the most active. The survey by Müller-Dauppert (2016) illustrates this. The sample consists of 71 German firms and 54.9% of the respondents already used nearshoring as location strategy for their production plants. 22.4% of the participants consider nearshoring as a relevant future trend. Nearshoring is chosen based on costs, but the delivery time and the availability of qualified employees play also an important role. Central-Europe proved to be the most relevant region for nearshoring.

Lőrincz (2018) enumerates some further reasons why the CEE region can be favourable area for nearshoring of West-European firms. These are for example geographical and cultural proximity, same time zone, lower costs. Placing business in a nearby country enables face to face meetings, that can ease problem solving and building mutual trust. Eastern European specialists may be more expensive than Indian ones, but it is compensated by fewer mistakes and misunderstandings at work. It is difficult to cooperate with people with poor English or a strong accent.<sup>10</sup>

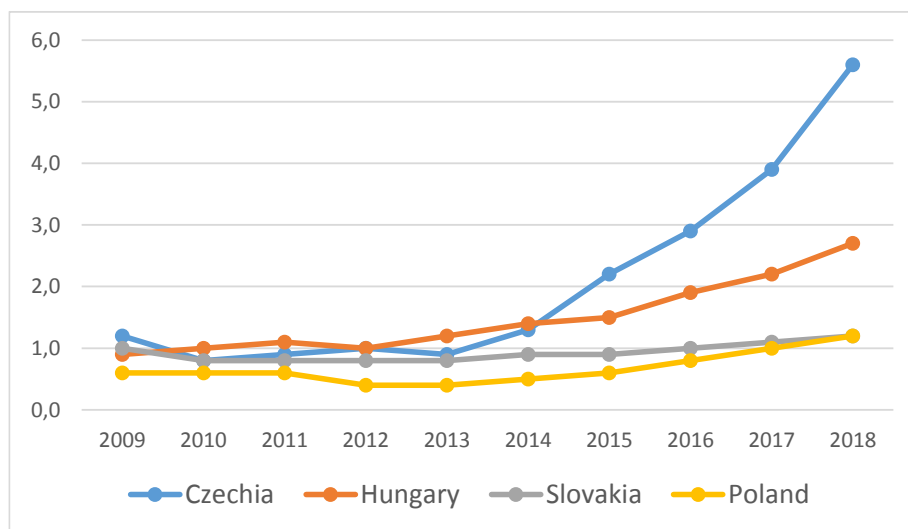
There are also certain economic policy elements that can enhance nearshoring. The very low, 9% corporate income tax rate in Hungary is a good example. In

<sup>9</sup> The Austrian-owned Prevent Premium closed in 2017 in Hungary. The firm produced car seat carpets, 300 workers were laid off and production moved to Bosnia. Another example is Lear Corporation that moved in 2017-18 labour-intensive car seats and electronic car parts production to lower cost countries from Hungary and automated at the same time in the US and Germany.

<sup>10</sup> <https://euvic.se/se/nyheter/nearshoring-is-gaining-popularity-why+&cd=1&hl=hu&ct=clnk&gl=hu>

2015–2018 Hungary experienced an increasing FDI inflow and very high reinvested earnings<sup>11</sup> stemming mainly from European investors. Favourable fiscal conditions thus promote reinvestment of profits and nearshoring too.

The severe labour shortage in the V4 is also an incentive for automation of the production process and digitalisation of nearshored plants. Eurostat registers job vacancies and the job vacancy rate provides a comparative indicator for the Visegrád countries (*see Figure 2*).



**Figure 2. Job vacancy rate**

*Note:* The job vacancy rate (JVR) is the number of job vacancies expressed as a percentage of the sum of the number of occupied posts and the number of job vacancies:  $JVR = \text{number of job vacancies} / (\text{number of occupied posts} + \text{number of job vacancies}) \times 100$

*Source:* Eurostat

Most job vacancies are in the Czech Republic and the second most serious case is Hungary. Labour shortage become more and more a barrier to proper business conduction as several company surveys show. Apart from that, there has been an accompanying significant (30–40%) wage increase since 2012 in these countries.

In the European Reshoring Monitor we can find seven nearshoring cases to the Visegrád countries. The mother companies are from Germany, Sweden, Denmark,

<sup>11</sup> Reinvested earnings are the portion of income due to the owners of equity in addition to distributed income (dividend). The difference between the positive or negative adjusted profit after tax and the dividend declared in the period concerned is reinvested earnings.

USA.<sup>12</sup> The previous offshoring took place in China, Australia and one in Switzerland. Production was reshored from these places to Poland (4 cases), Slovakia (2 cases), Hungary (1 case). In one case automation was mentioned. The Danish JYSK decided to reshore from China to Poland due to rising costs in Asia, greater automation of production and shorter ordering time.<sup>13</sup> (There is a further case of the Taiwanese Pegatron Corporation shifting electronics production from China to the Czech Republic, which is not “nearer”, but the cause of reshoring here were avoiding the US tariffs introduced for Chinese products.<sup>14</sup>)

Summarizing the reshoring types (*Table 1*) it can be stated that backshoring from the Visegrád countries (mostly from Poland) because of automation of production proved to be much more relevant than nearshoring to the Visegrád countries.

#### 4. Industry 4.0 – risks and effects

Industry 4.0 still requires significant capital investment from the company, at least initially (Vaidya, Ambad and Bhosle, 2018). Therefore, these technologies are not yet widespread among SMEs. As mentioned, Industry 4.0 refers mainly to the emergence and diffusion of new digital industrial technologies like the Internet of things (IoT), embedded sensors, so that devices can interact with each other; big data analytics (BDA, the collection and real-time evaluation of data to optimise production); robots with greater autonomy and flexibility; additive manufacturing (3-D printing (Strange, Zucchella, 2017)). In the case of IoT, products are assigned unique identifiers, coordinate and synchronise themselves and can reduce transaction costs. IoT raises the question of cybersecurity, because each of the millions of embedded sensors and communications devices is a potential entry point for hackers (Strange, Zucchella, 2017). With BDA firms will be able to monitor overseas markets without paying local marketing affiliates, and they will be able to optimise their activities around the world. However, for analyse and operationalise the big data a range of technical and governance capabilities will be necessary. Apart from that, individuals’ privacy will be threatened from widespread big data application.

---

<sup>12</sup> The company Jabil was founded in 1966 in the United States and today is one of the most recognizable brands in the world, producing photovoltaic modules, industrial cameras and electronic products and components. It nearshored its production to an existing facility in Poland. <https://pomorskie.eu/-/amerykanska-firma-elektroniczna-przenosi-produkcje-z-chin-na-pomorze-kilkaset-nowych-miejsc-pracy>

<sup>13</sup> <https://forsal.pl/artykuly/1045937,jysk-przenosi-produkcje-do-polski-z-chin.html>

<sup>14</sup> <http://www.taipeitimes.com/News/biz/archives/2018/11/09/2003703847>

Additive manufacturing technologies have important advantages. Softwares can be used by anyone, every product may be customised to the user, production of complex products is easy and overall production time can be reduced and additive manufacturing generates little or no waste. Products can in principle be manufactured anywhere in the world where there is a compatible 3-D printer. However, the use of additive manufacturing technologies is currently limited. First, present additive technologies are relatively slow, not suitable for mass production as unit costs are substantially higher. Second, there is a limited range of raw materials, colours and size that can be used for 3-D printing. Third, 3-D printing cannot yet match high levels of engineering precision in strength, lower resistance to heat and moisture and compromised colour stability (Strange, Zucchella, 2017).

There are challenges for SMEs on the labour market too. In the past decade there is a growing literature concerning the effects of automation on the workers. This phenomenon is sometimes called “automation anxiety<sup>15</sup>” The projections vary from the highly pessimistic ones to optimistic ones. The most cited “pessimistic” estimation is that of Frey and Osborne (2013) who ranked around 700 job types in the USA according to their risk of getting replaced by a computer. They concluded that 47% of employees were working in occupations that could be performed by algorithms within the next twenty years. Other articles also followed this line. However, using alternative counting methods some scholars argue that automation aims at certain tasks rather than whole occupations. Jobs consist of performing a bundle of tasks not all of which may be easily automatable. Thus, the potential for automating entire occupations and workplaces may be much lower, according to the estimation of Arntz et al., (2016) only 9% of the US jobs are at risk of robotisation. Similarly, a research of McKinsey analysed around 2000 tasks in the USA and concluded that automation will delete only a few jobs totally. Instead, changes can affect almost every type of occupations to certain extent, depending on their task content (Chui, Manyika and Miremadi 2016).

The type of skills is important. Jobs, tasks with a low risk of computerisation usually require higher skill levels, creativity and social intelligence. According to an OECD study there is large variation in the risk of automation across countries. In general, jobs in Anglo-Saxon, Nordic countries and the Netherlands are less automatable than jobs in Eastern European countries, South European countries, Germany, Chile and Japan. The study shows that the risk of automation declines with the level of education, measured skills (numeracy and literacy) and with the wage level across almost all countries, suggesting that this wave of automation is skill biased (Nedelkoska, Quintini, 2018). The tasks will require more social and

---

<sup>15</sup> <https://blogs.wsj.com/cio/2017/09/01/as-automation-anxiety-grows-remember-weve-been-here-before/>

emotional skills, and more advanced cognitive capabilities, such as logical reasoning and creativity (McKinsey, 2017). Makó et al. (2018) analyse the data of European Working Conditions Survey and select workers into three main clusters according to cognitive characteristics of work tasks. In the group of creative workers are those who must use their cognitive abilities during work. At the other end, Taylorian workers have tasks with minimum autonomy and creativity. Taylorian jobs are those that can be easily replaced by robots sooner or later. In between there is a third group of “constrained problem solvers” who do creative job but have small autonomy. Regarding the Visegrád four, the share of creative workers decreased from 2005 to 2015 and the share of Taylorian workers (replaceable jobs) increased (Makó et al., 2018, 201, 203). This trend is just the opposite of the EU average development (increase of creative occupations). Certainly, new jobs will be created that are non-existent today. The report of McKinsey (2017) expects that 8 to 9 percent of 2030 labour demand will be in such new types of occupations.

Skills of students and adults of the developed countries are partly measured by the OECD. According to the PISA survey, within the Visegrad region Poland can boast with the highest results in student skills (reading and maths), similar ones to Germany. The results of Slovakia are the worst but also Hungary shows low levels<sup>16</sup>. In all Visegrád countries we can observe a deterioration between 2012 and 2015. Interestingly, regarding adult skills (literacy, numeracy, problem solving)<sup>17</sup>, Poland loses its advantages and becomes the last in the row. This result is influenced by the elder generations’ low scores and emigration of skilled youth.

## 5. Industry 4.0 readiness of the Visegrád countries

New technologies can be adopted not only at Western headquarters of investor firms but also at the firms functioning in Central and Eastern European region. Agglomeration effects can also help this strategy, the Visegrád countries have become important clusters of the automotive industry due to the high concentration of production capacities here. McKinsey (2018) argues that automation will reduce the mentioned labour shortage that is creating a bottleneck to economic growth.

How are the Visegrád countries prepared for Industry 4.0? Roland Berger (2014) developed a macro level Industry 4.0 readiness index bundling production process sophistication, degree of automation, workforce readiness and innovation intensity into a category called “industrial excellence”. Then factors like high value added, industry openness, innovation network and Internet sophistication

---

<sup>16</sup> <https://pisadataexplorer.oecd.org/ide/idepisa/>

<sup>17</sup> Programme for the International Assessment of Adult Competencies (PIAAC)

were combined into a category labelled “value network”. The combination of these two categories determines a country's position in the RB 4.0 Readiness Index. Combining this index with the percentage share of manufacturing in GDP, European countries were grouped into four clusters. The clusters are the „front-runners” (large industrial base, very modern business conditions and technologies (Sweden, Austria and Germany) „potentialists” (weakened industrial base but in the corporate sector indications of a modern and innovative mindset) „hesitators” (lacking a reliable industrial base, suffering from severe fiscal problems). The fourth group consists of the „traditionalists” mainly in CEE region. They have sound industrial base, but few of them have thus far launched initiatives for industry 4.0.

Naudé et al. (2019) analyse the Industry 4.0 readiness of the Central and Eastern European countries. The study divides this to three broad dimensions 1) technological competencies, 2) entrepreneurial and innovative competencies and 3) governance competencies. In each dimension several international indices, rankings are evaluated, and a composite normalized score is calculated. The authors find that the Czech Republic and Hungary are more I4.0-ready than Slovakia and Poland.

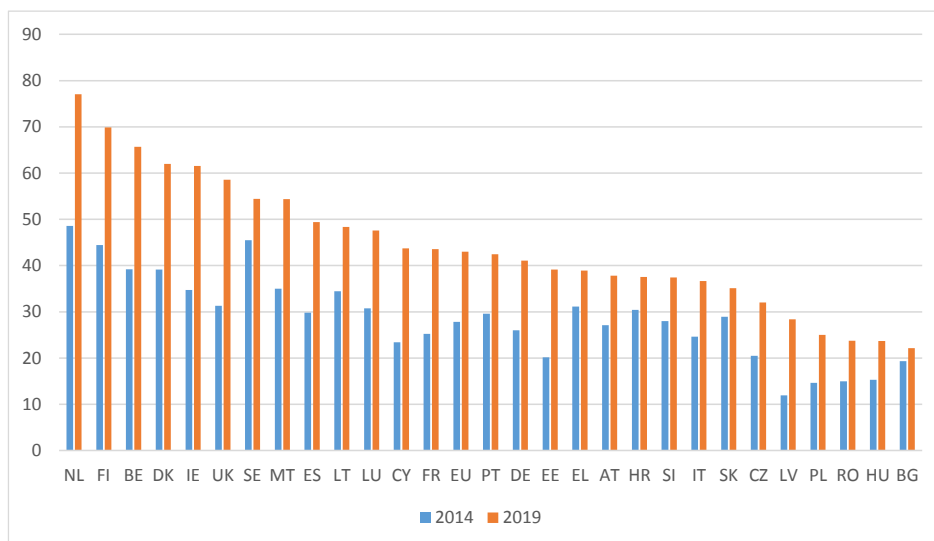
As a part of the Industry 4.0 implementation, digitalization can also be mentioned. In this respect the EU has built an index (DESI index) that can illustrate the position and development of certain countries. A part of this complex index is the „integration of digital technology” combining e-commerce and business digitization.<sup>18</sup> *Figure 3* shows that the increase of Business Digitisation index between 2014–2019 where V4 countries are at the end of the rank (except for Slovakia) with rather moderate development during the period.

SMEs and large companies work in a local economy, connected to its social and economic conditions, which is called an entrepreneurial ecosystem. Autio et al., (2018) constructed the European Index of Digital Entrepreneurship Systems (EIDES) to assess the digital entrepreneurial ecosystem. The authors state that digitalization creates new challenges for policy that should facilitate entrepreneurial ecosystems, instead of focusing on individual SMEs. Countries are grouped into „leader”, „follower”, „catcher-up” and „laggard” categories. Czech Republic is the only „catcher -up” country among the V4, the others belong to the “laggard” group.

---

<sup>18</sup> <https://ec.europa.eu/digital-single-market/en/desi>





**Figure 3. Development of Business Digitization 2014–2019**

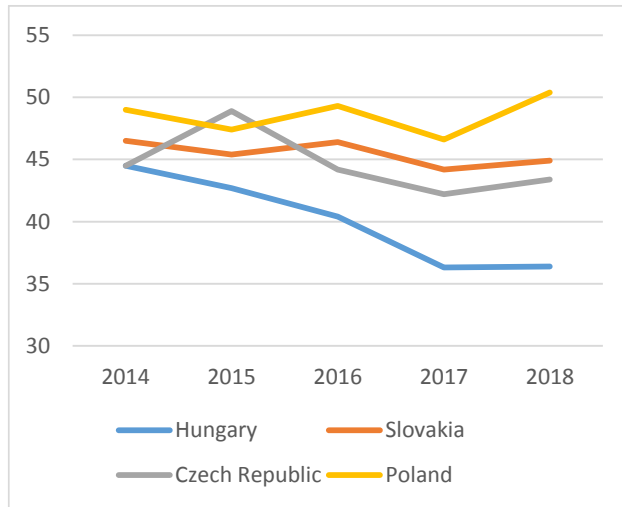
*Note:* DESI Business Digitisation sub-dimension is calculated as the weighted average of the normalised indicators: Electronic Information Sharing (enterprises who have ERP software package to share information between different functional areas), RFID (Enterprises using Radio Frequency Identification technologies for after sales product identification or as part of the production and service delivery), Social Media (firms that use two or more types of social media), e Invoices (firms sending e-invoices suitable for automatic processing), Cloud (buy Cloud Computing services of medium-high sophistication).

*Source:* DESI Index database.

The Global Entrepreneurship Index<sup>19</sup> is a composite indicator of the entrepreneurship ecosystem in each country. The GEI index has 14 components, it measures both the quality of entrepreneurship and the extent and depth of the supporting ecosystem. *Figure 4* shows that since 2014 this index has been deteriorating in Hungary, contrary to the other three Visegrád countries. The sub-components of GEI index show that the fields where Hungarian managers perform badly are the risk acceptance, competition, start-up skills and networking. (My interviews reinforced what the GEI index shows. Management is usually the weakest element in Hungarian SMEs, basic capabilities are missing and there is a complete lack of aims and strategy. Managers do not consider necessary to communicate aims to the employees and delegate tasks. Often the manager

<sup>19</sup> <https://thegedi.org/global-entrepreneurship-and-development-index/> The GEI index contains data of more than half million individuals from the Global Entrepreneurship Monitor and also composed institutional data from 6-8 large databases (WEF, UNESCO, OECD, UN, World Bank, etc).

undertakes a lot of things (HR, logistics, purchase, etc.) there is no middle-level leader or responsible person. Evaluation showed weakness in supply chain and quality management too).



**Figure 4. GEI index value**

*Source:* Global Entrepreneurship index, yearly reports.

Regarding Industry 4.0 technologies there is a kind of dichotomy in the Visegrád countries, foreign MNE affiliates (and large domestic firms too) are more able and willing to introduce these than domestic SMEs. This is partly, because SMEs are different from MNEs anyway in several respects. Scholars argue that the Industry 4.0 maturity models for SMEs should be different from large firms (Mittal et al., 2018). SMEs are financially constrained, they have informal organizational structure, they have scarce employee participation, less collaboration with R&D and educational centres, etc. The very starting point for an SME on the road of automation is different (lower) from that of a large firm. The other reason of the duality can be the attitude and capability of SME-managers as it is the case in Hungary (Éltető, 2019) and in Poland (Stasiak-Betejewska, Parv and Gliń 2018).

Adamik and Nowicki (2018) surveyed 120 SMEs operating in Poland and found that although increasingly aware of modern solutions, they still have a relatively low level of knowledge concerning Industry 4.0. This results in their low activity in terms of the use of tools, they lack preparedness. Ślusarczyk, (2018) found that according to firms' opinion the high financial investment requirements are the main barriers of Industry 4.0 implementation.

Observing the supply side, Grzyb, (2019) asked thirty-one providers of Industry 4.0 solutions who operate on the Polish market. According to their opinion the level of Industry 4.0-familiarity among enterprises in Poland is low or moderate, companies had heard of the concept, but they did not know what it meant (52%) or they understood only its basic assumptions (48%). The highest demand for Industry 4.0 technologies was observed in automotive sector (93%), followed by mechanical engineering (45%), pharmaceutical (35%), aerospace (33%) and food processing (26%), in these sectors market leaders are usually multinational and large enterprises.

Similarly to the former studies, based on survey data Mohelska and Sokolova, (2018) demonstrate that awareness in Czech companies' upper management level is quite high about Industry 4.0. However, companies still lack their own Industry 4.0 strategy and they have not assigned responsible personnel to take care of that. Benefits of Industry 4.0 are unclear and in many cases high costs are associated with its application. Results of a survey in 2017 of a thousand Czech SMEs (Vrchota, Volek and Novotná, 2019) are similar, 62% plan to implement automation in the next five years, but 71% of the micro enterprises and 48% of the small ones and 38% of the medium-sized firms did not have any strategy for that.

Regarding Slovakia, the survey of Papula et al., (2019) showed that the greatest need and actual introduction of new technologies/automation in Slovak companies is in the automotive and electrotechnical industry. The authors argue that there is a need for a comprehensive development of enterprises in Slovakia, the main challenges being in corporate culture and in people in relation to the necessary innovation. Grenčíková et al., (2019) conducted a survey among 80 Slovak SMEs operating in the mechanical engineering sector in 2017 and 2018. Compared to 2017, the number of businesses that have not started yet to deal with the Industry 4.0 issue has dropped from 25% to 11%. At the same time the share of those who made already first attempts in Industry 4.0 increased from 15% to 31%. Thus, awareness increased, however, the small (10%) share of the firms that have any kind of strategy remained.

## 6. Conclusion

In the past decade reshoring became a relevant phenomenon. In several developed economies companies brought back previously offshored production partly or totally. Backshoring took place mainly from China or from other far distance areas. Motivations for reshoring can be various, most importantly the need for more flexibility, control of the whole production process, prestige of the home country quality, etc. Automation and robotization proved to be also a motive for backshoring in the past years.

In this article I used the European Reshoring Monitor database, according to which there are some examples of backshoring from the Visegrád region, mostly from Poland. Nearshoring to the Visegrád area can also be important (there are a few examples also), because of its location advantages. However, some previous location advantages are weakening (there is a labour shortage and wage increase), thus investors can push automatization of their plants. The introduction of Industry 4.0 technologies can be bound mostly to foreign affiliates in the Visegrád countries and to some extent to large domestic companies. SMEs in most Visegrád countries proved to be unprepared for the application of Industry 4.0 technologies (although they are mostly aware of the concept and its effects). This statement is supported by global indices, studies presented in this article.

To sum up, the question for the future is whether location advantages in the Visegrád region will be attractive enough for maintaining or nearshoring foreign investments. After a while –if no cheaper skilled workers are available –it can be more advantageous for foreign investors to automate production at the home country. In this way, new Industry 4.0 production facilities in developed home countries can make investment in V4 superfluous. In order to avoid this a pool of skilled labour should be created with cognitive skills necessary for the new age and thus efforts to improve education and training is essential.

## References

- ADAMIK, A., NOWICKI, M. 2018. Preparedness of Companies for Digital Transformation and Creating a Competitive Advantage in the Age of Industry 4.0. In: *Proceedings of the International Conference on Business Excellence*. Vol. 12, No. 1, pp. 10–24.
- ANCARANI, A., DI MAURO, C., MASCALI, F. 2019. Backshoring Strategy and the Adoption of Industry 4.0: Evidence from Europe. In: *Journal of World Business*. Vol. 54, No. 4, pp. 360–71.
- ARNTZ, M., GREGORY, T., ZIERAHN, U. 2016. *The Risk of Automation for Jobs in OECD Countries: A Comparative Analysis*. OECD Social, Employment and Migration Working Papers. 189.
- AUTIO, E., SZERB, L., KOMLÓSI, E., TISZBERGER, M. 2018. *The European Index of Digital Entrepreneurship Systems*. EUR – Scientific and Technical Research Reports. Publications Office of the European Union.
- BALS, L., KIRCHOFF, J., FOERSTL, K. 2016. Reshoring and Insourcing: Drivers and Future Research Directions. In: *International Journal of Physical Distribution & Logistics Management*. Vol. 46, No. 5, pp. 492–515.
- BRANDON-JONES, E., DUTORDOIR, M., FROTA NETO, J., SQUIRE, B. 2017. The Impact of Reshoring Decisions on Shareholder Wealth. In: *Journal of Operations Management*.
- CHUI, M., MANYIKA, J., MIREMADI, M. 2016. Where Machines Could Replace Humans—and Where They Can't (yet). McKinsey.
- DE BACKER, K., MENON, C., DESNOYERS-JAMES, I., MOUSSIEGT, L. 2016. *Reshoring: Myth or Reality? OECD Science, Technology and Industry Policy Papers*. 27. Paris: OECD.
- DI MAURO, C., FRATOCCHI, L., ORZES, L., SARTOR, M. 2018. Offshoring and Backshoring: A Multiple Case Study Analysis. In: *Journal of Purchasing and Supply Management*. Vol. 24, No. 2, pp. 108–134.

- DIMA, G. 2018. Do Industry 4.0 Policies and New Technologies Provide an Incentive to Re-Shore Foreign Activities? An Empirical Study on European Manufacturing Companies. Laurea Magistrale / Specialistica, Politecnico Milano.
- ÉLTETŐ, A. 2019. Effects of Industry 4.0 on Reshoring Investments – Hungarian Experiences.
- GREŇČÍKOVÁ, A., KORDOŠ, M., SOKOL, J. 2019. The Approach to Industry 4.0 within the Slovak Business Environment. In: *Social Sciences*. Vol. 8, No. 4, pp. 104.
- GRZYB, K. 2019. Industry 4.0 Market in Poland from the International Perspective. In: *Hradec Economic Days Proceedings*. Vol. 9. University of Hradec Králové.
- IOZIA, E. M., LEIRIAO, J. C. 2014. Reshoring of EU Industries in the Framework of Reindustrialisation'. In: *European Economic and Social Committee*. CCMI/120
- KINKEL, S. 2012. Trends in Production Relocation and Backshoring Activities: Changing Patterns in the Course of the Global Economic Crisis. In: *International Journal of Operations & Production Management*. Vol. 32, No. 6, pp. 696–720.
- KINKEL, S., MALOCA, S. 2009. 'Drivers and Antecedents of Manufacturing Offshoring and Backshoring – A German Perspective'. In: *Journal of Purchasing and Supply Management*. Retrieved 25 January 2019 (<https://www.sciencedirect.com/science/article/pii/S1478409209000387>).
- KRENZ, A., PRETTNER, K., STRULIK, H. 2018. *Robots, Reshoring, and the Lot of Low-Skilled Workers*. SSRN Scholarly Paper. ID 3208886. Rochester, NY: Social Science Research Network.
- LŐRINCZ, N. 2018. Being an Investment Target in CEE. Country Attractiveness and near-Shoring. In: *Vezetéstudomány – Budapest Management Review*. Vol. 49, No. 5, pp. 47–54.
- MAKÓ, CS., ILLÉSSY, M., BORBÉLY, A. 2018. Automatizáció és kreativitás a munkavégzésben. In: *Educatio*. Vol. 27, No. 2, pp. 192–207.
- MANNING, S. 2014. Mitigate, Tolerate or Relocate? Offshoring Challenges, Strategic Imperatives and Resource Constraints. In: *Journal of World Business*. Vol. 49, No. 4, pp. 522–535.
- MARTÍNEZ-MORA, C., MERINO, F. 2014. *Offshoring in the Spanish Footwear Industry: A Return Journey?* SSRN Scholarly Paper. ID 2482252. Rochester, NY: Social Science Research Network.
- MCKINSEY. 2017. *What the Future of Work Will Mean for Jobs, Skills, and Wages: Jobs Lost, Jobs Gained*. McKinsey.
- MCKINSEY. 2018. *The Rise of Digital Challengers: How Digitization Can Become the next Growth Engine for Central and Eastern Europe*. 51.
- MITTAL, S., MUZTOBA A., ROMERO, D., WUEST, T. 2018. A Critical Review of Smart Manufacturing & Industry 4.0 Maturity Models: Implications for Small and Medium-Sized Enterprises (SMEs). In: *Journal of Manufacturing Systems*. Vol. 49, pp. 194–214.
- MŁODY, M. 2016. 'Reindustrialization of the European Union member states in the context of reshoring'. In: *International Business and Global Economy 2016* (Tom 35/1):455–67.
- MOHELSKA, H., SOKOLOVA, M. 2018. 'Management Approaches for Industry 4.0 – the Organizational Culture Perspective'. In: *Technological and Economic Development of Economy*. Vol. 24, No. 6, pp. 2225–240.
- MÜLLER-DAUPPERT, B. 2016. Production Nearshoring in Europe and Their Consequences to the Supply Chain. In: *Gazdaság és Társadalom*. Vol. 8, No. 2, pp. 5–25.
- NAUDÉ, W., SURDEJ, A., CAMERON, M. 2019. The Past and Future of Manufacturing in Central and Eastern Europe: Ready for Industry 4.0? In: *Central and Eastern Europe* 43.
- NEDELKOSKA, L., QUINTINI, G. 2018. Automation, Skills Use and Training. *OECD*.
- PAPULA, J., KOHNOVÁ, L., PAPULOVÁ, Z., SUCHOBA, M. 2019. Industry 4.0: Preparation of Slovak Companies, the Comparative Study. In: CAGANOVA, D., BALOG, M., KNAPCIKOVA, L., SOVIAR, J., MEZARCIÓZ, S. (eds.) *Smart Technology Trends in*

- Industrial and Business Management, EAI/Springer Innovations in Communication and Computing*. Cham: Springer International Publishing. pp. 103–14
- ROLAND BERGER. 2014. 'Industry 4.0 – the New Industrial Revolution'. *Roland Berger*. Retrieved 12 March 2019 (<https://www.rolandberger.com/en/Publications/Industry-4.0-%E2%80%93-the-new-industrial-revolution.html>).
- RÜßMANN, M., LORENZ, M., GERBERT, P., WALDNER, M., JUSTUS, J., ENGEL, P., HARNISCH, M. 2015. 'Industry 4.0: The Future of Productivity and Growth in Manufacturing'. 20.
- SIMCHI-LEVI D., PERUVANKAL J., MULANI N., READ, B., FERREIRA, J. 2012. Is It Time to Rethink Your Manufacturing Strategy? – ProQuest. In: *MIT Sloan Management Review; Cambridge*. Vol. 53, No. 2, pp. 20–22.
- ŚLUSARCZYK, B. 2018. Industry 4.0 : Are We Ready? In: *Polish Journal of Management Studies* Vol. 17, No. 1.
- STASIAK-BETLEJEWSKA, R., LUMINITA P., GLIŃ, W. 2018. The Influence of Industry 4.0 on the Enterprise Competitiveness. In: *Multidisciplinary Aspects of Production Engineering*. Vol. 1, No. 1, pp. 641–648.
- STRANGE, R., ZUCHELLA, A. 2017. Industry 4.0, Global Value Chains and International Business. In: *Multinational Business Review*. Vol. 25, No. 3, pp. 174–84.
- VAIDYA, S., PRASHANT, A., BHOSLE, S. 2018. Industry 4.0 – A Glimpse. In: *Procedia Manufacturing*. Vol. 20, pp. 233–238.
- VRCHOTA, J., VOLEK, T., NOVOTNÁ, M. 2019. Factors Introducing Industry 4.0 to SMES. In: *Social Sciences*. Vol. 8, No. 5, pp. 1–10.

# Wikipedia statistics as a tool to find financial markets determinants: case of Russia

DMITRY GLADYREV<sup>1</sup>, ANNA MINGALEVA<sup>2</sup>,  
VALERIYA VOLKOVA<sup>3</sup>

**Abstract:** Different news affect financial markets in different ways. To study this relationship, we must measure both financial markets and news. Measuring financial markets is not totally obvious task, but usually easy, as all the data about share prices and different indices are available. For example, we can use RTS Index to measure state of Russian financial market. Measuring news is more complicated task. Some topics (e.g. certain elections or armed conflicts) dominate in mass media over long periods, but public interest to these topics is very volatile. The research is based on hypothesis that we can determine causes of changes in financial markets by analyzing data of public interest to different news topics and financial market indices. Innovative feature of the research is using Wikipedia statistics as a measure of public interest to different news topics. This approach is much better than taking number of news (that depends on many factors including censorship) and statistics of Google searches (where each topic can be represented by many ways). It was found that number of visits of some Wikipedia articles (e.g. International sanctions during the Ukrainian crisis, Russian military intervention in the Syrian Civil War, 2016 United States presidential election and others) has a connection with state of Russian financial market. Also, the research examines these connections in different periods and use statistics of Wikipedias in different languages to distinguish public interest to the news in different regions.

**Key words:** market efficiency, financial markets, RTS index, news, Russia, Wikipedia

**JEL Classification:** G14

## 1. Introduction

Share prices and financial market indices are very volatile. Efficient market hypothesis (EMH) claims that these fluctuations are caused by all available information (Fama, 1970). But knowledge that current market state is caused by

---

<sup>1</sup> DMITRY GLADYREV, Graduate School of Economics and Management, Ural Federal University, Russia, unc-dg@mail.ru

<sup>2</sup> ANNA MINGALEVA, Graduate School of Economics and Management, Ural Federal University, Russia, mingaleva.ann@yandex.ru

<sup>3</sup> VALERIYA VOLKOVA, Graduate School of Economics and Management, Ural Federal University, Russia, lvolkova1997@yandex.ru

available information doesn't help us to reveal what specific information was a reason of certain market fluctuations.

Existing researches provide some findings about relationship between different news and financial markets. Number of news, day-of-week dummy variable and news importance as proxied by large New York Times headlines are directly related with market activity (Mitchell, Mulherin, 1994; Chan, 2003). Deviations from usual level of pessimism in Wall Street Journal increase market trading volume (Tetlock, 2007). Good political news has a positive impact on financial market and decrease volatility, meanwhile bad political news has a negative influence on market and increase volatility (Suleman, 2012). Also, the choice of words and tone used by the authors of financial news articles can affect the dynamics of markets (Schumaker et al., 2012). It was shown that traders are more likely to "overreact" to unexpected and dramatic news events (De Bondt, Thaler, 1985).

Public mood in social networks caused by news and rumors is also important for financial markets (Li et al., 2014). Twitter mood has a significant influence on the Dow Jones Industrial Average (Bollen, Mao and Zeng, 2011). Before the appearance of social networks, the major communication sites for traders were different message boards. These boards also influenced decisions of traders, even after controlling for news in media (Antweiler, Frank, 2004).

Some researches were focused on certain events. It was found that the conflict between Russia and Ukraine had negative consequences for financial markets of both countries, and international news about the conflict were more influential than domestic ones (Hoffmann, Neuenkirch, 2017).

To study relationship between financial markets and news we must measure both. As all the data about share prices and different indices are available, measuring financial markets is usually easy. It's more complicated to measure the effect of news. Existing researches provide some approaches, but these solutions are usually based on newspapers activity (that can be affected by censorship, editorial policy and other factors) or social network activity (that can be affected by category of news and crowd effect).

One more possible solution is using statistics of Google searches, because it can demonstrate public interest to the news. It is less affected by crowd effect, because unlike posts in social networks Google search requests are invisible for the society. But this approach is difficult to apply, as the same news can be described in many ways. Thus, measuring the effect of news is one of the main objectives of this research.



## 2. Methodology

The research offers to use Wikipedia statistics of daily page views as a tool to measure effect of different news. One of the services that provide such statistics was made by Wikimedia Toolforge supported by a dedicated group of Wikimedia Foundation staff and volunteers (URL: <https://tools.wmflabs.org/pageviews>).

In Wikipedia one personality, one subject and one event always have just one article, so it can be enough to track daily page views statistics of one article to measure the interest to the subject. This is a big advantage in comparison with other approaches. Unlike number of news, number of page views in Wikipedia cannot distort real interest to the subject due to censorship and editorial policy of different media.

An additional advantage of this approach is availability of Wikipedia's statistics in different languages that can allow us to distinguish public interest to the news in different regions.

The research takes dynamics of Russian financial market (measured by RTS index based on 50 Russian stocks) since 1 January 2016 till 31 December 2018 and some events that presumably affected Russian financial market during the period.

Six events were taken into consideration. The choice of these events was based on high interest of Russian and foreign media. The following list contains the names of articles in the English Wikipedia that correspond to the selected events.

1. War in Donbass
2. International sanctions during the Ukrainian crisis
3. Annexation of Crimea by the Russian Federation
4. 2016 United States presidential election
5. Russian military intervention in the Syrian Civil War
6. 2018 FIFA World Cup

The research takes daily page views statistics of these articles in Russian and English Wikipedias and study its connection with RTS index. We presume that interest to some of these events has a connection with state of Russian financial market, especially in periods of highest interest.

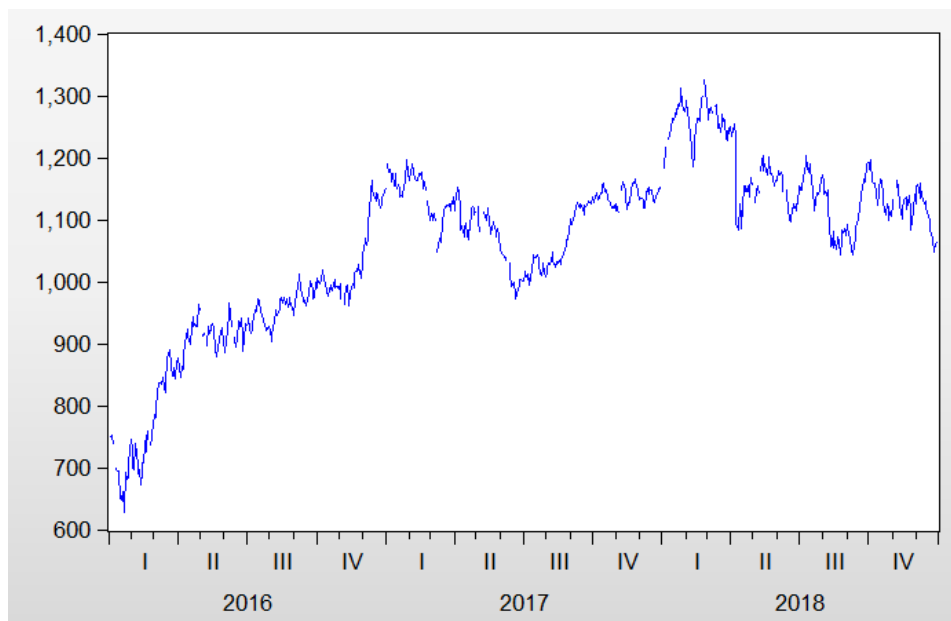
The research uses two methods to determine these connections. The first method is correlation analysis over quarters. Correlation coefficients for longer periods of time are not reasonable, because RTS index depend on many factors and we should not expect linear correlation between the market and number of page views during long period. At the same time we cannot take shorter periods, as we can get too many random results due to low number of observations. The disadvantage of this approach is that market's connection with news can be much more complicated than linear correlation. Traders often overreact for dramatic

events (De Bondt, Thaler, 1985) and market indices can move in opposite direction to fundamental values during some days after such events.

The second approach is based on analysis of days with highest interest to selected articles. Wikipedia's statistics allows easily determine such days. Abnormal changes in RTS index in the same period can be a strong evidence that the event which is described in the article is related with changes in the market. This method doesn't provide statistical accuracy, but at the same time it is very demonstrative and easy to apply.

Both approaches use first difference of RTS Index (RTS index growth), not RTS index on its own. This is since we are looking for market deviations from normal market state caused by different events, and normal market state is different in various periods (*see Figure 1*).

As trading activity does not take place on weekends, data excludes Saturdays and Sundays. RTS index growth for Monday is calculated as a difference with Friday value.



**Figure 1. Dynamics of RTS index from 2016 till 2018**

*Source:* Authors' own edition.

### 3. Results

Linear correlation coefficients between articles' page views and RTS index growth are presented in *Table 1* for each quarter from 2016 to 2018. Only significant coefficients are given in the table.

**Table 1. Correlation of RTS index growth with number of views of articles (only significant coefficients)**

Article	2016				2017				2018			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
	Russian Wikipedia											
War in Donbass								0,21*				
International sanctions during the Ukrainian crisis			0,21*		0,34***					-0,3**		
Annexation of Crimea by the Russian Federation					0,35***							
2016 United States presidential election											-0,22*	
Russian military intervention in the Syrian Civil War				0,26**		-0,24*		0,29**			0,26**	
2018 FIFA World Cup												
	English Wikipedia											
War in Donbass												
International sanctions during the Ukrainian crisis						-0,31**				-0,25*	-0,27**	
Annexation of Crimea by the Russian Federation						-0,23*					-0,23*	
2016 United States presidential election		-0,24*	-0,24**									
Russian military intervention in the Syrian Civil War						-0,33**		0,21*	-0,25*			
2018 FIFA World Cup			0,27**									

Notes: \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ .

Source: Authors' own edition.

We should not expect high values here, as financial market depends on many different factors. And we don't have strong evidence that even selected pairs have a connection with each other, because the significance is not strong enough. However, such analysis can be a good reason for further analysis of determined factors.

Two articles have the highest number of significant correlation coefficients both in Russian and English Wikipedias. These articles are:

- International sanctions during the Ukrainian crisis;
- Russian military intervention in the Syrian Civil War.

Presumably, these topics have the closest connection with the state of Russian financial market. It would be not surprising, because both topics have a significant influence on Russian economy. International sanctions create difficulties in international trade for the firms and affect the attitude to Russia in the world. But at the same time some Russian firms use opportunities created after trade restrictions and impact of international sanctions can be positive for them. Russian participation in Syrian Civil War can also have different influence on the market. On the one hand, predominantly successful military operations could raise status of Russia in the world. On the other hand, such operations are costly for economics.

Days when each article had the highest number of page views are taken for additional consideration. We're looking whether these days had some abnormal changes in RTS index.

Percentile of RTS index change shows how unusual was the RTS index growth in selected day. If percentile is close to 100%, it means that RTS index had unusual growth during the day, and percentile that close to 0% indicates that RTS index had unusual fall.

Two events relate to extremely high positive and negative changes in RTS index. On 27 January 2017 number of page views of the article «International sanctions during the Ukrainian crisis» in Russian Wikipedia reached the maximum, and RTS index increased by 31,99 points. Only 2% of trading days from 2016 to 2018 had higher RTS index growth. A review of the news on this day allows to find possible reason that caused high interest to the topic and RTS index change. Many newspapers made reports about Trump's willingness to cancel sanctions against Russia.

On 26 November 2018 number of page views of articles «War in Donbass» and «Annexation of Crimea by the Russian Federation» in English Wikipedia reached the maximum, and RTS index decreased by 29,35 points. Only 2% of trading days from 2016 to 2018 had higher RTS index fall. A possible reason relates to escalation of Kerch Strait incident and introduction of martial law in Ukraine.

**Table 2. Analysis of dates with highest interest to selected articles**

Article	Date with highest interest	RTS index change	Percentile of RTS index change	Possible reason (selected after googling the date)
Russian Wikipedia				
War in Donbass	8/02/2017	-14,56	14%	Assassination of DPR commander Givi
International sanctions during the Ukrainian crisis	27/1/2017	31,99	<b>98%</b>	Rumors about Trump's plans to cancel sanctions against Russia
Annexation of Crimea by the Russian Federation	18/3/2019	16,6	88%	Fifth anniversary of Russian administration in Crimea
2016 United States presidential election	9/11/2016	17,69	<b>90%</b>	The day after elections
Russian military intervention in the Syrian Civil War	7/10/2015	17,47	<b>90%</b>	Russian strikes from warships in Caspian Sea
2018 FIFA World Cup	14/6/2018	-6.6%	31%	First game of Russia in the tournament
English Wikipedia				
War in Donbass	26/11/2018	-29,35	<b>2%</b>	Escalation of Kerch Strait incident
International sanctions during the Ukrainian crisis	15/2/2017	-1,38	44%	US bill about sanctions against Russia
Annexation of Crimea by the Russian Federation	26/11/2018	-29,35	<b>2%</b>	Escalation of Kerch Strait incident
2016 United States presidential election	09/11/2016	17,69	<b>90%</b>	The day after elections
Russian military intervention in the Syrian Civil War	08/10/2015	12,32	81%	Russian strikes from warships in Caspian Sea
2018 FIFA World Cup	27/06/2018	11,24	78%	Last games of group stage in the tournament

*Source:* Authors' own edition.

Two more events also have notable changes in RTS index during the time of highest public interest. The article «2016 United States presidential election» had maximum number of page views in the next day after Donald Trump's victory, and this day was also notable by high RTS index growth (17,69 points). The article «Russian military intervention in the Syrian Civil War» had maximum number of page views after the news about Russian strikes from warships in Caspian Sea, and during this day RTS index increased by 17,47 points.

As well as correlation analysis, the methodology doesn't allow to make reliable conclusions about connection and causality, but it allows to determine factors that presumably affect financial markets and certain dates when this influence could be the highest.

#### **4. Conclusion**

Wikipedia's statistics provides daily data for page views of all articles in all language sections. It is a powerful instrument of measuring public interest to different events in different regions that has some strong advantages in comparison with other approaches. We used this instrument to determine causes of changes in Russian financial market taking the period from 2016 to 2018.

Two different approaches are used in the research to determine influence of different events on RTS index. The first approach is a correlation analysis over quarters. It didn't give strong evidences supporting connection of different news with the market, but allowed to determine two topics that presumably have such connection. These topics relate to international sanctions against Russia and Russian military intervention in Syria.

The second approach is based on analysis of days with highest interest to different topics. The approach allows to determine certain dates when selected topics could have the biggest influence on the market. We found days where the highest interest to different topics coincide with abnormal changes of RTS index. It allowed us to determine certain possible causes of changes in the market.

Despite we proved that Wikipedia's statistics can be used as a research instrument in financial market analysis, the most controversial point here is a choice of proper research algorithms that provide strong statistical significance of results. We got some interesting results with different level of credibility, but the research needs new methods which would allow getting stronger results. In the same time, methods that were applied in the research are very demonstrative and easy.

## References

- ANTWEILER, W., FRANK, M. Z. 2004. Is all that talk just noise? The information content of internet stock message boards. In: *The Journal of finance*. Vol. 59, No. 3, pp. 1259–1294.
- BOLLEN, J., MAO, H., ZENG, X. 2011. Twitter mood predicts the stock market. In: *Journal of computational science*. Vol. 2, No. 1, pp. 1–8.
- CHAN, W. S. 2003. Stock price reaction to news and no-news: drift and reversal after headlines. In: *Journal of Financial Economics*. Vol. 70, No. 2, pp. 223–260.
- DE BONDT, W. F., THALER, R. 1985. Does the stock market overreact?. In: *The Journal of finance*. Vol. 40, No. 3, pp. 793–805.
- FAMA, E. F., MALKIEL, B. G. 1970. Efficient capital markets: A review of theory and empirical work. In: *The journal of Finance*. Vol. 25, No. 2, pp. 383–417.
- HOFFMANN, M., NEUENKIRCH, M. 2017. The pro-Russian conflict and its impact on stock returns in Russia and the Ukraine. In: *International Economics and Economic Policy*. Vol. 14, No. 1, pp. 61–73.
- LI, Q., WANG, T., LI, P., LIU, L., GONG, Q., CHEN, Y. 2014. The effect of news and public mood on stock movements. In: *Information Sciences*. Vol. 278, pp. 826–840.
- MITCHELL, M. L., MULHERIN, J. H. 1994. The impact of public information on the stock market. In: *The Journal of Finance*. Vol. 49, No. 3, pp. 923–950.
- SCHUMAKER, R. P., ZHANG, Y., HUANG, C. N., HEN, H. 2012. Evaluating sentiment in financial news articles. *Decision Support Systems*. Vol. 53, No. 3, pp. 458–464.
- SULEMAN, M. T. 2012. Stock market reaction to good and bad political news. In: *Asian Journal of Finance & Accounting*. Vol. 4, No. 1, pp. 299–312.
- TETLOCK, P. C. 2007. Giving content to investor sentiment: The role of media in the stock market. In: *The Journal of finance*. Vol. 62, No. 3, pp. 1139–1168.

# Market selection effects in Russian regions: comparative analysis of Ural and Far Eastern Federal Districts

ANDREY PUSHKAREV<sup>1</sup>, OLEG MARIEV<sup>2</sup>,  
NATALIA DAVIDSON<sup>3</sup>

**Abstract:** In this research, we look at the effects of market selection in two Russian federal districts to determine similarities and differences between them. We aim to uncover regional differences in how competition process affects growth of firms. Namely, we consider Far Eastern Federal district and compare the obtained results with findings for the Ural Federal District. We expect that differences in resource allocation (including human resources) and market structure will also result in differences of market selection effects. We consider over 13.5 thousand observations of firms from agriculture, mining or manufacturing sectors for the period from 2006 to 2015. In the paper, we use statistical and econometric analysis to obtain empirical estimations regarding how market selection affects revenue growth on regional and sectoral level. We use NACE 2 as an industrial classification, which allows results to be comparable with the previous findings regarding market selection effects in developed economies.

Our findings suggest that generally, that there is high level of heterogeneity in terms of productivity and revenue growth on the sectoral level, allowing extremely productive firms coexist with firms that are much less productive on the same market. We suggest that it is a sign of competition working ineffectively, in terms of purging weak firms from the market. This heterogeneity is significantly higher for the Far Eastern Federal District. Explanatory power of market selection for the economic growth is similar in both federal districts, but there are significant differences when considering separate industries. Namely, for the Ural Federal District explanatory power of the market selection is stronger for almost every industry, except fishing and manufacturing of the electric products. Based on the obtained results we propose several policy implications.

**Key words:** market selection, productivity, regions, competition

**JEL Classification:** L11, D40

---

<sup>1</sup> ANDREY PUSHKAREV, Graduate School of Economics and Management Ural Federal University, Russia, a.a.pushkarev@urfu.ru

<sup>2</sup> OLEG MARIEV, Graduate School of Economics and Management Ural Federal University, Russia, o.s.mariev@urfu.ru, natalya.davidson@gmail.com

<sup>3</sup> NATALIA DAVIDSON, Graduate School of Economics and Management Ural Federal University, Russia, natalya.davidson@gmail.com



## 1. Introduction

Productivity growth is crucial for the economy both on federal and regional levels. One of the processes that affects this growth is so called market selection. If it is effective, then market shares should reallocate to more productive firms, thus increasing sectoral productivity (with all other processes considered). That is why understanding this process is extremely important when introducing policy that supposed to stimulate economic growth.

In this paper, we aim to understand the degree of market selection effects on the firms operation in Far Eastern and Ural Federal Districts (FEFD and UFD respectively). To do this we employ one of the primary methods to determine market dynamics: econometric estimation of connection between firm growth and their productivity that has been initially suggested for the estimation of firm growth rates by Bottazzi and Secchi (2006). Essentially this method allows estimating the intensity of the market selection by assessing effects its static and dynamic components, represented by the productivity level and productivity dynamics respectively, on the revenue growth.

Even though we are aware of the other processes affecting productivity growth, such as productivity growth on the firm level and technological growth, we are focusing on the market selection as it may highly vary more from region to region. Second point is that the policy makers can more easily adjust this process.

Our choice of the regions to consider is guided by the two main ideas. First, both districts are rather large, so infrastructure and climate conditions should be comparable. On top of that, both regions have rather high GRP per capita, with UFD being first in Russian and FEFD being third. Second, these two regions are different in terms of economic activity, availability of labour and consumers. FEFD has much lower population density. Therefore, we expect to see differences in market selection effects because of that.

The rest of the work is structured as follows: in the Section 2, we present overview of the previous research in the field and describe the used method. Section 3 provides description of the data used and preliminary statistical analysis. Section 4 describes the results of the econometric estimation. Section 5 concludes the paper.

## 2. Methodology and previous research

In this research, we mainly look in at explanatory power of the productivity and productivity growth on the revenue growth of companies. This way, we should be able to estimate how important market selection process for the economic growth is.

The logic behind this approach is connected to viewing market as a filter allowing more productive firms to stay (and take higher share of the market revenue) and excluding less productive firms from the market (rather similarly to the ‘invisible hand’ mechanism of Smith [1776]). Such process is often called replicator dynamics (Friedman, 1953; Foster et al., 2008) and highly resembles evolution process in nature.

For the estimation, we use method suggested by Bottazzi and Secchi (2006) and further used by Dosi et al. (2015) for developed economies. We present a shortened description of the procedure below.

We use correlated random effects estimator to obtain the share of explained variance for the growth-productivity ratio. The specification we use has the following form:

$$g_{i,t} = a + b_t + \beta_{\Delta}\Delta\pi_{i,t} + \beta_m\bar{\pi}_{i,t} + \beta_{\Delta a}\overline{\Delta\pi_{i,t}} + \beta_{ma}\bar{\pi}_i + c_i + \epsilon_{i,t}, \quad (1)$$

where  $\Delta\pi_{i,t}$  denotes the logarithm of the productivity difference for two consecutive years, reflecting the dynamics of productivity growth, and  $\bar{\pi}_{i,t}$  is the average productivity level of the firm for periods  $t$  and  $t-1$ , reflecting the difference in productivity between firms in absolute terms. The model is also expanded by adding an average dynamic component, and an average absolute component, which increases the model’s ability to take into account the contribution of productivity to explaining the economic success of firms. The model also contains a dummy variable of the period and firm level fixed effects.

In Equation (1) we consider how relative competitiveness (in comparison with the performance of other firms in the industry) affects the relative growth of firms (i.e., its revenue share in the industry). Considering aforementioned logic, if the market selection process is present and effective, we should see positive significant connection between productivity indicators and the revenue growth.

For estimating explanatory power of the revenue growth, we use share of dispersion explained by the productivity factors:

$$S^2 = \frac{Var(\beta_{\Delta}\Delta\pi_{i,t} + \beta_m\bar{\pi}_{i,t} + \beta_{\Delta a}\overline{\Delta\pi_{i,t}} + \beta_{ma}\bar{\pi}_i)}{Var(g_{i,t})}. \quad (2)$$

Previous research suggest that relationship between productivity and growth is weak; therefore, market selection process should be weak as well. For example, Dosi et al. (2015) obtain such results for the set of developed economies: USA, France, Germany, UK. They find that productivity can only explain 13–18% of the revenue growth variance in these countries.

Bottazzi et al. (2010) also suggest weak connection between firm growth and productivity. In the research based on the Italian and French firms, productivity

terms explain only 3–5% of the growth rate variance, while other factors contribute more.

### 3. Data

In this research, we use data on firms that belong to agriculture, mining or manufacturing in the Far Eastern Federal District for the period from 2006 to 2015. The dataset includes 13,557 observations and covers almost all industries in aforementioned groups. Data is taken from the Ruslana database provided by the Bureau van Dijk. For the estimation purposes and comparability of the results, we exclude all firms with less than 20 employees. Such micro-firms can be extremely volatile, which may skew the estimations.

All further estimates for the Ural Federal District are taken from our previous research (see Savin, Mariev and Pushkarev, 2019).

Brief look at the descriptive statistics suggests that firms in both federal districts are growing at the approximately the same rate of 10%, however, firms in UFD are significantly more productive both on average and in median values. Even though there are less firms in FEFD, size parameters for small firms are extremely close, while large Ural firms are more than two times larger than in Far Eastern Federal District (*Table 1*).

**Table 1. Number of observations, mean and median values for the revenue growth, productivity and number of employees**

	Revenue growth			Labour productivity (USD per employee)			Size (≤ 250 employees)			Size (> 250 employees)		
	Obs.	Mean	Median	Obs.	Mean	Median	Obs.	Mean	Median	Obs.	Mean	Median
Russia	248,066	0.114	0.115	306,802	11,788	2,516	259,488	61	40	47,314	891	432
UFD	18,249	0.104	0.111	22,209	23,405	3,116	17,933	64	43	4,276	1,613	495
FEFD	10,801	0.102	0.101	13,557	15,596	1,960	11,336	63	42	2,221	637	395

*Source:* Own estimations. Estimations for the Ural Federal District are taken from Savin, Mariev, Pushkarev (2019).

Largest industries (based on the NACE 2 industrial classification) in Far Eastern Federal district are Crop and animal production (26.8% of observations), Food production (13.22%), Fishing (12.06%), and Other mining (11.49%). Each other industry accounts for less than 5% of the observations. Therefore we see focus of this region on more traditional industries, connected to agriculture and mining.

Market structure is different for the Ural Federal District. More than 16.6% of firms there are engaged in Crop and animal production. Other large industries in the UFD are Machinery and equipment (13.4%) and the Manufacture of finished metal products (12.7%); smaller industries are the production of other non-metallic mineral products (7.1%) and food production (7%). Other industries account for less than 5% each. Even though agriculture takes significant share of observations, this district is focused on the heavy manufacturing industries more. We assume that some differences in market selection between the regions may arise from different specialization.

Preliminary analysis showed that markets are significantly heterogeneous in both regions, with more than 20 times difference between median and extreme values of the revenue growth and the labour productivity. Therefore, in *Table 2* standard deviations of these factors on the sector levels are presented. In computing them we follow methodology presented by Bartelsman and Doms (2000), Bottazzi and Secchi, (2006), Dosi (2007).

Looking at the obtained results, we can see an important difference between two federal districts. Average and median values suggest that FEFD is much more heterogeneous, which suggest that market selection mechanisms are not as effective, allowing extremely productive companies coexist with lagging ones on the same market. Even though similar situation is observed for the UFD it is less pronounced.

We see high standard deviations for most industries connected to the natural resources and agriculture.

#### **4. Results of the econometric estimation**

In the *Table 3* below, we present the results of the econometric estimation for the Ural and Far Eastern Federal District.

Results suggest the following. First, we see that mean and median estimates are similar for both regions and only slightly higher for the Ural Federal District. Another similarity is that we observe the dominance of the dynamic component in explaining variance of the revenue growth. We also do not observe any common patterns in the explanatory power of the market selection. In other words, in both districts there are no systematic differences between market selection in high-tech and low tech industries, agriculture, mining and manufacturing, and so on.

Low explanatory power of the market selection that we observe goes in line with the previous findings for the developed economies described in the aforementioned papers.

**Table 2. Standard deviations of revenue growth and labour productivity for Ural and Far Eastern federal districts**

	Ural Federal District		Far Eastern Federal District	
	SD Revenue growth	SD Labour productivity	SD Revenue growth	SD Labour productivity
Crop and animal production	0.51	1.59	0.62	1.80
Forestry	0.66	1.61	0.72	1.66
Fishing	0.45	1.26	0.89	1.68
Petroleum and gas	0.84	2.01	0.73	1.54
Metal mining	0.64	1.46	0.93	1.72
Other mining	0.55	1.40	0.90	1.91
Mining support services	0.53	1.48	0.35	2.12
Food products	0.51	1.41	0.67	1.52
Beverages	0.64	1.59	0.57	1.42
Textile	0.33	1.35	0.22	1.39
Wearing apparel	0.76	1.52	0.38	1.50
Leather	0.52	1.38	0.43	1.57
Wood and wooden products	0.75	1.53	0.82	1.64
Paper	0.33	1.24	0.42	1.25
Recorded media	0.44	1.34	0.29	1.32
Coke and refined petroleum	0.40	1.63	0.10	3.41
Chemical products	0.45	1.35	0.46	1.08
Pharmaceuticals	0.30	1.04	0.21	0.82
Rubber and plastic products	0.65	1.36	0.47	1.28
Non-metallic products	0.63	1.59	0.68	1.55
Basic metal	0.73	1.79	0.50	1.23
Fabricated metal	0.64	1.39	0.76	1.52
Computers and electronics	0.51	1.23	0.57	1.16
Electrical equipment	0.52	1.42	0.65	1.40
Machinery	0.71	1.41	0.62	1.44
Motor vehicles	0.57	1.17	1.35	1.78
Transport equipment	0.49	1.46	0.78	1.74
Furniture	0.55	1.50	0.37	1.32
Other manufacturing	0.47	1.32	1.22	2.02
Mean	<b>0.54</b>	<b>1.47</b>	<b>0.62</b>	<b>1.59</b>
Median	<b>0.53</b>	<b>1.42</b>	<b>0.62</b>	<b>1.53</b>

*Source:* Own estimations. Estimations for the Ural Federal District are taken from Savin, Mariev, Pushkarev (2019).

**Table 3. Estimation of the market selection effects. Labour productivity**

	Ural Federal District			Far Eastern Federal District		
	Static component	Dynamic component	Overall	Static component	Dynamic component	Overall
Crop and animal production	0.00	0.06	0.06	0.00	0.09	0.09
Forestry	0.15	0.08	0.23	0.02	0.09	0.11
Fishing	0.02	0.16	0.18	0.00	0.28	0.28
Petroleum and gas	0.03	0.22	0.25	0.03	0.10	0.14
Metal mining	0.00	0.15	0.15	0.00	0.16	0.16
Other mining	0.00	0.16	0.16	0.03	0.17	0.20
Mining support services	0.01	0.07	0.08	0.00	0.02	0.02
Food products	0.01	0.06	0.07	0.01	0.06	0.07
Beverages	0.08	0.16	0.24	0.06	0.02	0.08
Textile	0.07	0.17	0.24	0.03	0.10	0.12
Wearing apparel	0.01	0.14	0.15	0.02	0.06	0.07
Leather	0.03	0.06	0.09	0.04	0.10	0.13
Wood and wooden products	0.02	0.20	0.22	0.03	0.14	0.17
Paper	0.01	0.02	0.03	0.01	0.02	0.03
Recorded media	0.01	0.08	0.09	0.03	0.06	0.09
Coke and refined petroleum	0.02	0.29	0.31	0.00	0.01	0.01
Chemical products	0.00	0.05	0.05	0.05	0.06	0.11
Pharmaceuticals	0.01	0.15	0.16	0.03	0.04	0.06
Rubber and plastic products	0.02	0.06	0.08	0.00	0.03	0.03
Non-metallic products	0.01	0.13	0.14	0.03	0.08	0.11
Basic metal	0.00	0.08	0.08	0.08	0.08	0.16
Fabricated metal	0.00	0.12	0.12	0.01	0.06	0.07
Computers and electronics	0.06	0.02	0.08	0.01	0.05	0.05
Electrical equipment	0.01	0.04	0.05	0.04	0.28	0.32
Machinery and equipment	0.00	0.12	0.12	0.00	0.08	0.08
Motor vehicles	0.00	0.09	0.09	0.04	0.03	0.07
Transport equipment	0.03	0.12	0.15	0.00	0.20	0.20
Furniture	0.10	0.02	0.12	0.12	0.08	0.20
Other manufacturing	0.07	0.05	0.12	0.04	0.07	0.11
Mean	<b>0.03</b>	<b>0.11</b>	<b>0.13</b>	<b>0.03</b>	<b>0.09</b>	<b>0.12</b>
Median	<b>0.01</b>	<b>0.09</b>	<b>0.12</b>	<b>0.03</b>	<b>0.08</b>	<b>0.11</b>

*Source:* Own estimations. Estimations for the Ural Federal District are taken from Savin, Mariev, Pushkarev (2019).

We also do not see systematic differences connected to the market structure. For example, crop and animal production takes up 26.8% of all firms in FEFD (compared to only 12% in UFD), but market selection effects are comparable. Same can be said about Machinery and equipment sector, which is much larger in UFD in terms of number of companies involved, but market selection effects are just slightly stronger than in FEFD.

On the other hand, there is a number of differences between these two districts, when separate industries are considered. First, we observe much higher explanatory power of the market selection in the fishing sector in Far Eastern Federal district. This industry is traditional for the district, and has significant share of companies involved in it, so it higher explanatory power of the market selection is to be expected. It is also worth noting that explanatory power of the market selection in this industry is one of the highest.

We also see significant difference in the electrical equipment sector, where competitive selection explains significantly higher variance of growth for the FEFD. Considering size of this industry is comparable between the districts this result is rather puzzling to us and may suggest that Far Eastern firms are existing in more competitive environment due to the neighborhood with China.

For other industries, we see its explanatory power is greater for the UFD firms. This result suggests that competitive selection is stronger in UFD. We theorize that it may be connected to the higher productivity levels of Ural firms, meaning that firms that are more productive are selected more effectively. In the long run, this should allow for faster growth in the aforementioned federal district.

As a robustness check, we repeat the estimations for total factor productivity (see Table 4 in Appendix). For this purpose TFP is calculated following the procedure introduced by Van Beveren (2012) and that was later applied by Dosi et al. (2015). Results of this estimation are extremely close to the ones of labour productivity, as expected. We observe the same patterns and similarities in both estimations, which confirms the obtained results.

## 5. Conclusion

In this research we have estimated market selection effects for the regions of Russia. We have used previously established methodology for two Russian federal districts: Ural and Far Eastern, to see if there are significant differences between them.

We find that these two districts are rather different in terms of productivity levels, even though their economic growth happens at approximately the same rate. More so, standard deviations of the productivity and revenue growth on the sectoral level are extremely high for Far Eastern Federal District. This result

suggests that competition in FEFD is rather ineffective in terms of selecting only the most productive and successful firms, but allows less effective firms to exist as well. In the Ural district situation is comparable, but results suggest higher homogeneity in this region.

This conclusion is reinforced by the results of the econometric modelling. We find that explanatory power of the market selection is low in both district and is slightly lower for the Far Eastern one.

On the sectoral level, we see significant differences between considered territories. Explanatory power of the market selection is almost always higher for Ural sectors, with only exception of fishing sector, which is traditional for the Far Eastern federal district, and electric goods production. We argue that the latter may be connected to the fact that China – one of the largest producers of electrics and electronics – is a close neighbor of the FEFD.

Based on these results, we suggest that policymakers should focus on improving competitive climate and institutional framework in both regions as well as reducing financial preferences for some companies, more so for the FEFD. This will allow market selection to be more effective and should subsequently result in faster economic growth.

The limitation of this research is mainly connected to the fact, that industrial classifications are not perfect. Essentially, companies that are classified to one sector do not necessarily produce products that compete with each other (i.e. heart medication and hair loss medication do not compete on the final markets). Unfortunately, for the data we are using this issue cannot be corrected. Nonetheless, obtained results should provide good general estimate for the research.

### **Acknowledgements**

This research has been supported by the President of Russian Federation grant for the support of young Russian scientists number МД-3196.2019.



## Appendix

**Table 4. Estimation of the market selection effects. Total Factor productivity**

	Ural Federal District			Far Eastern Federal District		
	Static component	Dynamic component	Overall	Static component	Dynamic component	Overall
Crop and animal production	0.00	0.07	0.07	0.01	0.10	0.10
Forestry	0.18	0.16	0.34	0.02	0.10	0.12
Fishing	0.02	0.09	0.11	0.01	0.25	0.26
Petroleum and gas	0.03	0.21	0.24	0.01	0.15	0.16
Metal mining	0.01	0.16	0.16	0.00	0.16	0.16
Other mining	0.00	0.14	0.14	0.01	0.20	0.21
Mining support services	0.01	0.06	0.07	0.01	0.01	0.02
Food products	0.00	0.08	0.08	0.01	0.07	0.07
Beverages	0.00	0.24	0.24	0.06	0.02	0.08
Textile	0.00	0.25	0.25	0.04	0.12	0.16
Wearing apparel	0.00	0.06	0.06	0.02	0.08	0.10
Leather	0.01	0.04	0.05	0.02	0.07	0.09
Wood and wooden products	0.00	0.07	0.08	0.03	0.18	0.21
Paper	0.00	0.04	0.04	0.03	0.02	0.05
Recorded media	0.00	0.02	0.02	0.01	0.05	0.07
Coke and refined petroleum	0.00	0.03	0.03	0.01	0.01	0.02
Chemical products	0.00	0.02	0.02	0.05	0.06	0.11
Pharmaceuticals	0.00	0.08	0.08	0.02	0.02	0.04
Rubber and plastic products	0.00	0.10	0.10	0.00	0.01	0.01
Non-metallic products	0.00	0.11	0.11	0.01	0.09	0.10
Basic metal	0.00	0.07	0.07	0.11	0.09	0.20
Fabricated metal	0.00	0.10	0.10	0.00	0.08	0.09
Computers and electronics	0.00	0.11	0.11	0.00	0.11	0.11
Electrical equipment	0.00	0.05	0.05	0.02	0.27	0.30
Machinery	0.00	0.09	0.09	0.00	0.10	0.10
Motor vehicles	0.00	0.06	0.06	0.02	0.02	0.04
Transport equipment	0.00	0.03	0.04	0.02	0.24	0.26
Furniture	0.00	0.13	0.13	0.10	0.06	0.16
Other manufacturing	0.01	0.03	0.05	0.04	0.10	0.14
Mean	<b>0.01</b>	<b>0.09</b>	<b>0.10</b>	<b>0.02</b>	<b>0.10</b>	<b>0.12</b>
Median	<b>0.00</b>	<b>0.08</b>	<b>0.08</b>	<b>0.02</b>	<b>0.09</b>	<b>0.10</b>

*Source:* Own estimations. Estimations for the Ural Federal District taken from Savin, Mariev, Pushkarev (2019).

## References

- BARTELSMAN, E. J., DOMS, M. 2000. Understanding Productivity: Lessons from Longitudinal Microdata. In: *Journal of Economic Literature*. Vol. 38, pp. 569–594.
- BOTTAZZI, G., DOSI, G., JACOBY, N., SECCHI, A., TAMAGNI, F. 2010. Corporate Performances and Market Selection: Some Comparative Evidence. In: *Industrial and Corporate Change*. Vol. 19, pp. 1953–1996.
- BOTTAZZI, G., SECCHI, A. 2006. Explaining the Distribution of Firms Growth Rates. In: *The RAND Journal of Economics*. Vol. 37, pp. 235–256.
- DOSI, G. 2007. Statistical regularities in the evolution of industries: a guide through some evidence and challenges for the theory. In: MALERBA, F., BRUSONI, S. (eds.) *Perspectives on Innovation*. Cambridge MA: Cambridge University Press.
- DOSI, G., MOSCHELLA, D., PUGLIESE, E., TAMAGNI, F. 2015. Productivity, market selection, and corporate growth: comparative evidence across US and Europe. In: *Small Business Economics*. Vol. 45, No. 3, pp. 643–672.
- FOSTER, L., HALTIWANGER, J., SYVERSON, C. 2008. Reallocation, firm turnover, and efficiency: Selection on productivity or profitability? In: *American Economic Review*. Vol. 98, No. 1, pp. 394–425.
- FRIEDMAN, M. 1953. The Methodology of Positive Economics. In: FRIEDMAN, M. (ed.) *Essays in Positive Economics*. University of Chicago Press, USA, pp. 3–43.
- SAVIN, I., MARIEV, O., PUSHKAREV, A. 2019. Survival of the Fittest? Measuring the Strength of Market Selection on the Example of the Urals Federal District. In: *HSE Economic Journal*. Vol. 23, No. 1, pp. 90–117. (in Russian)
- SMITH, A. 1776. *An Inquiry into the Nature and Causes of the Wealth of Nations*. Edited by Sálvio M. Soares. MetaLibri.
- VAN BEVEREN, I. 2012. Total factor productivity estimation: A practical review. In: *Journal of Economic Surveys*. Vol. 26, No. 1, pp. 98–128.

# Key guidelines for the development and functioning of cities and municipalities in Serbia

TAMÁS BAKÓ<sup>1</sup>, SZILÁRD RÁCZ<sup>2</sup>

**Abstract:** In the period of socialism (until 1990), municipalities owned larger amounts of funds, more jobs and responsibilities were entrusted to them, and a higher degree of inter-municipal cooperation was achieved. Public service and services were more accessible to citizens.

The turning point in the development of cities and municipalities in Serbia was the period between 1990–2000. During this decade, a strong centralization of the authorities, taking over the competencies of the municipalities and transferring them to the city and state levels were carried out. In this way, cities and municipalities lost their role and the character they had built in the socialist era. We can conclude that in the 21st century, through the activities of city authorities and public companies, a high degree of centralization and state management of cities and municipalities is achieved. Most of the work at the municipal and city level is done by the public sector.

There is a lack of cooperation and dialogue between the institutional and non-institutional environments. This means that the dialogue between city government and citizens is on low level. In the period of socialism, industrial zones and green spaces were envisaged and represented much more by urban plans. Since 2000, with the aim of stimulating business and urban development, more and more areas have been earmarked for the construction of business premises and shopping centers.

**Key words:** Serbia, cities, municipalities, governance

## 1. Introduction – Characteristics of cities and municipalities in Serbia

*The socialist cities as the predecessors of modern cities.* During the socialist system great attention was paid to state property and social collectivity. There was a general belief that the individual was a part of society that the state should help. According to the viewpoint of socialism, the development of cities requires the formation of cities in order to develop and further develop society (Hirt, 2012). This ideological reason actually facilitated the start of the urbanization process in Yugoslavia and its rapid implementation (migration from village to city). Great attention was paid to the process of urban planning, which was considered part of

---

<sup>1</sup> TAMÁS BAKÓ, Széchenyi István University, Hungary TBako@mfa.gov.hu

<sup>2</sup> SZILÁRD RÁCZ, Institute for Regional Studies; Bolyai+ Scholar, Széchenyi István University, Hungary, szracz@rkk.hu

the mechanism for optimal decisions. Urban planning, due to its awareness of collectivity, was an integral part of urban development (Enyedi, 1978).

The following political-institutional and economic factors, which characterize the state system, contributed to the formation of a unified structure of socialist cities (French, Hamilton, 1979): (1) *extensive industrialization* to develop the economy, industrial development was a priority; (2) *under-urbanization* (Konrád, Szelényi, 1971) lower growth rates and less territorial concentration of the urban population, lagging behind in terms of infrastructure development compared to capitalist cities. The socialist cities of Yugoslavia, including Serbia, were characterized by a slow increase in the urban population relative to industrial production. Under-urbanization was most characteristic of the early stages of the development of socialist cities.

*The building area and communal infrastructure are state property, state monopoly.* Following the land nationalization the land became social property, and due to this the new legal status, it was fully controlled by the state. Maintenance and development of communal infrastructure was the responsibility of public companies (as if they were natural monopolies). It is important to mention that until 1990 these tasks were essentially the responsibility of the municipalities.

*Strong state control of financial resources and development funds of the cities.* Through the establishment of development funds, the cities obtained significant financial resources, which have mostly been used for infrastructure development and housing construction. Decision-making on the distribution of money to cities and municipalities was reviewed on the state level.

*Central housing policy was also under centralized control and it resulted a specific procedure.* According to Yugoslav socialism, the state must provide housing space for all residents (state egalitarianism). Housing funds existed for this purpose, but they were not able to provide everyone with this opportunity, so other, not economic criteria were used for the allocation of housing.

*Table 1* shows the development history of Serbian cities and municipalities. Until 1990, most of the activities took place at the municipal level, since 2000, cities have been prioritized.

It is important that municipalities had the greatest power during socialism. Their decision-making power and influence have been enforced by the regional municipal communities. *Figure 1* presents the map of regional municipal communities. The decision to establish the municipal communities was an important step towards decentralization, increasing the powers of local governments and reducing the impact of the central government. These changes were contrary to traditional socialism in Eastern Europe.

During socialism, municipalities and cities (in various forms) had greater budgetary autonomy than they do today. The municipalities as a social-political

communities were set up to carry out independently the tasks within the competence of the republic. Cities and municipalities have greater financial resources and sets of resources.

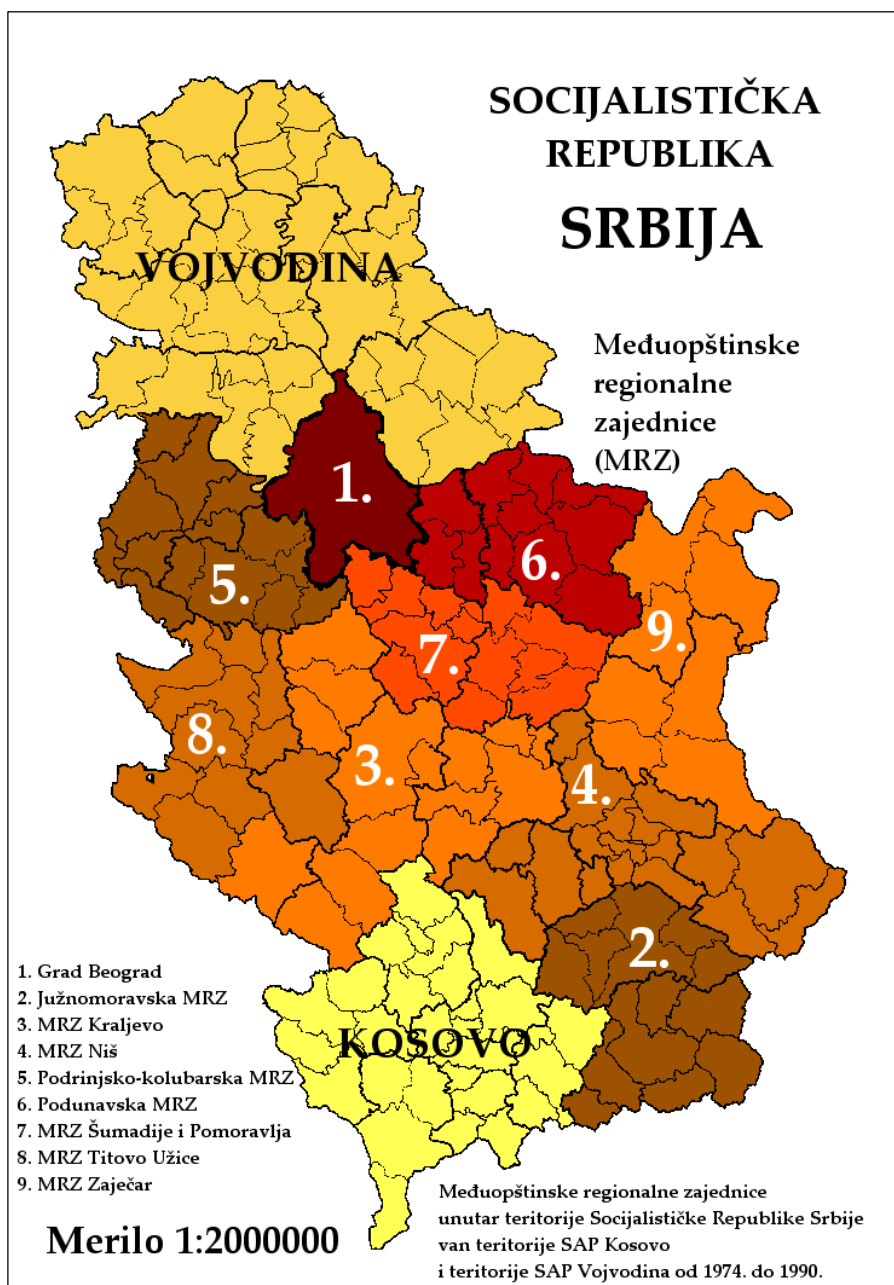
The transfer of powers to the municipal level was the result of the socialist principle of bringing citizens closer to the decision-making process in the interest of activities useful to society (the only socialist country where this type of self-government was realized). During socialism, cities and municipalities were very important elements of the national development strategy.

**Table 1. History of the development of cities and municipalities in Serbia**

Period	Administrative division
1943–1975	After the Second World War, the districts and larger districts were phased out. Several cities and villages were part of one larger district. The municipalities were established and their area expanded over time.
1975–1990	Municipalities are grouped into regional municipal communities. In the territory of the Socialist Republic of Serbia existed 8 regional municipal communities. The territory of Autonomous Province of Vojvodina, the Autonomous Province of Kosovo and the city of Belgrade were exceptions (several independent municipalities remained within the autonomous provinces).
1980–1989	In the city of Belgrade, of Novi Sad and Pristina a community of municipalities was established. This is the first form of association at city level.
1990–2000	Regional municipal communities have ceased to exist and many smaller municipalities have been established. In Novi Sad the community of the municipalities was dissolved and the Novi Sad municipality was formed.
2000–2019	Cities were formed as a result of the reorganization of institutions and the enforcement of laws. In 2008, a decision was taken to adopt the Statute of the city throughout Serbia. As a result of this measure, it was possible to establish cities and their urban municipalities. As of 2017, Serbian cities have begun to introduce new Statutes to strengthen local governments.

*Source:* Own compilation<sup>3</sup>.

<sup>3</sup> Based on the following: Constitutional Law on the Abolition of Districts/Ustavni zakon o ukidanju srezova, 1966.; Law on Amendments to the Law on Education of Municipalities in SR Serbia, 1967/Zakon o izmenama i dopunama zakona o obrazovanju opština u SR Srbiji iz 1967; Constitution of the Socialist Republic of Serbia, 1974/Ustav Socijalističke Republike Srbije 1974; Supplement and amendment to the 1980 Act on the Definition of the Territory of Local Governments/Zakon o izmenama i dopunama Zakona o utvrđivanju teritorija opština iz 1980; Law on Territorial Organization of the Republic of Serbia 1991/Zakon o teritorijalnoj organizaciji Republike Srbije iz 1991; Law on Territorial Organization of the Republic of Serbia 2007/Zakon o teritorijalnoj organizaciji Republike Srbije iz 2007; Statut of the City 2008/Statut grada iz 2008.



**Figure 1. Regional municipal communities in Serbia 1974–1990**

Source: Federal Institute for Statistics of the SFRY.

For the regional development of the state (SFRJ) has established two funds (Radulović, 2013)

Federal Finance Fund for lending to the faster development of economically underdeveloped republics and regions/*Fond federacije za kreditiranje bržeg razvoja privredno nedovoljno razvijenih republika i regiona*/Founded in 1965 and at the federal state level, it was a major source of funding for faster regional development. Assets earmarked by the central government for a period of 5 years were included in the Fund (the full amount came from domestic sources). The following table shows the distribution of these assets.

**Table 2. Distribution of Federal Financial Fund assets by area, %**

Period	Bosnia and Herzegovina	Montenegro	Macedonia	Kosovo
1966–1970	30.7	13.1	26.2	39.0
1971–1975	32.4	11.4	22.9	33.3
1976–1980	30.6	10.8	31.6	37.0
1981–1985	26.4	9.2	20.9	43.6
1986–1987	29.3	9.1	16.9	44.7
1988–1990	24.6	6.2	16.9	52.3

Source: Radulović, 2013.

There was also a fund for financing the increase of employment in economically underdeveloped and highly emigrated areas/*Fond za finansiranje povećanja zaposlenosti u privredno nedovoljno razvijenim i izrazito emigracionim područjima*. The fund was set up in 1978 to increase employment and, due to the financial difficulties of Yugoslavia in the late 1970s, was financed exclusively from foreign loans and non-repayable assets. It was set up in 1978 to increase employment and, due to the financial difficulties of Yugoslavia in the late 1970s, was financed exclusively from foreign loans and non-repayable assets. This fund was used to finance programs in the form of loans at local level.

Within the framework of the demographic and economic development of the socialist cities, the aim was to form them as strategic centers of industrial development and regional administration (Hamilton, 1979). In line with the principles of egalitarianism and collectivism, due to accelerated urbanization, the cities have been expanding at a faster rate than planned.

It can be stated that in the second half of the 20th century the Yugoslav socialist municipalities were overwhelmingly suited to the tasks of the municipalities, but today the Serbian municipalities mostly have only an advisory role.

The role of municipalities has gradually declined over the last three decades. Local governments had the greatest autonomy and decision-making power during the period of socialism (until 1990).

Between 1990 and 2000, political and economic insecurity in Yugoslavia and then in Serbia resulted in the strengthening of centralism and the suppression of the role of municipalities. From 2000 to the present, as the city emerged, the situation of municipalities continued to deteriorate as fortified cities became centers of power and command/political influence. In parallel with the process of the formation of cities from 2000 to the present day, the position of the municipalities deteriorated, because the cities strengthened, and became the centers of power and command/political influence.

The perception of the successful functioning of the socialist cities continues to this day, which is also supported by the fact that the inhabitants of Belgrade consider that the socialist system has provided the population with a particular welfare (Zepeda et al., 2017).

**Table 3. Territory and population of the five largest cities in Serbia**

Cities in Serbia	Number of inhabitants				Territory, (km <sup>2</sup> )	Population /km <sup>2</sup>	Growth rate (%)	
	1991	2002	2011	2018			1991–2002	2002–2018
Belgrade	1,602,226	1,576,124	1,659,440	1,690,193	3,234	522	-1.63	7.24
Novi Sad	265,464	299,294	341,625	358,572	699	513	12.74	19.81
Nis	248,086	235,159	260,237	256,381	597	430	-5.21	9.02
Kragujevac	180,084	175,802	179,417	177,383	835	212	-2.38	0.90
Subotica	150,534	148,401	141,554	137,173	1,007	136	-1.42	-7.57

*Source:* Statistical Office of the Republic of Serbia.

## **2. Basic guidelines for the development and operation of cities and municipalities**

During the period of socialism (until 1990), municipalities had greater financial resources, more mandates, wider powers and greater cooperation among themselves. Public services and services were more accessible to citizens.

Between 1990 and 2000, the development of Serbian cities and municipalities took a turn. During this period, the central power was strongly centralized, the power of the municipalities was reduced, and the city and state became highly competent. As a result, cities and municipalities have lost their character acquired during socialism.



Our conclusion might be that in the 21st century in Serbia, the operation of city authorities and public enterprises is highly centralized and that the cities and municipalities are governed by the state. In cities and municipalities, most of the activity is carried out by the public sector. There is a lack of dialogue between the institutional and non-institutional spheres, including the relationship between city government and citizens.

During socialism, industrial and green areas were given much greater prominence in urban planning. Since 2000, business facilities and shopping centers have been gaining more and more space in order to stimulate business and to develop cities.

In 2009, the territory of the Republic of Serbia was subdivided according to the NUTS system, but never in practice. Population migration to large cities is ongoing. The population is growing most in the downtown areas. The introduced city statute is the legal framework for the rules governing the city. As a result of city statutes, many former municipalities became cities in Serbia. The regulation and management of urban land is entirely within the competence of the city, as opposed to socialist practice when it was in the hands of the municipality.

### **3. Analysis of the economic development in the regions of Serbia**

In the 21st century, free zones were created to create the conditions for developing business in cities and attracting foreign direct investment. Currently, the most successful free zones are “Subotica”, “FAS Slobodna zona” in Kragujevac, and the “Novi Sad” in Novi Sad.

The current statutes of cities determine the city budget to which most of the municipal income has been redeployed. The consequence of this measure is that municipalities are in a state of dependence on cities and the financial resources they receive from the city. According to the new statute of cities, municipalities have been given greater autonomy in the use of money.

*Table 4* shows the 2018 foreign trade flows in the Republic of Serbia. Examining the regions, it can be concluded that the Belgrade Economic Region mainly depends on the development of the volume of imports. Most of the goods on the Belgrade market are imported. The reason for this is the continuous expansion of the market and the fact that the needs cannot be met from domestic sources. Imports are also strongly encouraged by the fact that the domestic population is looking for foreign goods and services. In the Belgrade Region, the continuous expansion of the market is supported by the expansion of capacity and the emergence of new companies. Growth in the city's population will also boost demand for foreign goods. The Belgrade Region, with its many business and other opportunities, is different from other regions and encourages new companies to

invest in Belgrade. In 2018, the bulk of total imports (46.1%) came to Belgrade, followed by Vojvodina (29.4%), Sumadia and Western Serbia (14.7%) and Southern and Eastern Serbian Region (9.2%). Imports of goods in the Belgrade Region also show that investment and trade in goods are more intensive here. In all regions, intermediate exports (goods that require further processing before being placed on the market) are present in total exports. Such a structural breakdown of imports shows that, in order to maximize profits, companies supply raw materials which require further processing to meet the needs of the population.

**Table 4. Foreign trade by region**

Export			Import			% of total exports		% of total imports		Balance	
2017	2018	index	2017	2018	index	2017	2018	2017	2018	2017	2018
Republic of Serbia											
15050.8	16271.4	108.1	19396.0	21918.4	113.0	100.0	100.0	100.0	100.0	-4345.2	-5647.0
Region of Belgrade											
3967.5	4342.6	109.5	8907.8	10104.9	113.4	26.4	26.7	45.9	46.1	-4940.3	-5762.3
Region of Vojvodina											
4974.6	5655.8	113.7	5340.3	6448.0	120.7	33.1	34.8	27.5	29.4	-365.6	-792.2
Region of Sumadia and Western Serbia											
3704.3	3678.9	99.3	3183.9	3222.2	101.2	24.6	22.6	16.4	14.7	520.5	456.6
Region of Southern and Eastern Serbia											
2395.0	2582.9	107.8	1848.5	2024.2	109.5	15.9	15.9	9.5	9.2	546.5	558.8

*Source:* Statistical Office of the Republic of Serbia.

Vojvodina ranks first (34.8%) in total Serbian exports due to agriculture. From here they export primary agricultural products (fresh and frozen fruits and vegetables). Second place is Belgrade Region (26.7%), followed by Sumadia and Western Serbia (22.6%) and Southern and Eastern Serbia (15.9%).

*Table 5* shows the GDP values of the regions and their proportion within the national GDP. The country's GDP increased by 69% between 2009 and 2017, mainly due to the accelerated growth of the Belgrade Region. The Belgrade Region continues to achieve average annual GDP growth of 5%. To make business decisions, it is very important to look at the GDP per capita of a given region, which is an indicator of the standard of living of the population and the level of development of the region.

**Table 5. Regional GDP**

Area	GDP (million RSD)		GDP (%)		GDP per capita (thousand RSD)	
	2009	2017	2009	2017	2009	2017
Republic of Serbia	2,815,000	4,754,368	100.0	100.0	385	677
Belgrade Region	1,124,565	1,921,025	39.9	40.4	690	1139
Vojvodina Region	720,301	1,261,004	25.6	26.5	366	674
Sumadia and Western Serbia Region	563,734	913,299	20	19.2	275	470
Southern and Eastern Serbia Region	406,400	655,938	14.4	13.8	243	431

*Source:* Statistical Office of the Republic of Serbia.

The GDP per capita in the Belgrade Region is RSD 1139000. In this region, GDP per capita is 68.1% higher than the national level. The uneven distribution of the regions is caused by the concentration of resources (domestic and foreign) and the stronger purchasing power in the Belgrade Region. Internal migration to Belgrade will only deepen these processes. The GDP per capita in the Vojvodina Region corresponds to the average of the Republic, while the other two regions lag behind significantly. When comparing the regions, the Belgrade Region (as measured by GDP per capita) is 2.6 times more developed than the Southern and Eastern Serbian region. Compared to 2009, regional disparities have declined to some extent (compared to the national value, GDP growth per capita in the Belgrade Region was 80% and all other regions were below the national average).

#### 4. Conclusions

The analyzes above and data confirms that in the early 1990s, when Yugoslavia began to dissolve and a total economic embargo was introduced against the country, the transformation of the municipal system in Serbia began. The former socialist municipal system based on reducing regional disparities and helping the prosperity in less developed regions was replaced by a centralized “income redirection” system with the official explanation, that the reason of it is the difficult economic condition in the country.

The economic and social development of the five largest Serbian cities was completely different in the last decades of the 20th century. A serious decline in the population can be observed everywhere, except in Novi Sad. The largest number of refugees from Croatia, Bosnia and Herzegovina and Kosovo moved to the capital of Vojvodina and the population growth was 12.74%.

In all the cities the economic performance has fallen significantly. The two cities with the smallest decline in economy were Belgrade and Novi Sad, the

center of agricultural products processing that performed well despite the economic embargo. The biggest economic downturn was in the central Serbian city Kragujevac, a city known for its armaments and car industry. Large companies in the city have lost their export markets, and the unemployment was over 50%.

Although the Nis lost its earlier importance in heavy and electrical industry, but as one of the centers of so-called tolerated black trade, socially it has not been in difficult situation as Kragujevac was.

Subotica also suffered heavy losses in the 1990s, in terms of population decline (1.42%), but far below the rate of Nis (5.21%).

The economic crisis caused by Milosevic's policy Subotica, as a border city, compensated from the aforementioned black market, prosperous agriculture, and previously negligible revenue from tourism, which achieved significant growth in the 1990s. In the nearly two decades since the democratic transition, in the five largest Serbian cities these processes have changed slightly. Development is evident in every city, but not in the same fields or to the same extent.

Population growth continues to be the most significant in Novi Sad (19.81% between 2002 and 2018), but there is a strong population growth both in Nis (9.02%) and Belgrade (7.24%).

In contrast, the population of Kragujevac could not increase significantly (0.9%), while in Subotica the number of inhabitants decreased by 7.57% (basically social migration). Since 2001 the economic growth was most significant in Belgrade and Novi Sad. While Novi Sad has grown into an export-oriented center of science, innovation and technology, Belgrade became an “import distribution center”. The education policy support given by the city management of Novi Sad and the significant increase of foreign investments played an important role in the serious economic growth. Belgrade and its region play a significant role (40.4%) due to the high proportion of multinational companies and real estate developments that result in rapid GDP growth.

The situation improved slightly in the city of Nis thanks to rapid growth in IT training and IT companies operating in the town, while the former successful heavy and mechanical industry is still underdeveloped.

The rapid economic growth expected from the investment of the Italian FIAT plant in Kragujevac was delayed because the investment – trusting in the benefits of the Serbian-Russian Free Trade Agreement – was not successful, as the Russian market did not open up for cars manufactured in Serbia.

In recent years Subotica made good use of its free zone potential and of the proximity of the EU border. Large number of multinational companies have emerged, and nowadays the labor shortage is the barrier to further growth. In the last one and a half decade there was a huge emigration from the city, and now the

question is, will it be able to replace the lost labor and to provide the basic conditions for growth or no.

## Acknowledgements

Research of Szilárd Rácz supported by the János Bolyai Scholarship of the Hungarian Academy of Sciences.

## References

- ENYEDI, GY. 1978. *Kelet-Közép-Európa gazdaságföldrajza*. Budapest: Közgazdasági és Jogi Könyvkiadó.
- FRENCH, R. A., HAMILTON, F. E. I. 1979. *Is there a Socialist City?* U R. A. French i F. E. I. Hamilton (Ur.), *The Socialist City: Spatial Structure and Urban Policy* (str. 1–22). Chichester, New York, Brisbane, Toronto: John Wiley & Sons.
- HAJDÚ, Z., SZÜGYI, É. 2015. Szerbia. In: HORVÁTH, GY. (szerk.): *Kelet- és Közép-Európa régióinak portréi*. Budapest: Kossuth Kiadó. pp. 385–408.
- HAJDÚ, Z., RÁCZ, SZ. 2011. Urbanisation, state formation processes and new capital cities in the Western Balkans. In: *Acta Universitatis Palackianae Olomucensis Facultas Rerum Naturalium Geographica*. Vol. 42, No. 2, pp. 63–77.
- HAMILTON, F. E. I. 1979. *Urbanization in Socialist Eastern Europe: The Macro-Environment of Internal City Structure*. U R. A. French i F. E. I. Hamilton (Ur.), *The Socialist City: Spatial Structure and Urban Policy* (str. 167–194). Chichester, New York, Brisbane, Toronto: John Wiley & Sons.
- HIRT, S. A. 2012. *Iron Curtains: Gates, Suburbs and Privatization of Space in the Post-socialist City*. Chichester, Oxford, Malden: John Wiley & Sons.
- KONRÁD, GY., SZELÉNYI, I. 1971. A késleltetett városfejlődés társadalmi konfliktusai. In: *Valóság*. No. 12, pp. 19–35.
- NAGY, I. (szerk.) 2007. *Vajdaság*. Pécs–Budapest: MTA Regionális Kutatások Központja, Dialóg Campus Kiadó. (A Kárpát-medence régiói, 7).
- RADULOVIĆ, D. 2013. *Regionalna politika i regionalni razvoj – Evropska Unija*. Hesperia, Novi Sad.
- WOODWARD, S. L. 1995. *Socialist Unemployment: The Political Economy of Yugoslavia, 1945–1990*. Princeton: Princeton University Press.
- ZEKOVIĆ, S. 2009. Regional competitiveness and territorial industrial development in Serbia. *Spatium*. No. 21, pp. 27–38.
- ZEPEDA C., ZARIĆ S. 2017. An analysis of urban planning in postsocialist societies through the concept of sustainable development: Evidence from Budapest and Belgrade, *Limes plus*. Vol. XIV, No.3, pp. 75–91.

# Hungarian cooperative banks and financial exclusion after new integration processes

SÁNDOR ZSOLT KOVÁCS<sup>1</sup>

**Abstract:** The Hungarian cooperative bank sector was characterized by the lack of integration and fragmentation before 2013. To solve this problem, several scientifically supported solutions with international examples (German, Italian) have been proposed but the Hungarian Government made an Act. for the rapid solution of this problem because of the slowness of the bottom-up models, alternatives. This top-down integration has several positive results related to economy of scale and resource efficiency, but this can also be characterized by an important disadvantage with little publicity. The 'bank of the countryside' function (Kiss, 2009) seems to be lost, the financial decision-makers are going further and further away from the local level, the financial exclusion rate increase in the peripheral and rural areas.

In this paper, we would like to describe a short history of the Hungarian cooperative banks, and examine the effects of the integration processes. We supplemented our Hungarian quantitative analysis with an international comparison between the European Union member states.

**Key words:** corporate savings banks, financial exclusion, distances, territorial differences, Hungary

**JEL Classification:** G21, P13, R12, R51

## 1. Introduction, transforming cooperative banks in Hungary

The history of Hungarian cooperative savings banks can be divided into more phases. The first credit cooperative was founded in the 1850's. The next period is characterised by the way towards the network integration (1898) while in the third period, in the early 20th century, the sector expanded dynamically. Historical and economic events (world wars, economic crisis) repeatedly interrupted these processes. During the communist era cooperative banks were oppressed and controlled by the political decision makers (Kulcsár, 2007; Moizs, Szabó, 2012).

Experience from the transition from planned to market economy suggests that the role of the state was especially significant in the case of reforming the post-socialist banking systems, while the concept of financial deregulation proposes the withdrawal of the state from financial markets. However, the post-socialist

---

<sup>1</sup> SÁNDOR ZSOLT KOVÁCS, CERS Institute for Regional Studies, Hungary,  
kovacs.sandor@krtk.mta.hu

state had not only committed itself to the neoliberal restructuring, reforms required by EU accession, but unilaterally biased towards large foreign investors who played a key role in bank privatization (Raviv, 2008; Gál, Schmidt, 2017). The Hungarian government policy supported international companies, particularly foreign owned commercial banks, at the expenses of domestic banks (cooperatives) and local entrepreneurship. This policy also failed to recognize the potential advantages of the domestic cooperative banking sector in financing small businesses and mitigating financial exclusion (Gál, Kovács, 2018). In this period, the evolution of the Hungarian cooperative banks in turn not only followed international trends towards demutualisation, but the regulatory shortcomings and the dual banking system significantly affected their transformation.

The transformation crisis imposed a huge burden on the banking system and cooperative banks became particularly vulnerable. Cooperative banks which became vulnerable during the first domestic banking crisis after the change of regime during the first stage of economic transition were supported by the state through the newly established National Cooperative Banking Institution Protection Fund (OTIVA) and by strengthening the Takarékbank. Despite setting up these institutions, both the effective lobbying force by cooperative banks and the government policy will for further support have disappeared (Kalmi, 2010; Gál, Burger, 2013). The sector remained alone in the unequal/uneven market competition with commercial banks, all the while maintaining its 4–6% market share. The banking reforms of the early transition period offered a unique opportunity to strengthen the domestic cooperative banking sector, but it was not exploited and its internal and external framework conditions were totally lacking (Gál, Kovács, 2018).

The complex transition processes added some new problems to the cooperative sector. Due to the absence of adequate legal regulation, the corporate governance structure further weakened paving the way towards demutualization and the social embeddedness of the cooperative banking sector started to disappear in Hungary. Moreover, there was no mandatory membership at an institutional protection fund for Hungarian cooperatives, as it is typical in other European countries. The degree of heterogeneity was high and, at the same time, the propensity for stronger network integration remained low. Institutions often look at each other as competitors and not as partners. While some cooperatives chose to operate without any protection fund, and sometimes demutualized ex-cooperatives, operating as commercial banks, were admitted. As a result, up until 2013, three protection funds existed in the country (OTIVA, TAKIVA, REPIVA) with varying degree of control over the cooperatives and financial power (Gál, Kovács, 2018). In 2013, the government launched a forced integration of the cooperative banks passing the Act on Cooperative Banks (Act. 135/2013), which interrupted the bottom-up and voluntary integration processes within the sector. Instead of this the government

introduced a mandatory, top-down and political-driven integration. Despite that this ‘reform’ had some cost-cutting results, it did not solve the main problems of the sector: for example the small market share, the lower efficiency and performance, and it led to the final erosion of territorial principle of cooperatives and the increasing of the financial exclusion (Kiss, 2009; Kovács, 2015). In this Act, the legislature created a new institutional framework of networks, established a new umbrella organisation of the integration, which is responsible for the institutional protection, the financial supervision and the crisis management, if it is necessary. In this duplicated structure, the Takarékbank (the former apex bank) became the old and new umbrella bank of the integration with extensive inspection rights, but its main task is the making of common strategy and business policy (Bodnár et al., 2015). Lastly, this Act influenced the network of cooperative banks, too. The integration process and the development of closer cooperation among the cooperative banks has not come to a halt; as a result of the mergers and acquisitions there were approximately 90 institutions in 2016 (Bodnár et al., 2015), in the end of 2019, we could identify only one aggregated institution due to multistage acquisition processes (*Table 1.*).

A significant part of the relevant literature revealed that the financial service or banking sector has effects for the economic growth in different geographical (local, regional, national) scopes (Mitchell, 1970; Bekaert, Harvey and Lundblad, 2005; Beck, Demirgüç-Kunt and Martinez-Peria, 2010) so the presence of these institutions plays a significant role in the local economies. In this paper, I would like to analyse the changes of local presence of the Hungarian cooperative banks, and the impacts of these changes on the financial exclusion and its economic consequences.

**Table 1. The number of cooperative banks and their branches, 2011–2019**

	2011	2014	2018	2019.06	2019.11
Number of cooperative savings banks	142	129	22	17	1
Number of branches	1 945	1 733	1 658	1 231	1.021

*Source:* Own editing based on the data of National Bank of Hungary.



## 2. Data and Methodology

The main aim of this paper is to show that how has changed the availability of the Hungarian cooperative banks during last decade and after the integration act. These changes have an impact on financial exclusion so firstly we analyse the data of inclusion or exclusion of European Union member states based on the Global Findex database is prepared by the Worldbank (Demirgüç-Kunt et al., 2018). This comparative analysis examines the macro-regional differences according to the income status of individuals, as Horn and Kiss (2019) showed the relationship between income status and account ownership. Our second macro-regional analysis focus on territorial (urban-rural) differences of account ownership.

Our Hungarian analysis is based on the data of the National Bank of Hungary and we used some dataset from the Central Statistical Office of Hungary.

Different types of the financial distances describe that the territorial differences of the accessibility of financial products and services. As regards the types of distances that are interpreted in the field of financial services, the indices of physical distance and operational distance were demonstrated by Kovács (2014; 2017). Physical distance measures the distance between customers' location (settlements) and the nearest bank branch in kilometres and operational distance shows how many people served by a branch in the analyzed area (settlement, district, county, etc.). In this paper, we use the values of the functional distance indicator (Alessandrini et al., 2009; Kovács, 2018) of cooperative banks from 2011, 2014, 2018 and 2019. Functional distance takes into consideration, in addition to the simple physical branch–centre (and decision-making) distance, the disparities of the socio-economic indices (local participation activity, development level of non-governmental sector, housing conditions) of the respective territorial units, and also the diverse economic structures (breakdown of employees by sectors). So, this indicator contains the following three different components:

- physical distance component ( $FD_j^1$ ): distance ( $KM_{jz}$ ) between the settlement of analysed branch and the settlement of headquarter of its institute on public road in kilometres.
- social component ( $FD_j^2$ ): we used different indicators ( $SC_j$ ) for the description of the social status of the settlements e.g. income status, unemployment rate, voter turnout.
- economic component ( $FD_j^3$ ): our index handles the economic differences of the settlements, so we analyzed the sectoral distribution of the labour force and the local enterprises ( $W_{ij}$ )

$$FD_j^* = FD_j^1 + FD_j^2 + FD_j^3$$

or

$$FD_j^* = \frac{\sum(\text{branch}_j \times \ln(1 + KM_{jz}))}{\text{no. of branches}_j} + \frac{\sum(\text{branch}_j \times \ln(1 + |SC_j - SC_z|))}{\text{no. of branches}_j} + \frac{\sum(\text{branch}_j \times \ln(1 + \sum_{h=1}^m |W_{hj} - W_{hz}|))}{\text{no. of branches}_j}$$

where:

j – is the analyzed district

z – is the district of the headquarter of analyzed branch

h – is the sectors of economy (1–m)

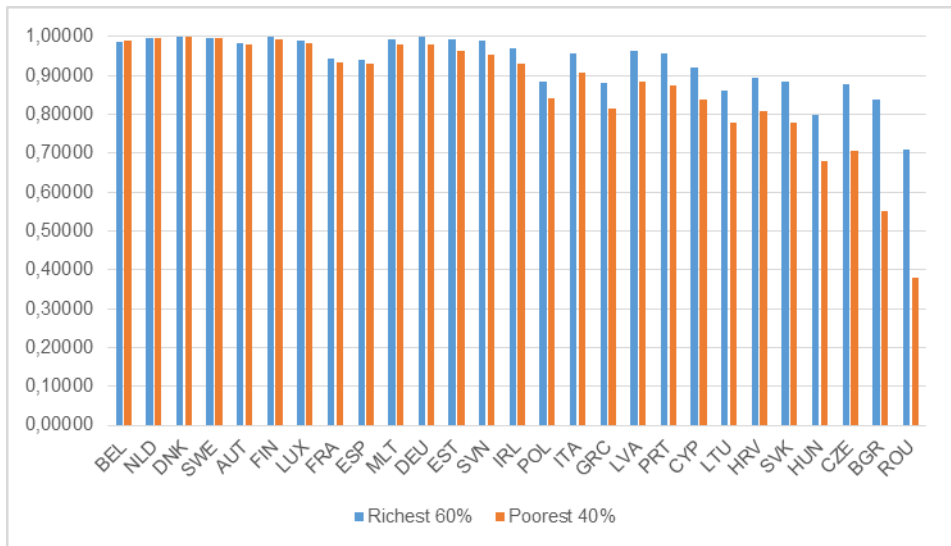
It is clear that in an optimum case the two regions are the same, the volume of functional distance is zero, while its increase leads to a growing number of financing limits in the respective region. Functional distance has a positive correlation to the financial assets of the businesses, the cash-flow sensitivity of investments and correlates negatively to the possibility of indebtedness or overdrawing according to the result of Alessandrini et al. (2009).

### 3. Results

#### 3.1 Trends of financial exclusion in European Union

On average around the world, poorer adults are less likely to have an account than wealthier ones (Demirgüç-Kunt et al., 2018). However, we can see significant differences between the inclusion rate of the richest and poorest groups of the society in the European Union. *Figure 1* divides the countries into two groups, the first one contains mainly Northern and Western countries (exc. Slovenia, Estonia and Malta) and it is characterised by relatively high inclusion rates and low differences between social groups. In Eastern and Southern countries, we can see lower inclusion rate and higher differences between the analysed social groups. In Hungary, the account ownership status depends on the job status (leader, employee, physical works, etc.) too (Kovács, 2014).

The account ownership shows not only social, but also territorial differences. We examined that how much difference is in the rural value of inclusion rate compared to the national average values in the member states of the European Union (*Figure 2*). According to the EU average, the rate of bank account holders in the rural population is about 0.5 percentage lower than the national average, but *Figure 2* shows that this difference is the second highest in Hungary (6.1%) behind Bulgaria (6.6%), while, in some countries, for example, in the neighbouring Croatia, the proportion of the rural population having an own bank account is higher compared to that of the total population. The higher number of financially excluded people determined by the lower accessibility of financial services in the rural areas (Kovács, 2017).



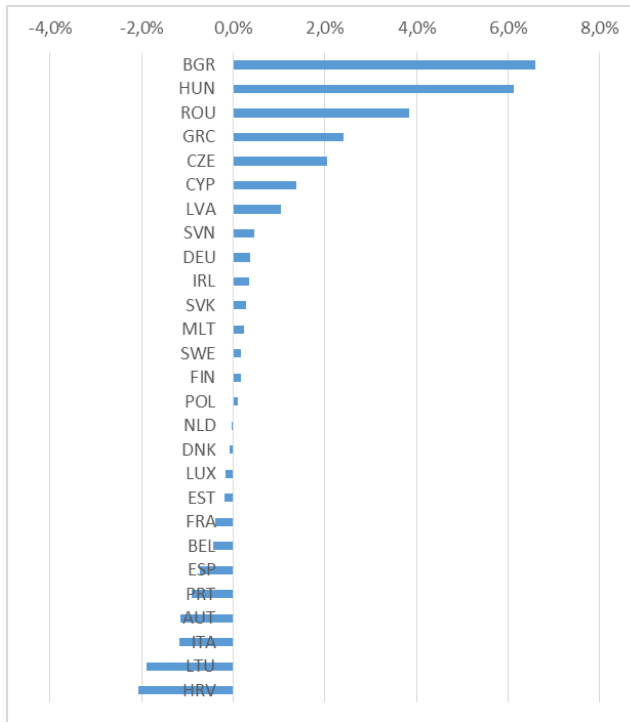
**Figure 1. Proportion of account ownership by individuals from different financial situations, 2017 (%)**

Source: Own editing based on data from Demirgüç-Kunt et al. 2018.

### 3.2 Exclusionary effects of the integration processes

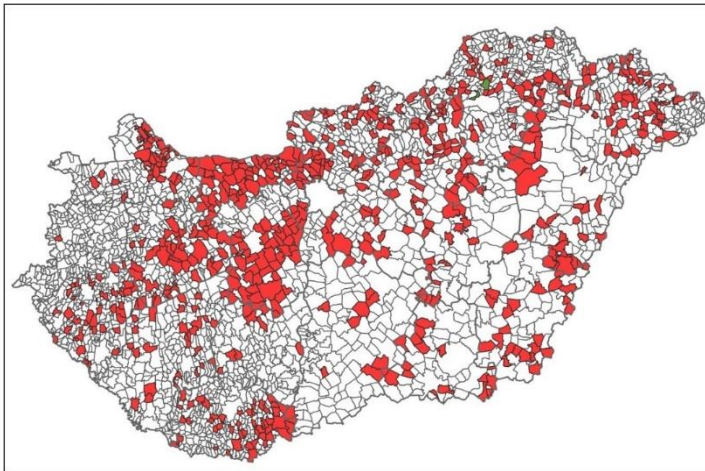
After the analysis of the European trend of financial exclusion/inclusion, we analyse that the territorial effect of the cooperatives' integration. Firstly, according to *Table 1*, we checked and collected those settlements where the cooperatives closed definitively. The *Figure 3* shows that where closed the last cooperatives (red) and where opened a new branch (green). Since 2011, the "Takarék" Group has emerged as a financial service provider in two settlements (Sajószentpéter and Parasznya), while it has withdrawn from 631 small settlements (*Figure 3*).

We used the functional distance indicator for the evaluation of the financial exclusion. Because of mergers and acquisitions, the decision making processes (e.g. decisions about loans, interest rates, etc.) are moved further away from the local level, thus reducing the local embeddedness of decisions and increasing information asymmetry. It is also true for the integration of the Hungarian cooperatives, because *Figure 4* shows that the map became darker and darker during the last decade.



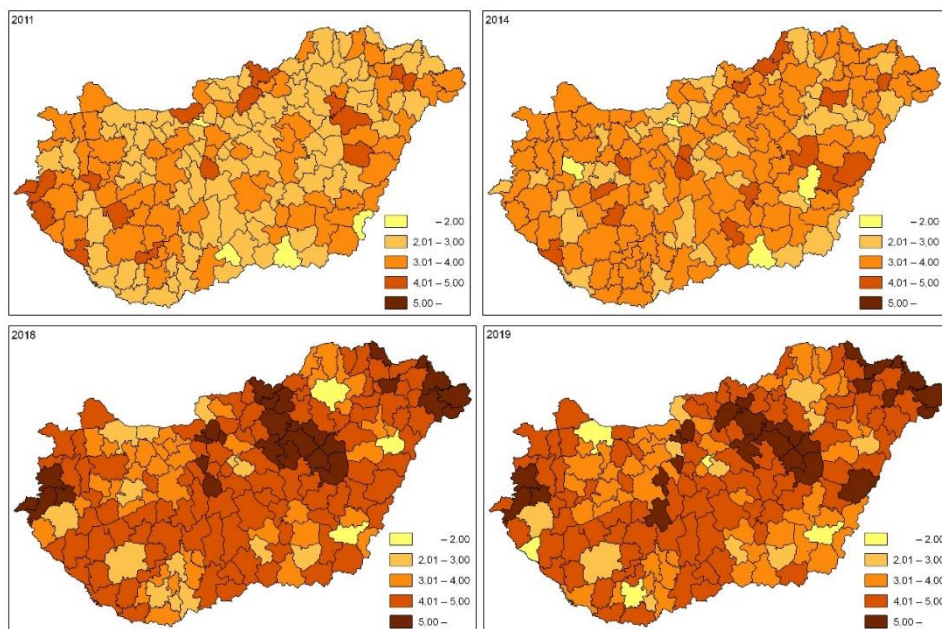
**Figure 2. Differences in account ownership between total and rural population, 2017 (%)**

*Source: Own editing based on data from Demirgüç-Kunt et al. 2018.*



**Figure 3. Cooperative branch closures and openings between 2011 and 2019**

*Source: Own editing based on the data of National Bank of Hungary*



**Figure 4. The functional distance of the cooperative savings banks at level of districts, 2011–2019**

*Source:* Own editing based on the data of National Bank of Hungary and the Central Statistical Office of Hungary.

Overall, the integration of the savings cooperative sector was necessary due to the previous fragmentation and different strategic considerations, but the high Hungarian financial exclusion rates raise some problems. Poor accessibility of banking services (mainly in rural, peripheral areas) can lead to an increase in the number of excluded people. They not having access or not knowing how to use properly bank services can depending on status and life experience of people facing it, have an impact on self esteem and lead to (self)-isolation and deprivation of social connections and social relationships with friends or family (Bayot, 2008).

#### 4. Conclusion and discussion

As our results showed, the integration of Hungarian cooperative savings banks corresponds to a centralisation process in the context of decision making and strategic planning. This integration has some result in the common brand building (advertising, marketing), IT-developments, but it is not a good solution for the problems of financial exclusion. For the solution we can find many best practices

and new forms of banking in the international literature and practice, but we need to see their limits.

The first solution is the possibilities of digitalization and online banking. Nowadays, many banking products are available on the internet or mobile apps (e.g. pay withdrawal, digital payment, other account using). However, some other banking activities do not have online substitute products (e.g. account opening, contract modification, etc.). The main problem in Hungary is increasingly not the shortage on the supply side of product, but the limitations of demand (income situation, education) and lack of physical infrastructure (branch network), which increases financial exclusion (Kovács, 2017; 2020). That is why it is essential to develop the necessary competencies, financial knowledge and culture, because without them no significant progress is expected. On the other hand, the problems of handling bank data and the dangers of data theft should not be forgotten (Burián, 2014).

Numerous international examples show that the involvement of local society in financial services and processes can be solved in an alternative way, with the help of alternative or local currencies. Currently, we know five operating local currencies in Hungary, but these are not yet significant factors in reducing exclusion and putting the local economy on the path of development, as their volume and acceptance have not yet reached a critical mass (Lakócai, Gál and Kovács, 2018).

The “Takarék” Group introduced a new way of banking in some rural and peripheral areas of Hungary. This is the mobile bank branch. It is a bank on four wheels which travel around excluded areas of the country and offer a lot of the same current account services as customers would find in a branch, including depositing cash, withdrawals and bill payments ([magyartakarek.blog.hu](http://magyartakarek.blog.hu); [portfolio.hu](http://portfolio.hu)). We think, this solution is good for serving existing customer but it doesn't offer services for new customers e.g. new account opening, new credit or loan contract, thus, it doesn't significantly reduce the financial exclusion.

## References

- Act 135<sup>th</sup> of 2013 on Credit Institutions and Financial Enterprises
- ALESSANDRINI, P., PRESBITERO, A. F., ZAZZARO, A. 2009. Banks, Distances and Firms' Financing Constraints. In: *Review of Finance*. Vol. 13, No. 2, pp. 261–300.
- BAYOT, B. 2008. *Social, Economical and Financial Consequences of Financial Exclusion*. Bruxelles: Réseau Financement Alternatif.
- BECK, T., DEMIRGÜÇ, A., KUNT, A., MARTINEZ-PERIA, M. S. 2005. Financial and Legal Constraints to Firm Growth: Does size matter? In: *The Journal of Finance*. Vol. 60, No. 1, pp. 137–177.
- BEKAERT, G., HARVEY, C. R., LUNDBLAD, C. 2005. Does Financial Liberalization Spur Growth? In: *Journal of Financial Economics*. Vol. 77, No. 1, pp. 3–55.

- BODNÁR, L., DELIKÁT, L., ILLÉS, B., SZEPESI, Á. 2015. Savings cooperatives + integration = More efficient payment services? In: *Financial and Economic Review*. Vol. 14, No. 3, pp. 122–146.
- BURIÁN, G. 2005. Az Internet Banking Kockázatai [Risks of Internet Banking]. In: *Hitelintézet Szemle*. Vol. 4, No. 2, pp. 36–56.
- DEMIRGÜÇ-KUNT, A., KLAPPER, L., SINGER, D., ANSAR, S., HESS J. 2018. *The Global Findex Database 2017: Measuring Financial Inclusion and the Fintech Revolution*. Washington, D. C.: World Bank.
- GÁL, Z., BURGER, CS. 2013. A vidék bankjai? A magyar takarékszövetkezeti szektor hitelezési aktivitása [Banks of the rural areas? Lending activity of Hungarian savings sector]. In: *Közgazdasági Szemle*. Vol. 60, No. 3–4, pp. 373–401.
- GÁL, Z., KOVÁCS, S. ZS. 2018. Corporate Governance and Local Embeddedness of the Hungarian Cooperative Banking Sector. In: *Safe Bank / Bezpieczny Bank*. Vol. 71, No. 2, pp. 30–54.
- GÁL, Z., SCHMIDT, A. 2017. Geoeconomics in Central and Eastern Europe: Implications on FDI; In: MUNOZ, J. M. (ed.) *Advances in Geoeconomics*. Routledge, pp. 76–93.
- HORN, D., KISS, H. J. 2019. Who Does Not Have a Bank Account in Hungary Today? In: *Financial and Economic Review*. Vol. 18, No. 4, pp. 35–54.
- [https://magyartakarek.blog.hu/2020/01/07/a\\_kistelepulesek\\_eletet\\_segiti\\_a\\_mobil\\_bankfiok](https://magyartakarek.blog.hu/2020/01/07/a_kistelepulesek_eletet_segiti_a_mobil_bankfiok) [Access: 12. 01. 2020].
- <https://www.portfolio.hu/bank/20180608/ujabb-ot-mozgo-bankfiokot-indit-el-a-takarek-csoport-288230> [Access: 12. 01. 2020].
- KALMI, P. 2010. *The Development of the Legislation on Co-operative Banks in Finland*. For the workshop on legislation on co-operative banking. [Access: 10. 05. 2011].
- KISS, GY. K. 2009. A „vidék bankja” megteremtésének dilemmái Magyarországon. [Dilemmas of the Establishing of the ‘bank of Countryside’ in Hungary]. In: *Hitelintézet Szemle*. Vol. 8. No. 6, pp. 496–515.
- KOVÁCS, S. ZS. 2014. Elérhetőség és kirekesztés Magyarországon a pénzügyi szolgáltatások aspektusából [Accessibility and Exclusion from the Aspects of Financial Services in Hungary]. In: *Területfejlesztés és Innováció*. Vol. 8, No. 3, pp. 28–35.
- KOVÁCS, S. ZS. 2015. A magyar szövetkezeti hitelintézetek teljesítménye nemzetközi példák tükrében [Performace of Hungarian cooperative saving sin context of international examples]. In: BERKES, J., KECSKÉS, P. (eds.) *Távol és közel, az elmúlt 25 év területi folyamatai, szerkezetei, intézményei, ahogy az új generáció látja: A IX. Fiatal Regionalisták Konferenciájának előadásai*. Győr: Széchenyi István Egyetem Regionális- és Gazdaságtudományi Doktori Iskola. pp. 118–128.
- KOVÁCS, S. ZS. 2017. Város–vidék-kapcsolat a magyar pénzintézetálózatban [Urban-Rural Relation in the Hungarian Banking Network]. In: *Területi Statisztika*. Vol. 57, No. 5, pp. 495–511.
- KOVÁCS, S. ZS. 2018. Dualities of the Hungarian Credit Institute Activities. In: *Deturope: The Central European Journal of Regional Development and Tourism*. Vol. 10, No. 3, pp. 108–119.
- KOVÁCS, S. ZS. 2020. Az alapvető pénzügyi szolgáltatások online térbe helyezésének korlátai [Limitations of putting of basic financial services on online space]. In: *Tér és Társadalom*. Vol. 34, No. 2, forthcoming
- KULCSÁR, T. 2007. *Mezőgazdasági hitelezés gyakorlata a takarékszövetkezeteknél* [Agricultural lending practices of the cooperative savings]. Szakdolgozat. Debrecen: Debreceni Egyetem Közgazdaságtudományi Kar.
- LAKÓCAI, CS., GÁL, Z., KOVÁCS, S. ZS. 2018. Local Alternative currencies – New opportunities in expanding local financial services. In: *Public Finance Quarterly*. Vol. 63 No. 4, pp. 473–489.

- 
- MITCHELL, B. R. 1970. A Theory of Economic History by John Hicks – Book review. In: *The Economic Journal*. Vol. 80, No. 31, pp. 350–352.
- MOIZS, A., SZABÓ, G. 2012. A szövetkezeti hitelintézetek története, jelenlegi rendszere és sajátosságai Magyarországon [History, current system and specialities of cooperative financial institutions in Hungary]. In: *Hitelintézeti Szemle*. Vol. 11, No. 1, pp. 67–85.
- RAVIV, O. 2008. Chasing the Dragon East: Exploring the Frontiers of Western European Finance. In: *Contemporary Politics*. Vol. 14, No. 3, pp. 297–314.



## **Chapter 2**

### **Tourism and local development**



# Characteristics of Mobility in Danube Cruise Tourism – Accessibility of Tourism Attractions in Hungary

MELINDA JÁSZBERÉNYI<sup>1</sup>, MÁRK MISKOLCZI<sup>2</sup>,  
ANDRÁS MUNKÁCSY<sup>3</sup>

**Abstract:** In the tourism of 21st century, seeking for unique and authentic experiences became primary elements of the modern tourism preferences. Danube, the second longest river in Europe is an outstanding tool for gathering cultural and authentic experiences with its unique landscape potential and breathtaking destinations. In our research we point out the fundamental characteristics of Danube cruise tourism concerning the Hungarian destinations. Through highlighting the special experience offer of this phenomenon we can also get insight to the mobility needs in urban transport system generated by cruise tourism. Our presentation gives a picture about the theoretical background of cruise tourism and the importance of the heritage attractions in the supply of cruise journeys. Apart from presenting the basic features of it, our research aims to understand the relationship between river cruises and tourism attractions in Hungarian destinations: how tourist can access attractions, what kind of accessibility problems can be revealed and how the destinations and service providers can react to these challenges. In response to these questions we applied qualitative analysis of structured interviews among stakeholders (service providers – companies in tourism and transport, governments). According to the results the basic problems can be identified, and recommendations can be formulated to decision-makers to improve the accessibility of tourism attractions. Furthermore, our findings and suggestions can contribute to a deeper recognition of Danube cruise tourism and its impact on transport system of cities.

**Key words:** Danube region, cruise hotel tourism, tourism mobility, accessibility, tourism attractions

**JEL Classification:** R4 Transportation Economics: R41 Transportation: Demand, Supply, and Congestion, Travel Time, Safety and Accidents, Transportation Noise

---

<sup>1</sup> MELINDA JÁSZBERÉNYI, Corvinus University of Budapest Institute of Marketing, Hungary, [jaszberenyi@uni-corvinus.hu](mailto:jaszberenyi@uni-corvinus.hu)

<sup>2</sup> MÁRK MISKOLCZI, Corvinus University of Budapest Institute of Marketing, Hungary, [mark.miskolczi@uni-corvinus.hu](mailto:mark.miskolczi@uni-corvinus.hu)

<sup>3</sup> ANDRÁS MUNKÁCSY, KTI Institute for Transport Sciences, Hungary, [munkacsy.andras@kti.hu](mailto:munkacsy.andras@kti.hu)

## 1. Introduction

Due to the special character of river cruise tourism, it has a special place in the world of leisure tourism; ships are both attractions and the way of traveling. In the last ten years, even during the global economic crisis, river cruise tourism has been expanding: the number of river cruise tourists increased by 10% per year (CLIA, 2019). At the beginning of 2019, several service companies have already sold their packages for the next season.

Despite the prosperous trends, Danube cruise tourism is a less discovered research area of social sciences. In addition to business and marketing analyses, there are few comprehensive, objectively evaluative studies concerning the processes of this product. As new problems are emerging, new approaches are needed for the study of this tourism segment. One of these is the comprehensive analysis of the accessibility of destinations and attractions by river cruise tourists. In the present paper, primary and secondary research methods are applied to understand how people access cruise ships, attractions from the ship and how do they move within urban destinations. Review of the literature on cruise ship tourism and online information by service operators aims to get acquainted with current market trends of the cruise industry. Semi-structured interviews with experts and stakeholders have been carried out to reveal trends this tourism product, focusing on the above-mentioned accessibility issues and impacts on urban attractions and the city itself. Although outcomes are translated into general findings about river cruise tourism, the focus is on the Danube river and especially one of the key destinations here: Budapest and the related river section in Hungary. Based on the identified problems, recommendations are formulated at the end of this contribution.

## 2. Background

A cruise ship is a watercraft that offers luxury accommodation and many onboard services while traveling (Jászberényi, Ásványi, 2016). Cruise ships can transport tourists on different varieties of surfaces (oceans, seas, rivers, canals, etc.); in this article, we focus on the Danube river and cruises operating on the Danube (i.e. river cruise ships, river cruisers).

By the review of the recent literature, it may be deduced that the number of researches dealing with Danube cruise tourism is limited. Scholars focus on cruise tourism as a process of traveling in the context of maritime tourism (Johnson, 2002; Brida, Zapata, 2010; Klein, 2011). Key topics include assessment of impacts on the ecosystem (Moreno, Amelung, 2009) and sociological or anthropological aspects of river cruises (Dwyer, Forsyth, 1998; Dragin et al.,

2008). Despite the fact that some studies focus on the tourism and economic impacts of river cruise industry (Hall, Braithwaite, 1990; Dwyer, Forsyth, 1996; Henthorne, 2000; Brida, Zapata, 2010; Dragin, 2009) many aspects of the product are still under researched. In the recent years, some scholars studied marketing aspects, such as the issue of maximizing consumer satisfaction (Henthorne, 2000; Shirakawa, 2004), or how to extend the service portfolio (Petrick, 2004; Jászberényi, Ásványi, 2016; Gabe et al., 2006; Dragin, 2009).

This research focuses on attraction accessibility in the Danube river cruise tourism, i.e. transport and mobility to/from ships and related influencing factors. Intrinsic value of transportation as a tourism experience may be varied (Page, Connell, 2006; Lumsdon, Page, 2004): the value of transportation as utility (or transport for tourism, such as urban buses or intercity rail services) is rather low, but transport as tourism (e.g. heritage railways, cycling holidays) may have high intrinsic value for tourists. In this context, we can classify cruise tourism as a means of transport with high value due to its vibrant onboard services and spectacular itineraries (Pécsek, 2014). Furthermore, river cruise tourism may be considered a kind of mixture of modern mass tourism (e.g. a high number of attractions is visited) and slow tourism (e.g. long journey time).

### 3. Method

In the primary analysis, experts and stakeholders have been interviewed to gather information about the research topic from different angles: cruise ship operators, tourism service providers (tourist attraction management, program organizers), transport companies, and port operators. The diversity of interviewees allows the researcher to gather information from different aspects (Lamont, 2015). The information provides description of individual situations and thus help to refine standardized questionnaires to be developed later (Babbie, 2013). The information provided by the interviewed individuals was processed anonymously. The semi-structured interviews lasted 45–60 minutes each. The main topics were: personal (anonymous) information, general questions about the river cruise industry (volumes, demand, problems, stakeholders, etc.), river cruise related transport (mobility by the staff, logistics, and access to ship by tourists before/after the journey), accessibility of attractions (types of attractions, impact of tourists movements on mobility systems, accessibility problems, good and bad practices), suggestions.

#### 4. River cruise tourism

The high popularity of river cruise tourism is due to the unique environment of European rivers and the possibility of visiting historical attractions around them. River cruises are smaller compared to cruise ships: infrastructural characteristics of rivers (e.g., water level, bridge heights) requires the limitation of their size. An average river cruise ship is about 120 meters long, 11 meters wide and has a capacity of 200 people, in contrast to ocean liners that can exceed 200 meters in length, 25 meters in width and suitable for the accommodation of 1,000 people (Jászberényi, Miskolczi, 2019). Cruise tourism can be characterized as a recreational product that meets the needs of senior consumers with its high service palette. River ships are typically three-storeyed, which is enriched by a lounge, sun terraces, and one or more bars and restaurants. Ships have about 100 suites; rooms are equipped with balconies with high-quality digital devices, satellite channels, and of course, with free wireless internet connection (tauck.com, 2019). The tourist high season is 8–9 months long: the entire season runs from the end of February to the beginning of January and the peak period is from early spring to the end of autumn.

Hungary's role in the river cruise industry is relevant, especially due to spectacular World Heritage Site in Budapest, its central position on the Danube river and good location for starting/finishing journeys on the Rhine–Danube corridor. Statistics also prove the increasing role of Hungary; every year ca. 500 thousand passengers visit Budapest. The volumes from the main European sender countries (Germany, Austria, France, Denmark, Sweden, Ireland, United Kingdom) and even of the overseas markets (e.g. USA, Canada, Australia) are increasing. Furthermore, Budapest was awarded the Best European River Destination in the Best Cruise Destination contest in 2017, on the basis of guest ratings at [cruise critic.com](http://cruise critic.com).

Cruise tourists can generate significant revenue for tourism companies through their high purchasing power (Jászberényi, Ásványi, 2016). China can also be identified as an emerging sender country; the role of this Asian country escalates year by year. According to statistics of CLIA, 40% of guests from overseas extend their stay in Budapest by 2–3 nights, and hotels of 4-stars (as a minimum) are popular among cruise tourists. There are five big operators in the cruising market: Tauck, Avalon Waterways, Crystal River Cruises, Uniworld River Cruises, and Viking River Cruises, and a handful of other companies.

One of the key success factors of river and maritime cruise tourism is evident: tourists are able to visit several destinations in a relatively short time, travelling by a luxury hotel by night (or day) (Jászberényi, 2019). There are significant differences, as well: river cruise ships are smaller (like boutique hotels in contrast to large luxury hotels), with a limited range of on-board services (in contrast to

the complex leisure, entertainment, sports and culinary services of maritime cruise ships), cruising shorter distances to offer an insight into the cultural and natural attractions of a river and its catchment area (in contrast to a large region...).

The primary target group of river products are tourists with high discretionary income and leisure time, mostly from the senior age group (*Table 1*). Despite this trend, recent survey results by the Cruise Lines International Association (CLIA 2019) show that 57% of respondents reported on a good value for money of river cruise packages and younger generations are increasingly interested in this product. Uniworld has also recognized that it is worth developing products that offer attractive programs for the younger generation. The brand is also able to move toward a more flexible, lower price range, and the program palette is extending with leisure programs (CLIA 2019). With active and health-conscious programs, dominant companies stretch the boundaries of the product.

**Table 1. Characteristics of consumer segment**

Characteristics	Details
Age	60+ (it is also common tourist between the age of 75-80)
Life-cycle	Pensioners in small groups or married couple
Sending country	Europe: Scandinavian, German, Dutch, Swedish, English, Italian, French, Spanish, Danish Overseas: American, Peruvian, Panamanian, Austral, Chinese
Income	High discretionary income
Motivation	Seeking for authenticity, would like to get to know historical places of the Danube
Mobility preferences	High secure, well-equipped, accessible

*Source:* Authors' own edition.

## 5. Mobility of river cruise tourists: trends and impacts

Accessibility of attractions in the river cruise industry is the way, mode or process how tourists approach places of interest from the ship (and vice versa). A crucial issue of inland waterways transport on the Danube is water level, especially on the Middle and Lower sections of the river (from Hungary to Romania). In 2018, due a period of unusually dry weather, water level of the Danube sank to a deficient level, which affected cruise ships mainly on the Hungarian, Serbian and German sections of the river. In October 2018, the water level of the Danube fell below 0.5 m in Budapest. As a consequence, ships (i.e. a key element of the tourist experience) had to be replaced by buses from Budapest or Vienna to Bratislava, and by hotels at the destination, where the prompt availability of accommodation of similar category (min. 4-star) was rather low.

The mobility of cruise tourists and the related issues may be grouped as follows:

- traveling between the sending country and the destination; i.e., the transport of tourists between their place of residence and the point of departure of the ship;
- mobility in the destination area, e.g., the trip between the port and the city;
- approaching tourist attractions in the destination(s), e.g., access to a monument in the city.

Cruise tourists on the Danube come from Western European (approx. 60%) and overseas countries (40%). Their primary means of transport to the destination is airplane. Rail services and individual modes are rarely used (e.g. by some tourists from Germany, who drive to the parking facilities of ports in the same country). After landing, transfer services (usually by minibuses) are provided as part of the package tour, or tourists take taxi or public transport (rare), as well. Tourists usually spend extra days before/after the cruise, which makes points of departure/arrival (i.e. some large cities like Budapest) privileged destinations. Here, impacts of river cruise tourism is different than in destinations where ships stop for a visit of only a few hours.

In the destination (in a city, town or a rural area), mainly buses are used to reach attractions. Usually local bus companies are contracted, applying high quality standards (e.g. maximum age of vehicles, on-board service requirements). In the specific case of Budapest, where most ships dock at the historical city centre, buses have to load and unload cruise ship tourists in the busy lower embankment, where road traffic is extremely busy in peak hours. Taking into account that usually tourists of more than one cruise ship would like to start their daily sightseeing or other tours in the morning peak hours, there are several issues to be managed: to designate parking places for buses before reaching the port and stops for loading passengers at or near the docking point, to guide passengers to the buses avoiding transport and other safety problems, to minimise the impact on other road users, etc.

Another problem may be the insufficient capacity and service quality of some rural ports. In high season, several ships may dock at the same time, and 3 or 4 buses per ship are needed to transport passengers to tourist sites. If parking places are located to relatively large distances (e.g. few hundred meters) from the ship, transfer may take long time for people with limited mobility, which may cause delays for the entire trip.

In terms of bus services, another general issue may be mentioned here. The pace of increase of the cruise industry is not fully followed by capacities of bus companies. Furthermore, the limited number of bus drivers may be a barrier, which is partly tackled by the use of alternative modes, as follows.



In large cities, increasing use of public transport can be observed, primarily for specific program packages (small groups doing thematic tours). In this case, tourists prefer surface transport (e.g. tram services in Budapest). Bicycles and micro-mobility modes seem to become popular. In city centres, new means (e.g. electric kick scooters, e-scooters) cause new problems (e.g. lack of proper regulation, unprecedented traffic, relatively quick speed of electric assisted vehicles in pedestrian zones, parking needs) and local governments have to face conflicts among new mobility trends (by local residents, visitors and tourists), well-being (desired by residents) and sustainable use of public spaces.

To gain profound and authentic experiences, tourists prefer transport modes that provide insights into everyday life. For example, to reach rural destinations by bus, they prefer slower minor roads through towns and villages to fast highways, in order to have impressions about rural life and landscape.

In the close area of urban attractions, one of the main accessibility problems is road traffic and parking capacity for buses. Although most attractions may be reached by foot or public transport, tour organisers usually avoid these modes by large groups, due to the number of people (that may not be able to travel together by a single public transport services) and the age of tourists (i.e. they are unable to walk larger distances). In some cases, groups are distributed according to mobility capacities, e.g. people with limited mobility may take short walks and visit less attractions, avoiding stairs and steep streets. Shortly, the increase of multi-generational (“children with grandparents”) journeys is expected on the market, which also raises the need for group differentiation.

In the most attractive urban spaces (e.g. squares in the historical city centre, main square of towns), concentration of tourists (of any kind) –i.e. overtourism– may have an impact on the pedestrian (or other traffic) flows, provision of services (e.g. direct access to shops), well-being of people living or working there, and the tourist experience itself. In smaller towns and villages (such as Dürnstein in Austria) as destinations along waterways, river cruise tourism may largely affect local stakeholders: residents (who may be unable to do certain trips as usual), shops (e.g. their opening hours are adjusted to the arrival of ships), other tourists (whose access to some attractions may be limited due to the presence of large groups of cruise ship tourists), etc.

Although full accessibility of tourist attractions for everyone is becoming general, some of them are still lacking elevators and other solutions to provide people with alternative mobility options.

## 6. Conclusion

For destination management, the development of port infrastructure is one of the most critical issues; the expectations of tourists regarding accessibility are primarily related to the accessibility of ports (e.g., availability of elevators). The future use of embankments is a substantial issue (mostly in Budapest) which goes far beyond cruise tourism and can only be handled in a general (urban and transport) development concept. In river cruise tourism, it would induce many effects, e.g. reducing road traffic can make ports more accessible (buses do not have to waste time in traffic, they do not have to cope with others for a limited number of parking spaces, etc.). For pedestrian traffic, the reinterpretation of the embankments would undoubtedly be a positive change, and the beneficial effects of it could also be enjoyed by cruise tourists as well.

Tourists usually reach attractions by buses; in an urban environment (especially in Budapest) plenty of problems arise (bus parking, approaching of sights or port, etc.). To moderate these problems, the creation of an integrated information interface (application) has been proposed. This would offer service providers up-to-date and real-time information about the state of parking places (availability, capacity, current occupancy, etc.) and traffic circumstances. As a next step, this application could also function as part of an urban traffic management system and could contribute to the modernization of passenger transport.

To do this, it is necessary to designate dedicated areas for the parking of buses and other vehicles connected to cruise tourism (e.g., the cars of the crew) not necessarily in downtown areas (of course, usage of downtown parking garages, underground garages can also be possible). It is recommended to keep in mind the quick access to the port as a requirement in case of designating other areas of the city.

To enhance tourists' experience, and at the same time to raise accessibility and stimulate innovation of services, service providers should develop background services, too. For example, the creative development of public transport services (e.g. increasing the role of heritage lines) and further improvement of the quality of bus services (e.g. by training the staff) or introducing innovative services (extension of sharing economy-based solutions) could amplify the accessibility of public areas and sights of cities.

It is also recommended to add new tours and new attractions into the program. This may be a response to the phenomenon of overtourism. Due to the mass presence of tourists in public areas, visiting some attractions in the city centre is repulsive for many tourists. The less visited and therefore quieter, less crowded attractions can be alternatives to the popular sights. Of course, they should also offer authentic experiences to adapt to cruisers' preferences. These attractions or programs can be overtaken in smaller groups by foot, by bicycle or by public

transport, which also could eliminate the problems mentioned above (especially parking problems).

Analysing accessibility from the aspect of attraction management, the turnover of cruise ships (especially in urban environment) contributes only lightly (but contributes) to overtourism, its adverse effects – e.g. crowds in public areas around attractions – can be experienced by cruise tourists, as well. In this context, it may be essential to have more coordinated planning for tourists visiting such destinations, mainly using a reservation system. Some good practices are applied in institutions (e.g. museums), although it would be a solution for managing visitors' entrance and movements within tourist zones, as well. A good example is the Imperial Castle of Keiserburg, a symbol of Nuremberg, and a popular attraction for river cruise tourists, where there is an electronic registration system. The complex parking reservation system can balance tourism traffic and reduce the overload of the infrastructure.

Experts recommend the introduction of new products, i.e. that traditional products may be replaced by stories and legends, e.g. about famous people (e.g. in Hungary, about Empress Elisabeth “Sisi”, composer Ferenc/Franz Liszt, football player Ferenc Puskás). Storytelling boosts personal involvement, which includes the vicinity of local people (“be a guest of a family”) and the realization of activities in workshops (“make yourself something traditional”).

## **7. Further research directions**

Findings of expert and stakeholder interviews have been briefly presented here to highlight trends and impacts of river cruise tourism in Europe, especially on the Danube and in Hungary. The next step can be the inclusion of further stakeholders and experts representing different fields of the industry. New topics may also be addressed with a more in-depth analysis of the various transport services (e.g. the role of airlines in cruise tourism). Further research of the complexity of the service chain may be relevant to understand internal and external competition of the cruise sector. As this contribution has gathered information from the supply side, it seems to be necessary to analyse needs and opinion of the demand side (i.e. tourists), which can help to find out how the product creates experiences and how tourist experience their impacts.

## References

- AVALON WATERWAYS. Danube river cruises Date of access: 03/01/2019 <https://www.avalonwaterways.com/River-Cruises/Danube-River/>
- BABBIE, E. 2013. *The basics of Social Research*. Cengage Learning, 6th edition.
- BELIJ, S. et al. 2014. Sustainable planning and tourism development policy exemplified by medieval fortresses along the river Danube. In: *Glasnik Srpskog geografskog drustva*. Vol. 94, No. 3, pp. 69–82.
- BRIDA, J. G., ZAPATA, S. 2010. Cruises Tourism: Economic, Socio-cultural and Environmental Impacts. In: *International Journal of Leisure and Tourism Marketing*. Vol. 1, No. 3, pp. 205–226.
- BRIDA, J. G., ZAPATA, S. 2010. Economic impacts of cruise tourism: the case of Costa Rica. Anatolia. In: *International Journal of Tourism and Hospitality Research*. Vol. 21, No. 2, 322–338.
- CLIA (Cruise Lines International Association) 2019. Cruise trends and industry outlook. <https://cruising.org/news-and-research/-/media/CLIA/Research/CLIA%202019%20State%20of%20the%20Industry.pdf> [Date of access: 10/01/2019].
- CRYSTAL CRUISES 2019. Danube River Cruises. <https://www.crystalcruises.com/> [Date of access: 11/01/2019].
- CRYSTAL CRUISES 2019. River cruises for 2019. <http://www.crystalcruises.com/river> [Date of access: 10/01/2019].
- CSAPÓ, J., DARABOS, F. 2011. Vízi közlekedés. In: VERES, L. et al.: *Turizmus és közlekedés*. Pécs: Pécsi Tudományegyetem, Kempelen Farkas Hallgatói Információs Központ.
- DRAGIN, A. 2010. International Tourist Cruises along the Corridor VII and Novi Sad. University of Novi Sad, Faculty of Science, 321 p.
- DRAGIN, A. S., JOVICIC, D., LUKIC, T. 2010. Cruising along the river Danube – Contemporary tourism trend in Serbia. In: *Geographica Pannonica*. Vol. 14, No. 3, pp 98–108.
- DRAGIN, A., BUBALO-ŽIVKOVIĆ M., IVANOVIĆ, L. J. 2009. The Romanians on international cruises along the Corridor VII: The structure of the crew on tourist boats. In: *Geographica Timisiensis*. No. 1–2, pp. 35–44.
- DWYER, L., FORSYTH, P. 1996. Economic impacts of cruise tourism. In: *The Journal of Tourism Studies*. Vol. 7, No. 2, pp. 36–43.
- DWYER, L., FORSYTH, P. 1998. Economic significance of cruise tourism. In: *Annals of Tourism Research*. Vol. 25, No. 2, pp. 393–415.
- GABE, T. M., LYNCH, C. P., MCCONNON, J. C. 2006. Likelihood of cruise ship passengers return to a visited port: the case of Bar Harbor, Maine. In: *Journal of Travel Research*. Vol. 44, No. 3, pp. 281–287.
- GENC, R. 2018. Environmental Sustainability and the Future of the Cruise Tourism. In: *Çukurova Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*. Vol. 22, No. 1, pp. 107–114.
- HALL, J. A., BRAITHWAITE, R. 1990. Caribbean cruise tourism. *Tourism Management*. Vol. 11, No. 4, pp. 339–347.
- HENTHORNE, T. L. 2000. An analysis of expenditures by cruise ship passengers in Jamaica. In: *Journal of Travel Research*. Vol. 38, pp. 246–250.
- HILL, C. 2013. What's behind the river-cruise boom. <http://www.marketwatch.com/story/whats-behind-the-river-cruise-boom-2013-02-01> [Date of access: 7/10/2018].
- JÁSZBERÉNYI, M., ÁSVÁNYI, K. 2016. *The image of Budapest as the best river cruise port city*. Budapest: Corvinus University of Budapest, Economic Geography and Futures Studies Department. pp. 140–148.

- JÁSZBERÉNYI, M., MUNKÁCSY, A. (eds.) 2018. *Közlekedés, mobilitás, turizmus*. Budapest: Akadémiai Kiadó.
- JOHNSON, D. 2002. Environmentally Sustainable Cruise tourism: A Reality Check. In: *Marine Policy*. Vol. 26, No. 4, pp. 261–270.
- JONES, P., COMFORT, D., HILLIER, D. 2016. European river cruising and sustainability. *International Journal of Sales*. In: *Retailing and Marketing*. Vol. 5, No. 1, pp. 61–71.
- JÁSZBERÉNYI, M. 2019. *Vízi turizmus és közlekedés: termékek, trendek, regionalitás*. Budapest: Akadémiai Kiadó.
- JÁSZBERÉNYI, M., MISKOLCZI, M. 2019. Szállodahajó-turizmus a tengeren. In: IRIMIÁS, A. R., JÁSZBERÉNYI, M., MICHALKÓ, G. (eds.) *Innovatív turisztikai termékfejlesztés*. Budapest: Akadémiai Kiadó.
- KLEIN, R. A. 2011. Responsible Cruise Tourism: Issues of Cruise Tourism and Sustainability. In: *Journal of Hospitality and Tourism Management*. Vol. 18, No. 1, pp. 107–118.
- LAMONT, C. 2015. *Research Methods in International Relations*. SAGE Publications Ltd; 1 edition
- LUMSDON, L. M., PAGE, S. (eds.) 2011. *Tourism and transport: Issues and agenda for the new millennium*. New York: Routledge.
- MORENO, A., AMELUNG, B. 2009. Climate change and coastal & marine tourism: review and analysis. In: *Journal of Coastal Research*, pp. 1140–1144.
- PAGE, S., CONNELL, J. 2006. *Tourism: A modern synthesis*. London: Thomson Learning.
- PÉCSEK, B. 2014. Gyorsuló idő, lassuló turizmus: a lassú turizmus modellezése. In: *Turizmus Bulletin*. Vol. 14, No. 1, pp. 3–10.
- POPPER, K. R. 2005. *The Logic of Scientific Discovery*. London/New York: Routledge.
- TAUCK WORLD DISCOVERY 2019. Date of access: 03/01/2019 <http://www.tauck.com/river-cruises/european-river-cruises/danube-river-cruising.aspx>
- UNIWORLD BOUTIQUE RIVER CRUISE COLLECTION 2019. River cruises for 2019 Date of access: 03/01/2019 <https://www.uniworld.com/eu/promotions/danube-river-cruises/>
- VIKING RIVER CRUISES 2018. Danube river cruises Date of access: 03/01/2019 <https://www.vikingrivercruises.co.uk/cruise-destinations/europe/rivers/danube/index.html>

# The Asgardia Project: An Intersection between Space Tourism and Smart City

JHANGHIZ SYAHRIVAR<sup>1</sup>, TAMÁS GYULAVÁRI<sup>2</sup>,  
MUHAMMAD PRIMA PUTRA<sup>3</sup>

**Abstract:** Space tourism is predicted to be the next best thing. Some private companies, such as Virgin Galactic and SpaceX, are in race to send billionaires to outer space either for leisure or business purposes. The Asgardia project which was founded in 2016 has become an international sensation. In 2019, the Asgardia gathered over 1,000,000 people from more than 200 countries of which slightly over 18,000 registered members have accepted its constituents. This research aims to investigate sustainability factors which motivate people to travel or migrate to outer space. While studies about sustainable and smart cities are getting more spotlight in recent years, very few studies in this topic made a radical leap by closely examining a radical model of the smart city concept, such as Asgardia. We took a random sampling of 307 members of the Asgardia community. We employed SEM analysis in order to test the hypotheses. The results of this study reveal that there are three factors which are appealing to space tourism enthusiasts, namely Smart Economy, Smart Governance and Smart Mobility. This study is expected to add novelty in the smart city literature as well as to fill the gap in the current conceptualization of smart cities. Moreover, the findings are expected to offer a valuable insight for business practitioners of smart city and space tourism.

**Key words:** Smart City, Space Tourism, Asgardia

**JEL Classification:** O18

## 1. Introduction

Cities are places where economic activities and innovations take place at the same time, they are also places where inequality is seen to be higher. If this issue is not properly managed, the negative effects of urbanization will soon outweigh its benefits (Monzon, 2015). Moreover, many cities around the world face a dilemma due to rapid population growth: on one hand are the overexploitation of resources, an insufficient numbers of services, and an increase in pollution level. On the other

---

<sup>1</sup> JHANGHIZ SYAHRIVAR, Corvinus University of Budapest, Hungary, President University, Indonesia, jhanghiz@president.ac.id

<sup>2</sup> TAMÁS GYULAVÁRI, Corvinus University of Budapest, Hungary, tamas.gyulavari@uni-corvinus.hu

<sup>3</sup> MUHAMMAD PRIMA PUTRA, President University, Indonesia, mjman9@gmail.com

hand, sustainability is the goal that must be achieved in order to overcome these challenges (Bifulco et al., 2016).

According to WHO (2014), the world's urban or city population will be doubled by 2050; by 2030, six out of every ten people will live in cities; and by 2050, it will be seven out of every ten people. It means that the number of urban citizens is growing by nearly 60 million people each year. Moreover, cities' inability to provide adequate fresh natural resources, cleaner energy, the capacity to move people efficiently from one location to another, a greater sense of safety and security have become problems for citizens around the world (IEC, 2018).

It is important to take into account various creative factors in the governance and management of urban areas. This process turns out to be a more complex conceptualization of the so-called "smart city" (Schaffers, 2011). In the last twenty years, the concept of smart city has become more popular in scientific literature as well as international policies (Albino, Berardi and Dangelico, 2015). In smart cities, human and social capital as well as conventional and modern communication infrastructures are combined to create sustainable economic conditions and development. At the end of the tunnel is a higher quality of life through a careful use of available resources (Caragliu, Bo and Nijkamp, 2009). There is no standard framework for framing a smart city, nor a one-size-fits-all definition for it (O'Grady, O'Hare, 2012).

As the world becomes ever more modern, cities need to be more intelligent. Massive urbanization requires new and innovative ways to manage the complexity of urban living, such as fresh approaches to overcrowding, carbon consumption, inadequate utilization of capital and environmental disasters. In this context, smart cities are not only a solution for future urban living, but also as a crucial strategy for addressing poverty and inequality, unemployment and energy management (EUP, 2014).

Some perfect examples of ongoing Smart "Sci-fi" City projects in the world are Neom Smart City of Saudi Arabia and Meikarta Smart City of Indonesia which boast to be an independent area and a hub of trade, a center of innovation and creativity. Smart cities typically deliver a healthy lifestyle to their people, combined with excellent economic opportunities that will thrive in comparison with most other cities around the world. Among all the world's smart city initiatives, Asgardia is the first – if not the only – project that pushes the current goals of smart cities. Therefore, we think that it is important to research smart cities in the context of Asgardia.

Asgardia was founded by Igor Ashurbeyli, a Russian scientist and businessman. He is also a chairman of UNESCO's Science of Space Committee and the founder of the Aerospace International Research Centre in Vienna (Earth Sky, 2016). The Asgardia Smart City Project was first unveiled on 12 October 2016 at a press conference in Paris, encouraging 100,000 applications so that it can be

registered as a nation (The Guardian, 2016). As of 11 July 2018, Asgardia Smart City residents numbered 261,417, making it 171st in the world in terms of population (Asgardia Space, 2016). Asgardia officially launched the first Asgardia-1 satellite, which includes 0.5 terabytes of data belonging to its people, as well as digital images of the flag, arm coat and constitution of the space nation (CNN Style, 2017).

Asgardia is the fulfillment of the old vision of mankind, which has always tried to break free and escape from the imperfect earth (Asgardia Space, 2016). Each culture and society in the past had stories of people who traveled to places alien to humanity. In this regard, culture – which is a set of beliefs, values and practices adopted by a group of people – is crucial to understanding human behavior (Chairy, Syahrivar, 2019; Gyulavári, Malota, 2018, 2019). For instance, why some people are willing to risk their comfort at home and leave the earth. In addition, Asgardia will be the first smart city and a nation to position itself in space, directly in the orbit of earth. It seeks to open up access to space technologies, to protect the earth from extraterritorial objects or threats, and to carry out space research safely (The Guardian, 2016).

A revolutionary smart city concept in the sky that promotes clean and renewable energy, provides more economic opportunities and leads to improved quality of life may be far away in the future. Many people may consider it as a topic of science fiction, as it is literally a city of experimentation (Santis et al., 2014). People can be skeptical to innovative ideas that sound like science-fiction, while some can exhibit a negative behavior towards it (Lewandowsky et al., 2016). Likewise, Asgardia is not exempt from public skepticism.

## 2. Literature review

Smart city is an “*instrumented, interconnected, and intelligent city*” (Harrison et al., 2010; Albino, Berardi and Dangelico, 2015). Instrumented refers to collecting and incorporating real-world data live through the use of sensors, meters, appliances, personal devices and other related sensors. Interconnected means incorporating the data into a computerized network that allows the data to be shared through all city services. Finally, intelligent means the use of several complex simulations, modeling, optimization and visualization to make a better strategic decision.

Giffinger et al. (2007) argue that a city can be called a “Smart City” if it has the following six characteristics: Smart Economy (Competitiveness), Smart People (Social and Human Capital), Smart Governance (Participation), Smart Mobility (Transport and ICT), Smart Environment (Natural Resources), and Smart Living (Quality of Life).



Smart Economy refers to factors around economic competitiveness, such as innovation, entrepreneurship, productivity and flexibility of labor market, and trademarks (Albino et al., 2015). Smart economy of industry 4.0 involves smart grid components, innovation networks, high-tech manufacturing, high-level comfort, a healthy climate, sustainable development and international competitiveness (Galperina, Girenko and Mazurenko, 2016). Based on the work of Giffinger et al. (2007) some elements of Smart Economy are innovative spirit, entrepreneurship, productivity, flexibility of labor market, international embeddedness, and ability to transform.

Smart People applies to people who have a higher education degree and a culture of life-long learning (Harrison et al., 2010). Smart people may also refer to residents who have at least secondary education, knowledge of at least 3 foreign languages, a culture of life-long learning, and strong computer skills (Lombard et al., 2012). Based on the work of Giffinger et al. (2007), some elements of Smart People are level of qualification, affinity to life-long learning, social and ethnic plurality, flexibility, creativity, cosmopolitanism/open mindedness, and participation in public life.

Smart governance includes aspects of political engagement, institutional operation and programs for its people (Caragliu, Bo and Nijkamp, 2009). Scholl and Scholl (2014) argue that smart governance has two characteristics: first, it involves openness and accountability in government decision-making and actions, knowledge sharing, cooperation and involvement of stakeholders, services through integrated and smart technology, and enhanced government operations. Second, local government facilitates innovation, economic growth, sustainability and livability. Based on the work of Giffinger et al. (2007), some elements of Smart Governance are participation in decision-making through the use of technology, technology-based public and social services, transparent governance through technology, and the incorporation of technology into political strategies and perspective.

Smart Mobility refers to the local and international transport in a city, as well as the fairness of its information and communication technology infrastructures (Giffinger et al., 2007). Smart Mobility may also refer to the use of innovative and sustainable modes of transport, typically high-tech and environmentally friendly public transportation (Alonso, Aletà and Ruiz, 2016). Based on the work of Giffinger et al. (2007), some elements of Smart Mobility are local accessibility, international accessibility, availability of ICT and infrastructure, and sustainable, innovative and safe transport systems.

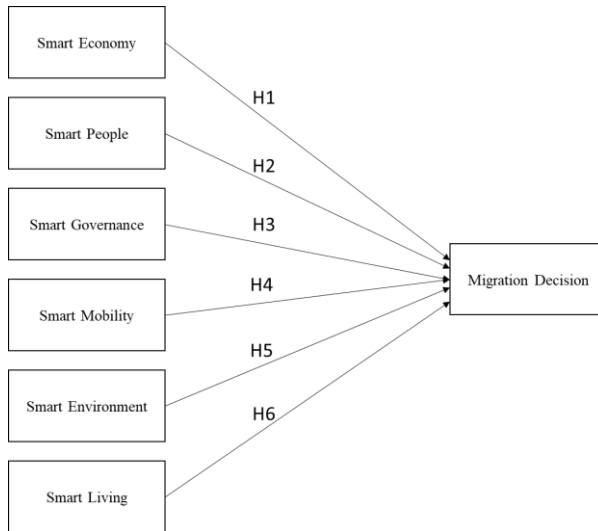
Smart Environment ensures the city should be desirable and protect its own ecosystem (EUP, 2014). A smart environment requires the Internet of Things (IoT) to run smoothly. Cited from Psannis, Xinogalos and Sifaleras (2014; p.476), IoT could be described as *a dynamic global network infrastructure with self-*

*configuration capabilities based on standard and interoperable communication protocols where physical and virtual 'things' having identities, physical attributes and virtual personalities and using intelligent interfaces.* Based on the work of Giffinger et al. (2007), some elements of Smart Environment are attractiveness of the natural environment, pollution level, environmental protection, and sustainable resource management.

Smart Living means improved quality of life, education system, public services, accommodation, and healthcare system (Monzon, 2015). According to Anez and Romera (2015), Smart Living is the wise management of infrastructure, public services and spaces using ICT-enabled technology, with a specific focus on increasing user efficiency and accessibility and what they really need. Based on the work of Giffinger et al. (2007), some elements of Smart Living are cultural facilities, health condition, individual safety, housing quality, education facilities, touristic attractiveness, and social cohesion.

Migration Decision is a process in which people try to consider certain factors which make them interested and eventually decide to migrate to the country of destination (Brezis, 2016). Based on the work of Jong (2010), the indicators of Migration Decision are the propensity to migrate, motivation to migrate and decision to migrate.

### 3. Research methodology



**Figure 1. Theoretical Framework**

Source: Adapted from Giffinger et al. (2007) and Jong (2010).

The hypotheses are as follows (*Figure 1*):

H1: Smart Economy has a positive effect on Migration Decision to Asgardia.

H2: Smart People has a positive effect on Migration Decision to Asgardia.

H3: Smart Governance has a positive effect on Migration Decision to Asgardia.

H4: Smart Mobility has a positive effect on Migration Decision to Asgardia.

H5: Smart Environment has a positive effect on Migration Decision to Asgardia.

H6: Smart Living has a positive effect on Migration Decision to Asgardia.

The population of this study are those who have registered and become members of the Asgardia community. This information can be found in Asgardia's official website. In this study, we employed random sampling. We disseminated a 42-item online questionnaire to our respondents via the Asgardia official website and social media. In this research, we managed to gather 307 valid respondents who were considered capable of representing a predetermined population. *Table 1* presents the respondents' profile:

**Table 1. Respondent Profile**

		Number	Percent
Gender	Male	207	67.43
	Female	96	31.27
	Others	4	1.30
Generation	Generation X	122	39.74
	Generation Y	178	57.98
	Generation Z	7	2.28
Occupation	Public Servant	42	13.68
	Private Employee	49	15.96
	Entrepreneur	31	10.10
	Professional	80	26.06
	Student	69	22.48
	Housewife	15	4.89
	Retired	15	4.89
Education	Unemployed	6	1.95
	Bachelor Degree	155	50.49
	Master Degree	102	33.22
	Doctoral Degree	16	5.21
District in the Asgardia	Others	34	11.07
	English	127	41.37
	Turkish	51	16.61
	Russian	26	8.47
	Chinese	21	6.84
Status	Others	82	26.71
	Approved Members	247	80.46
	Parliament Candidates	45	14.66
	Government Members	10	3.26
	Waiting List	5	1.63

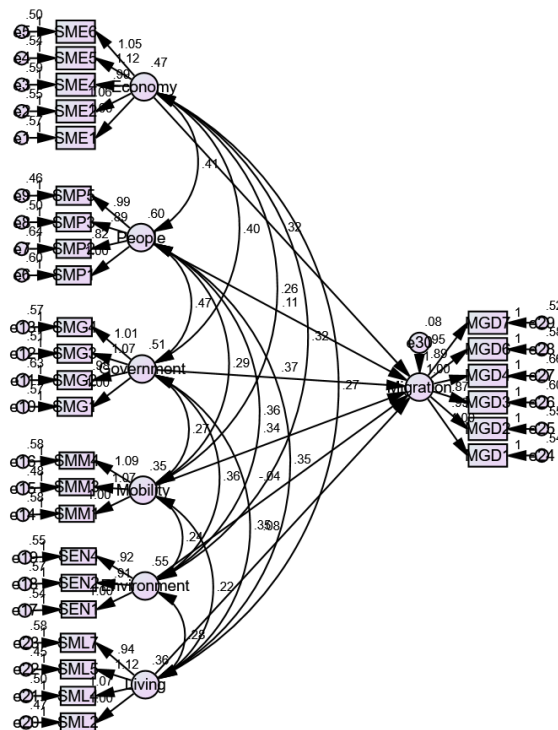
*Source:* Authors' own edition.

The measurement scales of Smart Economy (6 items; *Cronbach's alpha* 0.842), Smart People (7 items; *Cronbach's alpha* 0.851), Smart Governance (4 items; *Cronbach's alpha* 0.786), Smart Mobility (4 items; *Cronbach's alpha* 0.716), Smart Environment (4 items; *Cronbach's alpha* 0.765) and Smart Living (7 items; *Cronbach's alpha* 0.823) were adapted from the work of Giffinger et al. (2007). Meanwhile, the measurement scale of Migration Decision (10 items; *Cronbach's alpha* 0.894) was adapted from the work of Jong (2010).

In order to test the hypotheses, we employed Structural Equation Modelling (SEM) via SPSS and AMOS software. We used the work of Schreiber et al. (2006) as a guideline for assessing the fitness of the proposed model.

### 4. Analysis

During the Exploratory Factor Analysis (EFA), we eliminated some items with small coefficients as well as communalities (less than 0.5). The final SEM model is presented in *Figure 2*:



**Figure 2. SEM Model**  
 Source: Authors' own edition.

*Table 2* presents the recommended thresholds for SEM Model based on Schreiber et al. (2006). Some indicators, such as GFI, AGFI and NFI, have values below the recommended thresholds. Meanwhile, RMSEA, SRM, TLI and CFI have values above the recommended thresholds. Our final judgement for the model is that the model has a good fit.

**Table 2. Model Fit**

	Recommended Threshold	Result	Note
Root Mean Square Error of Approximation (RMSEA)	< 0.07	0.019	Excellent Fit
SRMR	< 0.08	0.0352	Excellent Fit
GFI	> 0.95	0.921	Modest Fit
AGFI	> 0.95	0.903	Modest Fit
NFI	> 0.95	0.898	Poor Fit
TLI	> 0.95	0.987	Excellent Fit
CFI	> 0.95	0.988	Excellent Fit

*Source:* Authors' own edition.

Based on *Table 3*, H1 which states that Smart Economy has a positive effect on Migration Decision is accepted and the nature of the influence is positive; H2 which states that Smart People has a positive effect on Migration Decision is not supported; H3 which states that Smart Governance has a positive effect on Migration Decision is accepted and the nature of the influence is positive; H4 which states that Smart Mobility has a positive effect on Migration Decision is accepted and the nature of the influence is positive. H5 which states that Smart Environment has a positive effect on Migration Decision is not supported. H6 which states that Smart Living has a positive effect on Migrating Decision is not supported.

We attempted to refine the model by excluding the non-significant variables (Smart People, Smart Environment and Smart Living) from the model in order to achieve a better model fit. The trimmed model has the following model fit summary: RMSEA 0.07 ( $\leq 0.07$ ), SRMR 0.0297 ( $< 0.07$ ), GFI 0.955 ( $> 0.95$ ), AGFI 0.941 ( $< 0.95$ ), NFI 0.942 ( $< 0.95$ ), TLI 0.999 ( $> 0.95$ ) and CFI 0.999 ( $> 0.95$ ). Overall, the trimmed only slightly improve the original model. *Table 4* presents the path analysis:

**Table 3. Path Analysis of Original Model**

Hypotheses	Relation	Estimate	C.R.	P	Result
H1	Smart Economy → Migrating Decision	0.324	2.737	0.006	Significant
H2	Smart People → Migrating Decision	0.107	0.926	0.335	Not Significant
H3	Smart Governance → Migrating Decision	0.367	1.992	0.046	Significant
H4	Smart Mobility → Migrating Decision	0.337	3.353	0.000	Significant
H5	Smart Environment → Migrating Decision	-0.038	-0.514	0.607	Not Significant
H6	Smart Living → Migrating Decision	0.077	0.559	0.576	Not Significant

*Source:* Authors' own edition.

**Table 4. Path Analysis of Trimmed Model**

Hypotheses	Relation	Estimate	C.R.	P	Result
H1	Smart Economy → Migrating Decision	0.327	2.800	0.005	Significant
H3	Smart Governance → Migrating Decision	0.482	4.135	0.000	Significant
H4	Smart Mobility → Migrating Decision	0.358	3.665	0.000	Significant

*Source:* Authors' own edition.

## 5. Conclusion

This research aims to understand factors motivating people to migrate to outer space, particularly to Asgardia. We hoped that the results of this research can be used as a platform for a more in-depth discussion on each motivating factor thereby creating a better understanding of why people were in quest of a better life outside the earth. The results of this research suggest that the members of the Asgardia community are strongly motivated by Smart Economy, Smart Governance, and Smart Mobility in their migrating decisions. Meanwhile, Smart Governance has the highest total impact on Migration Decision among Asgardian respondents. We conclude that the recent political and social upheavals affecting not only developing but also developed nations, and the changing trend toward a

more autocratic (and less welcoming to minorities) model of governance (as in the case of the United States, Turkey, Saudi Arabia, etc.) have led Asgardians to pursue a better form of governance that instills more transparency and participation in politics from the public through improved systems and technology.

## References

- ALBINO, V., BERARDI, U., DANGELICO, R. M. 2015. Smart Cities: Definitions, Dimensions, Performance, and Initiatives. In: *Journal of Urban Technology*, 3–21.
- ALONSO, C. M., ALETÀ, N. B., RUIZ, R. M. 2016. Smart Mobility in Smart Cities. Cit2016 -XII Congreso de Ingeniería del Transporte. Valencia: Universitat Politècnica de València. pp. 1209–1219.
- ANEZ, V. F., ROMERA, G. V. 2015. Smart cities: concept & challenges deliverable 1a. ASCIMER.
- ASGARDIA SPACE. 2016. Why we created Asgardia. Retrieved from Asgardia The Space Kingdom: <https://asgardia.space/en/>.
- BIFULCO, F., TREGUA, M., AMITRANO, C. C., D'AURIA, A. 2016. ICT and Sustainability in Smart Cities Management. In: *International Journal of Public Sector Management*, Vol. 29, No. 2, pp. 132–147.
- BREZIS, E. S. 2016. Why Migrate: For Study or for Work? In: *Economies* Vol. 4, pp. 1–12.
- CARAGLIU, A., BO, C. D., NIJKAMP, P. 2009. Smart cities in Europe. *3rd Central European Conference in Regional Science – CERS*, 2009, 45–59.
- CHAIRY, SYAHRIVAR, J. 2019. Bika Ambon of Indonesia: history, culture, and its contribution to tourism sector. In: *Journal of Ethnic Foods*, Vol. 6, No. 1, 2.
- CNN STYLE. 2017, November 16. Asgardia, the world's first 'space nation', takes flight. Retrieved from CNN Style: <https://edition.cnn.com/style/article/asgardia-satellite-launch/index.html>.
- EARTH SKY. 2016, October 20. Asgardia: Space nation or pie in sky? Retrieved from Earth Sky: <http://earthsky.org/space/asgardia-nation-in-space-or-pie-in-the-sky>.
- EUROPEAN UNION PARLIAMENT. 2014. Mapping Smart Cities in the EU. *Policy Department A: Economic and Scientific Policy*, pp. 17–20.
- GALPERINA, L. P., GIRENKO, A. T., MAZURENKO, V. P. 2016. The Concept of Smart Economy as the Basis for Sustainable Development of Ukraine. In: *International Journal of Economics and Financial Issues*. Vol. 6, No. 8, pp. 307–314.
- GIFFINGER, R., FERTNER, C., KRAMAR, H., KALASEK, R., PICHLER-MILANOVIC, N., MEIJERS, E. 2007. Ranking of European Medium-Sized cities. In: *Smart Cities*, 1–25.
- GYULAVÁRI, T., MALOTA, E. 2018. Do Perceived Culture Personality Traits Lead to a More Favourable Rating of Countries as Tourist Destinations? In: *Market-Tržište*, 30(1), 77–91.
- GYULAVÁRI, T., MALOTA, E. 2019. The role of culture personality and self-congruity in the evaluation of cultures as destinations. In: *Tourism Review*, Vol. 74, No. 3, pp. 632–645.
- HARRISON, C., HAMILTON, R., ECKMAN, B., WILLIAMS, R. P. 2010. Foundation for Smarter Cities. In: *IBM Journal of Research and Development*, Vol. 54, No. 4, pp. 1–16.
- INTERNATIONAL ELECTROTECHNICAL COMMISSION. 2018, March 12. Smart Cities; Why Cities Need to Become Smart Now. Retrieved from International Electrotechnical Commission: <http://www.iec.ch/smartcities/introduction.htm>
- JONG, G. D. 2010. Expectations, Gender, and Norms in Migrating Decision Making. In: *Population Studies*, Vol. 54, No. 3, pp. 307–319.
- LEWANDOWSKY, S., MANN, M. E., BROWN, N. J., FRIEDMAN, H. 2016. Science and the Public: Debate, Denial, and Skepticism. In: *Journal of Social and Political Psychology*. Vol. 4, No. 2, pp. 1–99.

- LOMBARDI, P., GIORDANO, S., FAROUH, H., YOUSEF, W. 2012. Modelling the Smart City Performance. Innovation: In: *The European Journal of Social Science Research*, Vol. 25, No. 2, pp. 137–149.
- MONZON, A. 2015. Smart Cities Concept and Challenges. In: *Bases for the Assessment for Smart Cities Projects*, 17–31.
- O'GRADY, M., O'HARE, G. 2012. How Smart is Your City? In M. O'Grady, G. O'Hare, M. J., & M. P. Greg, Science Vol. 335 (6076) (pp. 1581–1582). In: *American Association for the Advancement of Science*.
- PSANNIS, K. E., XINOGALOS, S., SIFALERAS, A. 2014. Convergence of Internet of things and mobile cloud computing. In: *Systems Science and Control Engineering: An Open Access Journal*, Vol. 2, No. 1, pp. 476–483.
- SANTIS, R. D., FASANO, A., MIGNOLLI, N., VILLA, A. 2014. Smart city: fact and fiction. In: *Munich Personal RePEc Archive*. pp. 2–15.
- SCHAFFERS, H., KOMNINOS, N., PALLOT, M., TROUSSE, B., NILSSON, M., OLIVEIRA, A. 2011. Smart Cities and the Future Internet: Towards Cooperation Frameworks for Open Innovation. *Future Internet Assembly*, LNCS 6656, pp. 431–446.
- SCHOLL, H. J., SCHOLL, M. C. 2014. Smart Governance: A Roadmap for Research and Practice. In: *iConference 2014 Proceeding*. Illinois. pp. 163–176.
- SCHREIBER, J. B., NORA, A., STAGE, F. K., BARLOW, E. A., KING, J. 2006. Reporting structural equation modeling and confirmatory factor analysis results: A review. In: *The Journal of Educational Research*. Vol. 99, No. 6, pp. 323–338.
- THE GUARDIAN. 2016, October 12. Will you become a citizen of Asgardia, the first nation state in space? Retrieved from The Guardian:  
<https://www.theguardian.com/science/2016/oct/12/will-you-become-a-citizen-of-asgardia-the-first-nation-state-in-space>.
- WORLD HEALTH ORGANIZATION. 2014. Urban Population Growth. Retrieved from World Health Organization  
[http://www.who.int/gho/urban\\_health/situation\\_trends/urban\\_population\\_growth/en/](http://www.who.int/gho/urban_health/situation_trends/urban_population_growth/en/)



# Self-driving cars for tourists and consumers

MELINDA JÁSZBERÉNYI<sup>1</sup>, KATALIN ÁSVÁNYI<sup>2</sup>,  
LÁSZLÓ KÖKÉNY<sup>3</sup>, JHANGHIZ SYAHRIVAR<sup>4</sup>,  
TAMÁS GYULAVÁRI<sup>5</sup>, TAMARA NÓRA KESZEY<sup>6</sup>

**Abstract:** When we would like to rent a car while traveling abroad and then explore the landscape or get to the sea, we could not look around while we are driving, nor read information on the site on what we are seeing, nor perhaps take a photo and send it to our friends about what we saw on the way. And after the evening party, it would be nice to get home as soon as possible, but it is not possible to sit behind the wheel with alcohol in the body, and taxis are expensive and take a long time to arrive. The system of self-driving cars can offer solutions to these set of problems. Self-driving cars are unlikely to replace public transport, but they can support mobility. Nowadays, more and more Artificial Intelligence Development Centers are designed to deal with traffic-awareness applications: how the pedestrian walks around the sidewalk, how the car going is moving along with us, etc. These new technologies have already been researched in the literature, but there is no evidence for a consumer-oriented approach. The purpose of our research is to identify the service systems in the scientific literature where the appearance of a self-driving car would change or increase the popularity and attendance of the elements, places. It would also increase the attractiveness of a tourist destination if it could be easier to discover effectively even through self-driving cars. This study summarizes relevant articles from high-prestige journals dealing with topics that provide the bases and questions for a prospective empirical research. We have identified different areas within tourism where the presence of self-driving cars can be useful. In the course of the research, we have seen that the appearance of self-driving cars in tourism could be very beneficial, as can be seen in the examples above.

**Key words:** Self-driving cars, Community, Tourism, Services, Development, Mobility

**JEL Classification:** L62

---

<sup>1</sup> MELINDA JÁSZBERÉNYI, Corvinus University of Budapest, Hungary, jaszberenyi@uni-corvinus.hu

<sup>2</sup> KATALIN ÁSVÁNYI, Corvinus University of Budapest, Hungary, katalin.asvanyi@uni-corvinus.hu

<sup>3</sup> LÁSZLÓ KÖKÉNY, Corvinus University of Budapest, Hungary, laszlo.kokeny2@uni-corvinus.hu

<sup>4</sup> JHANGHIZ SYAHRIVAR, Corvinus University of Budapest, Hungary, jhanghiz@stud.uni-corvinus.hu

<sup>5</sup> TAMÁS GYULAVÁRI, Corvinus University of Budapest, Hungary, tamas.gyulavari@uni-corvinus.hu

<sup>6</sup> TAMARA NÓRA KESZEY, Corvinus University of Budapest, Hungary, tamara.keszey@uni-corvinus.hu

## 1. Introduction

In the last decade, Autonomous Vehicles (AV) have gained serious worldwide attention for their potential to solve various environmental as well as social problems modern societies are currently facing, from high pollution to car accidents due to stress, drunk driving and other negligence, especially in touristic places. AV is said to be a disruptive technology due to its ability to shape neighborhood and business districts as well their economy (Rosenzweig, Bartl, 2015; Crayton, Meier, 2017). Moreover, AV technology may come sooner than most people think and when the tech is available for mass consumption it will revolutionize many business sectors, including tourism industry and increase of competitiveness (Gyulavári, Kenesei, 2012) of cities and regions.

Autonomous Vehicles (AV) can be a part of the sharing economy which is increasingly popular among millennials. AV may contribute to the betterment of our environment through reduced car ownership hence reduced pollutions, traffic congestions and oil consumption (Woldeamanuel, Nguyen, 2018). AV technology can be one of the solutions to combat our common enemy that is global warming.

Despite some potential benefits a society can reap from the emergence of AVs, some challenges still exist to making them fully operational on the road. They mainly concern safety and legal and ethical issues, such as consumer privacy, ownership and maintenance, insurance and accountability in the event of manslaughter (Douma, Palodichuk, 2012; Rosenzweig, Bartl, 2015). The latter, which is basically a question about “who is responsible?” has been an ongoing debate within the AV literature (Liu, 2017). Delicate issues concerning morality and technology require policy-makers to have a holistic perspective and reform their current laws in order to enable the adoption of innovative technology, such as AV, in the future.

Beyond the scope of law and ethics, potential long-term health issues derived from automation are recently raised in the literature on AVs. For instance, while the emergence of AV technology can potentially help in stress relief due to driving, it can also become the source of Non-Communicable Diseases (NCDs), such as inactivity and obesity (Crayton, Meier, 2017). It is then a question to determine which types or what forms of car automation (semi vs full) in the future can bring about positive social implications to our society through a well-balanced lifestyle.

Although most – if not all – studies in AV presented what-if or hypothetical scenarios, it should be clear by now that AV possesses some potential benefits as well as potential harms. We, however, are inclined to step forward and progress in this topic by framing AV technology in the scope of tourism.

The literature of autonomous vehicles is widespread, but most of the main topics are related to technical and technological aspects. Only 6% is constituted

by social science literature (Cavoli, Phillips, Cohen and Jones, 2017). There is no research specifically targeting the relationship between autonomous vehicles and tourism at the international level.

A notable exception is the article of Tussyadiah, Zach and Wang (2017) about the attitudes of the public towards the concept of self-driving taxis. The authors studied 325 people in the USA in two different contexts, as residents and as tourists. Negative attitude towards technology is at a low level, and is triggered by the dehumanizing aspect of the technology. Confidence in self-driving taxis is high, people have expectations concerning reliability, functionality and helpfulness. Travellers who often use a taxi in tourism destinations and who are open to innovative technologies are also more likely to use self-driving taxis. So there is a potential impact of self-driving taxis for the tourism industry.

The first article on tourism was written by Cohen and Hopkins (2019). In their conceptual paper, they presented some opportunities and challenges of connected and autonomous vehicles (CAVs) related to urban tourism.

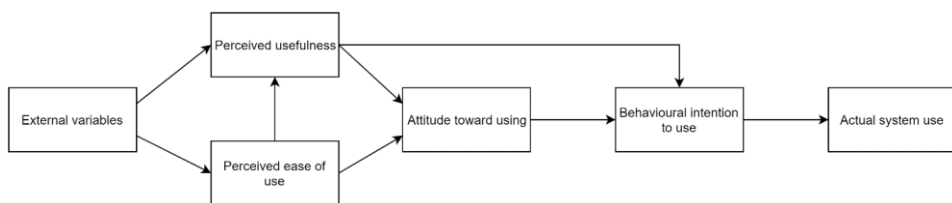
We will deepen our discussions in this study by examining the potential implications of the anthropomorphism features of AV for overall touristic experience. Previous studies have linked anthropomorphism features of AV to greater trust among passengers (Forster, Naujoks and Neukum, 2017) which may vary across cultures (Yerdon et al., 2017). This study is expected to offer policymakers a valuable insight into the tourism sector.

## **2. The theoretical background of technology acceptance models**

The Technology Acceptance Model (TAM) and its subsequent enhancements have been called upon to consider, test, and assess critical influencing factors for potential innovative technologies. Nevertheless, most studies in the literature deal with technologies that have already been introduced. Therefore, in this study, we believe that it may be worthwhile to first examine technology adoption models for social acceptance of autonomous vehicles, which, on the one hand, supports more efficient consumer satisfaction and, on the other hand, Technology Acceptance Models may be explored in new areas of research. It is worth mentioning that autonomous vehicles are more or less on the roads today, but in many cases consumers may not even use the automatic parking system. Therefore it is important to understand not only fully autonomous vehicles but also semi-autonomous vehicles.

Research into the acceptance of technology is largely due to breakthroughs in new IT systems (most notably personal computers). More serious research on this topic can be dated back to the mid to late 1980s (Davis, 1986) and then modified and supplemented by Davis, Bagozzi and Warshaw (1989) to create the TAM 1

model (*Figure 1*). The model focuses on the attitude toward the new technology, the behavioural intention to use, and the actual system/technology use. Among the independent variables in the model are the so-called external variables which do not directly influence consumer attitudes or behaviours; however, they directly affect perceived usefulness and perceived ease of use (Keszezy, Zsukk, 2017). External variables are not explicitly listed and defined in the model (Davis et al., 1989). According to Davis et al. (1989), external variables can be, for example, technological innovations or user specificities, making TAM 1 a framework model that can be used flexibly by downstream users and researchers of the model, taking into account the characteristics of the technology being studied.



**Figure 1. The first Technology Acceptance Model**

*Source:* Keszezy and Zsukk, 2017, Authors' own edition.

A more detailed description of previously undefined externalities was sought in the TAM 2 model (Venkatesh, Davis, 2000). At that time, these external factors were divided into two groups. One is social influence processes such as subjective norm, image and voluntariness. These elements primarily affect perceived usefulness, except for the factor of voluntariness, moderating influence through the subjective norm on the behavioural intention to use. The other group is constituted by cognitive instrumental processes such as job relevance, output quality, and result demonstrability. These elements also directly affect the perceived usefulness. In addition to these elements, the researchers also examined the experience factor in the model, which moderates the perceived usefulness and behavioural intention to use through the subjective norm. Experience is a very interesting element of the model through which we can see the differences between an introduced and an upcoming technology. Experience negatively modifies the effect of the subjective norm on perceived usefulness and behavioural intention to use. This means that if a technology system is not fully developed and users' knowledge and beliefs about the new device are still vague (i.e. they have no experience), they will be much more reliant on others' judgment of utility and intended use. After implementation, however, when much more is known about the strengths and weaknesses of the system or technology, and more experience is gained, the role of influence by others diminishes (Keszezy, Zsukk, 2017).

It can be seen that the TAM 2 model only addresses the factors affecting perceived usefulness, not the perceived ease of use. TAM 3, the latest TAM model extension to date, has identified new variables. According to Venkatesh and Bala (2008), variables can be grouped here as well into two categories. One group is the anchor of general experience from previous experiences, which mainly helps to form opinions before gaining personal experience with technology. These include computer self-efficacy, perception of external control, computer anxiety, and computer playfulness. The other group is adjustments, which modify prior perception in the light of direct experience with technology, such as perceived enjoyment and objective usability.

Along with the development of the TAM 3 model, the researchers began to investigate (Venkatesh et al., 2003) the factors that directly influence the behavioural intention to use. The Unified Theory of Acceptance and Utilization of Technology (UTAUT) was born after reviewing eight different theories. The purpose of the UTAUT model is to provide a useful tool for managers to assess the likelihood of success in introducing a new technology and to understand the additional influencing factors during adoption. The authors distinguish four direct influencing elements: expected performance, expected required effort, social impact, facilitating conditions. In addition, four other variables moderating these direct relationships were identified: gender, age, experience, voluntariness.

Extending previous facilitation conditions, they created the UTAUT 2 model (Venkatesh, Thong and Xu, 2012), which can already measure the expected adoption of technologies that are suitable for everyday use. As a result, the element of voluntariness in the UTAUT model has disappeared because, in everyday technology, the authors assume that it will not be used involuntarily. As a result, three new elements have been added: hedonic motivation, price value, and habit.

From the point of view of our research, the UTAUT models, which already take into account the social effects, can be really relevant, especially the UTAUT 2 model, where the authors have already adopted the acceptance of the technologies used in everyday life. All in all, the factors affecting the primary latent variables of TAM models (perceived usefulness, perceived ease of use, and behavioural intention to use) should not be overlooked.

### **3. The impact of autonomous vehicles in tourism**

Autonomous vehicles will have travel implications in three categories: individual travel decisions, transportation system impacts, and industrial and logistic impact (Henderson, Spencer, 2016). While all of them are somehow connected to tourism

industry, we primarily focus on how autonomous vehicles may influence the individual travel decisions of tourists.

There are also some examples which show that tourists might be the first to experience autonomous vehicles. Heathrow Airport tested autonomous vehicles and reduced travel time at Terminal 5 and also saved carbon. Gatwick airport also used autonomous shuttles as transfers (Cohen, Hopkins, 2019). England's Lake District national park used autonomous vehicles as a sustainable transport solution to reduce congestions and pollution (Mogg, 2018).

In this article, our aim was to discuss as many impacts (positive and negative) as possible of autonomous vehicles in relation to tourism industry.

### **3.1 Travel distance of tourists might be longer**

There are also multiplication impacts of autonomous vehicles, since as the travel speed increases, travel time will reduce (Yokota et al., 1998), so tourists could travel to a greater distance in the same period of time. They could reach destinations which they would not have chosen due to the long travel time. Thus, autonomous vehicles could also foster longer travel distances (ITF, 2015). The reduction in the value of time could also change the preferences in travel mode, as autonomous vehicles might become more attractive than other transport options such as train or flight (IFMO, 2016).

People in autonomous vehicles favor activities that they can perform while travelling such as gazing out of the window and talking to fellow travelers, but they rarely mentioned work (Cyganski et al., 2015).

All passengers may sleep in an autonomous vehicle while travelling to a destination, so they can book less accommodations (Bainbridge, 2018).

Door-to-door mobility could also reduce travel time compared to public transport and it might also enable tourists to access attractions that they could not reach on foot alone (IFMO, 2016).

Autonomous vehicles could replace transfer buses and taxis, so they could also be useful for transferring people from airport to hotel and return as hotel pickups (Bainbridge, 2018).

Due to the constant travel speed, the planning of the route and the travel time is more reliable and predictable (Guth et al., 2012).

### **3.2 Travel demand might increase**

There are a large number of positive factors that could increase travel demand. For example, in autonomous cars people with age-related or medical constraints and teenagers could increase the travel demand (Kim et al., 2015; IFMO, 2016). They do not need a driving licence. They could become independent from others

and flexible in their mobility, their social isolation could decrease and they could easily access the services they demand (Anderson et al., 2014). This new travel demand might increase with about 11% (Sivak, Schoettle, 2015).

Tourists could share autonomous vehicles attaining the perfect speed for less energy consumption, so the travel would cost less for tourists (Sivak and Schoettle, 2015), which could also increase the travel demand.

Safety is another reason for tourists to use autonomous vehicles, as they do not have to know the driving rules of the destination, it does not matter that the driving direction is left or right, unfamiliar environments and tiredness will not be a problem anymore (Cohen, Hopkins, 2019).

### **3.3 Parking spaces might change**

Parking might become easier (Pitcher, 2011). As autonomous vehicles could find the nearest free parking place and could park perfectly, more cars could park in the garage (Mitchell et al., 2010, Kowalewski, 2014) or a reduced space would be enough for vehicles, so cities could improve the livability of environments and there could be more spaces for pedestrians or bicycles (Alessandrini et al., 2015). According to Wiseman's study (2017), near the airports as in Um El Hamam, not far from Tel-Aviv, large parking lots could liberate free lands, which might be used for shopping malls, hotels or other services for tourist. All of these changes would increase the number of tourists, as they could use these new environments.

Many historical capital cities have parking difficulties. Wiseman (2017) analyzed the advantages of autonomous vehicles in parking in Israel. In Jerusalem and in Tel-Aviv, autonomous vehicles could solve the problem of parking in the city centre. Car parks might be less in demand near the attractions, but set down and pick up space will be necessary. Tickets could also be purchased on autonomous vehicles to shorten the time of waiting, so tourists could enter the attraction straightaway (Bainbridge, 2018). Tourists would not have to spend time on parking and they might have more time to spend on the destination.

Parking places near hotels located in rural locations or close to highway and major routes could be liberated for other usages, such as building more rooms or redesigning them for new services (Henderson, Spencer, 2016).

### **3.4 New tourism services could appear**

Bainbridge (2018) mentioned some possibilities that autonomous vehicles could provide in the tourism industry. Notably, the creation of a new class of sight-seeing tours, which could be called an *auto-tour*. It could function as a hop on hop off bus tour in cities and it could also replace guided tours on foot. The authors collected all the characteristics making *auto-tours* advantageous:

- proximity does not matter anymore,
- itinerary could be easily re-configured and algorithmically generated,
- personalisation could happen in real time according to anybody's preferences,
- multiple topics could be organized in a single tour,
- door-to-door function,
- flexibility, as the tour can start and end anywhere and anytime, and it can take any duration in reliable timing,
- the travel mode could also be changed.

Independent tour guides could transform vehicle-based tour operator businesses, widening their business opportunities.

This type of transport might provide people private space, so if somebody does not like to travel with other tourists, he or she can go there alone or just with the preferred people (IFMO, 2016). The autonomous vehicle could also be used as an accommodation or a small meeting room. So hotels by the hour will not be needed anymore, as tourists could book an autonomous vehicle. Small meetings could also be organized in specially designed ones, impacting not just leisure tourism but also MICE tourism (Bainbridge, 2018).

### **3.5 New opportunities for tourists**

Bainbridge (2018) also highlighted the positive impact of autonomous cars, whose advantages come from human delivery. As people will not drive, driving might become an experience, a leisure activity. Evening experiences could be longer, and people could also drink alcohol since they could travel by an autonomous vehicle, making evening tours more attractive.

As tourists can travel to the suburbs of cities, there will be more opportunities to have a dinner or book an accommodation, so not only the centrally located restaurants and hotels would suit tourists' preferences. Safety and reputation of the hotel might become less important, as the autonomous vehicle could pick up tourists in the pickup zone (Bainbridge, 2018).

Tourists could visit other or new attractions, avoided previously because of their distance from the city centre. So autonomous vehicles give opportunities and popularity to new destinations and attractions (Cohen, Hopkins, 2019).

Autonomous vehicles could also impact shopping tourism, as shopping streets and specific shops outside shopping malls could be reached easily, so the shopping areas of cities might be reconfigured (Bainbridge, 2018).



### **3.6 The disadvantages of autonomous vehicles**

Autonomous vehicles have also negative impacts on the tourism industry (Cohen, Hopkins, 2019). As more tourists reach more destinations, they can get off the car near the attractions, which would generate over-tourism. As tourists spend their time better, and can travel to more far destinations, public transport will be less attractive in cities, and people will be less likely to use trains, preferring to travel by autonomous cars instead. It also impacts employment as professional human drivers could be replaced by autonomous vehicles, so a lot of people will lose their job. There are also problems with passenger protection related to data privacy, security, and terrorism.

### **3.7 Anthropomorphism feature in tourist autonomous vehicles**

Anthropomorphism describes the attribution of human-like characteristics, physical and emotional, to a nonhuman agent or a machine (Epley, Waytz and Cacioppo, 2007). Anthropomorphism in nonhuman agents, such as AVs, is motivated by the need to create a meaningful relationship between human and robotic systems (Duffy, 2003). Previous studies have linked anthropomorphism feature in AV to greater trust among passengers (Forster, Naujoks and Neukum, 2017) which may vary across cultures (Yerdon et al., 2017). Culture, which is a set of beliefs and values embraced by a group of people, is pivotal in explaining human behavior (Chairy and Syahrivar, 2019). This is especially true in the case of driving culture. The application of the anthropomorphism feature in tourist AV can be a potential solution to the shortage of experienced and multilingual tourist guides and historians, especially in growing tourist attractions, such as Budapest. Talking or interacting Artificial Intelligence (AI) embedded in AV can potentially improve the overall tourist experience and create a positive impression on solo tourists knowing that they are ‘accompanied’ and supplied with relevant information that they need during sightseeing. We contend that building a meaningful relationship between tourists and Tourist Autonomous Vehicles (TAV) can be one of the important research agendas in the future.

## **4. Conclusion**

In overall, the value of the study is its special interest in tourism industry related to the development and implementation of autonomous vehicles. Since it was written before the widespread availability of literature on autonomous vehicles dealing mainly with its technological aspects, analyzing this topic from a consumer perspective could constitute a novelty. In addition, we examined the

social acceptance of autonomous vehicles in a theoretical framework that also contains new niche areas, as presented in Chapter 2. Technology acceptance models provide the theoretical framework of the study, and such a niche area may be the measurement of the attitude towards the technology that has not yet been introduced, which moreover, may be an everyday technology that does not necessarily have to be used. All of this is reinforced by the fact that we will be exploring the field of tourism, where the use of technology-based on hedonistic approaches will appear. It is important to emphasize that autonomous vehicles technology is not an innovation of the next 20–30 years, there are already cars on the road or in private ownership that already use some semi-autonomous vehicles technology (Parking Assistance, Lane Keeping Assistance, Pilot Assist etc.). In future research, it will also be important to measure the extent to which these technologies influence purchase and use intentions, and, if so, how they may provide a competitive advantage over vehicles that do not use such technologies. Tourists can plan their trips more freely thanks to the spread of autonomous vehicles. Door-to-door travel will be possible and it is a safer way than using a bike or a scooter. Evening mobility can be affected by autonomous vehicles, as tourists can return to their accommodation more comfortably and relaxed from the pub or after wine tasting. In addition, less time should be spent on scheduling or paying other travel costs.

The empirical measurement of the social acceptance of autonomous vehicles may be a critical point in our future research. For this reason, we consider it worthwhile to first systematize empirical research on technology acceptance models, taking into account the existing research methodology and relevant topics. Thus, we first presented the literature review and summary, and later focussed on our own empirical research and hypotheses. As already mentioned, this topic is under-researched in this respect, but with the inclusion of a few related areas, a more detailed literature analysis can be prepared.

All this can further support a deeper understanding of consumer behavior and the reasons for adopting new technologies such as autonomous vehicles.

### **Acknowledgements**

The work presented in this article was supported by the Topic Excellence Program 2019, Social impact of autonomous vehicles subproject.

## References

- ALESSANDRINI, A., CAMPAGNA, A., DELLE SITE, P., FILIPPI, F., PERSIA, L. 2013. Automated vehicles and the rethinking of mobility and cities. In: *Transportation Research Procedia*. Vol. 5, pp. 145–160.
- ANDERSON, J. M., KALRA, N., STANLEY, K. D., SORENSEN, P., SAMARAS, C. OLUWATOLA, O. 2014. *Autonomous Vehicle Technology – A Guide for Policymakers*. Santa Monica, Calif.: RAND Corporation, RR-443-1-RC.
- BAINBRIDGE, A. 2018. Autonomous vehicles & auto-tours. What is an auto-tour and how autonomous vehicle impact tours, attractions & cities? DestinationCTO, <https://www.destinationcto.com/docs/AutoTour.pdf>
- CHAIRY, SYAHRIVAR, J. 2019. Bika Ambon of Indonesia: history, culture, and its contribution to tourism sector. In: *Journal of Ethnic Foods*, Vol. 6, No. 1, 2.
- COHEN, S. A., HOPKINS, D. 2019. Autonomous vehicles and the future of urban tourism. In: *Annals of Tourism Research*. Vol. 74, pp. 33–42.
- CRAYTON, T. J., MEIER, B. M. 2017. Autonomous vehicles: Developing a public health research agenda to frame the future of transportation policy. In: *Journal of Transport & Health*. Vol. 6, pp. 245–252.
- CYGANSKI, R., FRAEDRICH, E., LENZ, B. 2015. *Travel-time valuation for automated driving: A use-case-driven study*. Transportation Research Board 94th Annual Meeting.
- DAVIS, F. D., BAGOZZI, R. P., WARSHAW, P. R. 1989. User acceptance of computer technology: a comparison of two theoretical models. In: *Management Science*. Vol. 35, No. 8, pp. 982–1003.
- DAVIS, F. D. 1986. *A technology acceptance model for empirically testing new end-user information systems: Theory and results*. Cambridge, MA: Massachusetts Institute of Technology.
- DAVIS, F. D. 1989. Perceived usefulness, perceived ease of use, and user acceptance of information technology. In: *MIS Quarterly*. Vol. 13, No. 3, pp. 319 – 340.
- DOUMA, F., PALODICHUK, S. A. 2012. Criminal liability issues created by autonomous vehicles. *Santa Clara L. Rev.* Vol. 52, No. 4, pp. 1157–1169.
- DUFFY, B. R. 2003. Anthropomorphism and the social robot. In: *Robotics and autonomous systems*, Vol. 42 No. 3–4, pp. 177–190.
- EPLEY, N., WAYTZ, A., CACIOPPO, J. T. 2007. On seeing human: a three-factor theory of anthropomorphism. In: *Psychological review*. Vol. 114, No. 4, pp. 864–886.
- FORSTER, Y., NAUJOKS, F., NEUKUM, A. 2017. Increasing anthropomorphism and trust in automated driving functions by adding speech output. In: *2017 IEEE intelligent vehicles symposium (IV)* pp. 365–372.
- GUTH, D., SIEDENTOP, S., HOLZ-Rau, C. 2012. Erzwungenes oder exzessives Pendeln? Zum Einfluss der Siedlungsstruktur auf den Berufspendelverkehr. In: *Raumordnung und Raumforschung*. Vol. 70, pp. 485–499.
- GYULAVÁRI, T., KENESEI, ZS. 2012. The impact of marketing resources on corporate competitiveness. In: *Market-Tržište*. Vol. 24, No. 1, pp. 7–21.
- HENDERSON, J., SPENCER, J. 2016. Autonomous vehicles and commercial real estate. In: *Cornell Real Estate Review*, Vol. 14, No. 1, pp. 44–55.
- IFMO 2016. Autonomous driving, The impact of vehicle automation on mobility behaviour. Institute of Mobility Research.
- ITF. (2015). Urban mobility system upgrade: How shared self-driving cars could change city traffic. International Transport Forum, OECD.
- KESZEY T., ZSUKK J. 2017. Az új technológiák fogyasztói elfogadása; A magyar és nemzetközi szakirodalom áttekintése és kritikai értékelése. In: *Vezetéstudomány – Budapest Management Review*. Vol. 48, No. 10, pp. 38–47.

- KIM, K.-H., YOON, D.-H., KO, Y.-S., KIM, D.-H. 2015. *An analysis of expected effects of the autonomous vehicles on transport and land use in Korea*. working paper, August 26., Marron Institute of Urban Management.
- KOWALEWSKI, S. 2014. *Überlassen Sie das Parken Ray*. Deutschlandradio Kultur.
- LIU, H. Y. (2017). Irresponsibilities, inequalities and injustice for autonomous vehicles. In: *Ethics and Information Technology*, Vol. 19, No. 3, pp. 193–207.
- MITCHELL, W. J., BORONNI-BIRD, E.; BURNS, L. D. 2010. *Reinventing the Automobile. Personal Urban Mobility for the 21st Century*. Cambridge, MA: The MIT Press
- MOGG, T. 2018. Driverless pods could be used to ferry tourists around a U.K. national park. Digital Trends: Emerging Technologies.
- PITCHER, P. 2011. Hit the deck: impacts of autonomous vehicle technology on parking and commercial real estate. B.S. Urban Planning.
- ROSENZWEIG, J., BARTL, M. 2015. A review and analysis of literature on autonomous driving. *E-Journal Making-of Innovation*.
- SIVAK, M., SCHOETTLE, B. 2015. *Influence of Current Nondrivers on the Amount of Travel and Trip Patterns with Self-Driving Vehicles*, Sustainable Worldwide Transportation Program ([www.umich.edu/~umtriswt](http://www.umich.edu/~umtriswt)), University of Michigan.
- TUSSYADIAH, I. P., ZACH, F., WANG, J. 2017. Attitudes toward autonomous on demand mobility system: The case of self-driving taxi. In Schegg, R., Stangl, B. (Eds.), *Information & Communication Technologies in Tourism 2017*. Springer International Publishing.
- VENKATESH, V., BALA, H. 2008. Technology acceptance model 3 and a research agenda on interventions. In: *Decision Sciences*. Vol. 39, No. 2, p. 273–315.
- VENKATESH, V., DAVIS, F. D. 2000. A theoretical extension of the technology acceptance model: Four longitudinal field studies. In: *Management Science*. Vol. 46, No. 2, pp. 186–204.
- VENKATESH, V., MORRIS, M. G., DAVIS, G. B., DAVIS, F. D. 2003. User acceptance of information technology: Toward a unified view. In: *MIS Quarterly*. pp. 425–478.
- VENKATESH, V., THONG, J. Y., XU, X. 2012. Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology. In: *MIS Quarterly*. Vol. 36, No. 1, pp. 157–178.
- WISEMAN, Y. 2017. Self-Driving Car – A Computer will Park for You. In: *International Journal of Engineering & Technology for Automobile Security*. Vol. 1, No. 1, pp. 9–16.
- WOLDEAMANUEL, M., NGUYEN, D. 2018. Perceived benefits and concerns of autonomous vehicles: An exploratory study of millennials' sentiments of an emerging market. In: *Research in Transportation Economics*. Vol. 7, No. 1, pp. 44–53.
- YERDON, V. A., MARLOWE, T. A., VOLANTE, W. G., LI, S., & HANCOCK, P. A. 2017. Investigating cross-cultural differences in trust levels of automotive automation. In: *Advances in Cross-Cultural Decision Making* (pp. 183–194). Springer, Cham.
- YOKOTA, T., UEDA S., MURATA, S. 1998. *Evaluation of AHS effect on mean speed by static method*. Proceedings of the 5th World Congress on Intelligent Transport Systems, Seoul Korea. Paper no. 3201.

# Which are the main differences in the traditions and innovations on the festivals from regional aspects? Hungarian and Transylvanian festival analysis

MELINDA JÁSZBERÉNYI<sup>1</sup>, LÁSZLÓ KÖKÉNY<sup>2</sup>

**Abstract:** The aim of the research is to analyse and compare the Hungarian and Transylvanian traditional festivals regarding their economic and social impacts on the organising settlement's community, regionally and nationwide. The study examined this topic from six aspects: economic development, employment structure, development of value system, extension of social and business network, creativity, innovation and organisations in the community. The key finding of the research was that these traditional festivals boost mainly the organizing settlement's economic prosperity and foster the cohesion of the community, but only bigger festivals can trigger regional or national economic growth. Besides, we tested the innovation rate of the Hungarian and the Transylvanian festivals. Our results, based on a sample containing more than 100 elements showed that Hungarian festivals are significantly more innovative than Transylvanian festivals. The main difference between the two regions is that Hungary organizes these events independently and cooperates with other nations, while Transylvania shows a strong dependence on the mother country.

**Keywords:** festivals, innovation, tradition, Transylvanian, Hungarian

**JEL Classification:** L83

## 1. Introduction

Event tourism is an important element of tourism products. Its benefits are comparable to other products at a certain level, that is, it extends the tourist offer, increases the tourist turnover, and thus increases the national income. It represents the country's cultural heritage, traditions and customs and, if successfully implemented, has a positive impact on the country's image. Economically, the lives of local communities can be influenced by events and festivals. At national and international level, it can be said that the realization of certain events is typically ensured with a high level of state or local government support. There are economic and non-detectable economic impacts when organizing an event

---

<sup>1</sup> MELINDA JÁSZBERÉNYI, Corvinus University of Budapest, Hungary, jaszberenyi@unicorvinus.hu

<sup>2</sup> LÁSZLÓ KÖKÉNY, Corvinus University of Budapest, Hungary, laszlo.kokeny2@unicorvinus.hu

(Jászberényi, Zátori and Ásványi, 2016). In recent years, more and more festivals have been reported nationwide. According to the Hungarian Festival Association (MFSZ, 2014), “festivals can be considered as any cultural, artistic, gastronomic, sporting or other series of events that take place one or more times around one or more organized themes at one or more venues to provide high quality, value-oriented, for a high-quality, knowledge-based, and entertaining community experience.” The organizers strive to attract participants from all over the country (and the world) with increasingly beautiful and personal sounds (Tangit et al., 2016). Festivals can be grouped by theme, frequency, type of organizer (Hunyadi et al., 2006; Sulyok, Sziva, 2009; Kundi, 2013) by target group (Kardos, 2011), cultural adaptation (Szabó, 2014), or their sustainability level (Laing, Frost, 2010).

MFSZ defines four different genres: gastronomic, artistic, amateur and other public festivals. They can also be categorized according to the degree of cultural value creation (Jászberényi et al., 2016). It is primarily because of the latter that festival organizers have a great responsibility in the renewal of culture, the promotion of creation and presentation, and innovation (Ásványi, Jászberényi, 2017). Nowadays, festivals tend to be categorized according to their innovative or traditional level. In our research, we analysed national festivals based on the information available on their websites using the content analysis method. The purpose of our research is to present positive examples, that is, how festivals can contribute to the visualization and development of tradition. We also look for differences in which festival themes can be more traditional than innovative. In addition, Transylvanian festivals are briefly presented, which, due to their traditional and value-preserving character, can be positive examples for domestic organizers.

## **2. Literature review**

In most of the cases, the importance of festivals in tourism can generally be assessed from two perspectives. On the one hand, a festival creates memories and stories, liberates the human soul and spirit, removes it a little from everyday life, but sometimes, in its unfolded form, draws attention to the trifles of everyday life, namely, learning from one another and getting to know others. On the other hand, it contributes to the economic benefits of a given community, region, country by utilizing various infra- and supra-infrastructures (Michalkó, 2016). Generally, the latter aspect is more likely to be explored, but it is worth exploring the value-creating and experiential processes of festivals and festival tourism, both at individual and social levels.

## 2.1 Tradition in festival tourism

Besides traditional, mainly mass tourism, which, according to many authors, raises and causes problems that need to be considered (Green, Chalip, 1998; Skayannis, 1999; Stamboulis, Skayannis, 2003; Anderson et al., 2013), it is also important to consider alternative approaches to tourism, to distinguish between appearance and communication (Stamboulis, Skayannis, 2003). The concept of “benevolent” tourism has already been introduced, which gives greater responsibility and sensitivity to the creation of community needs (Kelly, 1997), and the concept of co-production is taken into account in light of experience (Troye, Supphellen, 2012). However, it is important to preserve values and traditions, especially for cultural tourism products. In terms of their distinguishing features, in general, it can be said that traditional festivals aim to create cultural value, the focus is on the performers and the program, while the fun and community atmosphere is more important at festivals offering more entertaining elements (Zátori, 2016). Festivals that build on authentic elements usually have a high cultural value, as opposed to commercial ones where the main purpose is entertainment and business results. Of course, this does not mean that a traditional festival does not have a large audience. One such example are “all-in-one” (usually art) festivals, which are popular types of cultural mediation.

But as seen in the example of Dogan (2012), former traditional educational festivals are increasingly becoming image mediators. The question arises whether a festival with a classic cultural and historical theme can only be wrapped in classic clothes, or tradition is not necessarily a thing of the past. One Indonesian study found that festivals played an important role in the attraction of tourists. In addition, the results show that traditional festivals and events have become a means of communicating local wisdom for future generations (Andari, 2016). A study of Wang (1999) highlights their role as a form of mediating experience that can bring new dimensions. This means that a traditional festival can be regarded as an experience as well. According to Lena (2011), the values discussed by the participants are diverse and cultural and include the material/technical, situational, appreciative and functional aspects of the event. The following program elements could be considered as typical for traditional festivals: gastronomy (winery, garlic), wine region, wine tasting, craftsmen, event fairs, cooking, fishing, fish making, harvest parade, authentic programs – folklore programs, folk music, choir meeting, cultural programs, e.g. baroque culture, baroque costumes, folk tales, historical and regional cultural exhibitions, archery and equestrian program (Jászberényi et al., 2016). Sometimes it may be necessary to reposition old legends, rethink, invent new ones, and embed the site in synergy with them (Jászberényi et al. 2016). Finally, in the case of the elements of the 4E (Pine, Gilmore, 1999), tradition may be presented in four different ways: in the element

of 'Entertainment', in fully authentic programs, in folklore programs, in 'Escapist', usually gastronomic novelties consisting of traditional ingredients; for the 'Esthetic' element, exhibitions could be relevant, and in case of 'Educational', the element of experience, which is best characterized by traditional, themed festivals, is based on the use of folk tools, the preservation of culture, and the presentation of folk customs. The proportion of 'Educational' festivals in the sample is low in the national-level analysis, but there are some trends that suggest that for more traditional festivals the 'Educational' experience element are better is much more characteristic (Jászberényi, Ásványi and Kökény, 2018a). From the aspect of potential experience, only one difference can be observed between the main NUTS 1 categorization and the 'Educational' element. It follows that the site does not significantly affect the other elements. The literature review also indicates that the characteristics of the 'Entertainment', 'Escapist' and 'Esthetic' elements do not refer directly to the destination, while in the case of the 'Educational' element, it may result only in a significant difference. However, it can be seen that county seats, which are also larger cities, are more innovative than small settlements. In addition, these larger cities are characterized by a higher number of 'Entertainment' and 'Escapist' elements than smaller ones (with a 5% level of significance). This may indirectly be attributed to the fact that there are more music festivals in county seats than elsewhere (Jászberényi, Ásványi and Kökény, 2018b).

## 2.2 Research method

The nature of our research required the use of the inferential, and more specifically, the descriptive method. Within the latter, the literature distinguishes between two categories: the interviewer and the observational method. The observational methodology can be used to systematically assess people's behaviour, objects, and events, and obtain information about a particular phenomenon. Content analysis is the objective, systematic and quantitative characterization of observable communication content. The content analysis method is suitable in cases where the object of observation is not behaviour or a physical object, but communication. Units of analysis can be words, features, topics, space and time measurement or communication. The categorization of analytical units creates rules, thus interrupting the observed communication with the units (Malhotra, Simon, 2009). The size of the sample suggests that the results obtained will be quantifiable (the sample is larger than 60), but at first, only generalities can be deduced from the obtained results. We made our observations at 85 festivals at [programturizmus.hu/categoria-fesztival](http://programturizmus.hu/categoria-fesztival). Traditional elements are based on the scales of Stamboulis, Skayannis (2003), which measure the characteristics of



innovation. There were five elements related to innovative festivals and three elements to traditional festivals (*Table 1*).

**Table 1. Items that measure innovation and tradition**

	Items that measure innovation (5)
1.	They use some digital technology at the festival
2.	They treat their visitors uniquely, trying to reach their audience in many ways
3.	Delivers unique/novel/interesting ideas between programs
4.	Trying to attract cyber/online space [sharing, hotspot, wifi, apps]
5.	They tell old stories, but with a new design
	Items that measure tradition (3)
6.	Following tradition [mainly with traditional design]
7.	Old/non-renewable ideas [over 10 years old due to online penetration in the last decade]
8.	Classic themes, classic dressing, simple ideas

*Source:* Authors' construction based on Stamboulis and Skayannis, 2003.

These characteristics were identified and rated on a five-point Likert scale to determine to what extent the festival is characterized by the factor being studied (1 is the strongly not characterized, 5 is the strongly characterized). Based on the researchers' decision, two of the three traditional festival functions (7th and 8th elements) were considered twice as important in our analysis, since the fulfillment of these two features determines the traditional nature of a festival to a greater extent than having a Facebook page pair with hundreds of likes. If such a statement was characteristic of the festival, it would neutralize two innovative statements. Accordingly, based on the 8 examined statements, we divided our festivals into five different categories. These groups are: traditional festival, rather traditional festival, traditional as well as innovative festival, rather innovative festival, innovative festival.

The existence of 4E was examined according to the following criteria, with 3-3 characteristics for each concept (*Table 2*). They are measured on a five-point Likert scale, where 1 is the strongly not typical and 5 is the strongly typical for a given festival.

We used a research question based on the literature and our own research intuitions.

RQ<sub>1</sub>: There is a connection between the theme of the festival and the more traditional character of the festival.

During our research, we sought an answer to this question. In addition, at the end of our study, we mention a few of the 35 traditional Transylvanian festivals examined, and the social impact of a well-organized festival of this kind.

**Table 2. Items that measure the 4E elements**

Items of 4E elements			
Entertainment	Educational	Escapist	Esthetic
The festival looks fun/spectacular	The information on the website makes me interested in the festival	It gives you the feeling of “getting rid of this world”	The location looks attractive
The website and its information are inspiring	At the festival, I can learn more about music/cooking/wines, etc. according to the theme	It is worth a visit because you can gain new experiences	Based on the information it has a nice environment
The destination itself moves me with its information	I seem to know more about the local culture	It suggests that if you go here, you can forget all other everyday things	Based on the information I have received, I find the site attractive

*Source:* Authors’ construction based on Manthiou et al., 2014, Semrad et al., 2015, Semrad and Rivera, 2016.

### 3. Results

A total of 85 festivals were analysed during our content analysis. In our analysis, we examined factors related to tradition on the basis of the above articles and our previous studies. Of the 85 randomly selected samples, 28 (32.9%) are traditional, 10 (11.8%) are more traditional, 17 (20%) are traditional and innovative, 19 (22.4%) are more innovative and 11 (12.9%) are innovative. Based on the results, Hungarian festivals are more traditional than innovative. Taking into account the categorization presented in the literature review, 85 festivals were classified into 6 different themes according to the researchers’ decision. Gastronomy-related festivals had the largest rate (32, 37.6%), followed by music and dance (26, 30.6%), and the third were “other” (e.g. KockaFeszt Debrecen, Seven Tower Festival [Héttorony Fesztivál]) (13, 15.3%). The other three categories were art (8, 9.4%), “all-in-one” (4, 4.7%) and children’s festivals (2, 2.4%).

If we look for differences between themes in terms of whether a given festival is traditional rather than innovative, we can speak of a significant difference (p-value of 0.024) at 5% significance level (medium sample, Chi-square test), i.e.,

there is a difference between the theme of the festival and the level of tradition. This difference is not very strong (Cramer V 0.318) and 80% of the cells contain less than 5 items, so the results have to be accepted with conditions (this can be explained by the average sample). If we look specifically at the numbers, we see the differences, since gastronomic festivals are more traditional (23 traditional, 2 neutral, 7 innovative), music and dance festivals are more traditional (11 innovative, 7 neutral, 8 traditional), 5 innovative and traditional festivals, while art festivals are more innovative (3-4-1). Based on these, we can observe some trends in the theme of traditional festivals, so we can accept  $RQ_1$  because gastronomy festivals are more likely to be traditional, while other themed festivals, especially music and dance festivals, are significantly more innovative.

### **3.1 Differences between Transylvanian and Hungarian traditional festivals**

At first glance, we can state that the Hungarian and Transylvanian tradition-preserving festivals are mainly gastronomic, and there is not much difference in the subtopics. The difference is that the gastronomic festivals of the Transylvanian festivals tend to be all-art festivals and the mediating values of the culture. Almost all Hungarian festivals are organized around the features of the venue, the performers and even further subtopics. While Hungarian festivals mainly present foods and drinks of a folk tradition at such festivals, Transylvanian festivals convey value through the traditions of Szeklerism and the fullness of Hungarians. Finally, it is important to mention that Transylvanian tradition-keeping festivals also have a spiritual character. Usually, the festival opens and closes with a Mass or other religious activities. It is worth mentioning the Hungaricum Days in Sibiu (Nagyszebeni Hungarikum Napok), the Onion Festival in Madéfalvi (Madéfalvi Hagymafesztivál), or the Thousand Székely Girl's Day (Ezer Székely Leány Napja) festivals. From all this, it can be seen that in a later Transylvanian research we can assume that the preservation of traditions characterizes gastronomy festivals to a significantly greater extent.

## **4. Conclusions and limitations**

We accepted our research question. It can be observed that the gastronomic festivals in our sample are significantly more traditional than the festivals of music and dance or other topics. In addition, traditional elements seem to be harder to distinguish, and traditional classical festivals are increasingly disappearing and becoming more novel as their themes grow old. In practice, on their first visit, visitors are more likely to describe an entertaining music festival as innovative

than a gourmet sausage festival. It can be seen, however, that gastronomic festivals can sometimes be entertaining and can distract visitors from everyday life. The question arises whether a classical tradition-keeping festival can be innovative, and whether there is a transition between the two scale points. More and more “all-in-one” festivals are appearing, which, in addition to communicating and organizing programs in an innovative way, also try to convey tradition as a value. If this is the direction, it will be increasingly difficult to group festivals into themes in the future.

Content analysis is, in our opinion, a more subjective genre, despite considerations and assertions. Some festivals may have used innovations, but our research did not place a large emphasis on these. It is worth examining a larger sample for even more sophisticated results, and exploring the demand side through a questionnaire by survey to find out how innovative solutions affect visitors and impact their experience.

## References

- ANDARI, R. 2016. Traditional Festivals: a Tourism Development Contribution for Cultural Inheritance, (May), pp. 26–30. *South East Asia Journal of Contemporary Business, Economics and Law*, Vol. 11, Issue 2 (Dec.)
- ÁSVÁNYI, K., JÁSZBERÉNYI, M. 2017. The role of rural cities' festivals in the development of regions. In: *DETUROPE: Central European Journal Of Tourism And Regional Development*. Vol. 9, No. 3, pp. 177–187.
- DOGAN, E. 2012. City as spectacle: The festivalization of culture in contemporary Istanbul. *Young Minds Rethinking the Mediterranean*, 69.
- GETZ, D. 2012. *Event Studies: Theory, Research and Policy for Planned Events*. 2nd ed. Abingdon: Routledge.
- GREEN, C., CHALIP, L. 1998. Sport tourism as the celebration of subculture. *Annals of Tourism Research*. Vol. 25, No. 2, 275–291.
- HUNYADI, ZS., INKEI, P., SZABÓ, J. Z. 2006. Fesztivál-világ. *NKA-kutatások 3 – Fesztivál-világ*.
- JÁSZBERÉNYI, M., ZÁTORI, A., ÁSVÁNYI K. 2016. *Fesztiválturizmus*. Budapest: Akadémiai Kiadó.
- JÁSZBERÉNYI, M., ÁSVÁNYI, K., KÖKÉNY L. 2018a. Innovation and experience creation in the festival tourism. In: ANDRÁS, I., RAJCSÁNYI-MOLNÁR, M. (szerk.): *East–West cohesion II.: Strategic study volumes*. Subotica, Szerbia: Čikoš Group, pp. 146–153.
- JÁSZBERÉNYI, M., ÁSVÁNYI, K., KÖKÉNY L. 2018b. Innovation and experience creation in the festival tourism: Festival analysis from regional aspects. In: DORISZ, GY., VIVIEN KLESCHNÉ CSAPI, ZSOLT, B. (szerk.): *II. International Conference on University-Based Entrepreneurship and Regional Development: Theory, Empirics and Practical Implementation. ICUBERD 2017: Book of Papers*. pp. 218–235
- KELLY, I. 1997. Study tours: A model for benign tourism? In: *The Journal of Tourism Studies*. Vol. 8, No. 1, pp. 42–51.
- KUNDI, V. 2013. Fesztiválok városokra gyakorolt gazdasági és társadalmi-kulturális hatásainak elemzése a győri Magyar Táncfesztivál és a Miskolci Operafesztivál példáján keresztül. Doktori értekezés. Győr: Széchenyi István Egyetem.

- LAING, J., FROST, W. 2010. How green was my festival: Exploring challenges and opportunities associated with staging green events. In: *International Journal of Hospitality Management*. Vol. 29, No. 2, pp. 261–267.
- LENA, C. J. 2011. Tradition and transformation at the Fan Fair festival. In: MOERAN, B., PEDERSEN, J. S. (eds.) *Negotiating Values in the Creative Industries Fairs, Festivals and Competitive Events*. Cambridge University Press, pp 224–248.
- MAGYAR FESZTIVÁL SZÖVETSÉG 2014. Bemutatkozik a Magyar Fesztivál Szövetség, Magyar Fesztivál Szövetség „Szakmai Napok 2014”. 2014. március 19.  
<http://slideplayer.hu/slide/1929036/>
- MALHOTRA, N. K., SIMON, J. 2009. *Marketingkutatás*. Budapest: Akadémiai Kiadó.
- MICHALKÓ, G. 2016. *Turizmológia – Elméleti alapok*. Budapest: Akadémiai Kiadó.
- MANTHIOU, A., LEE, S., TANG, L., CHIANG, L. 2014. The experience economy approach to festival marketing: vivid memory and attendee loyalty. In: *Journal of Services Marketing*. Vol. 28, Vol. 1, pp. 22–35.
- PINE, B. J., GILMORE, J. H. 1999. *The Experience Economy*. Boston, Ma: Harvard Business School Press.
- SEMRAD, K. J., RIVERA, M., CROES, R. 2015. The five E’s in festival experience in the context of Gen Y: Evidence from a small island destination. In: *Revista Española de Investigación de Marketing ESIC*. No. 19, pp. 95–106.
- SEMRAD, K. J., RIVERA, M. 2016. Advancing the 5E’s in festival experience for the Gen Y framework in the context of eWOM. In: *Journal of Destination Marketing & Management* 7.
- SKAYANNIS, P. 1999. Planning tourism, development and the environmental protection in the coastal area of Magnesia: local interests and expectations. *Association of European schools of planning annual conference*. Bergen, 7–10 July.
- STAMBOULIS, Y., SKAYANNIS, P. 2003. Innovation strategies and technology for experience-based tourism. In: *Tourism Management*. Vol. 24, No. 1, pp. 35–43.
- SULYOK, J., SZIVA, I. 2009. A fesztiválturizmus nemzetközi és hazai tendenciái. *Turizmus Bulletin* Vol. 13, No. 3.
- SZABÓ, J. Z. 2014. *A fesztiváljelenség*. Budapest: Typotex kiadó.
- TANGIT, T. M., KIBAT, S. A., ADANAN, A. 2016. Lessons in Managing Visitors Experience: The Case of Future Music Festival Asia (FMFA) 2014 in Malaysia. In: *Procedia Economics and Finance*. Vol. 37, pp. 52–57.
- TROYE, S. V., SUPHELLEN, M. 2012. Consumer Participation in Coproduction: “I Made It Myself” Effects on Consumers’ Sensory Perceptions and Evaluations of Outcome and Input Product. In: *Journal of Marketing*. Vol. 76, No. 2, pp. 33–46.
- WANG, N. 1999. Rethinking authenticity in tourism experience. In: *Annals of Tourism Research*. Vol. 26, No. 2, pp. 349–370.

# Design of public buildings and spaces in European towns as a significant part of the territory's tourist image

TATIANA BYSTROVA<sup>1</sup>

**Abstract:** Abstract. Based on the analysis of objects and architectural bureaus, presented in the “political compass of modern architecture” by A. Zaere-Polo, significant changes in the architecture of public buildings of various types built in the 2000s in European cities are shown. The existence of an inverse relationship between stylistics and the symbolic meanings of such buildings and the increasing attention of cities to public spaces has been proven. Examples confirming the patterns derived from the work are presented.

**Key words:** Public building, architecture, European city, image of the city, “political compass of modern architecture”, A. Zaere-Polo.

**JEL Classification:** Z3

## 1. Introduction

Issues of enhancing identity and creating an attractive tourist image of a territory are interconnected by a common tool for their solution. The protection and updating of the historical and cultural heritage, the identification and strengthening of the positive values of a territory, the “face” and images of a place, a “building-sight” and the “spirit of the place” are important for both residents and tourists. These essentially interdisciplinary questions have not only economic, but also aesthetic and general cultural value.

New conceptual approaches to the development of territories, not only in large cities, are paying increasing attention to public spaces as places of interaction and community activities (Baba, 2009). This unites the most diverse specialists, ranging from developers to sociologists and from marketers to designers. At the same time, the appearance of administrative and other public buildings in European cities is becoming more concise, but this rather noticeable tendency is hardly explored in the specialized literature on architecture. Moreover, there is no parallel between the increase in the specific gravity of public spaces and the “impoverishment” of the stylistics of public buildings. However, it is they that become the criterion for assessing the condition of the territory not only by economists or investors, but also by “ordinary” people choosing their place of

---

<sup>1</sup> TATIANA BYSTROVA, Ural Federal University named after the first President of Russia B. N. Yeltzin, Russia, taby27@yandex.ru

residence, place to travel, etc., and focused today on finding a “happy” (R. Florida) space.

## 2. Research

### 2.1 Methodology

In accordance with the increasingly popular urban interdisciplinary approach, the characteristics of individual objects take into account their context, physical and semantic connections with the surrounding urban space, as well as the impact on the psyche and mood of people. This allows us to translate the assessment of public buildings from a purely art history perspective (based on norms of style, compositional techniques, means of expression, etc.) into, say, the “city” one, grounded in the approach to the city as a place of life for citizens (Jacobs, 1992; Lynch, 1990; Ellard, 2015).

Architecture is not simply associated with economic indicators, but is called an economic driver if it is stable, healthy (Stephenson, 2019; ‘alive’ (Salingaros, 2014), transparent (Latour, 2008), non-architectural (Archigam, 2005; Lemer, 2013), invisible (Brooks, 2014; Fracis-Jones, 2015), etc. Today, instead of the postmodern “icons” (Jencks, 1991), cities naturally tend to confirm their strategic priorities and common human values (Constructing, 2010; Lezhava, 2014).

To understand the urban context, we turned to works on urban planning on the contemporary stage: from C. Lynch (1990) and R. Venturi (2001) to B. Latour and A. Yaneva (2008); A. Lemer (2013); Y. Baba (2009), and ideas about citizens’ participation (Jenkins, 2010). Studies of the architectural process of the XX–XXI centuries, which help to develop criteria for evaluating new architectural structures, are divided into four large groups, partially overlapping with each other. The first is made up of authors who criticize modernism and its derivatives, as well as “star architects” who create such objects – R. Venturi (2001); N. Salingaros (2014); K. M. Hays, who criticized the “nightmare of deconstruction” (1998); etc. The second is their opponents, defending the competence of the new aesthetics: P. Johnson, upholding deconstructionism; P. Eisenman, who predicted post-modern architecture in the 1980s, later advocating deconstructivism (2007). The third group is not so clearly included in the “ideological” disputes and explores new technological and ontological parameters of architecture: P. Schumacher; B. Kolarevic, reflecting on the implications of using computer technology for architectural shaping (2005). The ecological trend in its various supranational manifestations is becoming global (Hassel, 2010; Salat, 2011), which needs to be specially studied because of the difference in terms and approaches. In addition, the semiotic approach of Ch. Jencks, implemented in the

“Language of the architecture of postmodernism” (1991), which has become canonical, is productive to decipher the values of various elements of architecture.

## 2.2 Results

The article shows the presence of radical changes in approaches to the design of public buildings in European cities of the 2000s, due to a change in understanding the phenomenon of a city itself. After J. Jacobs and the idea of a “city for citizens” (and not a “city for cars”) (Jacobs, 1992), man and later community, are gradually becoming the main identification sign, confirmation of the authenticity of city life and the loyalty of city policy. Accordingly, the more attention is paid to public spaces, the more modest in appearance are public buildings, transforming, as it were, into the “background” of social life; this is evidenced by the results of our study of the activities of more than 30 leading European architectural bureaus.

## 2.3 Discussion

### *2.3.1 External factors of architecture development in modern times*

External factors that determine modern architectural processes include the following:

- the transformation of culture, the overcoming of the paradigm of postmodernism, with its burden of redundancy and the paradox of forms (Dobrizyna, 2004; Salingaros, 2014);
- the changing nature and scale of cities – growing urbanization and movement from industrial to post-industrial and neo-industrial cities, where priority is given to the quality of life of citizens (Bystrova, 2017; Ellard, 2015; Jenkins, 2010);
- internationalization, unification of an architectural process, especially in large cities, where the most expressive buildings for a long time have been created by international teams of “star” architectural bureaus (Salingaros, 2014);
- increasing economic and technological stratification of an architectural process, a renewed interest in low-budget, social, unassuming projects;
- the emergence of new building materials and technologies, “smoothing” regional differences (Kolarevich, 2005; Kesik, 2019);
- a shift in the quality assessment of architecture from style characteristics to impression, mood, user perception (Sadeghi, 2015), the blurring of aesthetic criteria (Amrutia, 2017; Zaere-Polo, 2017).



Traditionally, the so-called “big styles”, expressing the “spirit” of the whole culture, including architectural forms, arose independently and even in some separation from other regions. According to O. Spengler, in Egypt, Greece, the Arab world or medieval Europe, these were intensive processes, practically independent of external interference. Today, a great number of circumstances, including cultural ones, affect both world and domestic architecture; at the same time culture itself has become different. Everything is evaluated through their prism, including the quality of an architectural object which must carry a more or less intelligible “message” – to consumers, managers, investors, tourists, individually or together.

In parallel with a similar “human” process, in the first third of the 20th century, architectural styles replaced by an image – a communicative form that actively influences an impression (Venturi, 2001). To be understood by a wide or unprepared target audience, this image should be simple, stereotyped, brightly emotionally colored (F. Kotler) and, therefore, well remembered. It can be worked out in detail, not for the sake of observing some aesthetic patterns, but in order to achieve a greater impact on investors, users, tourists, etc.

In turn, since about the 1970s, image buildings have been included in the process of transforming industrial cities oriented to growth and production into post-industrial ones, mostly connected with tourism, business, education, and fashion. They allow one to recognize and memorize the city, increase its competitiveness – as well as the discreteness of the object-spatial environment. Arguments and criteria for their evaluation lie far beyond architecture itself. Textbook examples in the form of the Sydney Opera (arch. J. Utzon, 1973), the Pompidou Center in Paris (arch. R. Rogers, R. Piano, D. Franchini, 1977), the CCTV building in Beijing, arch. R. Koolhaas, O. Scheeren, 2009) indicate the communicative potential of image architecture, as well as the most diverse ways of its formation, from bright-shaped to highly constructive.

Inviting foreign “star” architects to capitals and major cities introduces more international than other features to newly created objects. They can develop local style motifs, as a rule, limiting themselves to imitation or making it a reason for decorating, i.e. externalizing and tearing the original style. In contrast, regional architecture – as one of the manifestations of regionalism – forms the environment of everyday “self-life” (Moore, 2007).

### *2.3.2 Process context: international vs. regional*

In her work, a decade ago, I. A. Dobritsyna considers the opposition between the temptations of digital architecture and some “restraining principle” that she does not pronounce precisely, to be the main contradictions of the architecture of the beginning of the 21st century: “On the one hand, there is an accelerated process

of “digitalization” and globalization, which is estimated very contradictory – both as a factor forcing architectural talent to develop, and as a way to eliminate such unpredictable things as talent and insight from the project process. (...) The meaningful opposition of the essential foundations of architecture to everything extra new is enhanced. Architecture is “stretched” between the two poles, and, apparently, this tension has reached the limit values” (Dobrzyna, 2004).

If you look at most academic publications, today the opposition of the international and the regional becomes such a contradiction. Most likely, this is also important for Europe, since it is not enough to demonstrate identity exclusively with historical objects.

The regional appears in the texts of specialists in three main features:

- as elements of traditional architecture incorporated into new objects;
- as the development of local types of buildings when they are implemented in new materials (see, for instance, the symbiosis architecture in Japan in the 1960s);
- as vernacular (“vernacular” – local, national) architecture – non-professional or – more broadly – a “line” that does not associate itself with the general architectural process. Skepticism about it that existed a few decades ago is being replaced by ever closer attention. The authors (Moore, 2007) tend to view it as a manifestation of national identity and a way to preserve identity in the context of globalization.

### 2.3.3 *Process context: capital and society*

A critic of The Guardian R. Francis-Jones wrote in 2015 a review that has not lost its acuteness today: “Modern cities no longer pronounce themselves with a sequence of public buildings that represent our values and aspirations ... The image of Mammon dominates, a horizon of commercial skyscrapers... The social identity of our cities is destroyed, capital dominates...” (Francis-Jones, 2015). He aptly says that the trends of branding and the identity of cities are often completely opposite to each other and emphasizes the role of public buildings and public spaces in the balance of promotion and self-determination.

These trends apply to almost all major cities in any territory of the world. Here, the City as a banking and partially state architecture is opposed to objects of social, cultural, educational purpose, which confirms itself with the types and style of buildings. Nevertheless, even here trends of sustainability, democracy (at least ostentatious), and the connection of technology with the needs of people are becoming more and more pronounced.

### 2.3.4 Indicative examples

Empirical examples arose in the course of an occasional (random) sample of architectural bureaus of the 2000s, creating public buildings of different typologies in Europe and responding to a survey by A. Zaere-Polo (2017). Choosing them from each segment of the “political compass of modern architecture”, one can see an almost complete absence of stylistic and other differences in the approaches to form; the difference of positions concerns only understanding the social role of an architect.

1) In the “constitutionalists” segment, we arbitrarily choose an architectural bureau (more precisely, a “network”), LAN from Paris, created in 2002 by Benoît Jallon and Umberto Napolitano. The abbreviation stands for Local Architecture Network, architects emphasize openness to different disciplines, interdisciplinarity as part of the creative method. Laureate authors of many European awards declare their commitment to the values of modern architecture.

In the project of a town hall in a French city, made in 2016, they use extremely laconic and modest forms, deliberate depth of volume, a two-layer facade, wooden interior trim (*Figure 1*). At the same time, the building is spacious, neat and democratic. The semantics of the town hall, located between two squares and connecting different levels, is extremely clear and looks like a social program, like an objectified social role.



**Figure 1. Town hall. Brittany, France. Architects: LAN architects, 2016**

Source: <https://www.designboom.com/architecture/lan-architecture-saint-jacques-de-la-lande-town-hall-france-04-29-2016/>

The National archive of Energy company EDF was completed in 2011 with maximum consideration for the environment, as architects say about it (*Figure 2*). Due to the double-faced perforated panels, the building seems almost transparent and looks completely different when changing lighting or the time of year. Being 19 m high and with an area of about 1,400 sq m, it looks very compact, somewhat mysterious (this is a consequence of using the translucency effect) and easily blends into the landscape.



**Figure 2. National archives of energetic company EDF building, France. 2011.  
Architects: LAN**

Source: <https://www.dezeen.com/2011/05/05/edf-archives-centre-by-lan-architecture/>

The isolated location of the building has led to the necessity to create a wastewater treatment system, photovoltaic panels make it energy-saving and self-sufficient. Aesthetics, supported by technology, makes this object highly conceptual and, undoubtedly, modern.

2) Among those named by “historians” we take the works of the architectural bureau DRDH from London which created the Stormen Cultural Center in Bodø, Norway, and was shortlisted for the 2016 RIBA International Prize. The city with a population of 50 thousand inhabitants is beyond the Arctic Circle. The architects made a cultural center, consisting of the volumes of the concert hall and library, as inconspicuous as possible. At first glance, this is still the same modernism (*Figure 3*). It turns out that modernism is already considered “historical” today, albeit with a Scandinavian slant (although A. Zaere-Polo himself dares to take historical images and reminiscences). Colonnades of concrete emit the entrance, vertical ribs on the facades protect from the sun. The volume is quite fractional, it is noted that in this way it is brought closer to the individual.



**Figure 3. Cultural Center in Bodø, Norway. Architects DRDH, 2016**

*Source:* <https://archspeech.com>

### **3. Conclusion**

Despite the apparent difference in approaches, the projects of the vast majority of public buildings in European cities of the last decade are similar in their minimalist restrained forms. These forms are opposed to the spirit of the post-modern architecture of the 21st century with its excessive metaphoricity.

Being an integral part of the image of the city (Lynch, 1990), architectural objects remain the hallmark of cities and territories, however, public buildings today are assessed in their proportional relationship with an individual – both spatial and semantic.

A new concept for architecture itself in this regard is transparency, perceived as the openness and friendliness of the place. A fundamentally new feature is the dominance of public spaces of cities above architectural solutions, dictated by the needs of residents and tourists and confirmed by urbanists.

The methodology of the semiotic approach in the new conditions is only partially justified, since the public buildings of European cities increasingly cease to be “icons”. The “sustainability” of their technologies is far from being always read by a non-professional, and the desire for simplicity and economy creates the angularity of forms, akin to the modernist ones.

### **Acknowledgements**

The work was supported by Act 211 Government of the Russian Federation, contract № 02.A03.21.0006. The authors wish to thank the Russian Foundation for Basic Research for the financial support of this research (project 17-22-07001 “The complex algorithm of culture-based regeneration of old industrial cities”).

## References

- AMRUTIA, J. 2017. Contemporary Architecture Style: From the Same Time Period. In: *Kadvacorp*. URL: <https://www.kadvacorp.com/design/contemporary-architecture-style/> [Access: 15.12.2018].
- Archigram: *Architecture without architecture*. 2005. Cambridge, Massachusetts; London, England: The MIT Press. 242 p.
- BABA, Y. 2009. URBAN 2.0—Urban coding as an alternative to planning? In: *Proceedings 4th International Conference of the International Forum on Urbanism (IFoU)*. Amsterdam, TU Delft. pp. 201–210.
- BEZIRGANOV, D. M. Sovremennye tendencii v arhitekture obshchestvennykh zdaniy i kompleksov. URL: [http://cont-trend-arch-proect.blogspot.com/2014/04/blog-post\\_6836.html](http://cont-trend-arch-proect.blogspot.com/2014/04/blog-post_6836.html) [Access: 19.08.2018].
- BROOKS, K. 2014. 14 Architectural Trends that Will Define the Next Decade. In: *Archdaily*. URL: <https://www.archdaily.com/512235/14-architectural-trends-that-will-define-the-next-decade> [Access: 3.01.2019].
- BYSTROVA, T., KOCHETKOV, D. 2017. Branding as an Identification of the Territory Potential: Insufficiency of Constructivist Approach. In: *FEBM 2017. International Conference on Economic and Business Management. Shanghai. October 21–23.2017*. Atlantis Press. pp. 907 – 916.
- Constructing a New Agenda: Architectural Theory 1993–2009*. Editors: A. Krista Sykes. Princeton Architectural Press, NY, 2010. 516 p.
- DOBRICZYNA, I. A. 2004. Ot postmodernizma – k nelinejnoj arhitekture: Arhitektura v kontekste sovremennoj filosofii. M.: Progress-Tradiciya. 416 p.
- ELLARD, C. 2015. Places of the Heart: The Psychogeography of Everyday Life. Perseus Books, LLC. 256 p.
- Feelings Are a Better Way to Discuss Architecture Than Concepts*. By Timothy Brittain-Catlin on 23.04.2017 URL: <https://thewire.in/127360/feelings-better-way-discuss-architecture-concepts/> [Access: 17.08.2019].
- FRANCIS-JONES, R. 4.01.2015. The Disappearance of the Contemporary Public Building. In: *Urban*. URL: <http://www.cardiganrow.com/urban/disappearance-contemporary-public-building> [Access: 07.07.2018].
- HASSEL, E., BOJL, D., HARVUD, Dzh., HLEBNOVA, T. 2010. *Sovremennaya arhitektura*. M.: Art-rodnik. 128 p.
- HAYS, K. M. 1998. *Architecture Theory since 1968*. The MIT Press. 824 p.
- JACOBS, J. 1992. *The Death and Life of Great American Cities*. Vintage Book, NY. 474 p.
- JENCKS, Ch. 1991. The Language of Postmodern Architecture. Rizzoli. 204 p.
- JENKINS, P., FORSYTH, L. 2010. *Architecture, Participation & Society*. Routledge, New York. 212 p.
- EISENMAN, P., KIPNIS, J. 2007. *Written into the Void: Selected Writings, 1990–2004*. Yale University Press. 208 p.
- KESIK, T. J. *Building Science Concepts*. URL: <https://www.wbdg.org/resources/building-science-concepts> [Access: 04.01.2019].
- KOLAREVIC, B. 2005. Architecture in the Digital Age – Design and Manufacturing. Taylor & Francis. 308 p.
- LATOURE, B., YANEVA, A. 2008. Give me a Gun and I will Make All Buildings Move: An ANT's View of Architecture. In: *Explorations in Architecture: Teaching, Design, Research*. Editor: Reto Geiser. Birkhäuser. pp. 80–89.
- LEMER, A. 2013. Architectural Theories of the Environment: Posthuman Territory. In: *Construction Management and Economics*. Vol. 31, No. 11, pp. 1162–1164.

- LEZHAVA, I. G. 2014. Sovremennaya arhitektura i gorod. In: *Academia. Arhitektura i stroitel'stvo*. No. 4, pp. 5–15.
- LYNCH, K. 1990. *The Image of the City*. The MIT Press. 103 p.
- MOORE, S. 2007. Technology, Place, and Non-modern Regionalism. In: *Architectural Regionalism: Collected Writings on Place, Identity, Modernity, and Tradition*. Editor: Vincent Canizaro. New York: Princeton Architectural Press. pp. 432–442.
- SADEGHI, G., SANI, R. M., WANG, Y. 2015. Symbolic Meaning of Transparency in Contemporary Architecture: An Evaluation of Recent Public Buildings in Famagusta. In: *Current Urban Studies*. Vol. 3. No. 4, pp. 385–401.
- SALAT, S. 2011. *Cities and Forms: On Sustainable Urbanism*. Hermann Editeurs des Sciences et des Arts: CSTB Urban Morphology Laboratory. 543 p.
- SALINGAROS, N. A. 2014. *Twelve Lessons about Architecture. Algorithmic Sustainable Design*. Sustasis Foundation, Portland, Oregon. 256 p.
- STEPHENSON, J. Architecture as an economic driver. In: *Form*. URL: <https://www.formarchitecture.ca/news/architecture-economic-driver> [Access: 14.07.2019].
- VENTURI, R., IZENOUR, S., SCOTT BROWN, D. 2001. *Learning from Las Vegas: The Forgotten Symbolism of Architectural Form*. The MIT Press. Cambridge.
- ZAERE-POLO, A., ABASCAL, G. F. 2016. Architecture's "Political Compass": A Taxonomy of Emerging Architecture in One Diagram. In: *Archdaily*. URL: <https://www.archdaily.com/801641/architectures-political-compass-a-taxonomy-of-emerging-architecture-in-one-diagram> [Access: 24.08.2018].

# Competitiveness factors in spas and health resorts in Hungary and adjoining regions

MÁRTA BAKUCZ<sup>1</sup>

**Abstract:** In this paper two topics are linked. The first focuses on the competitiveness of Spa Tourism in two regions of Hungary – in settlements with different characteristics; the second asserts the need for a new way to measure competitiveness in the sector and proposes a new index.

The benefits of virtually all forms of tourism – economic or social – need no repetition. This is especially true of such fields as Spa or Health Tourism, in which there is a natural tendency towards longer stays and higher expenditure by visitors. For a relatively poor country such as Hungary – weak in natural resources apart from agricultural land – the basic presence of a generous supply of easily accessible thermal or medicinal water below a huge proportion of its surface area (70%) is a remarkable gift. Nevertheless, many factors are to be studied if a rational, sustainable development policy is to be elaborated by public and private interests.

There are many spas – settlements with thermal or medicinal waters (or both) – spread across Hungary, and their variety is extraordinary. There are huge differences in terms of size, visitor numbers, accommodation facilities, overnights, leisure or treatment facilities and location – that is, their closeness to favourable population areas (domestic or foreign). The critical decisions on investment and development need comprehensive data on all factors of all locations. The essential issue is competitiveness: in Central Europe, where spas have a long tradition (e.g., Germany, Austria and today's Czech Republic), does or can Hungary offer a sellable product?

In 2015 the writer-led team from the Faculty of Business and Economics at Pécs, supported by Hungary's National Scientific Research Foundation (OTKA), embarked on a study of the competitiveness of spas in the Southwest of the country – an area close to the border with Austria – both an important source of clients and, with its own modern, highly developed spa tourism sector, a serious competitor.

A total of 38 spas were examined in Hungary and Burgenland, with our approach based on a variety of considerations: on data obtained from, for example, Hungary's Central Statistical and Tax Offices, on the individual websites of spas, on personal visits and interviews by members of the research team and on a telephone survey of customers by a professional market research organisation.

Many factors were used to create a comprehensive set of indicators for what we hope will be accepted as a useful general-purpose tool. These ranged over basic concerns such

---

<sup>1</sup> MÁRTA BAKUCZ, University of Pécs, Faculty of Business & Economics, Hungary, bakuczster@gmail.com



as the type of water in a location and accessibility to size, accommodation quality, facilities and services – together, of course, with cost.

**Key words:** Spa Tourism, local environmental care, innovative tourism products, spillover-effect, regional co-opetition

**JEL Classification:** R11

## 1. Introduction

Health Tourism in Hungary is a unique product with a unique background in its spas based on an almost unlimited supply of natural thermal and medicinal waters, and these have the capacity for sustainable development and growth. However, although Hungary is only a modestly sized country, there are huge regional disparities within the sector in terms of history, development, competitiveness, client base and even seasonality. The sector has a highly fragmented ownership structure and the consequent differences in commercial and investment philosophy, experience and expertise do not generate great confidence for the future, even though its importance to the country is so obvious. There exists highly sophisticated competition in the immediate vicinity, and so constructive comment and criticism can only be of benefit. *The aim of our research* is to explore whether, as the result of the *spillover effect*, the regions having weaker potential, hence poorer indicators reflecting less developed economy and tourism, could have both regional and local benefit. We hope to offer an accurate picture of supply and demand factors in two neighbouring regions of Hungary (West and South Transdanubia). The regions are at different levels of development in competitiveness and the exploitation of these resources. The reasons for these differences are economic and geographic and so might originate in the quality of supply and the affluence of the clientele. We examined four spas in each region, comparing data on guests from the domestic and incoming markets; we explored differences in terms of average stay and income levels and also the role of spa development and various new trends. The spas selected for analysis were: Hévíz, Bük, Zalakaros and Lenti in West Transdanubia and Harkány, Nagyatád, Igal and Tamási in South Transdanubia. We duplicated this procedure in two neighbouring, cross-border regions of Austria (Burgenland) and Slovenia where the spas involved were Bad Sauerbrunn, Lutzmannsburg, Bad Tatzmannsdorf and Stegersbach in Burgenland and Radenci, Moravske Toplice, Terme Lendava and Terme Banovci in Slovenia.

The selection of four spas in each region was made on the basis of their size and the specialised or innovative services offered. In our study we present the Health Tourism characteristics of the four regions, their clientele and the current situation of the spas; the latest Health Tourism trends are also analysed, highlighting the role of environmental factors in choosing a destination.

## 2. The Role of Spa Tourism in some neighbouring Central European Regions

### 2.1 The Role of Spa Tourism in West and South Transdanubia

Perhaps the most important area of medicinal tourism in Hungary is West Transdanubia, which has unique natural endowments and a continuously developing infrastructural background. The leading role is also due to the effective use of development funds, through which a competitive and diverse supply of medicinal tourism has emerged. By high-quality spa and hotel development a spatially well-differentiated service network has grown, where, in addition to baths of international significance (Hévíz, Bük, Zalakaros), lesser spas (Lenti) are also significant.

The internationally known spa towns of the region feature permanently in the top 10 list of the most visited towns in Hungary (*Table 1*). Hévíz, Bük, Sárvár and Zalakaros could also thank their spas and the related tourism services, for having enjoyed for many years a large number of mainly foreign guests. In the top 10 list, not a single South Transdanubian spa is found – a fair reflection of the current difference between the regions.

**Table 1. Number of visitor-nights spent in commercial accommodation in thousands, West Transdanubian spa towns in bold**  
The most visited Hungarian settlements, 2015, 2018 \*

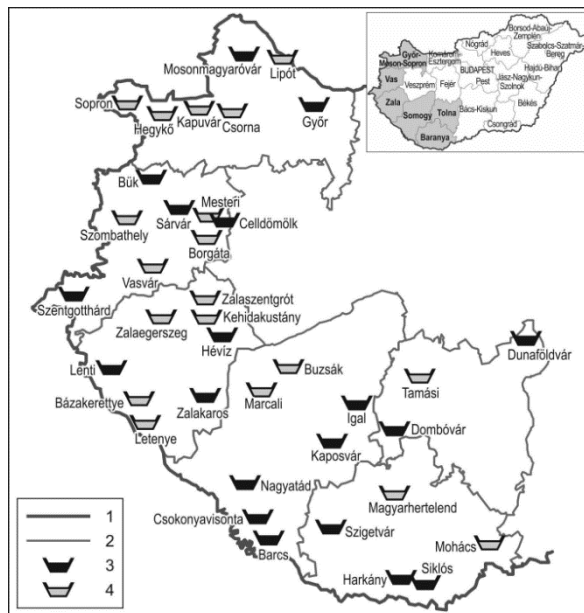
2015			2018		
City		Number of guest nights	City		Number of guest nights
1.	Budapest	8,152,775	1.	Budapest	10,370,479
2.	Hévíz	987,367	2.	Hévíz	1,135,549
3.	Hajdúszoboszló	803,671	3.	Hajdúszoboszló	991,103
4.	Siófok	706,856	4.	Bük	740,158
5.	Bük	679,835	5.	Balatonfüred	725,449
6.	Balatonfüred	543,500	6.	Zalakaros	638,069
7.	Sárvár	452,496	7.	Siófok	632,667
8.	Zalakaros	428,900	8.	Sárvár	494,970
9.	Sopron-Balf	381,645	9.	Győr	475,951
10.	Eger	371,324	10.	Szeged	442,240

Source: HCSO, 2016, 2019

In Hungary from the early 2000s to the end of the 2007–2013 planning period several major accommodation and spa investments were realized from national and EU development funds. As a result of this, hotel and spa construction or

reconstruction, in the settlements concerned, tourism revenues increased, the labour market improved, and often so did the basic and tourism infrastructure (Mundruczó, 2005, 11). At the national level the number of visitors and visitor-nights also increased, although in South Transdanubia developments did not bring the expected results.

Spa settlements involved in our research are shown in the following map (Figure 1):



**Figure 1. West and South Transdanubian spa settlements involved in this research**

Note: 1 – State border; 2 – County border; 3 – Medicinal spa; 4 – Thermal spa.

Source: Edited by the Authors.

In spite of its significant natural resources, South Transdanubia continuously loses ground to its domestic competitors, including West Transdanubia. In South Transdanubia the few investments were uncoordinated, general overall improvement was not felt and capacity expansion was not matched by increased demand. This may be due to the ‘siphoning’ power of West Transdanubia, and so the sector is very appropriate for asserting that, no matter how favourable touristic endowments are, only through *properly established hosting capacity* and integrated regional utilization of the reserves of thermal water can they become dominant players in tourism. An outstanding example is the neighbouring Austrian region of Burgenland.

There are regional and national processes which could explain the decline experienced in South Transdanubia. Statistical data back to 1990 confirm that the touristic position of the region has steadily deteriorated since the Transition. It is continuously drifting and lagging behind its competitors, and even those with a less favourable starting position such as the Great Plain regions having improved their position. If Health Tourism is taken as the basis, it may be that failure is due to more developed West Transdanubian and cross-border medicinal tourism regions ‘siphoning’ off domestic and foreign (Western) demand. Another reason could be the absence of developments in the region capable of attracting external investors. Quality (four- and five-star) hotels are lacking due to insufficient investment. The backwardness of the region was also reinforced by old, attractive destinations and baths (particularly Harkány) losing their significance whilst the new products, those restored by EU grants, – Igal, Nagyatád, Tamási – do not attract serious traffic. There is, therefore, no serious medicinal and thermal tourism product to trigger mass interest.

*Table 2* shows the number of visitors and visitor-nights in the relevant Hungarian spa settlements from 2011 to 2014. It is clear that the oldest and most popular spa in South Transdanubia, Harkány, is also unable to compete in volume with the most popular West Transdanubian spa settlements. Already in terms of visitor numbers, Harkány shows a 3 or 4-fold lag, although this increases for visitor-nights compared to Hévíz and Bük. The larger difference in the number of visitor-nights shows that the western spas, due to their services and programmes, are better able to hold their visitors longer. Although the waters of the spas of South Transdanubia are unique, they cannot, due to slow and non-innovative development, hold the visitors longer, and finding new clients is especially hard. Also regarding baths of regional importance, West Transdanubia is more successful. Lenti more than doubled its visitor-nights in 2014 due to continuous development. By contrast, smaller regional spas in South Transdanubia tended to stagnate (Nagyatád) or increased their clientele very slowly (Tamási) in the absence of suitable investment.

The internationally significant West Transdanubian spas of Hévíz, Bük and Zalakaros have produced similar visitor numbers in recent years. In the minor decline by Hévíz in 2014, political-economic problems affected its most important foreign source of visitors, Russia (the Ukraine conflict, rouble and oil crises), a phenomenon seen in all destinations with Russian clientele, including Hungary.

#### *The role of foreign clientele*

Due to individual treatments and high-quality accommodation, foreign clients play a significant role in the most important spas of Hungary. Foreign visitors are important since they spend a relatively long time in a particular area, they use many services and spend substantially more than Hungarian guests.

**Table 2. Number of visitors and visitor-nights in the West and South Transdanubian spa settlements examined**

	West Transdanubia				South Transdanubia			
	Hévíz	Bük	Zalakaros	Lenti	Harkány	Igal	Tamási	Nagyatád
	Number of visitors							
2011	207,000	154,430	131,294	8,341	46,486	1,916	2,329	3,053
2012	207,226	152,036	121,298	6,477	50,285	n/a	2,305	3,319
2013	204,853	157,692	117,486	6,513	48,636	1,322	2,711	2,616
2014	187,530	166,223	128,250	11,992	50,054	n/a	3,005	3,305
	Visitor nights							
2011	990,980	655,801	436,454	27,719	156,102	6,794	8,170	10,209
2012	1,004,622	635,181	403,133	23,226	163,625	n/a	8,130	10,433
2013	1,048,682	655,957	411,794	17,974	155,179	5,449	9,479	8,942
2014	987,367	679,835	428,900	41,355	155,333	n/a	10,056	10,888

Source: HCSO, 2015.

In *Table 3* foreign visitor-nights are shown, and in these terms West Transdanubia has absolute superiority due to its quality services and accommodation. In Bük the majority of visitor-nights are spent by foreign guests, and in Hévíz the most important guests are Russian. These appeared only in the last few years, but they overtook the number of German visitor-nights in 2014. Russian guests stay longer and are characterised by high spending.

German clients are still very important in the field of medicinal tourism both across Hungary and in the region. Germany is a dominant sending country with a long tradition in all the domestic spas examined. In addition to the traditional German client base, the volume of Czech tourists has increased due to the favourable location of the region, and their number constantly grows, especially in the case of Bük, where most overnights are spent by Czechs. The Czechs have a strong interest in high-quality medicinal tourism, since there is a very high level of spa culture in the Czech Republic, home to numerous old and prestigious spas. However, a negative trend is that in general a decline in the traditional Austrian guest circle has appeared. At the national level the number of Austrian visitor-nights decreased by 4% in 2012/2013 and by 2.2% in 2013/2014 (Hungarian National Tourist Office 2015). Among the reasons can be the development of the spas in Burgenland providing modern, improved services. The spa of Zalakaros is popular rather in the domestic market; in addition to the traditional German clientele, the proportion of Slovenian guests is the highest here due to its geographical location.

**Table 3. Distribution of foreign visitor-nights in the Hungarian spa settlements examined**

Highlighted countries	West Transdanubia				South Transdanubia			
	Hévíz	Bük	Lenti	Zalakaros	Harkány	Igal	Nagyatád	Tamási
Austria	83,442	105,001	14,242	20,372	1,004	157	418	222
Germany	207,048	111,577	5,838	37,245	19,028	1,796	1,113	1,762
Czech Republic	24,423	134,958	1,734	13,835	21,485	33	10	378
Russia	242,882	6,502	364	1,863	2,304	n/a	n/a	n/a
Netherlands	1,283	2,098	421	546	357	45	110	863
Poland	5,652	10,515	319	2,375	1,147	n/a	39	115
Switzerland	16,251	7,285	619	770	412	n/a	55	13
Slovakia	9,945	17,092	137	4,689	948	10	88	38
Croatia	509	434	21	286	783	n/a	18	15
Slovenia	1,929	1,558	365	2,226	171	n/a	97	64
Serbia	431	149	2	351	2,013	n/a	1	n/a
Other	52,070	4,013	871	5,708	1,398	338	532	58
Total	660,508	405,649	25,154	92,347	52,110	2,427	2,571	3,580

Source: HCSO, 2014.

South Transdanubian spa settlements attract far fewer foreign visitors; even the internationally significant Harkány has only slightly more than 50 thousand foreign guest-nights. Here the two major foreign markets are the Czech Republic and Germany. The other spa towns of the region examined have more regional significance, and only German guests could be regarded as significant in the case of smaller spas.

#### *Average length of stay*

In *Table 4* the average length of stay of foreign visitors can be seen in the Hungarian spa settlements. *Medicinal tourism* is usually characterised by longer durations of stay due to the complex treatments offered compared to other branches of tourism, and it can be seen that the longest times were spent by German and Russian guests who undergo long treatments and try many services in a particular spa. The longest stays are in Hévíz, where the town is able to attract foreign guests for long periods with its treatments and varied tourist programmes. Austrian and Czech guests pay shorter visits to destinations in general (3-6 days) but try more wellness services during their holiday. Regarding the length of stay, there is a smaller difference between the two Hungarian regions, although with some sender countries (e.g., Switzerland) there is a significant disparity in favour

of the more popular West Transdanubia. However, Igal, the small spa in South Transdanubia, clearly provides high value for its German clientele (9.7 days).

**Table 4. Distribution of foreign visitor-nights in the Hungarian spa settlements examined**

Highlighted countries	West Transdanubia				South Transdanubia			
	Hévíz	Bük	Lenti	Zalakaros	Harkány	Igal	Nagyatád	Tamási
Austria	4.2	3.3	3.9	3.8	4.8	4.2	6.1	6.0
Germany	10.1	8.3	6.8	8.8	7.8	9.7	5.2	10.6
Czech Republic	4.3	3.8	2.7	4.0	5.6	2.5	1.3	3.5
Russia	10.4	6.0	6.5	6.2	8.8	n/a	n/a	n/a
Netherlands	3.3	4.9	3.3	3.5	3.3	4.1	3.4	4.1
Poland	4.7	4.7	1.9	3.5	2.9	n/a	3.0	4.6
Switzerland	7.0	8.6	7.5	6.1	3.5	n/a	4.2	2.2
Slovakia	3.1	2.7	2.1	3.1	3.0	2.5	3.8	3.8
Croatia	2.9	2.6	2.3	2.9	2.3	n/a	1.3	5.0
Slovenia	1.8	2.3	2.5	3.0	2.0	n/a	4.2	4.0
Serbia	3.5	2.8	1.0	2.6	3.4	n/a	1.0	n/a
Average	6.8	4.3	4.0	4.6	5.4	7.6	4.6	5.8

Source: HCSO 2014.

## 2.2 Spa Tourism in Burgenland and the Pomurska Region (Pomurska/Pomurje)

In the neighbouring Austrian region of Burgenland, in recent years ongoing, well-planned developments were implemented, resulting in growing competition for Hungarian spas close to the border. In terms of their offers, they differ from Hungarian practice. The spas in Burgenland are characterised by their thematic nature based on their clientele and services; they complement each other's services and address different target groups by creating unique packages for their guests. In respect of the thematic nature among the spas in Burgenland, we can distinguish a family-friendly spa (Lutzmannsburg), a spa with specific medicinal and medical treatment (Bad Sauerbrunn) or one combining golf and wellness (Stegersbach). In addition, the spas of Burgenland are characterised by strong territorial cooperation (Bakucz, Flink, 2012). Environmental elements also play increasingly emphasized roles in the offerings introduced in detail in the specific analysis of the Burgenland spas. Thanks to this conscious development, a growing number of Burgenland spas are found among the most popular spa settlements in Austria (*Table 5*).

**Table 5. Best Austrian spas (Burgenland spas underlined)**

Best Spas in Austria, 2014				
	Wellness category	Entertainment category	Medicinal category	Family category
1.	Avita Terme	Therme Loipersdorf	Parktherme Bad Radkersburg	<i>Sonnenherme Lutzmannsburg</i>
2.	<i>Allergiatherme Stegersbach</i>	Eurotherme Bad Schallerbach	Avita Terme	Eurotherme Bad Schallerbach
3.	Therme Loipersdorf	<i>Sonnenherme Lutzmannsburg</i>	Therme Rogner Bad Blumau	<i>Allergiatherme Stegersbach and Therme Loipersdorf</i>

Source: Webhotels 2014.

Pomurska (Pomurje) is Slovenia's historic northeast region and also the centre of ethnic Hungarian Slovenian citizens. A key element of the touristic offer in this area is Health Tourism, a sector characterised by continuously developing infra- and supra-structure. In many cases in the area valuable thermal water was found during intensive crude oil and gas exploration, and these became popular spas. Of the four spa towns included in the analysis, Moravske Toplice is the most popular (thanks to its huge water theme park), whilst Lendava, Radenci and Verzej attract nearly the same number of guests.

Table 6 shows the number of visitors and visitor-nights of Burgenland and Moravske Pomurje. Both regions' spas are popular and permanently stable, and in some cases (Stegersbach, Radenci) have increasing guest numbers. The most popular spas of the two regions reach a total of ca. 500 thousand visitor-nights with different profiles. Whilst in the most popular spa of Burgenland, Bad Tatzmannsdorf, the traditional complex medical tourism offer dominated, the most popular spa of Moravske Pomorje, Moravske Toplice, attracts visitors based on wellness and thematic features. The smaller spas can also maintain a steady demand, always above 100 thousand visitor-nights.

Analysing the four regions, although the opportunities appear similar, the popularity of West Transdanubia is still outstanding. In the case of Burgenland, for example, the cause of the backlog in the number of visitors compared to West Transdanubia could be explained clearly by the lack of foreign markets. Analysing the data of the number of visitors and visitor-nights in the summer of 2014 (Table 7) it can be clearly seen that in the case of Bad Tatzmannsdorf providing the most popular and complex services, foreign visitor-nights form only 10% of the total; the best value in respect of Stegersbach (specializing in golf and wellness) is also only 16%. As for Bad Sauerbrunn (concentrating on special medical treatment) there are hardly any foreign visitor-nights (1%). In contrast, for Hévíz 67% of



visitor-nights, and for Bük 60%, come from foreign visitors (Statistik Burgenland 2014; HCSO 2014). The number of domestic visitors and visitor-nights, however, are very good for the Burgenland spas; with their thematic offers they can more effectively address domestic tourists, who in many cases have given up their holidays and treatments in Hungary in recent years for journeys to Burgenland.

**Table 6. Number of visitors and visitor-nights in the examined spas of Burgenland and Pomurska**

	NUMBER OF VISITORS			
	Burgenland spa settlements (Austria)			
	Bad Tatzmannsdorf	Lutzmannsburg	Stegersbach	Bad Sauerbrunn
2011	93,944	98,204	84,658	11,349
2012	104,893	79,294	90,481	11,661
2013	102,836	89,013	87,596	11,970
2014	108,993	92,187	91,837	13,301
	Pomurska Spa Settlements (Slovenia)			
	Lendava	Moravske Toplice	Radenci	Veržej
	2011	29,273	143,748	32,172
2012	30,669	135,860	33,091	27,817
2013	31,124	135,802	32,587	28,192
2014	32,275	137,581	36,493	29,575
	VISITOR NIGHTS			
	Burgenland spa settlements (Austria)			
	Bad Tatzmannsdorf	Lutzmannsburg	Stegersbach	Bad Sauerbrunn
2011	545,492	247,801	218,243	96,499
2012	565,759	201,853	229,838	100,415
2013	531,095	224,603	223,591	106,855
2014	535,509	230,166	232,818	120,534
	Pomurska Spa Settlements (Slovenia)			
	Lendava	Moravske Toplice	Radenci	Veržej
	2011	111,758	522,767	126,359
2012	111,133	508,865	137,371	103,961
2013	110,463	496,878	128,630	102,111
2014	114,777	490,564	132,534	103,851

Source: Statistik Burgenland Tourismus 2014, SI-STAT Statistical Office RS Slovenia 2014.

**Table 7. Domestic and foreign visitor number and number of visitor-nights in the examined settlements, 2014 summer period**

	Number of visitors, 2014			Visitor nights, 2014		
	Domestic	Foreign	Total	Domestic	Foreign	Total
Burgenland	501,656	135,449	637,105	1,464,603	504,106	1,968,709
Bad Sauerbrunn	6,826	225	7,051	63,114	631	63,745
Lutzmannsburg	42,662	4,397	47,059	110,492	14,335	124,827
Bad Tatzmannsdorf	48,065	5,346	53,411	252,493	27,495	279,988
Stegersbach	37,801	4,742	42,543	96,893	18,159	115,052

*Source:* Statistik Burgenland Tourismus 2014.

It is interesting to examine the differences between wellness and medicinal tourism and their effect on the spas of the area. In Stegersbach in 2014 91,837 visitors arrived, who spent there 232,818 visitor nights, the same numbers in the case of Bad Tatzmannsdorf: 108,993 visitors and 535,509 visitor-nights (so hardly 17 thousand visitors are the difference between the two spas, but they still differ by 300,000 visitor-nights). This also indicates the difference between wellness and medicinal tourism, so between Stegersbach and Bad Tatzmannsdorf, since in Stegersbach guests arrive for much shorter periods, for 2-3, maximum 4, days, whilst in Bad Tatzmannsdorf they take long treatments (even for several weeks). In Stegersbach, however, the rate of returning guests is high – those who come more than once per year for a few days, a wellness weekend or wellness treatment linked to a little golf or family swimming.

### **3. Comparative Analysis of the Most Significant Spa Settlements in West and South Transdanubia**

The objective of the above-mentioned OTKA study was the formulation of a so-called Competitiveness Index of Settlements with Spas (CISS) and, using CISS, the evaluation and comparison of settlements with medicinal and thermal spas based on their overall and tourism destination competitiveness. The index is based on tourism destination competitiveness models and factors that determine tourism destination competitiveness.

#### **3.1 The CISS comprises six sub-indices**

1. *Tourism indicators of a given settlement:* This group comprises a total of fifteen tourism indicators. These partly relate to guest arrivals (total number of guests, total number of nights spent, average length of stay, etc.) and are either calculated for all guest arrivals or for foreign tourist arrivals only. The rest of

the indices relate to tourist accommodation (occupancy rate, income per bed places, etc.).

2. *Medicinal tourism indicators* of a given settlement: This group comprises a total of eight tourism indicators. They focus on a specific segment of the tourist industry, namely medicinal tourism. Here we use only some of the indices in the first group, that is, we use only demand-side indicators and occupancy rate, and calculate them only for medicinal/spa hotels.
3. *Indicators of settlement infrastructure*: This group comprises a total of fifteen indicators and rests on a complex basis. Factors influencing the quality of life of local residents are also important, and so we paid particular attention to the number of houses/apartments with utility services, the size of green spaces in residential areas, the length of paved roads, family doctor and pharmacy services, the number of cars, telecommunication networks, residential homes with Internet connection. We normalised these indices to 1,000 residents. In this way we could compare settlements of different sizes.
4. *Economic situation* of a given settlement: This group comprises a total of ten indicators, which relate to the economic situation of a given settlement. Here we included indices describing economic operations and income levels. In order to be able to describe the economic performance/situation of a settlement, we need to quantify local income generation. To this end, we investigated local tax revenues, the employment situation and age structure of the population.
5. *Social components*: We have also taken into consideration the quality of social services when constructing our model. Here we included a total of ten indicators. These make up the fifth group. The model includes basic demographic variables, variables related to the number of inhabitants (population size), education-related data and the number of those receiving other social services. We also investigated public safety as a significant positive component based on the Tourism Penetration Index (TPI).
6. *The characteristics of local baths*: This section summarises the results of questionnaire data collection, expert interviews and website analyses.

While sub-indices can be used to rank settlements, they are not directly comparable.

In the third and final step we thus constructed a composite index by taking the average of the six sub-indices:

$$CISS = \frac{T_{tourism} + T_{medicinal} + T_{infrastructure} + T_{economic} + T_{social} + T_{bath}}{6}$$

**Table 8. Settlement-competitiveness sub-dimension, composite-index values and the ranking of settlements**

Settlements with Spas	Sub-dimensions						Composite index	Ranking
	I	II	III	IV	V	VI		
Győr	12	6	7	1	1	21	54,4	1
<i>Harkány</i>	8	4	3	15	4	6	49,3	2
Zalakaros	5	2	11	17	2	2	46,1	3
Hévíz	3	1	19	8	15	1	45,3	4
Bük	2	3	17	10	9	3	44,5	5
Zalaegerszeg	16	6	1	3	14	14	39,6	6
Sárvár	4	5	13	7	21	5	39,1	7
Kehidakustány	7	6	38	31	19	4	31,7	8
Sopron	20	6	6	4	5	31	30,1	9
Lipót	6	6	34	33	7	8	29,8	10

Source: Pótó, 2016.

### 3.2 The analysis of individual CISS components

Following our index-construction methodology, described above, we calculated a score for each settlement, which then translated into a clear ranking of settlements. In order to understand the final ranking of settlements, first we have to analyse and compare the different sub-dimension-based rankings of these settlements (Table 8).

It is obvious from the highlighted top ten Hungarian settlements out of the total 38 examined, included in the table above that there are significant regional differences. The dominance of West Transdanubian settlements with spas/baths is evident: with the exception of *Harkány*, all the others can be found in this region. The three most important settlements with respect to medical and thermal spa tourism, namely Hévíz, Bük and Zalakaros, score particularly high among sub-dimensions I and II (tourism-related indicators). Whereas the overall ranking of settlements is in line with our expectations, the high ranking of two West Transdanubian towns with spas is somewhat unexpected among the other settlements with baths. The high ranking of the two small settlements of Kehidakustány and Lipót is striking next to the two towns with economic (competitiveness) potential. However, this supports our hypothesis, that medical and thermal baths/spas play an important role in improving/increasing a settlement's competitiveness. Nonetheless, in order to understand the underlying mechanisms, we need to conduct a number of studies, which can shed light on the role that individual sub-

indices, and hence certain indicators/components, play in determining competitiveness.

*Table 8* suggests that, overall, settlements with medicinal spas score higher in our CISS-ranking. The average score of the 19 settlements with medicinal spas is higher than of those with thermal baths. We can get a more accurate picture, if we have a closer look at those sub-indices (i.e. I, II, and VI) that measure tourism-related competitiveness. There are significant differences between the rankings based on the tourism-related sub-indices also: the mean score of settlements with medicinal baths is higher than of those with thermal baths. Sub-index VI measures how well-known individual baths are. Here the ranking of settlements with medicinal spas is again more favourable than of those with thermal baths. Therefore, we can conclude that *settlements with medicinal spas are more competitive*. However, in the present study we can only document this relationship, but we cannot investigate the causality between the type of bath a certain settlement has and the ranking of the settlement. This requires further statistical analysis.

Amongst the spas with unique/rare spring-water composition Harkány, Hévíz, Bük, Zalakaros, and Sárvár all have top rankings. All five settlements score higher in the tourism-related sub-dimensions than in sub-dimensions measuring the settlement's general competitiveness.

#### 4. Conclusion

Of the three countries discussed, Hungary has the largest Spa Tourism sector and some tradition – including strong state support in the Socialist era. However, disposable incomes are low and if the domestic sector is to survive, foreign visitors are needed. So far these have mainly come from Germany; other sources are much weaker and less reliable. Austria is the wealthiest and most advanced socially and culturally, but the Austrian tradition is to holiday at home. Slovenia displays features of both.

These observations may explain some of the points above, but they offer little encouragement to the Hungarian Spa sector without a pro-active approach – regional 'co-opetition' being an obvious example of what is needed. Spa Tourism is the most significant touristic product of these regions, but our study showed that only innovative development sensitive to demand can help many spas to survive in an increasingly competitive market.

Serious environmental factors now play a greater role irrespective of location. Visitors are more aware and sensitive and their demands increase, influencing their choice of destination. In terms of the environment, the spas in Burgenland currently lead those of West Transdanubia, but the developments in Hungarian spa settlements are also moving in the right direction – mainly in the fields of

material usage and environment-friendly transport. Every service provider should consider these factors as environmentally conscious improvements do mean competitive advantage for a spa.

Taking into consideration the current situation and the trends examined and explored in this paper, we can conclude that, in the analysed geographical region, due to the *spill-over effect*, the more developed regions having spas, will, at least in the medium term, see a positive impact on tourism of the less developed Hungarian regions – so fostering competitiveness and (consequently) wealth creation and a higher quality of life for residents of settlements with spas in their particular regions.

### References

- BAKUCZ M., PÓTÓ ZS., KÖBLI, Á. 2016. The Competitiveness of Settlements with SPAS in some Central European Regions. In: *Acta Universitatis Danubius Oeconomica*. Vol. 12, No. 2, pp. 219–244.
- BAKUCZ M., FLINK, A. 2012. Competitiveness and Potential in Spas and Health Resorts in Some Central European Regions: Conclusions from on-going research in South Transdanubia, Hungary. In: ANRÉLIANE BEAUCLAIR, ELIZABETH MITCHELL (eds.) *Networks regions and cities [in] times of fragmentation: developing smart, sustainable and inclusive places: Annual European Conference, Sunday 13th May – Wednesday 16th May 2012, Delft University of Technology, Delft, the Netherlands*. Venue and time of the Conference: Delft, the Netherlands, 2012.05.13-2012.05.16. Seaford: Regional Studies Association, 2012. Paper 01. p.14.
- MUNDRUCZÓ, GY. 2005. Az egészségturisztikai fejlesztések gazdasági hatásai Magyarországon. In: <http://www.polgariszemle.hu/app/data/17.pdf>. p.11
- Statistik Burgenland Tourismus, viewed 12 November 2015. In: <http://www.burgenland.at/land-politik-verwaltung/land/statistik-burgenland/>
- Statinfo.ksh.hu, Hungarian Central Statistical Office (HCSO), viewed 29 October 2015. In: [www.ksh.hu](http://www.ksh.hu)
- SI-STAT Statistical Office RS Slovenia, viewed 31 October 2015. In: <http://www.stat.si/StatWeb/en/home>
- Webhotels 2014, viewed 19 November 2015. In: <http://www.webhotels.at/pressemitteilung-46/beste-therme-des-jahres-2014.htm>

# The Economic Role of Gastro-Festivals in Rural Regions

ISTVÁN BOTTYÁN<sup>1</sup>

**ABSTRACT:** Of the many sectors of tourism, gastronomy is rapidly becoming a significant driving force for travel, and it is an especially important feature of domestic tourism, thanks to its future development potential and its role of accelerator in each region. Gastronomic festivals can play a special role within the tourism industry, since a variety of individual or niche enterprises can be born as a direct result of their development. The aim of this paper is to show the economic and social impact of 'Gastro-Festivals' on the life of a region through two nationally -known events. The results of the research carried out are based on a questionnaire. In 2016 and 2017 a total of 941 visitors were surveyed. The results, evaluated by SPSS, produced representative results, and, with the help of established economic methods, we were able to determine the financial impact of these festivals on a region, thus strongly supporting decisions promoting regional development.

**Key words:** festivals, food, local economy, financial impact

## 1. Introduction

The objective of this study is to summarise the results of my research results obtained in the course of my examination of gastro-festivals' impact on regional economies, or, more precisely, two of the arguably most traditional domestic events, namely the Békéscsaba Sausage Festival (Békéscsabai Kolbászfesztivál) and the Baja Fish Festival (Bajai Halfőző Fesztivál).

Over a year, and in general terms, I analysed domestic gastro-festivals, and found that, on average, 200 events market themselves as gastronomic festivals every year, with roughly 65% of them lasting more than one day and 35% one filling a day. There are 10 county events in general, domestically, their standard deviation is 7.2, which means 3-17 by counties, 80% is one standard deviation from the average.

Budapest is totally exempt, where festivals are held in more than two standard deviation units.

There is no universally recognised definition of "festival" among the various professional organisations, researchers and institutions, and so a considerable scope exists for defining the term, for organisers and analysts alike.

---

<sup>1</sup> ISTVÁN BOTTYÁN, Pécs University, Faculty of Business and Economics, Hungary

In the course of my examination of festivals, I realised that their individual roles and objectives are not identical: there are some that have remained a 'get together' occasion in the local community, whilst others play a more significant role in the life of the region and a third group has achieved national standing.

Earlier, I divided the evolution of festivals into six phases: the first phase consists of purely local 'get togethers', with the aim of keeping in contact with friends; in the second phase the objective is relatively more serious: to demonstrate the local gastronomy and gastronomic culture in the form of organised events. In the third phase, the festivals play a touristic/economic role; the fourth sees them developing as independent touristic products, as a developed event which has a significant impact on the local economy and community. In the fifth, festivals can act as catalysts for various branches of industry – food processing, hotel accommodation development, infrastructure –; in the sixth phase, festivals can constitute a part of the National Food Industry Strategy.

I made a conscious decision to choose the festivals in question, as both can boast a rich tradition spanning a number of decades combined with a significant impact on their respective areas.

## 2. Method of Research

I evaluated the touristic attraction of gastro-festivals in a total of 1,039 gastro-touristic dedicated questionnaires. In the course of the survey, four data collections were made at two of Hungary's oldest and most important festivals: at the Békéscsaba Sausage Festival and the Baja Fish Festival. Surveys were conducted in 2016 and 2017 at both venues, in the framework of which volunteer interviewers conducted personal interviews on an ad hoc basis with festival goers who were not residents of Békéscsaba or Baja at the time of the interview. This enabled us, on the basis of analysing the answers to the questions to test the effects of the locations and the years, as well as the interactions of these two aspects.

Due to random sampling, all four sub-surveys can be considered sufficiently representative of the gastro-touristic audience at specific festivals, and we do commit the error of generalizing to a truly gastro-tourist audience that is difficult to define.

**Table 1. Festival goers' figures interviewed in 2016 and 2017 related to Baja and Békéscsaba**

Sample numbers	2016	2017	$\Sigma$
Békéscsaba	220	211	431
Baja	312	296	510
$\Sigma$	532	507	941

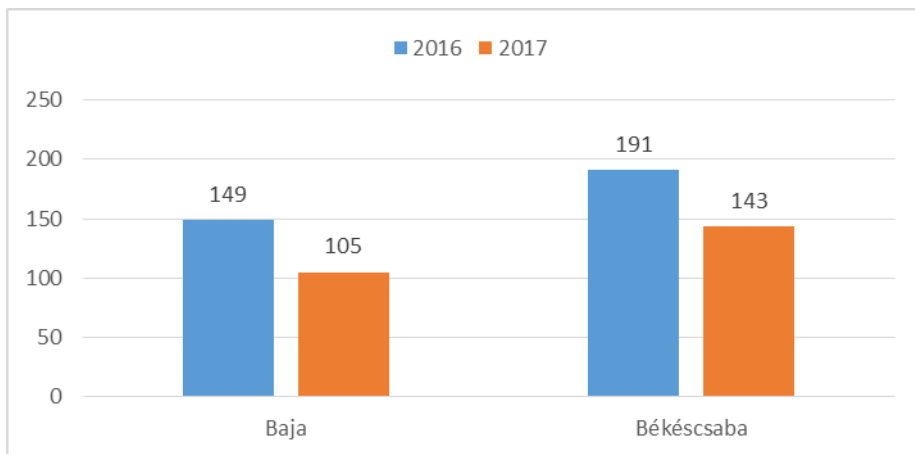
*Source:* Authors' own edition



## 2.1 Catchment area

Gastro-festivals are naturally visited by the residents of the host settlement, and this is particularly true in the case of the Baja Fish Festival, which has evolved from a local fish soup speciality (“halászlé”) cooking competition into a national, indeed internationally acclaimed event. However, only responses from non-local interviewees were recorded in the database, and not from Baja residents. The first question “How many kilometres do you live from the festival’s location?” received answers ranging from 9 to 1,600 kms, the main average was 144+4 kms (multiplication=123) (Figure 1).

Using a two-aspect variance analysis, we have found the location of the event is very significant ( $F=26,40$ ,  $p=0,000$ ), as well as the time of the event ( $F=34,03$ ,  $p=0,000$ ), but the location time interaction is not significant ( $F=0,01$ ,  $p=0,75$ ).... (the freedom level here and in all further cases is  $df=1; 940$ ).



**Figure 1. How many kilometers do you live from the festival’s location? (averages)**

Source: Authors’ own edition.

As can be seen on the diagram, the catchment area of the Békéscsaba Sausage Festival is substantially larger than that of the Baja Fish Festival. Clearly, this can be partly explained by the fact that Baja is centrally located, while Békéscsaba is situated in the east of the country, hence, it is farther from Budapest than Baja.

However, we also established that between 2016 and 2017 the catchment areas of both festivals shrank significantly. This can be explained by the fact that gastro-tourism and gastronomic festivals have gained ever more ground in Hungary in recent years, and from year to year ever more themed events appear on the scene,

creating a competitive environment. This results in people finding exciting events in the vicinity of their homes, thereby reducing their appetite for travelling greater distances for the sake of a particular festival than in the past, when Baja and Békéscsaba were the only truly famous ones domestically.

Taking all the responses into consideration, it was found that 70% of gastro-tourists travel by car to the festivals, 30% by public transport (train, bus) or by bicycle or other means, such as on foot. Location ( $F=22,47$ ,  $p=0,000$ ) and time ( $F=4,69$ ,  $p=0,020$ ) also had a significant influence, particularly location. 78% of visitors to the Békéscsaba festival travelled by car, while “only” 63% of visitors to the Baja festival. Viewed in terms of years, 2016= 74% by car, 2017= 66% by car.

Gastro-tourism motorists travelled on average 150 kms to the festivals, while tourists travelling by other means on average 131 kms ( $t=2,17$ ,  $p=0,030$ ,  $df=920$ ). Surprisingly, the difference in distance is not considerable. The main explanation for this is that in both years many gastro-tourists travelled to both festivals on travel agency-organised coaches.

## 2.2 Hotels – accommodation – staying

35% of gastro-tourists travelled to the festival for only 1 day, and so accommodation was not required. Close to 65% devoted more than 1 day for the adventure: average = 2.35 days (deviation = 1.23). The number of days spent in the respective areas does not, on average, differ by location, but, viewed in terms of years the difference is significant: in 2016 much more people attended the two festivals for only one day than in 2017. These figures reveal a lot about the festivals’ growing economic importance, since the longer the stay, the more money the visitor spends. Furthermore, it is also reflected in the fact that the festivals themselves have increasingly become the main attraction and motivation for the visitor’s excursion, rather than only being a sideshow. This is confirmed by the fact that more than 80% of those interviewed visited the localities expressly because of the festivals.

It is interesting to note when examining accommodation that, while 98% of visitors to Baja Fish Festival searched for and found lodging in Baja, only 55% of visitors overnights in Békéscsaba for the Sausage Festival, 45% looking for and finding lodging elsewhere, mainly in Gyula, which since 1965 has been an official medicinal spa resort. Another important factor is that the Békéscsaba festival organisers made a deliberate effort to structure the programmes in such a way that the weekday events were attractive.

### 2.3 With whom and why did visitors travel to the festivals

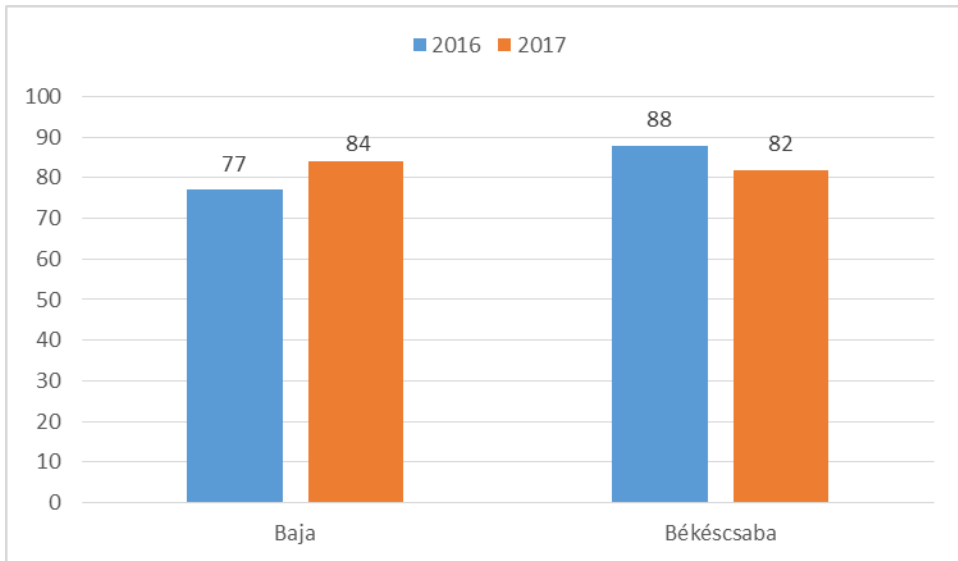
As festival-going is a form of social entertainment, only 13% of visitors arrived alone. Gastro-tourism is essentially a friends/ group-party form of entertainment, and so a greater number went with friends and/or colleagues rather than with family or partners. However, this phenomenon is more characteristic of the sausage festival than the fish festival.

83% of visitors stated that the festival was the primary reason for travelling to the locality, 17% listing other reasons, just visiting the festival along the way. The proportion was 85% in Békéscsaba, 81% in Baja. The difference was not significant, but keeping with the tendency ( $F=3,11$ ,  $p=0,078$ ).

There was no difference between the proportion of responses with respect to 2016 and 2017. At the same time, the locations\*time interaction was particularly significant ( $F=7,45$ ,  $p=0,006$ ). This can be primarily attributed to the respondents who attended the 2016 Baja festival, 23% of whom attended the festival only as an additional programme. Békéscsaba experienced a slight increase in ad hoc visitor numbers in 2017.

54% of the tourists interviewed had visited gastro-festivals on at least two occasions. We found that the location effect was extremely significant ( $F=9,21$ ,  $p=0,002$ ), while the year effect was not ( $F=0,15$ ,  $p=0,70$ ). The locations\*years interaction was, however, very significant ( $F=19,92$ ,  $p=0,000$ ). In Békéscsaba, the percentage of hardcore festival-goers rose from 53% in 2016 to 66% in 2017, while in Baja the percentage dropped from 58% to 42%. We can safely assume that this can be explained by the presence of side programmes, but, given the data available, more precise reasons cannot be given.

Among visitors who travel specifically for the festival, the share of hardcore festival gastro-tourists is 56%, while among visitors who visit the region for primarily other reasons, the percentage is „only” 45%. The most interesting statistic is that of visitors accompanied by friends and colleagues, 61% are hardcore gastro-tourists, while in other groups the proportion is only 48% ( $F=15,30$ ,  $p=0,000$ ). This statistic reinforces the supposition that groups made up of friends are emerging that organise gastronomy-themed trips themselves.



**Figure 3. Was the festival the unequivocal reason for visiting the given area? (yes, %)**

*Source: Authors' own creation.*

Finally we found that 65% of university graduates, 52% of high school graduates and only 47% of high school leavers without graduation are hardcore gastro-tourists. This can be partly explained by the fact that university graduates' earnings are generally considerably high, but another factor is that, like all trends, gastro-tourism spreads 'top-down' ( $F=7.50, p=0.001, df=2.934$ ). Regarding age range and gender, no significant differences were detected.

52% of gastro-tourists said that the festival itself was the attraction and they did not intend to visit the region's other attractions; 48% planned to visit the region's other sights.

Location has a significant impact on the responses ( $F=18.33, p=0.000$ ) while the location\*year interaction has an extremely strong impact ( $F=32.55, p=0.000$ ). The findings are also influenced by the fact the Békéscsaba region boasts more attractions than Baja.

#### **2.4 Accessing the target audience, how promotion channels are used**

16% of gastro-tourists could not respond to the question: „Where did you find out about the festival?”. 64% named one source, 20% more than one, the internet being the most often cited source among visitors: 81%. Compared to the internet,

others can be regarded as secondary sources: posters: 20%, flyers: 13%, local newspaper: 9%, national TV: 9%, local TV: 4%.

Respondents' level of education influenced the use of the internet: graduates=90%, school graduates=79%, school leavers without graduation=77%. Location also: Békéscsaba=86%, Baja=77%, while the influence of national TV is not so important among school graduates: Békéscsaba =12%, Baja=7%.

A similar situation can be observed in terms of years regarding mentions of the internet and national TV: 2016 – internet=77%, national TV=14%, 2017 – internet=85%, national TV=5%. It is evident that the internet plays an ever-growing role in the promotion of gastro-festivals, whilst the importance of TV advertising is waning.

## 2.5 Comparison of festivals' financial impact and role in regional economic and cultural life

Calculating with median categories, gastro-tourists spend an average 10,136 Hungarian forints on the premises of the festival. 8,561 HUF on accommodation, on food off the premises: 7,573 HUF, 7,776 HUF on transportation, 6,656 HUF on presents and others. Based on the 5 categories, average spending per capita at each of the 2 festivals is 40,701 HUF (*Table 2*).

**Table 2. In 2016 and 2017, spending by festival visitors on Baja and Békéscsaba**

Category of the cost	Baja		Békéscsaba	
	2016. av. HUF	2017. av. HUF	2016. av. HUF	2017. av. HUF
Transportation	5,612	6,593	7,017	11,881
Accommodation	5,967	7,260	8,045	12,971
On food off the premises	6,787	8,686	6,594	8,223
On the premises	7,238	10,625	9,486	13,193
Presents, others	5,762	8,443	6,375	6,045
Fully costs	31,366	41,607	37,517	52,313

*Source:* Authors' own edition.

To fully assess the two festivals' economic importance, we refer back to Donald Getz's formula.

$$Fi = (Vn - Vj) * CD * m$$

where Fi= Financial Impact, Vn= Visitors number, Vj=Visitors junior, CA= Additional Cost, CD= Direct Cost, m= multiplication value (C\_A/ C\_D).

Using the formula, we multiply spending per capita by the total number of visitors minus the attendees younger than 18 years old, and then multiply this by the multiplier.

With regard to Baja, we found that in 2016 the festival generated financial gains amounting to HUF 1.83 billion, and 2.25bn in 2017. In the case of Békéscsaba, higher amounts were recorded: in 2016, 2.16 bn, while in 2017, 3.23 bn.

Regarding the 5 items' average, based on the variance analysis the time effect was found to be extremely significant ( $F=60,44$ ,  $p=0,000$ ) together with the location ( $F=27.65$ ,  $p=0.000$ ).

The location\*time interaction was, however, not significant. In 2017, festival-goers spent substantially more money than in 2016, and growth was far greater than the annual rate of inflation. In both years, visitors to Békéscsaba spent more money than visitors to Baja.

Analysing spending averages, in the case of transportation expenses we found that besides the two main effects the interaction was also very significant (location:  $F=69.62$ ,  $p=0.000$ /year:  $F=53.14$ ;  $p=0.000$ ) / interaction =  $F=23.46$ ;  $p=0.000$ ). The latter arose because in Békéscsaba the average amount devoted to transportation grew much more robustly than for Baja, where in 2017 considerably more visitors arrived by public transport.

A similar situation characterizes accommodation spending (location:  $F=62.80$ ;  $p=0.000$ /year:  $F=40.65$ ;  $p=0.000$ / interaction:  $F=13.56$ ;  $p=0.000$ ).

Regarding food consumption off the venue's premises, neither the location effect nor the location\*year interaction were significant, but the time effect was very strong here, too:  $F=18.81$ ;  $p=0.000$ .

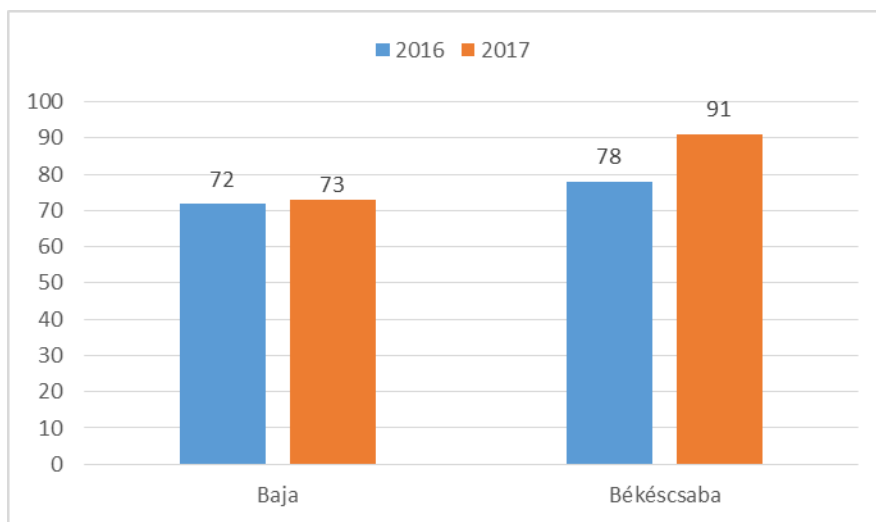
The time effect was the most relevant for on – premises spending:  $F=64.18$ ,  $p=0.000$ , but the location effect was also very significant:  $F=31.12$ ;  $p=0.000$ . Visitors to Békéscsaba spent substantially more in both years, and so the location\*year interaction is not significant.

Finally, regarding presents, the location\*year interaction was discovered to be the strongest:  $F=14.67$ ,  $p=0.000$ , as in Békéscsaba the average did not increase but rather decreased with this item, whilst time ( $F=8.95$ ,  $p=0.003$ ) and the location effect ( $F=5.15$ ;  $p=0.023$ ) were significant.

45% of visitors think that festivals play a prominent role in the economic and cultural life of their respective region; only 4% think they do not.

Based on a scale of 100 points for the responses: 100= prominent role, 75=significant role, 50=average, 25=minor role, 0=no role, we obtained an average of 78. Location has a very significant effect ( $F=50.41$ ;  $p=0.000$ ), as does time ( $F=15.24$ ;  $p=0.000$ ) and the location\*year interaction ( $F=13.78$ ;  $p=0.000$ ).

In Baja, opinions have not changed, whereas in Békéscsaba in 2017 visitors attached a much greater importance to the role of the festival than in 2016. The 91 point (*Figure 3*) average means that virtually everybody recognises the importance of this role.



**Figure 3. What role does the festival play in the region’s economic and cultural life? (averages on a scale of 100)**

*Source:* Authors’ own edition.

### 3. Conclusion

With regard to both festivals, we can state that they play a prominent role in the touristic life of the given regions. They are significant in financial terms and tourist traffic generation, evolving into stand-alone touristic products, serving the purpose of stimulating the desire to travel during the holiday or free time. While the Baja Fish Festival is “still only” in the fourth phase of festival evolution, in other words, it has a significant impact on the local economic and community life, the Békéscsaba festival has already developed into a catalyst for the local homemade food processing industry.

### References

- The tourism development plan of Bács-Kiskun county 2016–2020 (2016)  
FREEDMAN, D., PISANI R., PURVES R. 2005. Mean and Standard Deviation. In: *Statistics: Statistical methods in social research*. Typotex, pp. 77–79.

- DUARTW A., YI, L. 2011. Visitor Centers, Collaboration, and the Role of Local Food and Beverage as Regional Tourism Development Tools: The Case of the Blackwood River Valley in Western Australia. In: *Journal of Hospitality & Tourism Research*. Vol. 36, No. 4, pp. 517–536.
- ERDŐS, A. 2004. The Contemporary Dionysus Holidays – The Situation of the Event Tourism from the Perspective of a Quantitative Research. In: *Turizmus Bulletin*. No. 8, pp. 33–40.
- GETZ, D. 2010. The nature and scope of festival studies. In: *International Journal of Event Management Research*. Vol. 5, No. 1, pp. 1–47.
- GETZ, D. 2012. Festivals, Special Events, and Tourism.
- HUNYADI, ZS., INKEI, P., SZABÓ, J, Z. 2006. Festival-world. In: Budapest NKA-studies
- KALKESTEIN, C. A., LEHTO X, Y., CAI, L, A. 2007. Food and food related elements of festival brochures in rural Indiana: A content analysis. In: Annual International CHRIE Conference & Exposition. pp. 164–172.
- KÖRMENDI, J., KÉPES, M., LAURINYEZCZ. 2007. XI. Békéscsaba Sausage Festival Impact Study. In: KIFT-92 Travel Agency.
- KÖRMENDI, J., KÉPES, M., LAURINYEZCZ. 2008. XI. Békéscsaba Sausage Festival Impact Study. In: KIFT-92 Travel Agency.
- KÖRMENDI, J., KÉPES, M., LAURINYEZCZ. 2009. XI. Békéscsaba Sausage Festival Impact Study. In: KIFT-92 Travel Agency.
- KÖRMENDI, J., KÉPES, M., LAURINYEZCZ. 2010. XI. Békéscsaba Sausage Festival Impact Study. In: KIFT-92 Travel Agency.
- KUNDI, V. 2012. Analysis of the economic and socio-cultural effects of festivals on cities through the example of the Hungarian Dance Festival in Győr and the Miskolc Opera Festival. Ph.D. doctoral dissertation. István Széchenyi Doctoral School of Regional and Economic Sciences
- OTTENBACHER, M, C., HARRINGTON, R, J. 2011. A Case Study of a Culinary Tourism Campaign in Germany. In: *Journal of Hospitality & Tourism Research*. Vol. 37, pp. 3–28.
- KOTLER, P. et al. 1993. Marketing Places: Attracting Investment and Tourism to Cities, States and Nations. In: Free Press. pp. 141.
- POPESCU, R., CORBOS, R. A. 2012. The Role of Festivals and Cultural Events in the Strategic Development of Cities. Recommendations for Urban Areas in Romania. In: *Informatica Economică*. Vol. 16, No. 4. pp. 19–28.
- SULYOK, J. 2010. Festival attendance habits of the Hungarian population. In: *Turizmus Bulletin*. Vol. 14, No. 3. pp. 2–11.



## **Chapter 3**

### **Sustianable development in urban and rural areas**



# Effect of Brexit on rural development in Hungary, especially on agroforestry

KINGA SZABÓ<sup>1</sup>, DIÁNA KOPONICSNÉ GYÖRKE<sup>2</sup>

**Abstract:** The United Kingdom is going to leave the European Union in the near future. This is the very first time a member state quits the integration, therefore, there are many open questions still unanswered and which anticipate several post-Brexit scenarios in the European Union. It has one of the most serious effects on the common budget as the total revenues of the integration are going to decrease. On the other hand, with the new multiannual financial framework starting in 2021, the European Union will shift the focus among its main priorities and objectives. The share and rule of agricultural and cohesion subsidies in the common budget will definitely decrease.

Since the rural areas' development depends significantly on the incoming European sources and subsidies in Hungary, it is important to analyse the changes of the CAP budget with a special attention to the 2nd pillar measures. In our study we are going to examine the evolution of the new multiannual financial framework's draft and introduce some possible scenarios concerning Hungarian rural development.

It is a very actual and unsteady research topic as day-by-day decisions can have a significant effect on it, therefore, no one can formulate indisputable statements and findings about it.

**Key words:** EU, Brexit, MFF, rural development, agroforestry

**JEL Classification:** Q18, Q14, F530, F550, F150

## 1. Introduction

The UK is going to leave the European Union this autumn. Speculations began immediately after the Brexit voting in summer 2016 about the possible impacts of the first withdrawal from the integration. One of the most important issues is the question of financial contribution and the effects of the Brexit "gap" (actually the missing UK contribution to the common budget of the EU) on the different policies of the integration.

---

<sup>1</sup> KINGA SZABÓ, Kaposvár University, Hungary

<sup>2</sup> DIÁNA KOPONICSNÉ GYÖRKE, Kaposvár University, Hungary

## 2. Body of Paper

### 2.1 Steps towards Withdrawal from the EU – the History of Brexit

The United Kingdom was always a reluctant member of the European integration. It joined the EU after long negotiations and failures. The UK has had several opt-out opportunities during the decades within the EU: in the case of the euro as a common currency, the question of membership in the Schengen area or last but not least the rebate as a loophole in the common budget. It's clear that for the United Kingdom, excessive federalism and a supranational integration were never options. Among the exceptions, the referendum on withdrawing from the

EU is the most serious, which led to Brexit. On June 23, 2016, 51.9% of voters voted to leave integration.

The legal base of the exit was established with the Lisbon amendment of the founding treaty. Until 2009 there was no legislation or any regulation on how to leave the integration. According to Article 50 of the Treaty on the European Union „*any Member State may decide to withdraw from the Union in accordance with its own constitutional requirements.*” Negotiations shall be conducted according to the guidelines of the European Council in accordance with Article 218(3) of the Treaty on the Functioning of the European Union. It regulates the rules of negotiations with third (non-member) countries and international organizations. The exit shall take place after two years without an agreement if there is no signed treaty, but this deadline can be extended (TEU, Article 50). Theresa May submitted the letter of intention in March 2017, so the first official deadline of Brexit was 29 March 2019.

The three main issues of the Brexit negotiations are:

- a) The position of EU workers in the UK and the state of British workers at the EU27's labour market;
- b) The Brexit „bill” – what financial obligations the UK will have towards the Union and vice versa and for how long;
- c) Border interoperability issue between Ireland and Northern Ireland

Based on the last year's decisions and debates in the House of Commons the third point turned out to be the most serious and the hardest to find a solution to that is acceptable for each party. There is a no final but only a latest version of the Brexit agreement which was already adopted by the EU in December 2018. According to the EU's position, this is the final version and the integration is against any other further amendments. On the other hand, the EU has been allowed all of the deadline extensions, and last but not least, the EU is going to elect new leaders this autumn after the EP elections, thus it might also change its position. As for the UK's position, until recently, there have been three votings in the House

of Commons during which the favorable votes always constituted a minority albeit an increasing minority (House of Common 2019 a, b, c).

Actually, at the time of writing this article the situation is more uncertain than ever before. The UK government requested an extension after the second unsuccessful voting about the agreement. The EU accepted the UK's position, so now the valid deadline of the Brexit is 31 of October 2019. This summer Theresa May resigned from office and Boris Johnson, one of the most famous pro-Brexit politicians in the UK became the new prime minister. He made clear that the UK would leave the EU at the end of October with or without an agreement. On 28 August, the Queen consented to the suspension of parliament for five weeks. According to Johnson's plan, the opposition will have only two weeks in Parliament before the end of October to do anything in the question of Brexit. It serves the prime minister well, because he has only a one-member majority in the House of Commons.

## 2.2 Possible Brexit Scenarios

As the UK is the first member to leave the European integration, it could rely on no previous examples during the negotiations. The main point of departure was constituted by the existing agreements between the EU and third countries and the pattern of cooperation with other democratic states. An example of possible cooperation is Norway, Switzerland, the European Economic Area (EEA) cooperation, EFTA and, as a last resort, the WTO, which would mean that the EU and the United Kingdom would treat each other as equal partners in the world economy, without providing any relief *ab ovo* to each other. Nor do they exclude the possibility of closer cooperation in the future (see free trade negotiations between the EU and Canada and formerly the US). *Table 1* summarizes the most likely cooperation options and lists the pros and cons for the UK.

According to the Brexit agreement, the EU and the UK remain partners in the framework of a customs union. The weakest point of the draft agreement is the so-called „backstop”. The backstop is a position of last resort, aiming to maintain a seamless border on the island of Ireland. Based on the draft, if the UK leaves the customs union, Ireland and Northern Ireland will remain a part of the cooperation until an undefined deadline. However, this condition is perceived by the British as interference in their internal affairs. This has led to the current stalemate.

**Table 1. Possible Brexit scenarios**

	Cons	Pros
The Norway model – EEA membership	<ul style="list-style-type: none"> <li>– required to implement Single Market policies without representation in setting the rules</li> <li>– must comply with rules of origin for exports to the EU and with subjects to EU anti-dumping measures</li> <li>– contribution to the EU budget</li> </ul>	<ul style="list-style-type: none"> <li>– single market</li> <li>– able to negotiate trade deals independently of the EU</li> </ul>
The Swiss model – bilateral agreement	<ul style="list-style-type: none"> <li>– required to implement policies without representation in setting the rules</li> <li>– pay a fee to participate in EU programmes</li> </ul>	<ul style="list-style-type: none"> <li>– free trade in goods and free movement of people with the EU</li> <li>– able to negotiate trade deals independently of the EU</li> <li>– opting out of EU programmes on a case-by-case basis</li> </ul>
EFTA membership	<ul style="list-style-type: none"> <li>– no free movement of people</li> <li>– no free movement of services</li> <li>– goods exported to the EU must meet EU product standards</li> </ul>	<ul style="list-style-type: none"> <li>– free trade in goods with the EU</li> <li>– able to negotiate trade deals independently of the EU</li> <li>– not required to adopt EU economic policies and regulations</li> <li>– no budget contribution</li> </ul>
WTO model („hard Brexit“)	<ul style="list-style-type: none"> <li>– trade with the EU subject to MFN tariffs and any non-tariff barriers that comply with WTO agreements</li> <li>– no free movement of people</li> <li>– no right of access to EU markets for service providers</li> <li>– goods exported to the EU must meet EU product standards</li> </ul>	<ul style="list-style-type: none"> <li>– able to negotiate trade deals independently of the EU</li> <li>– not required to adopt EU economic policies and regulations</li> <li>– no budget contribution</li> </ul>

Source: Dhingara et al., 2016. p. 9.

### 2.3 The Brexit Gap and the Brexit Bill

The most important question is the Brexit's effect on the common budget: how large will be the missing amount of money? The amount examined can be divided into two parts, the Brexit bill and the Brexit gap in the EU budget. The “bill” has a one-off effect and includes the commitments that the Union has made before Brexit and that are due after Brexit (may be delayed up to 2023).

A more important issue is the question of Brexit's "gap" of budget revenue, which will last for a long time, and after the UK's exit, the EU will have to calculate with a reduced budget. There is a slightly greater consensus on this amount. Darvas and Wolff calculated 94 billion EUR to the next seven-year financial framework (Darvas, Wolff, 2017), or a 13 billion EUR/year deficit. Gábor Pápai based on the United Kingdom's annual net budget contribution predicted 9 billion EUR shortly after Brexit was announced (Pápai, 2017). At present, therefore, it appears that the EU has to face a structural deficit of around 10 billion EUR a year when planning expenditure for the next financial period. This amount is the difference between the UK's average annual budget contribution of 17.4 billion EUR and the EU's subsidy of 7.2 billion EUR to the country (Haas, Rubio, 2017b). There are several different items increasing and decreasing the EU's common budget. The details are summed up in *Table 2*.

**Table 2. Brexit's items increasing and decreasing the common budget**

Items increasing the EU's budget and its amount		Items decreasing the EU's budget and its amount	
+ custom duties (in the case of hard Brexit)	4.5–4.6 billion EUR	– UK's contribution as a member	3+14 billion EUR
+ rebate	10 billion EUR	– statistical effect, decrease of GNI base	17% decrease of the GNI base
+ future subventions will not paid	7 billion EUR	– in the case of a soft Brexit some subventions to the UK	cannot be planned yet
+ in the case of a soft Brexit some UK contribution	4.5–7.5 billion EUR		

*Source:* Based on Haas, Rubio, 2017a, 2017b; Nunez-Ferrer, Rinaldi, 2016 and Pápai, 2017.

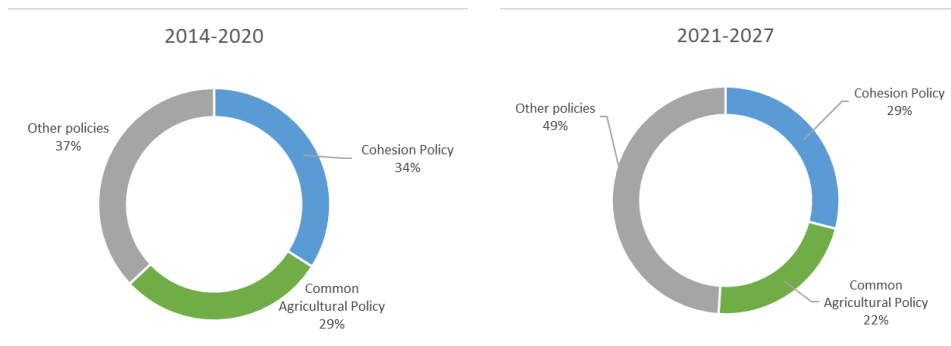
## 2.4 The Reduced Budget's Effect on the CAP

The EU has three different solutions to correct its annual budget with the amount equal to the Brexit gap.

- a) Increase of member states contribution
- b) Restraint of expenditure proportionately
- c) Mixture of the above-mentioned two solutions

The Common Agricultural Policy with the Cohesion Policy covers 72% of the multiannual Financial Framework (MFF) for 2014–2020 with their share of EUR

408 billion and EUR 367 billion, respectively. So it is obvious that these policies make more sacrifices when it comes to expenditure restraint (*see Figure 1*).



**Figure 1. Changes in the Multiannual Financial Framework**

*Source:* Bachtler, Mendez and Wislade, 2019, p. 7.

The new MFF for 2021–2027 puts less emphasis on the Common Agricultural Policy (CAP) than in previous periods allocating 365 billion EUR at current prices on the regulation of agriculture. At EU level, this represents a 5% drop for agriculture at current prices compared to the previous period. This decrease in resources concerns both the direct payments (–4%) and second pillar payments, the latter to a greater extent (*see Table 3*). The reduction in rural development support is planned to offset by a 10% increase in co-financing.

**Table 3. Share of Pillar 2 in CAP Budget, various MFF proposals**

	2014–2020	2014–2020	2021–2027
	2011 prices	2011 prices	2018 prices
	Commission proposal 2012	European Council conclusion 2013	Commission proposal 2018
CAP total (billion EUR)	375,018	362,787	324,294
EAGF (billion EUR)	283,051	277,851	254,257
EAFRD (billion EUR)	91,967	84,937	70,037
Share EAFRD in total	25%	23%	22%

*Source:* Matthews, 2018a.

The CAP cuts seem to have been disappointingly focused on the more worthwhile rural development and agri-environment support, rather than on direct payments to farmers, which is clearly not consistent with the Commission’s overall message about better targeting and EU added value, or with the 2016 Cork



2.0 declaration's focus on the rural environment, natural resources, and rural vitality (Nesbit, 2018).

While examining the impact of Brexit on EU agricultural policy, Alan Matthews found that 15 member states – including Hungary – can benefit, while 12 member states remain net contributors to CAP after the UK leaving the Community (Matthews, 2018b). Examining the effects in Hungary, Békési, Kovalszky – Varna agree with international forecasts that the resources available for agriculture and rural development will not change significantly (Békési, Kovalszky and Várnai, 2017). However Vermaas-Ziegler points out that the Brexit will also lower the EU regional average, therefore, certain regions may lose their status simply because of the statistical effect and in the future, resources for the development of small and medium-sized enterprises will be reduced (Vermaas-Ziegler, 2017).

## 2.5 Agroforestry as a Tool for Rural Development

Agroforestry in Hungary takes place in the context of the Common Agricultural Policy (CAP) of the EU. The current CAP is monitored in relation to three objectives (Mosquera-Losada et al. 2017):

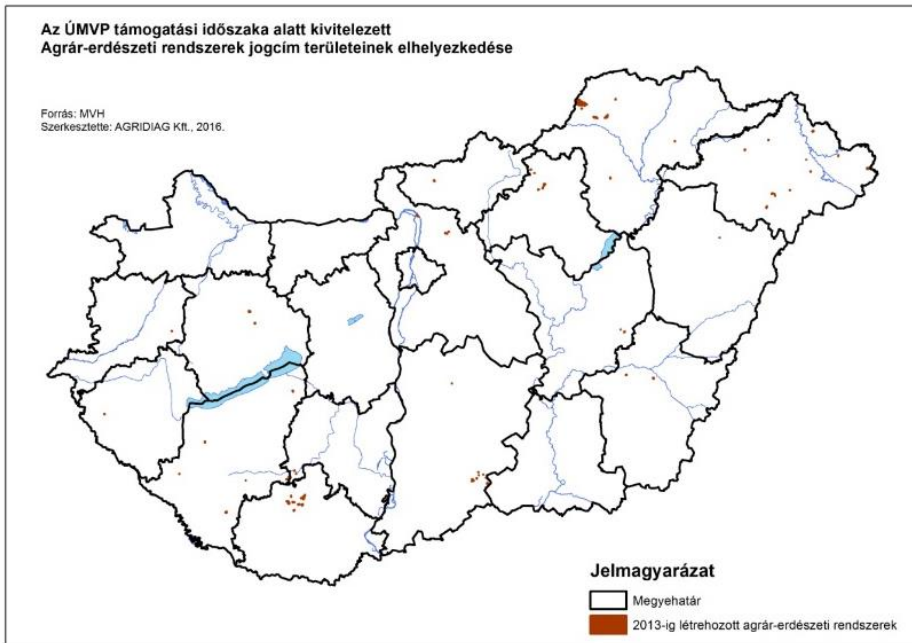
- a) viable food production, with a focus on agricultural income, agricultural productivity and price stability,
- b) sustainable management of natural resources and climate action, with a focus on greenhouse gas emissions, biodiversity, soil and water and
- c) balanced territorial development, with a focus on rural employment, growth and poverty in rural areas (Regulation 1306/2013)

Agroforestry measures in Pillar II of the CAP (Rural Development) focus on the delivery of environmental benefits.

An agroforestry measure was introduced in Hungary for the first time in the 2007–2013 CAP within the framework of New Hungary Rural Development Programme (NHRDP) (*Figure 2*). The aim of the measure 222. *First establishment of agroforestry system on agricultural land* was

- a) improving landscape value by establishing native trees,
- b) improving biodiversity by establishing different tree species,
- c) to inspire farmers to establish alternative farming systems,
- d) provide feed for protected bird species,
- e) to support the re-establishing of grazing forests,
- f) to improve grazing farming methods.

According to the ex-post evaluation of the NHRDP there was low interest in the support. From the 173 support requests, only 111 requests were supported for 69 farmers. Based on the payment requests, agroforestry systems were launched on 1,483 hectares with the support of Measure 222.



**Figure 2. Agroforestry systems established by the support of NHRDP**

*Source:* Ex-post evaluation of NHRDP p. 313.

*Translations for the legends:* county borders/established agroforestry-systems until 2013.

The establishment of silvopasture was supported on 550 hectares and farmers received support for planting trees on 933 hectares of already existing grassland. A total subsidy of 382,731,150 HUF was paid to the farmers, more than 55% of the total support was paid in Borsod-Abaúj-Zemplén and in Nógrád counties. In this period, 1483 hectares of silvopasture was established with the help of rural development support in the country.

Despite only a partial achievement of the fixed objectives with only 1483 hectares of the planned 3000 hectares of new silvopasture implemented, the NHRDP contributed to a number of environmental goals. Providing silvopasture has a positive impact of increasing biodiversity. The new establishments help the resettlement of numerous species.

Between 2014 and 2020, it became possible to establish agroforestry systems with the support of rural development payments according to Article 21 (1) (b) and 23 Regulation (EU) No 1305/2013 of the European Parliament and the Council on support for rural development by the European Agricultural Fund of Rural Development (EAFRD).

In the context of strategic programming for the period 2014–2020, agroforestry systems contribute to:

- Priority 5: “Promoting resource efficiency and supporting the shift towards a low carbon and climate resilient economy in the agriculture and food sectors and the forestry sector, and especially to Focus area 5 E: “Fostering carbon sequestration in agriculture and forestry” and to
- Priority 4: “Restoring, preserving and enhancing ecosystems related to agriculture and forestry.”

Based on Regulation 1305/2013, the current Hungarian Rural Development Programme consists of the measure “Establishment of agroforestry systems” with a total budget of 7272 million euros. The targeted number of beneficiaries of the measure is 100 farmers and the targeted number of hectares under new agroforestry systems is 2000.

The following two types of operations could be supported:

- establishment of agroforestry systems
- maintenance of the established agroforestry systems

According to preliminary data for the measure, 72 farmers requested support in Hungary until 2018 for establishing agroforestry systems. The requests cover more than 1000 hectares (*Table 3*). Almost 70% of the affected area is in Borsod-Abaúj-Zemplén County.

**Table 3: Requested support in measure Establishing agroforestry systems until 2018**

Supported activity		Payment request	Affected area (hectare)
Establishment of silvoarable		13	175
Establishment of silvopasture	establishment of pastureland and tree planting	27	671
	tree planting on an existing pastureland	26	423
Hedgerow	planting a hedgerow	4	13
	groups of trees	2	10
Total		72	1,192

*Source:* Based on the Hungarian State Treasury’s data

Despite farmers had two more opportunities to request support for establishing agroforestry systems in 2019 according to the tender call VP5-8.2.1., it is unlikely that the measure will reach the targeted number of beneficiaries and hectares in the current programming period.

In the next programming period, support for establishing agroforestry systems will definitely be a part of the Hungarian rural development program, however, determining the size of the budget allocated to the measure is a member state competence. The fact that during the last two periods, the available resources could not be allocated due to a lack of interest from the farmers will make negotiations difficult.

### 3. Conclusion

The United Kingdom leaving the European Union will not only affect the everyday life and economic position of the UK, its consequences will also be felt by the remaining member states. As we have pointed out, European farmers will have to face changes both in trade and subsidisation as the budget of CAP will be reduced in the upcoming MFF. The second pillar of the CAP will have to expect a larger decrease in the budget which will not necessarily mean less support for the beneficiaries as this reduction in rural development support is planned to offset a 10% increase in co-financing. We have shown that the future budget for the measure “Establishing agroforestry systems” within the new rural development program will be determined by member states’ decision on how to allocate the available financial framework rather than as a consequence of Brexit.

### Acknowledgements

The information presented in this paper is based on the research supported by the EFOP-3.6.2-16-2017-00018 “Produce together with nature – agroforestry as a new outbreaking possibility” project.

### References

- BACHTLER, J., MENDEZ, C., WISHLADE, F. 2019. *Reforming the MFF and Cohesion Policy 2021-27: pragmatic drift or paradigmatic shift?* European Policy Research Paper No. 107, University of Strathclyde Publishing.
- BÉKÉSI, L., KOVALSZKY, ZS., VÁRNAI, T. 2017. *Forgatókönyvek a Brexit lehetséges magyar makrogazdasági hatásaira.* MNB-tanulmányok 125. Budapest.
- DARVAS, ZS., WOLFF, G. 2018. *Rethinking the European Union’s post-Brexit budget priorities.* Policy Briefs 24758, Bruegel.
- DHINGARA, S., SAMPSON, T. 2016. *Life after BREXIT: What are the UK’s options outside the European Union?* London School of Economics and Political Science (LSE), Centre for Economic Performance Paper Brexit 01
- HAAS, J., RUBIO, E. 2017a. *Brexit and the EU budget: Threat or opportunity.* Jacques Delors Institut – Berlin; Bertelsmann Stiftung.

- HAAS, J., RUBIO, E. 2017b. *Research for AGRI Committee – Possible impact of Brexit on the EU budget and, in particular, CAP funding*. European Parliament, Policy Department for Structural and Cohesion Policies, Brussels.
- HOUSE OF COMMONS 2019a. *Voting and Proceedings*. No 234. 15.01.2019
- HOUSE OF COMMONS 2019b. *Voting and Proceedings*. No 267. 12.03.2019
- HOUSE OF COMMONS 2019c. *Voting and Proceedings*. No 280. 29.03.2019
- MATTHEWS, A. 2018a. Commission assaults rural development spending to protect direct payments. <http://capreform.eu/commission-assaults-rural-development-spending-to-protect-direct-payments/>
- MATTHEWS, A. 2018b. France's puzzling interest in increasing the CAP budget. <http://capreform.eu/frances-puzzling-interest-in-increasing-the-cap-budget/>
- MOSQUERA-LOSADA, M. R. et al. 2017. How can policy support the uptake of agroforestry in Europe? *AGROFORWARD*. pp. 14–19.
- NESBIT, M. 2018. Commission budget proposals for 2021–2027: An IEEP guide to the environmental issues. <https://ieep.eu/news/commission-budget-proposals-for-2021-2027-an-ieep-guide-to-the-environmental-issues>
- New Hungary Rural Development Programme (NHRDP) pp. 307–315.  
<http://extwprlegs1.fao.org/docs/pdf/hun161837.pdf>
- NUNEZ-FERRER, J., RINALDI, D. 2016. *The Impact of Brexit on the EU Budget: A Non-Catastrophic Event*. CEPS Policy Brief, No. 347. <https://ssrn.com/abstract=2859407>
- PÁPAI, G. 2017. *The possible impacts of Brexit on the Common Agricultural Policy from an EU budget point of view*. Proceedings of the 6<sup>th</sup> International Conference of Economic Sciences. Kaposvár University. pp. 347–354.
- REGULATION (EU) No 1305/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 December 2013 on support for rural development by the European Agricultural Fund for Rural Development (EAFRD) and repealing Council Regulation (EC) No 1698/2005 Official Journal of the European Union L 347/487 20.12.2013
- REGULATION (EU) No 1306/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 December 2013 on the financing, management and monitoring of the common agricultural policy and repealing Council Regulations (EEC) No 352/78, (EC) No 165/94, (EC) No 2799/98, (EC) No 814/2000, (EC) No 1290/2005 and (EC) No 485/2008 Official Journal of the European Union Official Journal of the European Union L 347/549 20.12.2013
- Az Új Magyarország Vidékfejlesztési Program (2007–2013) utólagos (ex-post) értékelése II. kötet. pp. 311–315. <https://www.palyazat.gov.hu/az-j-magyarorsz-g-vidkfejleszt-tsi-program-2007-2013-utlagos-ex-post-rtkelse>
- VERMAAS-ZIEGLER, SZ. 2017. *A brexit lehetséges gazdasági hatásai az Egyesült Királyságra és Magyarország gazdaságára*. Budapest: Külügyi és Külgazdasági Intézet. (KKI-elemzések).  
Treaty on the European Union (TEU)

# Urban Regeneration Processes and Their Consequences for the Urban Economic Base in Polish Cities

EWA M. BORYCZKA<sup>1</sup>

**Abstract:** Dynamic changes, after 1989 forced out changes in urban economic structures contributing to intensive development of services, necessary modernisation of industry, and stimulating local entrepreneurship. Yet, not all changes were so positive. They also triggered a number of social problems caused by the polarisation of society which got divided into the rich and the poor, the active and the passive. Unfortunately, many Polish cities not only have ceased to grow but they experience problems that restrict their development and transformations. The decreasing economic importance of industrial plants and the loss of major urban functions result in the emergence of crisis areas. Thus, we may conclude that transformations of the functional structure of contemporary cities are needed to adjust them to the current and future needs of their residents. During regeneration efforts, as a result of coordinated activities aimed at the transformation of functional and spatial structures of degraded urban areas, the economic base of cities gets transformed into the platform for future growth. Regeneration also consists in triggering other, new factors that stimulate economic growth and the development of a given area. It is a component of local development policy intended to counteract the degradation of urbanised space, alleviate numerous crisis occurrences, stimulate development, and introduce qualitative changes. The goal of urban regeneration is to improve the living and working conditions in cities, restore spatial order, and stimulate economic recovery of a given territory. These interventions produce changes in spatial and functional structure of degraded areas (McCann, 2013; Moretti, 2013).

The theory of economic base links with the identification of exogenous and endogenous factors of urban development. Exogenous urban functions at the economic level are social and economic activities performed for the external world and expressed mainly in jobs that they offer. The theory of economic base highlights the crucial importance and role groups of residents play in urban development as their activities and talents attract economic (pecuniary) resources. Exogenous function is responsible for urban development (O'Sullivan, 2012).

Systemic transformations have deeply degraded urban space, in particular in industrial cities, and caused significant negative changes in the urban economic structure. Local authorities have a wide array of tools pertaining to the regeneration policy and may actively shape the process of regeneration, which fundamentally impacts changes in the city's economic base.

---

<sup>1</sup> EWA M. BORYCZKA, Department of Regional, Economics and Environment, Institute of Spatial Economics, Faculty of Economics and Sociology, University of Lodz, Poland, ewa.boryczka@uni.lodz.pl

Against the main research problem formulated as above, the principal goal of the article was to find out how regeneration in post-industrial cities impacts their economic base. Its detailed goals were:

- to capture changes in urban functional structure over the period of transformation,
- to assess the toolkit and scale of instruments used in regeneration,
- to identify effects of regeneration measures,
- to identify the impact of regeneration on the development of city's economic base.

**Key words:** urban regeneration process, post-industrial city, theory of urban economic base, transformation, urban economic base.

**JEL Classification:** P25, O18, O21, R11

## 1. Introduction

Systemic transformations have deeply degraded urban space, in particular in industrial cities, and produced significant negative changes in the urban economic structure. Cummulation of a number of social and economic problems, loss of functions in many post-industrial areas which for many years were excluded from regular use, as well as advancing degradation of a functional spatial urban area have triggered the necessity to instigate regeneration measures and efforts that could bring degraded urban areas back to life. Economic base theory combined with the identification of the role of the so called exogenous and endogenous urban development factors is helpful in explaining functional transformations (Dziewoński, 1971; Dziewoński, 1990).

In the mid-1990s, due to the cumulative effect of problems and transformation processes in Polish cities, we witnessed first discussions about regeneration which was to have improved the situation in degraded areas in Polish cities. Regeneration is a comprehensive process triggered to put in place changes that lead to economic, social, and cultural re-vival of degraded cities or districts thereof. As a remedy process, regeneration that brings cities or their districts out of the crisis seems like an ideal tool to improve the situation in post-industrial cities. Regeneration is a new stage in urban development, a step that needs to be taken when previously used measures that support and maintain the urban tissue are not enough any more (Cunningham, 2002). Undertaken efforts are oriented at the protection and restoration of cultural assets in the urban space, promoting and initiating activities seeking to foster and mobilise urban economy, as well as strengthening social and economic engagement of local residents. Regeneration is aimed to improve the conditions in which people live and work in cities, restore spatial order, and revive the economy of the area. As a result of coordinated efforts aimed at the transformation of functional and spatial structure of degraded areas of cities, regeneration transforms the economic base of a city, the foundations of urban growth (Boryczka, 2016).

The so far accumulated body of Polish experiences in planning comprehensive functional-spatial transformations and urban regeneration is quite substantial, however, due to the fact that these processes call for huge financial outlays and for the integration of activities pursued in many functional urban spheres (Roberts, 2000), they are implemented rather slowly. Local authorities have a wide array of tools pertaining to the regeneration policy and may actively shape the process of regeneration, which fundamentally impacts transformations in the urban economic base. Against the backdrop of the above formulated research problem, the goal of the paper was to identify the impact of regeneration processes in post-industrial cities on the development of their economic base.

The following research questions have been asked:

- What actions and instruments were used in regeneration in cities covered by the study?
- How have the effects of regeneration activities influenced the development and functioning of the city?
- Has regeneration transformed the economic base of the city?

The approach combining urban regeneration, in particular in post-industrial cities, and economic base theory has been applied in Poland for the first time ever. This original approach, together with the research procedure using a number of research methods and techniques, have allowed to identify and assess the impact of regeneration on the economic base in the examined cities (Boryczka, 2016).

## **2. Regeneration and its consequences for economic base**

### **2.1 Transformation in industrial cities**

The growing population of post-industrial cities observed in the 2nd half of the 20th century, first in the U.S., Western Europe, and, later, in countries of Central and Eastern Europe was a result of shift in their economies from the manufacturing sector (the secondary sector of the economy) towards the service sector (the tertiary sector). The evolution of industrial cities was conditioned by a number of internal and external factors. Typically, megatrends, social and economic, as well as technological phenomena have always differed as to when they occur, how long they last, and what mechanisms determine development processes in cities. Such differences were especially clearly visible in Europe, a continent politically divided in the 2nd half of the 20th century. European countries and cities were developing under different political frameworks and followed diverse economic models. After the WWII, countries in Western as well as in Central and Eastern Europe geared their efforts towards reconstruction. However, in Western European countries reconstruction followed a capitalist modernisation agenda



while countries of Central and Eastern Europe were being reconstructed in the spirit of centrally planned economy pursued by a block dominated by the USSR (Churski, Dolata, Dominiak, Hauke, Herodowicz, Konecka-Szydłowska, Nowak, Perdał, Woźniak, 2018; Churski, Hedorowicz, Konecka-Szydłowska, Perdał, 2017).

Progressing transformation brought the countries and cities of Western Europe forward to the “logic of late capitalism” already in the 1970s and 1980s, meaning their economies and societies clearly exhibited post-modernisation processes (Churski, Dolata, Dominiak, Hauke, Herodowicz, Konecka-Szydłowska, Nowak, Perdał, Woźniak, 2018). Within the same period, countries of Central and Eastern Europe were only marginally involved in social-economic and technological transformations. Left aside the global mainstream and transformations, politically and economically isolated countries did not undergo any structural changes and processes that unrolled in them were not triggered by market forces but driven by political parties and decisions made in communist centres of power. Until transformations of the late 1980s, these countries, and cities in them, were left aside and isolated from global social and economic processes. Systemic transformation in Central and Eastern Europe at the turn of the 1980s and 1990s launched processes which Western European countries had accomplished many years before. Transformation triggered intensive modernisation and post-modernisation processes that developed in parallel in these countries. In addition, imperfect economic mechanisms in post-communist countries clashed with the free market competition of strong and mature (often integrated) capitalist economies of Western European countries and other parts of the world. That accelerated modernisation and post-modernisation transformations in post-communist countries.

Economic and social transformations in post-communist, the so-called people’s democracies (including Poland after WWII) that began with putting in place new systemic solutions got also reflected in social and economic situation and spatial structure of cities. At that time industry was also critical for urban development and intensive industrialisation preceded urbanisation processes. As a result, people who were massively moving to cities to work in industry could not find a place to live. Differences in the advancement of urbanisation and industrialisation forced people to commute which, in turn, increased the role of passenger transport as an urbanisation factor. Transport nodes were emerging in cities, which evolved into labour market centres, in inter-city traffic and in suburban zones. Significant role of industry as a city-forming factor is confirmed by unusual growth dynamics of many intensely industrialised Polish cities.

In the 1970s, especially after the oil crisis of 1973, changes in production organisation could be observed initially in highly developed countries, and then they spreaded across other economies. They were linked with social and economic

changes, with the development of new technologies, shorter production series in many industries, in particular in the textile, food processing, cosmetics, household appliances, and automotive industry. Changes were also connected with flexible production specialisation aimed to adjust to the increasingly faster changing market needs. The subject-matter literature (Jewtuchowicz, 2012; Domański, 2006) defines them as the shift from Fordism to post-Fordism, which although did not significantly impact the then existing settlement system, altered, among others, contemporary cities by creating a new category of post-industrial cities.

Changing conditions in which urban centres develop and operate produce social, economic, and technological transformations. A new type of cities emerges, referred to as a post-industrial (post-modernist) city. This type largely differs in many aspects from cities shaped in the period of dynamic industrial growth. Differences that we observe lie mainly in the economic base, management systems and development planning, social structure, as well as the landscape and how functions are distributed in it.

Features of a post-industrial city related to internal conditions of its development include, inter alia:

- stagnation or restructuring of industry-based economic base of a city,
- growth of service-related economic sectors,
- higher real income of inhabitants and consumers,
- more leisure time,
- improved living and housing conditions,
- explosion of information and knowledge about urban economy (Lever, 1987; Drobniak, 2012; Drobniak, 2014).

Growing role of the service sector becomes especially prominent in the economy of post-industrial cities. At the same time, the manufacturing sector is being restricted. The process has gradually degraded especially those urban centres which emerged and developed as centres of different traditional industries. Many cities, however, succeeded in transforming their economic base while others continue coping with substantial economic, social, and spatial problems because they failed to replace a declining industry with other types of business activities. Subject-matter literature points to increasing differences between these cities. Development disproportions between successful settlement units and localities suffering from crisis become deeper and more apparent. Post-industrial cities are mainly oriented at meeting consumer needs and growing demand for goods and services is one of the main drivers of their economies. In addition, post-industrial cities are much more flexible in their manufacturing functions than industrial cities as they tend to quickly exploit the existing market niches.

Transformation of industrial cities into post-industrial ones has been faced with a number of problems: examples can be found in cities in the United Kingdom,

Germany, or Poland (Glasgow, Manchester, Chemnitz, Dortmund, Bytom, Katowice, etc.). Negative aspects of transformation include, inter alia:

- a) freeing a big proportion of low quality human capital resources,
- b) changes in spatial employment patterns,
- c) intensified polarisation of inhabitants caused by income differences,
- d) intensified polarisation of inhabitants due to differences in environmental and housing conditions and access to services,
- e) intensified ghettoization,
- f) intensified disurbanisation of cities and suburbanisation of their immediate neighbourhood,
- g) decreasing income from taxes,
- h) lower economic and social position of cities, including the degradation and dying of city centres,
- i) freeing big post-industrial sites in city centres and in other urban districts (Drobnik, 2012; Drobnik, 2014).

At this juncture, we need to highlight that the decreasing economic and social position of a post-industrial city comes as a consequence of its impoverished economic base. The latter is the effect of advancing stagnation, liquidation or restructuring of traditional industries without replacing them with new activities in the service sector. This is how previously strong industrial cities are losing their economic power. The loss of position and economic relevance of a city is especially visible when compared to other cities, whose economic base evolved towards the service-based economy. On top of that, the declining economic position of a city and its impoverished economic base usually trigger migration processes. Highly skilled, entrepreneurial, creative, and mobile inhabitants of post-industrial cities usually migrate to other attractive urban centres.

Cities whose economy for many years had been operating outside of the market economy framework, like, e.g., cities in the post-communist countries, including Poland (Stawasz, 2016; Kołodziejcki, Parteka, 2000) found themselves in much less favourable situation. For them, positive impacts of globalisation are weakened, and they suffer from additional difficulties in getting adjusted to the changing conditions and possibilities to reach the competitive advantage. Systemic changes of 1989 opened up new development possibilities for Polish cities that can be referred to as post-industrial. Overly expanded industry with its inadequate structure and technological backwardness ceased being the key driver of development. Growth consisted, above all, in reinstating the capitalist economic model omitting, however, changes and transformations that the capitalist countries had been experiencing since the 1940s (Stryjakiewicz, 2000; Kukliński, Parysek, 2004). Changes taking place since the early 1990s have reflected themselves predominantly in rapid development of services which got almost totally privatised. In addition, forms of production organisation changed

through decentralisation of management and the emergence of small and medium-sized enterprises which much more flexibly respond to what is going on in the market. The structure of production also changed to better respond to market needs also in other countries. Post-industrial transformations manifest themselves, e.g., in the development of networks of retail and service establishments or business environment organisations responding to real demand. Polish cities have become homes to large shopping centres but also to a strong SME sector and institutions facilitating transfer of modern technologies. Their democratically elected local governments act as market and transformation regulators. All these post-industrial transformations belong to exogenous factors (conditions) of development and functional-spatial transformations in Polish cities. However, to a large extent these changes depend on local conditions decisive for how exogenous factors impact individual territorial self-government units. Polish cities governed by local governments exhibit characteristics of post-industrial development, such as, e.g.: attempts of strategic management, recruiting highly skilled, flexible staff, applying knowledge-based solutions, introducing innovation into urban economy, taking care of residents' needs and expectations of external investors.

Subject-matter literature (Domański, 2006; Heffner, Polko, 2012; Drobniak, 2012; Brandenburg, 2012; Polko, 2011; Suchacek, Wink and Drobniak 2012; Drobniak Plac, 2015; Suchacek, Krpcova and Stachonowa, 2012) highlights two main benefits of diversification of urban economic structure. The first one lies in the fact that an economy whose structure is diversified and harmonised is more resilient to business cycle fluctuations. It is also better adaptable, which is needed in the times of structural transformations. Secondly, diversification is the source of modern economic structure, a building block for further growth of creative businesses, population, and administration. Cities of diversified and modern economic structures stand a much better chance of development in today's fast changing environment. They are also much better prepared to improve their position in a wider spatial system of national and international economy.

The intensity with which service economy emerges in cities and regions is a feature common to all Central and East European countries. Changes in the employment structure and in functional types of cities in Poland reflect the degree of economic development and structural as well as modernisation changes, which favour the growth of the service sector. Systemic transformation accelerated the shift made by cities from manufacturing to services. The process, however, is not completed yet. The number of jobs offered in the manufacturing sector will continue to be shrinking leading to further reduction of the role played by industry as a cornerstone of the economy of small and medium towns. Nowadays, industry

may develop only if its productivity performance improves. In line with the economic base theory, the reduction of jobs in this sector means the reduction of the exogenous sector.

## 2.2 Research methodology

Many research methods were applied in the exercise. The key one was the case study methodology consisting in an in-depth investigation of selected objects, examples (three cities) using multiple sources of information and research techniques to validate adopted hypotheses and give answers to research questions. We also carried out a review of available subject matter literature and examined other government and self-government documents, reports, strategies, and programmes linked with regeneration (e.g. desk research). On top of that, a social study was conducted to identify instruments and effects of implemented regeneration efforts, the role played by local (self-government) authorities and other stakeholders engaged in the process, as well as the impact of regeneration on the growth of cities. To carry out the study, we used: (1) in-depth interviews with representatives of the executive directly responsible for regeneration and coordinating the process in cities covered by the study (7 in-depth interviews) and (2) questionnaire-based study targeting representatives of partners in regeneration (36 questionnaire-based studies).

Statistical methods were also deployed, in particular to examine changes in the economic structure of cities and their economic base. Identification of the qualities of cities and the analysis of their performance are possible when we adopt an assumption, according to which diverse and complex urban functions can be described by indexes, such as, e.g., employment and the structure of economic entities. Two aspects are of primary importance here: the nature and size used to construct indicators that laid the foundations for the empirical study. Economic base of cities was analysed using the surplus labour indicator also referred to as the residual method. The study also deploys the estimating of the exogenous sector by calculating the surplus of workers in individual economic sectors (PKD [Polish Classification of (Economic) Activities] sections). Surplus labour indicator has allowed measuring the absolute number of employees in the exogenous sector. The indicator is one among the most frequently used because it can be applied in analyses of individual cities as well as groups of cities. Its mathematical formula rests on the assumption that the size of the exporting sector (exogenous) in a given branch of activity (PKD section) is a difference between the total number of employees in a given industry and the product of the total number of workers in a given city and the share of the industry in question in the total population of employees in, e.g., a voivodeship or a country.

The second measure used in the analysis was P.S. Florence local specialization index. It is a relative measure applied to the structure of economic entities, which compares the uneven distribution with the structure of the entire set of cities in a given region. Over-representation of one or another type of business activity in a given city demonstrates the direction of a city specialization and functions offered to external users. The size of the index shows the intensity and strength of local specialization.

Detailed research analysis focused on middle-sized post-industrial cities with population ranging between 25K and 100K residents. Three Polish middle-sized cities: Żyrardów, Będzin, and Przemyśl from voivodeships (provinces) Mazowieckie, Śląskie, and Podkarpackie were selected for the analysis. The time frame of the study covered the years 2003–2015. Purposeful sampling technique was used to select the cities based on three fundamental criteria:

- a) the criterion of a function and its degradation: for the analysis we selected post-industrial cities, which, at the outset of the transformation were classified as cities performing industrial or industrial-service function,
- b) demographic criterion: the analysis covered medium-sized cities whose population ranges between 25K and 100K residents. Economic base transformations triggered by regeneration efforts were found to be of small scale, which is why a decision was made to focus on small and medium-sized cities where such impact could be more visible.
- c) time criterion: the analysis was carried out in cities, in which regeneration has been going on for at least 10 years. Considering the rate of transformations taking place in the economic base of a city, changes in the economic base can become visible in a long-term perspective (minimum 10 years).

### 2.3 Research results

Cummulation of a number of social and economic problems, loss of functions in many post-industrial areas which for many years were excluded from regular use, as well as advancing degradation of a functional spatial urban area have triggered the necessity to instigate regeneration measures and efforts that could bring degraded urban areas back to life. Obtained results suggest that regeneration efforts, their scale and range experienced in the period covered by the study in Będzin, Żyrardów, and Przemyśl varied. Regeneration projects were implemented differently and exerted different impact on urban functions and the performance of analysed cities (*Table 1*).

Generally speaking, in cities covered by the analysis regeneration efforts exerted the biggest impact on spatial urban functions (including mainly the improvement of the aesthetics and technical performance of buildings,

**Table 1. Impact of regeneration projects and activities on urban development**

Intervention area (no. of projects implemented in analysed cities)	Urban functions	Power of impact (on a scale 0–3)		
		Przemysł	Żyrardów	Będzin
Spatial-environmental (Przemysł – 103 projects; Żyrardów – 137 projects; Będzin – 75 projects)	Technical performance of buildings and aesthetics of their facades	2.9	2.6	2.5
	Aesthetics and functionality of public spaces	2.5	2.6	2.5
	Network infrastructure (e.g. roads, heat supply)	2.2	2.8	2.7
	Availability and management of post-military and post-industrial areas	1.7	2.3	1.3
	Shape and quality of natural environment	1.0	1.5	1.5
Economic (Przemysł – 13 projects; Żyrardów – 17 projects; Będzin – 7 projects)	Conditions for pursuing business activities	1.7	1.0	1.5
	Standard and availability of business space	1.7	2.3	2.1
	Availability of transport connections	1.5	2.3	2.5
	City image and attractiveness	2.6	2.7	2.5
	Offer of products and services	2.2	2.7	2.3
	Engagement of business entities	2.0	1.9	2.0
	User interest in regenerated areas	2.4	2.3	2.2
Social (Przemysł – 73 projects; Żyrardów – 21 projects; Będzin – 5 projects)	Standard and availability of housing	2.3	2.3	2.1
	Quality and availability of social infrastructure	2.2	2.3	3.0
	Safety and public order	1.9	2.3	2.5
	Civil engagement and entrepreneurship of residents	1.9	1.8	1.5
	Reduction of social problems of residents (long-term unemployment, poverty, pathologies)	1.5	1.5	1.3
	Quality of education (including life-long learning)	2.2	0.5	2.0
	Social relationships	1.5	0.5	0.0
	Assortment and quality of public services	2.0	1.5	2.0

*Source:* Own compilation based on results of the study.

development of network infrastructure, improvement of the aesthetics of urban public space). Regeneration significantly impacts economic urban functions (including in particular the improvement of city image and attractiveness, development of the offer of products and services, and better transport connections). Among social urban functions, significant impact of regeneration efforts was observed in the improved standard and availability of housing, higher quality and better availability of social infrastructure, as well as in the area of safety and public order, which closely links with the delivery of investment tasks targeting

the urban tissue. Regeneration efforts exerted the weakest impact on: the development of social relations, direct improvement of business environment, elimination of social problems, and the improvement of the condition and quality of the environment.

Detailed analysis of individual cities shows that regeneration in Przemyśl was pursued at a very large scale and included a wide array of actions. Although spatial interventions were crucial, social measures were important as they importantly influenced social and economic performance of the city. Economic projects represented the smallest fraction of regeneration interventions, however, their scale triggered deep changes in various areas of urban functions. The assessment of the impact of regeneration activities on the development of Przemyśl and its performance reveals broad scope of changes that occurred in the city at spatial, economic, and social levels. Regeneration projects also produced a number of additional external effects and multiplier effects, which cannot be grasped and estimated precisely. Obtained results help us unambiguously argue that big diversity and a very big scale of regeneration projects and activities put in place in Przemyśl resonated in transformations in all urban functions (social, economic, and spatial).

In Żyrardów, in turn, regeneration was pursued at a big scale and involved a rather diverse scope of activities. The city implemented mainly spatial and environmental projects and measures supplemented with social and economic interventions. These efforts brought effects mainly in spatial and economic spheres of urban performance. We observed that in Żyrardów, regeneration efforts in the area of social interventions were carried out at a smaller scope, which was reflected, i.a., in their smaller influence on social and economic spheres of the city. However, the assessment of the impact of regeneration efforts on other areas of urban operations indicates a wide scope of transformations that have taken place in Żyrardów, especially in spatial, economic, and – to a lesser extent – social areas. Regeneration activities carried out by key partners of the private sector (hard to clearly estimate) were very important and resulted in changes in many spheres of urban operations providing a development impulse to regeneration and to the entire city producing a series of additional, positive externalities. Diverse scale and range of regeneration projects and activities delivered in Żyrardów resonated in a broad scope of changes in all functional areas of the city (social, economic, and spatial).

Regeneration of Będzin was also conducted at a large scale and using diverse activities. Most projects and activities in Będzin focused on spatial and environmental areas. They were complemented with a small range of social and economic measures. Nevertheless, impact assessment of regeneration efforts on the performance of Będzin shows a wide scope of transformations in Będzin, especially in spatial and economic sphere. Regeneration activities implemented by other



partners produced changes in different areas in the city and a number of additional external and multiplier effects (*Table 2*).

**Table 2. Regeneration and its effects for economic structure and economic base of the city**

Links and relationships	Types of activities by PKD sections		
	Przemysł	Żyrdów	Będzin
Regeneration and its effects for urban economic structure	Real estate market services, Construction, Educational activities of public and private sectors.	Construction, Real estate market services.	Construction, Real estate market services, Education.
Regeneration and its effects for urban economic base	Real estate market services, Construction, Public administration, Culture, entertainment, and leisure, Health care and social welfare.	Catering and hospitality	Health care and social welfare, Public administration.

*Source:* Own compilation based on the results of studies.

The complexity of regeneration and economic transformations observed in cities covered by the study has contributed to the difficulty involved in an unambiguous assessment of the impact of regeneration on the economic base of the city. It is hard to put aside other factors (internal or external) that transform the economic structure and urban functions other than regeneration efforts. Difficulties emerge when we want to clearly assess if changes have been triggered directly by regeneration process and activities or should they be attributed to other occurrences. With this doubts in mind, however, we can conclude that there is a visible dependence between the number, nature, and power of implemented revitalisation activities and transformation in the economic base of a city.

In Przemysł regeneration was linked with increased employment and the population of businesses in sections, such as, e.g.: real estate market services, construction, public administration, culture and entertainment, health care and social welfare, as well as other services and households which employ workers. These were exogenous activities. Hence, finally, we may say that in Przemysł regeneration helped in fostering exogenous urban functions. Based on the obtained results, one may assume that the power and nature of regeneration efforts in Przemysł transformed the economic structure of the city, which translated into changes in its economic base.

In Żyrdów we could observe links between regeneration and increased employment in the exogenous sector in industries, such as health care and social

welfare, public administration. Regeneration efforts resulted in the development of public administration and health care. They were also accompanied by intensified exogenous activities in the private sector (e.g. development of wholesale and retail trade and services, real estate market services, catering and hospitality, medical services, and construction). Particular importance was attached to regeneration projects carried out by the private sector, since they worked towards the differentiation of the economic structure of the city. Thus, we may assume that in Żyrardów regeneration contributed to the fostering of selected exogenous urban functions. Based on the obtained results we may conclude that the scale and nature of regeneration efforts in Żyrardów influenced the economic structure of the city, which translated into changes in the city's economic base.

In Będzin we could notice dependence between regeneration and increased employment and population of businesses in sections, such as: real estate market services, construction, wholesale and retail trade and vehicle repair, public administration, culture and entertainment, health care and social welfare, as well as other services and households with workers. These were exogenous activities, which, in turn, confirm that regeneration significantly contributed to the strengthening of exogenous urban functions. Based on the obtained results we may conclude that the scale and nature of regeneration activities undertaken in Będzin influenced changes in the economic structure of the city, which triggered changes in the economic base of the city.

### 3. Conclusion

Results obtained from the analyses have led to an unambiguous conclusion that changes unleashed by systemic transformation exerted a powerful impact upon transformations of the economic structure of cities included in the research and produced the growth of the service sector as well as diversification in urban economy. In the period covered by the study, local authorities in Będzin, Przemyśl, and Żyrardów had regeneration policy instruments at their disposal and could actively shape the regeneration process. Self-government authorities in these cities made regeneration attempts already in the late 1990s and continued their regeneration policies for several years to come.

Due to the complexity of growth processes it is hard to unambiguously estimate to what extent changes in the economic structure of these cities can be attributed to regeneration. Yet, we may draw indirect conclusions about linkages between the implementation of regeneration projects and increases in employment or in the number of businesses broken down by PKD sections in investigated cities. Based on the results of studies we can conclude that, at least to a certain degree, the change in the economic structure of these cities results from regenera-

tion effort undertaken by them. Thus, it confirms that “regeneration efforts undertaken in cities change their economic structure and transform their economic base.”

The analysis of the impact of regeneration processes and activities on the economic structure and base is an interesting theme in considerations surrounding increasingly more broadly sketched actions undertaken by territorial self-government units in Poland. In particular cities, where regeneration was launched at least 10 years earlier offer a good testing ground for such analyses. Results of the latter could be used in an integrated planning of regeneration in Polish cities and to improve the efficiency of measures and public financial resources spent on this purpose.

## References

- BORYCZKA, E. M. 2016. Baza ekonomiczna w procesie rewitalizacji miast przemysłowych. *Gospodarka w Praktyce i Teorii*. No. 45.
- BRANDENBURG, H. (ed.) 2012. *Projekty regionalne i lokalne – uwarunkowania społeczne i gospodarcze*, Uniwersytet Ekonomiczny w Katowicach; Katowice.
- CHURSKI P., DOLATA M., DOMINIAK J., HAUKE J., HERODOWICZ T., KONECKA-SZYDŁOWSKA B., NOWAK A., PERDAŁ R., WOŹNIAK M. 2018. Współczesne przemiany czynników rozwoju społeczno-gospodarczego. In: CHURSKI, P. (ed.) *Teoretyczne i aplikacyjne wyzwania współczesnej geografii społeczno-ekonomicznej*, PAN Studia KPZK, 183, Warszawa.
- CHURSKI P., HERODOWICZ T., KONECKA-SZYDŁOWSKA, B., PERDAŁ, R. 2017. *Czynniki rozwoju regionalnego w świetle współczesnych przemian społeczno-gospodarczych – dyskurs teoretyczny*, Working Paper of FORSED Project, Zakład Analizy Regionalnej Instytutu Geografii Społeczno-Ekonomicznej i Gospodarki Przestrzennej UAM, Poznań.
- CUNNINGHAM. S. 2002. *The Restoration economy*. San Francisco: Berrett-Koehler Publishers, Inc.
- DOMAŃSKI, R. 2006. *Geografia ekonomiczna. Ujęcie dynamiczne*, Wydawnictwo Naukowe PWN, Warszawa.
- DROBNIAK, A. 2016. *Dynamika rozwoju miast w kontekście ich wielkości i rangi*, STUDIA EKONOMICZNE REGIONU ŁÓDZKIEGO, Nr XXI 2016, Polskie Towarzystwo Ekonomiczne Oddział w Łodzi, Łódź.
- DROBNIAK, A. 2017. *Hybrydyzacja rozwoju – prężność i dynamika rozwoju polskich miast*, Regiony, metropolie, miasta, Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu, nr. 467, Wrocław.
- DROBNIAK, A., PLAC. K. 2015. *Urban resilience – transformacja miast przemysłowych aglomeracji górnośląskiej*, Studia Ekonomiczne, Zeszyty Naukowe Uniwersytetu Ekonomicznego w Katowicach, nr 250/2015.
- DROBNIAK, A. 2012. Projekty na rzecz transformacji miasta przemysłowego. In: BRANDENBURG, H. (ed.) *Projekty regionalne i lokalne – uwarunkowania społeczne i gospodarcze*. Uniwersytet Ekonomiczny w Katowicach, Katowice.
- DROBNIAK, A. 2012. *Projekty strategiczne w mieście przemysłowym*, Wydawnictwo Uniwersytetu Ekonomicznego w Katowicach, Katowice.
- DROBNIAK, A. 2014. *Urban resilience concept and post-industrial cities in Europe*, Uniwersytet Ekonomiczny w Katowicach, Katowice.

- DZIEWOŃSKI, K. 1971. *Baza ekonomiczna i struktura funkcjonalna miasta. Studium rozwoju pojęć, metod ich zastosowań*, Wydawnictwo Naukowe PWN, Warszawa.
- DZIEWOŃSKI, K. 1990. *Koncepcje i metody badawcze z dziedziny osadnictwa*, Prace Geograficzne, nr 154, Wydawnictwo PAN, Wrocław, Warszawa, Kraków, Gdańsk, Łódź.
- HEFFNER, K., POLKO, A. 2012. *Transformacja funkcji miejskich w ośrodkach lokalnych*, Wydawnictwo Uniwersytetu Ekonomicznego w Katowicach, Kraków.
- HEFFNER, K. 2010. *Zmiany struktury funkcjonalnej małych miast w obszarach metropolitalnych*, In: HEFFNER, K. (ed.) *Transformacja funkcji miejskich w ośrodkach lokalnych*. Prace Naukowe Akademii Ekonomicznej w Katowicach, Katowice.
- JEW Tuchowicz, A. 2005. *Terytorium i współczesne dylematy jego rozwoju*, Uniwersytet Łódzki, Łódź.
- KOŁODZIEJSKI, J., PARTEKA, T. 2000. Perspektywy rozwoju metropolii Trójmiasta w XXI wieku. In: KUKLIŃSKI, A., KOŁODZIEJSKI, J., MARKOWSKI, T., DZIEMIANOWICZ, W. (ed.) *Globalizacja polskich metropolii*. Euroreg, Warszawa.
- KUKLIŃSKI, A. 2000. The Warsaw metropolis and the challenges of globalisation. In: KULKIŃSKI, A. (ed.) *The knowledge-based economy. The European challenges of the 21st Century*. Warsaw: Rewasz. (Science and Government Series, 5).
- LEVER, W. F. 1987. Glasgow: Policy for the Post-industrial City. In: ROBSON, B. (ed.) *Managing the City. The Aims and Impacts of Urban Policy*. Barnes & Noble Books, New Jersey.
- MCCANN, PH. 2001. *Urban and Regional Economics*, Oxford University Press, Oxford.
- MORETTI, E. 2013. *The new geography of jobs*, Mariner, USA.
- O'SULLIVAN, A. 2012. *Urban Economics*, McGraw-Hill/Irwin, wyd. 8, USA.
- PARYSEK, J. J. 2004. Transformacja społeczno-gospodarcza i jej konsekwencje w miastach polskich. In: SŁODCZYK, J. (ed.) *Rozwój miast i zarządzania gospodarką miejską*. Wydawnictwo Uniwersytetu Opolskiego, Opole.
- POLKO, A. 2011. Transformacja gospodarki centrum miasta przemysłowego na przykładzie zmian zachodzących w aglomeracji górnośląskiej. In: *Transformacja gospodarki – konsumenci, przedsiębiorstwa, region*. Studia Ekonomiczne, Wydawnictwo Uniwersytetu Ekonomicznego, Katowice.
- ROBERTS, P. 2000. The Evolution, Definition and Purpose of Urban Regeneration. In: ROBERTS, P., SYKES, H. (eds.) *Urban Regeneration: A Handbook*. Sage, London.
- SŁODCZYK, J. 2003. *Przestrzeń miasta i jej przeobrażenia*, Uniwersytet Opolski, Opole.
- SŁODCZYK, J. 2000. Rola funkcji przemysłowej w miastach regionu opolskiego w świetle struktury pracujących. In: SŁODCZYK, J. (ed.) *Spoleczne, gospodarcze i przestrzenne przeobrażenia miast*. Wydawnictwo Uniwersytetu Opolskiego, Opole.
- STAWASZ, D. 2016. *Współczesne dylematy zarządzania rozwojem miast*, Wydawnictwo Uniwersytetu Łódzkiego, Łódź.
- STRYJAKIEWICZ, T. 2000. Implications of globalisation for regions and localities in an economy in transition: the case of Poland. In: J. Parysek, T. Strykiewicz (ed.) *Polish economy in transition. Spatial perspectives*, Bogucki Wydawnictwo Naukowe, Poznań.
- SUCHAČEK, J., KRPCOVÁ M., STACHONOVÁ M. 2012. Transition and resilience in Czech post-industrial towns: The case of Ostrava and Karviná. *Regions Magazine*, vol. 286, iss. 1.
- SUCHAČEK, J., WINK R., DROBNIAK A. 2012. *New Developments in Old Industrial Regions and Agglomerations in Central Europe, The case of Saxony – Leipzig-Halle Agglomeration, Silesian Voivodeship – Upper Silesian Agglomeration and Moravian-Silesian Region – Ostrava Agglomeration*, LAP Lambert Academic Publishing, Saarbrücken.
- WINK, R. 2012. Economic resilience as the evolutionary concept for post-industrial regions: the case of Leipzig and Halle. In: DROBNIAK, A., BRANDENBURG, H. (ed.) *Journal of Economics and Management – Urban economic resilience – new concept for post-industrial city transition*. Vol. 10, pp. 59–72.

# How is the multidimensional perception of modern architectural objects associated with their surroundings? An example of Warsaw Ochota urban railway station

ALEKSANDRA NOWAKOWSKA<sup>1</sup>, JAGODA GUZ<sup>2</sup>,  
EDYTA ŁASZKIEWICZ<sup>3</sup>

**Abstract:** A historical monument and its surroundings together create an urban and functional monument. The surroundings have a strong influence on the object's perception and the identification of its value and benefits. Consequently, the value of the object/monument can either be raised or lowered, thanks to the composition and development of its surroundings. Showcasing the monument in the right way, and its harmonious relationship with its surroundings positively changes its perception and determines the assessment of its social value. This research will allow us to identify the impact that surroundings have on a given object's value and meaning (i.e. as part of the concrete architectural heritage). The analysis will cover issues like the landscape's harmony, the degree of variety in the surroundings, and the level of dereliction.

The primary research method will be a sensations curve/spatial mapping (which has been adapted from the research method created by Kevin Lynch and Kazimierz Wejchert). It will allow us to recognise subjective experiences and perform a multi-criteria analysis of the spatial environment's impact on the object.

*The research will be presented on the example of Warsaw Ochota Railway Station.*

**Keywords:** modernism, modernist legacy, perception, value, surroundings

**JEL Classification:** R00, R10, R14

## 1. Concrete modernist architecture: an unwanted legacy in countries of Central-Eastern Europe – introduction

In times of socialism in the countries of Central-Eastern Europe, modernism was seen as an example of the progressiveness of the eastern bloc's architecture, and it was treated as a proclamation of its openness to "novelties" and the loosening of the communist regime (Ciarkowski, 2017). Railway stations were designed in

---

<sup>1</sup> ALEKSANDRA NOWAKOWSKA, Department of Regional Economics and Environment, University of Lodz, Poland, aleksandra.nowakowska@uni.lodz.pl

<sup>2</sup> JAGODA GUZ, Department of Regional Economics and Environment, University of Lodz, Poland, jagoda.guz@uni.lodz.pl

<sup>3</sup> EDYTA ŁASZKIEWICZ, Department of Regional Economics and Environment, University of Lodz, Poland, edyta.laszkiwicz@uni.lodz.pl

this “new look”, for example, Warsaw Ochota, Warsaw Powiśle, and Warsaw Śródmieście. Today, however, because of the technical and social degradation of stations, which is accompanied by far-reaching transformations of the objects, incomprehension of the idea of modernism and a negation of the value of this legacy are taking place. Railway stations trigger many social controversies, and they are perceived as the essence of ugliness and the unwanted socialist past. Today, it is relatively easy to stop the physical depreciation of these objects, but its social degradation remains strong, particularly amongst elderly people, who remember their socialist past. For most of society, particularly people with little knowledge of architectural history or art, objects of this type are seen as typical symbols of communism rather than modernist objects; thus, they are interesting and worth conserving. On the other hand, these objects are a tangible image of the past and the transformation of the city, a strong element of its identity and image. For architects and urban planners, they are a valuable part of the cultural legacy, worth protecting and valorising.

Perceptions of the value and significance of forgotten modernist architecture from socialist times are conditioned not only by the features of the buildings themselves but also the quality and benefits of their surroundings. Along with the buildings, the surroundings have undergone a slow, long-term and thorough transformation. During construction, many of these buildings were harmoniously integrated with the existing urban fabric, creating a cohesive composition of the local landscape. However, as the surrounding areas developed, often in a chaotic, uncontrolled way, the monuments fell into ruin, which only emphasised the degradation and negative perceptions of the value of these objects. One example of such modernist architecture is Warsaw Ochota railway station (*Figure 1*). It was built in 1963 and designed by Arseniusz Romanowicz and Piotr Szymaniak. It is a classic example of the modernism of Central and Eastern Europe. It is characterized by a delicate structure, with the interior fitted with glass. The original roof is in the shape of a hyperbolic paraboloid, covered with a mosaic that consists of tiles arranged in black and white belts. The corners of the roof lie diagonally; two of them were left, and the other two were raised to a height 8.34 m relative to the level of the base of the structure. It is a relatively small building, built on the plan of a square about 17.25 m wide (Trammer, 2012; Ciarkowski, 2019). The railway station still performs its original function, and the architectural designs, based on modernist principles, are today treated as an interesting example of railway architecture. For this reason, in 2012, the railway station was designated a monument and entered into the public register of monuments of the capital city of Warsaw.

Warsaw Ochota railway station is a relatively small building, dominated by elements of its surroundings. It is crushed by the surrounding space, whose state and quality fall short of creating a harmonious and cohesive composition. The area

surrounding the monument is characterized by spatial chaos and low aesthetic value, which negatively influences perceptions of the socioeconomic and architectural-aesthetic value of the railway station. In this context, viewing the station as a valuable example of modernist, socialist architecture that is worth conserving has aroused a great deal of emotion and social controversy, and has not gained many supporters.



**Figure 1. Sketch of the station, archival (from the 1970s) and current photographs of Warsaw Ochota railway station**

*Source: Ciarkowski, 2019.*

## **2. Surroundings and their influence on the perception of monuments**

Historical monuments and their surroundings together create an urban and functional monument. The surroundings have a significant impact on the perception and identification of a monument's value and benefits. The monument and its surroundings are interrelated. On the one hand, a historic building contributes to the urban fabric and is an element of the composition of the local landscape. On the other hand, the features and quality of a city, particularly the area immediately surrounding a monument determine its benefits and functions.

The state of the area surrounding a monument (as well as the monument itself) evolves over time, reflecting the history of the place. The surroundings are not static; they change under the influence of technological progress, civilization, new ideas and social conscience. They depict diverse ideological and cultural influences. They reflect society and its needs, including aesthetic ones. The surroundings can lower or elevate an object; its meaning changes, reinforcing or eroding its concept and value. The area around a monument creates a unique landscape, perceived as a resource, with developmental potential and economic value, and influencing other structures and social-economic processes. It has meaning in the way it affects real estate prices or the tourist attraction of cities.

Consequently, the socioeconomic and aesthetic-architectural value of a monument is created not only by the features and benefits of the object itself, but indeed, they are conditioned by the quality of the space around it. The surroundings influence the perception of the monument, a value and advantages are re-asserting it. The value of a historical object can be weakened or strengthened by the composition of the space and its quality. We assume that the value of a monument

depends on how it is integrated into the urban fabric. Elements like the diversity and harmony of the landscape, the degree of the monument's disrepair, the existence of green areas can influence the evaluation of the monument. As such, factors that can positively affect a monument's social or economic value include how well it is presented and if it sits in harmony with its surroundings. Consequently, ascertaining the value of cultural monuments should go beyond a straightforward analysis of the very idea, its form and the function of the monument. It should include an evaluation of the state and qualities of its surrounding.

### **3. Aim of the study and conceptual framework**

The works and analyses of Kazimierz Wejchert (1984) and Kevin Lynch (1960, 1984) were the methodological inspiration for this research. Lynch (1960) is regarded as the forefather of research on the perception of the urban form. He singled out two kinds of elements in the city space: those that inconvenience residents in their daily lives and those that facilitate them. However, he did not take into account the societal dimension of the perception of space (e.g. how people participate in all sorts of formal and informal groups, or interpersonal interactions, etc.).

Raymond Ledrut (1973) made a significant contribution to research on perception. He offered a division of the urban space using four criteria that underly its valorisation (aesthetic, existential, functional, and ethical). Intensive research above the perception of the space took place in the 1960s and 1970s and was of interest to many scientists from Western Europe and the United States. From this period onwards, it is possible to indicate several research paths. Firstly, authors referred to the research of Lynch and took up the issue of behavioural mapping (Downs, Stea 1973; Gould, 1973, 1975; Gould, Lafond, 1979; Gould, White, 1968, 1974; Tuan, 1975) and the imagination of space (Gold, 1974; Klein, 1967; de Jonge, 1962; Pocock, 1975; Pocock, Hudson, 1978). Secondly, research on urban perception was common, with authors including Appleyard (1970), Bailly (1970), and Downs (1970). Some works presented the perception of particular spaces, e.g. Burgess (1978, Head upon Lobby) or Jordan (1978, Texas). Meanwhile, the studies of Brookfield (1969), Guelke (1976), Ittelsona (1978), Lowenthal and Riel (1972), Pocock (1974), Saarinen (1969), Sarinnen et al. (1984), and Tuan (1974) were devoted to environmental perception.

This rapid development resulted in a theoretical and methodological apparatus for perceptual research being established. However, abandoning the humanistic attempt resulted in this topic falling out of favour. Despite this, Lynch's works remain the basis for researchers from many fields (architecture, urban planning, geography).



To mark what would have been Lynch's hundredth birthday, the Journal of the American Planning Association published two volumes of articles devoted to him (Volume 84, Issue 3–4, 2018). The articles touched on the legacy and influence of Lynch's works in Los Angeles (Reitan, Banerjee, 2018), San Diego/Tijuana (Appleyard, Stepner, 2018), as well as in China (Tang, Liang and Yu, 2018). Wessel, Karduni and Sauda (2018) and Park and Evans (2018) attempted to verify Lynch's concept in today's digital world.

In current research on perception, it is possible to single out a few directions. Many works are devoted to research techniques based on Lynch's ideas – behavioural mapping and adapting it to contemporary technologies. This problem was taken up by, among others, Abdullah Al-Ghamdi, Al-Harigi (2015), Boschmann, Cubbon (2014), Curtis (2012), Lopez, Lukinbeal (2010), Raanan, Shoval (2014), and Vich, Marquet, and Miralles-Guasch (2018).

Filomena, Versteegen and Manley (2019) suggested a computational interpretation of Lynch's concept, transferring it to a Geographical Information System tool. Perceptual research has also been used in town-and-country planning (e.g. Panek 2016, Zmudzinska-Nowak 2003) and the protection of precious landscapes (Kearney and other 2008). Hospers (2010) applied Lynch's frames of the city in the context of urban marketing.

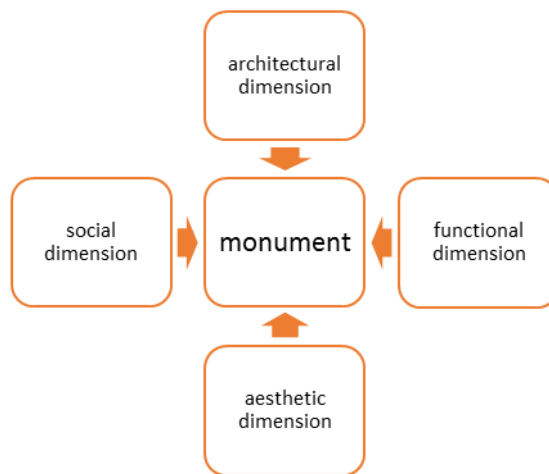
Previously, research focused on specific geographical locations (Burgess, 1978; Jordan, 1978). Now, however, it is more often related to more specific/ edged spaces, e.g. avenues in San Diego (Ford, 2001) or academic campuses (Topcu, Topcu 2012; Turk, Sen and Ozyavuz, 2015). There are also comparative analyses, e.g. the perception of Indonesian villages (kampung) or urban areas (Kossak, Damayanti, 2016). A group of studies introducing the perception of space from the point of view of different users has also appeared. For example, Yu et al. (2018) focused on how students perceive Memphis and its campus, while Julta (2000) compared the perception of Simla by residents and tourists. Finally, Pearsall et al. (2015) analysed changes in how secondary school pupils perceive higher education landscapes.

Wejchert's (1984) sensations curve was inspired by the works of Lynch. The author assumed that the urban space is the sum of many elements and the relationships that occur between them. He also thought that the urban space should be considered a temporary sequence. The method shows a correlation between space, time and the observer. It allows us to grasp the changing impressions when viewing the object. Based on Lynch's and Wejchert's research methods, we propose our own method to estimate perceptions of a monument, taking into account the quality of its surroundings. Assuming that there is a symbiotic relationship between the object and its surrounding, and that the perception of the monument is conditioned by the quality of its surroundings, the main aim of the

research was to assess how the surroundings of a monument impact the perception of its features. Three main research questions were formulated:

1. Do the surroundings and their quality influence the social, economic, aesthetic and architectural value of a historic building?
2. Which features of the surroundings (predominant features) influence the value of a monument, and in what way (positively or negatively)?
3. Does sex, level of education or the frequency of using a building affect how it is perceived in the context of the quality of the surroundings?

For the purposes of the research, four dimensions of the value of a historic building were shown: architectural, functional, aesthetic, and social (*Figure 2*). They are the most often shown aspects when analysing cultural legacy. At the same time, they are crucial dimensions of the spatial order (as is the ecological dimension, although it has been excluded on account of the intensive building development of the surroundings; therefore, is not possible to evaluate).



**Figure 2: Dimensions of the spatial order and evaluations of the value of a monument**

*Source:* Own elaboration based on Bartoszek, Szczepański and Gruszczyński, 1997.

The object of analysis is the modernist Warsaw Ochota railway station and its surroundings, analysed from three different perspectives. The selection of the perspective was determined by two criteria:

- spatial distance – the selected places to be analysed were characterised by a similar distance between the place being evaluated and the station, for saving the similar scale of the assessed object;

- the diversity of the surrounding elements – the selected perspectives were characterised by a great diversity of landscape elements that form the surroundings of the object.

## 4. Materials and methods

The research methods included field research and a standardized survey. We applied a random effect model for the survey data to explore how the perception of Warsaw Ochota railway station is associated with the station's surroundings in four dimensions.

### 4.1 Survey data

The research was preceded by a pilot study, carried out in May 2018 on a test sample of 22 respondents. They became the basis for correcting the research tool. They allowed us to reduce the analysed features from 20 to 17. The research was carried out in May 2019 on 119 respondents. Respondents were selected intentionally, creating a homogeneous group. Students between the ages of 20 and 25 were chosen as they represent a generation born after 1990; thus, they were not able to remember socialism or the period of the systemic transformation. Also, they have a more positive attitude than earlier generations to legacies of this type.

### 4.2 Random-effects model

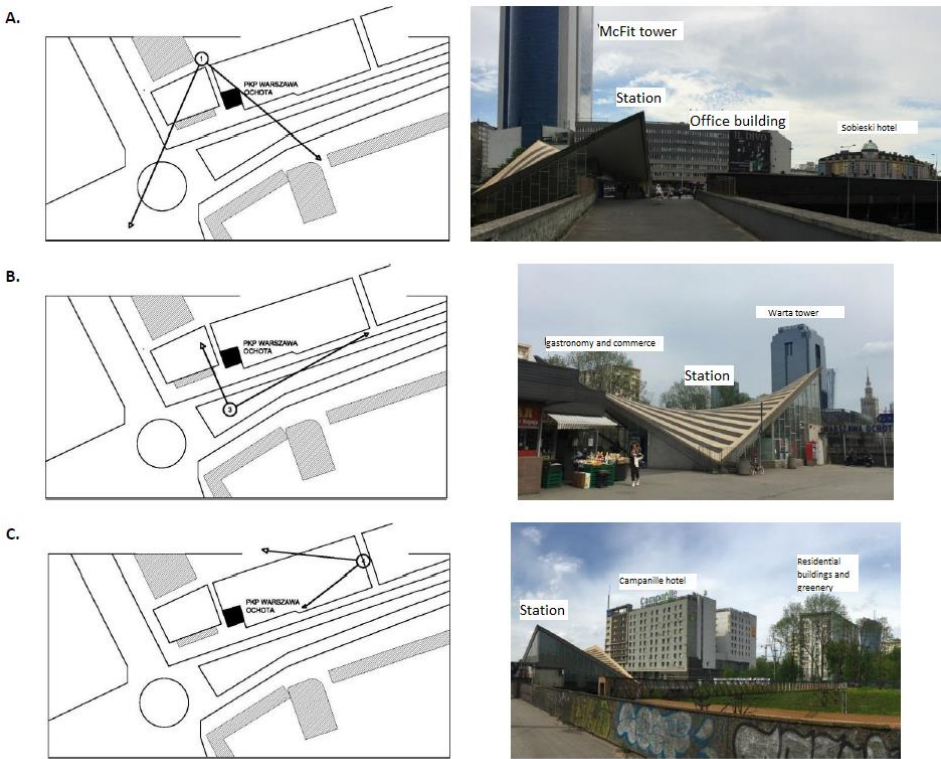
We applied the following random-effects model to explore the association between the perception of Warsaw Ochota railway station and its surroundings:

$$y_{ij} = \alpha_0 + \mathbf{z}_j^T \boldsymbol{\varphi} + \mathbf{x}_i^T \boldsymbol{\beta} + u_i + \varepsilon_{ij}, \quad (1)$$

where:  $y_{ij}$  is the dependent variable which reflects the perception of social, aesthetic, functional or architectural dimension reported by respondent  $i$  ( $i = 1, \dots, N$ ) in the spatial view  $j$  ( $j = 1, \dots, 3$ ), which approximates the railway station's surroundings;  $\mathbf{x}_i$  is a vector of the covariates of the respondents' features, such as age or sex, with coefficient vector  $\boldsymbol{\beta}$ ;  $\mathbf{z}_j$  is a vector of the spatial view (surroundings) covariates with coefficient vector  $\boldsymbol{\varphi}$ ;  $u_i$  is the random effect for the  $i$ th respondent, which captures unobserved features of the respondent which may affect perception, and  $\varepsilon_{ij}$  is the residual. The random effect and residual are assumed to be independent of one another and of the covariates, and they are normally distributed with zero means and constant variances.

We decided to apply the random effect model due to the structure of the data, which consists of repeated measurements of the respondents' perceptions. Each

respondent reported their perceptions of the social, aesthetic, functional or architectural dimension three times for different spatial views. In contrast to the traditional linear regression model, in the random-effects model, we can capture both observed and unobserved features of the respondents (*Figure 3*). The former is represented by covariates, while the latter is captured by a random effect. We estimated the parameters of equation (1) separately for each dimension using the restricted maximum likelihood method in R Cran. The list of the dependent and explanatory variables with their descriptive statistics is presented in *Table 1*.



**Figure 3. Spatial views evaluated by respondents**

*Source:* Own elaboration.

**Table 1. Description and summary statistics for the variables used in the model.**

Name	Description	Expected sign	Mean (or %)
<i>Dependent variable (perception)</i>			
Social dimension	Calculated as an arithmetic mean from the building's features, evaluated by respondents on a scale from -5 (the most negative perception of its feature) to +5 (the most positive perception), which were assigned to a particular dimension.	NA	-0.78
Functional dimension		NA	-0.44
Aesthetic dimension		NA	-1.75
Architectural dimension		NA	-0.09
<i>Explanatory variables</i>			
<i>Respondents' features</i>			
Sex	A dummy variable for respondent's sex (1 if a woman, 0 otherwise)	+/-	71.43
Age	Age of the respondent (as a continuous variable)	+	23.24
<i>Profile of education</i>			
Artistic	A set of dummy variables which takes the value of 1 if the respondent declared a given profile of education and 0 otherwise. Social science was set as the reference category.	+	3.57
Humanities		+/-	7.1%
Engineering and technical		+/-	16.0
Environmental science		+/-	5.36
Social science		+/-	67.86
Frequency of use	The self-declared frequency of using Warsaw Ochota railway station, where: 1 – once a week or more, 2 – few times per month, 3 – few times per year, 4 – first time.		3.59
Location	A dummy variable for the respondent's location (1 if the respondent lives in Warsaw and 0 otherwise)	+	22.45
<i>Surroundings – spatial view</i>			
Spatial view A	A set of dummy variables which take a value of 1 for a given spatial view and 0 otherwise. Spatial view A is the reference category.	+/-	NA
Spatial view B		+/-	NA
Spatial view C		+/-	NA

Source: Own edition.

## 5. Results

We used stepwise regression to eliminate those covariates which were statistically insignificant ( $p$ -value  $> 0.05$ ) in the random-effects models. The final estimates are presented in *Table 2*. The results show that most features of the respondents do not affect the perception of Warsaw Ochota railway station in any dimension. The only two factors which were found to differentiate the perception were the education profile and the frequency of using the station. However, the way they affect perception depends on the dimension, e.g., in the case of the functional and aesthetic dimensions, neither the educational profile nor the frequency of use influence the respondents' perceptions. By contrast, the respondents who have an environmental science education profile perceived the social dimension of Warsaw Ochota station higher than the other respondents. In addition, the architectural dimension is evaluated higher by those who visit Warsaw Ochota station occasionally or who are seeing it for the first time, in comparison with respondents who visit the station more frequently.

The results show that the spatial view, which approximates the railway station's surroundings, is associated with perceptions of Warsaw Ochota in each of the four dimensions. In each dimension, the respondent's perception is lower when the station is evaluated from spatial view C. Interestingly, spatial view B is associated with a higher perception of the station in two dimensions – social and architectural.

**Table 2. The results from the random-effects models**

Variable	Dimension of perception			
	Social	Functional	Aesthetic	Architectural
Intercept	-0.75***	-0.14	-1.50***	-2.10**
Spatial view B	0.36**			0.69***
Spatial view C	-0.41**	-0.72***	-0.60***	-0.44**
Artistic				
Humanities				
Engineering and technical				
Environmental science	1.41**			
Frequency of use				0.54**
AIC	1004	1040	1053	1040

Significance level: \*\* 0.05, \*\*\* 0.01.

Source: Own edition.

## 6. Conclusions

This study aims to evaluate whether the multidimensional perception of Warsaw Ochota railway station is associated with its surroundings and the observer's features. We found that the observers' educational profile and frequency of using the station affect their perception, but only in the case of the social and architectural dimensions. Meanwhile, the surroundings affect their perception of the social, functional, aesthetic and architectural dimensions. In particular, observers' perceptions of these four dimensions are lower when the station is not the dominant architectural feature, and other buildings have dominant positions in the surroundings. Perceptions of the architectural and social dimensions are higher when the station is evaluated from the spatial view which highlights the uniqueness of the station's roof. Additional research is needed to characterize which elements of the station's surroundings affect its perception positively/negatively.

## References

- ABDULLAH AL-GHAMDI, S., AL-HARIGI F. 2015. Rethinking Image of the City in the Information Age. In: *Procedia Computer Science*. Vol. 65, pp. 734–743.
- APPLEYARD, D. 1970. Notes on urban perception and knowledge. In: ARCHEA J., ESTMAN, C. (ed.) E.D.R.A. 2: Proceedings of Second Annual Environmental Design Research Association Conference, Hutchinson and Ross, Dowden.
- APPLEYARD, B., STEPNER, M. 2018. Toward the Dreams and Realities of Temporary Paradise? Lynch and Appleyard's Look at the Special Landscape of San Diego/Tijuana. In: *Journal of the American Planning Association*. Vol. 84, No. 3–4, pp. 230–236.
- BAILLY, A. S. 1977. *La perception de l'espace urbaine*. Paris: CRU.
- BARTOSZEK, A., GRUSZCZYŃSKI, L., SZCZEPAŃSKI, M. S. 1997. Miasto i mieszkanie w społecznej świadomości. Katowiczanie o Katowicach, Katowice.
- BOSCHMANN, E. E., CUBBON, E. 2014. Sketch Maps and Qualitative GIS: Using Cartographies of Individual Spatial Narratives in Geographic Research. In: *The Professional Geographer*. Vol. 66, No. 2.
- BROOKFIELD, H. C. 1969. *On environment as perceived*. In: BOARD, D., CHORLEY, R. J., HAGGETT, P., STODDART, D. R. (ed.) *Progress in Geography, 1*. London: Edward Arnold.
- BURGESS, J. A. 1978. Image and identity. A study of urban and regional perception with particular reference to Kingston upon Hull, Occasional Papers in Geography, 23, University of Hull Press, Kingston upon Hull.
- CIARKOWSKI, B. 2018. Racjonalność, użyteczność, trwałość. Żelbetowe konstrukcje łupinowe, Czytelnia horyzontu.
- CURTIS, J. W. 2012. Integrating GIS with Sketch Maps to Explore Fear of Crime in the Urban Environment: A Review of the Past and Prospects for the Future. In: *Cartography and Geographic Information Science Journal*. 39, pp. 175–186.
- DOWNS, R. M. 1970. *Geographic space perception. Past approaches and future prospects*. In: BOARD, D., CHORLEY, R. J., HAGGETT, P., STODDART, D. R. (ed.) *Progress in Geography, 2*. London: Edward Arnold.
- DOWNS, R. M., STEA, D. (red.) 1973. *Image and environment: cognitive mapping and spatial behaviour*. Chicago: Edward Arnold.

- FILOMENA, G., VERSTEGEN, J. A., MANLEY, E. 2019. A computational approach to 'The Image of the City'. In: *Cities*. Vol. 89, pp. 14–25.
- FORD, L. R. 2001. Alleys and urban form: testing the tenets of new urbanism. In: *Urban Geography*. Vol. 22, No. 3, pp. 268–286.
- GOLD, J. R. 1974. *Communicating images of the environment*. Birmingham: University of Birmingham. (Occasional Papers, 29).
- GOLD, J. R., Goodey B. 1984. Behavioural and perceptual geography: criticisms and responses, *Progress in Human Geography*, 8.
- GOODEY, B. 1968. A pilot study of the geographic perception of North Dakota students, Research Report, 1, University of North Dakota.
- GOODEY, B. 1971. *Perception of the environment*. Occasional Papers, 17, Centre for Urban and Regional Studies, University of Birmingham.
- GOODEY, B. 1974a. *Regional and urban images in decision making and planning* [in:] Reeds J., Newby P. (ed.) *Behavioural perspectives in geography*, Middlesex Polytechnic Monographs in Geography, 1.
- GOODEY, B. 1974b. Images of place: essays on environmental perception, communications and education, Occasional Papers, 30.
- GOULD, P. 1973. On mental maps. In: DOWNS, R. M., STEA, D. (ed.) *Image and environment: cognitive mapping and spatial behaviour*. Chicago: Edward Arnold.
- GOULD, P. 1975. *People in information space. The mental maps and information surfaces of Sweden*, Lund Studies in Geography, Ser. B. Human Geography, 42, The Royal University of Lund, Lund.
- GOULD, P., LAFOND, N. 1979. *Mental maps and information surfaces in Quebec and Ontario*, Cahiers Géographie Québec, 23, 60.
- GOULD, P., WHITE, R. 1968. *The mental maps of British school leavers*, Regional Studies, 2.
- GOULD, P., WHITE, R. 1974. *Mental maps*. Baltimore: Penguin Books.
- GÓRCZYŃSKA, M. 2008. Percepcja i waloryzacja osiedla mieszkaniowego (na podstawie badań prowadzonych w Warszawie w ramach projektu RESTATE), *Przegląd Geograficzny*, 80, z.2, IG i PZ PAN, s. 267–287.
- GREENBERG-RAANAN, M., SHOVAL, N. 2014. Mental maps compared to actual spatial behavior using GPS data: A new method for investigating segregation in cities, *Cities*, Volume 36, p. 28-40.
- GUELKE, L. 1976. *Interdisciplinary research and environmental perception*, Proceedings of the Association of American Geographers, 8.
- HOSPERS, G. J. 2010. Lynch's the Image of the City after 50 Years: City Marketing Lessons from an Urban Planning Classic. In: *European Planning Studies Volume*. Vol. 18, No. 12, p. 2073–2081.
- ITTELSON, W. 1978. *Environmental perception and urban experience*. Environmental Behaviour 10.
- DE JONGE, D. 1962. Images of urban areas, their structure and psychological foundations. In: *Journal of American Institute of Planning*. Vol. 28, No. 4, pp. 266–276.
- JORDAN, T. G. 1978. Perceptual regions in Texas. In: *Geographical Review*. Vol. 68. No. 3, pp. 293–307.
- JUTLA, R. S. 2000. Visual image of the city: Tourists' versus residents' perception of Simla, a hill station in northern India. In: *Tourism Geographies*. Vol. 2, No. 4, pp. 404–420.
- KEARNEY, A., BRADLEY, G., PETRICH, C., KAPLAN, R., KAPLAN, S., SIMPSON-COLEBANK, D. 2008. Public perception as support for scenic quality regulation in a nationally treasured landscape. In: *Landscape and Urban Planning*. Vol. 87, pp. 117–128.
- KLEIN, H. J. 1967. The delimitations of the town center in the image of its citizens. Urban core and inner city, Leiden.



- KOSSAK, F., DAMAYANTI, R. 2016. Examining spatial identity of kampungs through young adults' perception in Surabaya – Indonesia. In: *Journal of Architecture and Urbanism*. Vol. 40, No. 1, pp. 18–28.
- LEDRUT, R. 1973. *Les images de la ville*. Paris: Anthropos.
- LOPEZ, N., LUKINBEAL, C. 2010. Comparing police and residents' perceptions of crime in a Phoenix neighbourhood using mental maps in GIS. In: *Yearbook of the Association of Pacific Coast Geographers*. Vol. 72, pp. 33–55.
- LOWENTHAL D., RIEL M. 1972. *Publications in environmental perception*, American Geographers Society, New York.
- LYNCH, K. 1960. *The Image of the City*. Cambridge, Mass: MIT Press.
- LYNCH, K. 1984. Reconsidering the Image of the City. In: RODWIN, L., HOLLISTER, R. M. (ed.) *Cities of the Mind*. New York: Plenum Press, pp. 151–162.
- PÁNEK, J. 2016. *From Mental Maps to GeoParticipation*. In: *The Cartographic Journal. The World of Mapping*. Vol. 53, No. 4: The Past, Present and Future of Participatory GIS and Public Participation GIS, pp. 300–307.
- PARK, G., EVANS, G. W. 2018. Lynch's Elements of the City in the Digital Era. In: *Journal of the American Planning Association*. Vol. 84, No. 3–4, pp. 276–278.
- PEARSALL, H., HAWTHORNE T., BLOCK D., ENDEMAÑO-WALKER B.L., MASUCCI M. 2015. Exploring youth socio-spatial perceptions of higher education landscapes through sketch maps. In: *Journal of Geography in Higher Education*. Vol. 39, No. 1.
- POCOCK, D. 1974. *The nature of environmental perception*. Durham: University of Durham.
- POCOCK, D. 1975. *Durham: Images of a cathedral city*. Occasional Publications, 6, University of Durham.
- POCOCK, D. (ed.) 1981. *Humanistic geography and literature: essays on the experience of place*. London: Croom Helm.
- POCOCK, D., HUDSON, R. 1978. *Images of the urban environment*. London: Macmillan Press.
- REITAN, M. D., BANERJEE, T. 2018. Kevin Lynch in Los Angeles: Reflections on Planning, Politics, and Participation. In: *Journal of the American Planning Association*. Vol. 84, No. 3–4, pp. 217–229.
- SAARINEN, T. F. 1969. *Perception of environment*. Resource Paper 5, Association of American Geographers, Washington.
- SARININEN, T. F., SEAMON, D., SELL, J. L. 1984. *Environmental perception and behaviour. An Inventory and prospect*. University of Chicago, Research Paper, No. 209.
- TANG, Y., LIANG, S., YU, R. 2018. Theoretical and Practical Influences of Kevin Lynch in China. In: *Journal of the American Planning Association*. Vol. 84, No. 3–4, pp. 293–305.
- TOPCU, K. D., TOPCU, M. 2012. Visual Presentation of Mental Images in Urban Design Education: Cognitive Maps. In: *Procedia – Social and Behavioral Sciences*. Vol. 51, pp. 573–582.
- TRAMMER, H. 2012. Architektura dworców warszawskiej linii średnicowej, [in]: G. Piątek (ed.), *Architektura Arseniusza Romanowicza i Piotra Szymaniaka*. Wyd. I. Centrum Architektury, Warszawa 2012, s. 41–42.
- TUAN, Y.-F. 1974. *Topophilia: a study of environmental perception, attitudes and values*. Englewood Cliffs: Prentice-Hall.
- TUAN, Y.-F. 1975. Images and mental maps. *Annals of the Association of American Geographers*. Vol. 65, No. 2, pp. 205–212.
- TURK, Y. A., SEN B., OZYAVUZ, A. 2015. Students Exploration on Campus Legibility. In: *Procedia – Social and Behavioral Sciences*. Vol. 197, pp. 339–347.
- WESSEL G., KARDUNI A., SAUDA, E. 2018. The Image of the Digital City: Revisiting Lynch's Principles of Urban Legibility. In: *Journal of the American Planning Association*. Vol. 84, No. 3–4, pp. 280–283.

- WHITE, R. 1967. *The measurement of spatial perception*. Seminar Papers Series A, 8, University of Bristol.
- WEJCHERT, K. 1974. *Elementy kompozycji urbanistycznej*, Wydawnictwo Arkady, Warszawa.
- VICH, G., MARQUET, O., MIRALLES-GUASCHA, C. 2018. The scales of the metropolis: Exploring cognitive maps using a qualitative approach based on SoftGIS software In: *Geoforum*. Vol. 88, pp. 49–56.
- YU S., BRYANT, M., MESSMER E., TSAGRONIS, S., LINK, S. 2018. Is there a bubble to burst? college students' spatial perception of campus and the city, a case study of Rhodes College in Memphis, TN. In: *Urban Geography*. Vol. 39, No. 10, pp. 1555–1575.
- ŻMUDZIŃSKA-NOWAK, M. 2003. Searching for legible city form: Kevin Lynch's theory in contemporary perspective. In: *Journal of Urban Technology*. Vol. 10, No. 3, pp. 19–39.

# Vienna's gentle urban renewal programme – an option for European Small and Medium Sized towns?

GERHARD HATZ<sup>1</sup>

**Abstract:** The centres of European towns are characterized by their historic building fabric. Therefore, urban renewal is a prime agenda for urban planning in European towns. However, urban renewal calls for innovative solutions to manage social urban problems related to revitalization:

Urban renewal which is financed exclusively by private investors and with neither public direction nor involvement can cause serious socio-political consequences. Urban regeneration projects have often resulted in gentrification and an exchange of residents. This social shift and displacement of the population also brings about increasing social segregation.

The primary goal of the Vienna model of “gentle urban renewal” has been and still remains not to force out the resident population, but rather to remodel and improve the old buildings in a way that the apartments remain affordable for their tenants after renovation.

Conceptualised as a Public Private Partnership Model, “gentle urban renewal” aims at creating incentives for private landlords to launch procedures for refurbishment by ensuring a certain social sustainability of the renewal process. In 1998, 2000 and 2002 the Viennese social innovation of “gentle urban renewal” won the UN-HABITAT “Best Practices” award. The main instruments of this renewal policy, the results and the challenges will be discussed and analyzed in the following sections.

“Gentle urban renewal” in Vienna pursues two purposes: social and at the same time economic sustainability of refurbishments. These purposes are to be accomplished by the combined application of public and private financial investments. The subsidies of the City of Vienna are reducing the costs of the refurbishments and eventually the financial burdens in terms of an increase of rents for the tenants. The key idea of these subsidies is to achieve a neutrality of expenses of the refurbishment projects.

However, the neutrality of expenses for remodeling turned out to be an insufficient incentive for private landlords to launch a renewal process. Renovation initiatives could only be generated in case landlords could expect additional profits after completing the projects.

By combining public and private funding the renewal of apartment buildings could be accomplished, by avoiding excessive financial hardships for the tenants. However, new rental contracts followed the rules of the real estate market. Applying this strategy of allocating subsidies, the landlords` expectations of additional profits are financed indirectly. This protective measure is supposed to prevent passing on the total renewal costs to the tenants by an increase of rents. In this way the goals of the public sector –

---

<sup>1</sup> GERHARD HATZ, University of Vienna, Austria, gerhard.hatz@univie.ac.at

generating incentives for renewal on the one hand and avoiding the replacement of the local residents are intended to be accomplished.

Analyzing a survey of a sample of about 650 tenants in apartment buildings refurbished by the gentle urban renewal program the outcomes of the initiative as well its strengths and weaknesses will be evaluated, and, consequently, potential options suitable for European small- and medium-sized towns will be discussed.

**Key words:** Gentrification, urban renewal, Vienna

**JEL Classification:** R31

## **1. Introduction: The Heritage of the Nineteenth-Century Apartment Houses in Vienna's urban fabric**

Nearly one-third (31%) of the total number of apartments in Vienna were built before 1919. According to the concentric growth zones in Vienna apartments built before 1919 concentrate in the Inner Districts and in the neighboring areas of the Outer Districts. In these areas these apartments amount to 50 percent and more (see Hatz et al., 2016).

The building fabric of the second half of the 19th century “divided” the city spatially into neighborhoods for the middle and upper middle classes on the one hand and those for the working-classes on the other hand, which can be found in Outer districts of the Inner City, whereas the Inner Districts themselves are characterized by a higher percentage of middle class apartment buildings (see Hatz, 1998). While the Austrian tenants of the working-class apartments passed away or moved out to higher standard social housing apartments, since the 1970s these apartments have become home to an increasing low-status immigrant population.

On a political level it had always been clear that the renovation of these nineteenth-century buildings could not be funded by the public or private sectors alone. Both would have been overwhelmed by the amount of investments needed. Through private and public cooperation where both sides operated in their own interests and both could profit from the results, Vienna has become a model for Public Private Partnership (PPP).

## **2. Vienna's Model of “Gentle Urban Renewal”**

Compared to Viennese examples, the renovation of urban neighborhoods even in small and medium-sized cities in Germany, where substantially more liberal rent legislation is in force, reveals the results of physical improvements tied to increased rents. Market forces have often resulted in gentrification and a shift in the rental population, like e.g. in Kiel (see Hirnstein, 2013), Magdeburg (Weist 2006) or, to mention an Austrian example as well, in Linz (see Gstöttner, 2018). This social shift and displacement of population also brings about increasing

social segregation. Equally, the first renewal projects launched by the city of Vienna, such as the “Blutgassenviertel” completed in 1965, or the “Spittelberg” launched in 1973 resulted in the gentrification of these neighbourhoods (See e.g. Gebietsbetreuung Stadterneuerung, 2019).

In order not to repeat earlier mistakes, the Viennese ‘Public Private Partnership’ model aims at creating incentives for private landlords to start procedures for refurbishment by ensuring a certain social sustainability of the renewal process.

From 1984 and 1989, the years when the Public Private Partnership Model of Vienna’s type of urban renewal was put into force, to January 2004 about 4,650 apartment buildings were recommended for subsidized renewal. Out of this total number, 3,680 buildings had already been renovated (wbsf.wien.at, July 23rd, 2004). Between 2005 and 2017 a total of 699 applications for subsidized base renewal were submitted. In the same period of time, 715 apartment buildings with a total of 33,239 apartments were comprehensively refurbished by base renewals. These figures reveal that simply by its quantitative dimension gentle urban renewal is an essential instrument of urban renewal and of utmost importance considering processes of gentrification in Vienna.

“Gentle urban renewal” in Vienna follows two purposes: social and at the same time economic sustainability of refurbishments. These purposes are to be accomplished by a combined application of public and private financial investments (see Foerster, 2002, 114). The subsidies of the City of Vienna are reducing the costs of the refurbishments and as a result the financial burdens in terms of an increase of rents for the tenants. The central idea of these measures is to achieve a neutrality of expenses of the refurbishment works.

However, this neutrality of expenses has turned out to be an insufficient incentive for private landlords to launch a renewal process. Such incentives could only be generated in case landlords could expect additional profits after remodeling. “Often private landlords could not be motivated by attractive funding proposals targeted exclusively at a renewal of the buildings they owned, but rather by the option of future profits due to rents that were expected. By the application [of] funding the renewal of apartment buildings could be accomplished by avoiding excessive demands for the tenants. But in the case of new rental contracts, rents according to market prices are required” (Steiner, Riha, 1992, 66).

In this way, with the allocation of subsidies, the expectations of additional profits for the landlords are financed indirectly. The tenants shall be protected from investors, passing on the costs for the renewal by an increase of rents. As a consequence, the goal of the public sector – the generation of incentives for renewal and to avoid replacement of the dwellers – has basically been achieved.

The profit of the rents in case of new rental contracts for remodeled apartments more or less go completely to the private landlords. So the economic interests of

private landlords shall be met and mechanisms of the real estate market are becoming implemented in the gentle urban renewal programme. New tenants in apartments upgraded by “gentle urban renewal” therefore have to deal with mechanisms of the real estate market. Sitting tenants take advantage of the subsidised renewal segment. Differentiating between tenants with existing and new rental contracts makes it possible to analyze different effects of the public and private sector in the gentle urban renewal programme.

At the level of the building, the most important type of improvement of buildings under the label ‘gentle urban renewal’ is the so-called “base renewal” (“Sockelsanierung”), which involves simultaneous maintenance and modernization of buildings which are partially or fully inhabited. It can occur either as an all in one solution or in phases and the rental contracts continue like before. Not all the residents have to participate in modifications to their individual apartment but they are invited to. This means that in buildings which have undergone such a “base renewal”, substandard apartments can be found next to high quality-Category A ones. The aim of comprehensive renewal is the medium-term upgrade of the quality of the apartments. The heart of this type of remodeling is the so-called “piggyback” renewal, meaning the renewal of still inhabited apartments. In addition, the conversion of attics into apartments and the construction of new apartments are also options that are part of the package.

Until 2004, about 85% of all subsidies for renewal were used for “base renewals” of buildings owned by private landlords, in general measures likely to cause an exchange of tenants. This is the case for any methods of refurbishment that are not launched by the tenants themselves. With the decision for a comprehensive renovation of the entire building or the apartment, each of the residents is confronted with the decision about his future housing conditions: (1) To stay in their non-renovated apartment, (2) to leave the apartment for a financial compensation or (3) relocate into an apartment with the same standard in another building, an apartment that has to be provided by the landlord or, finally, (4) to participate in the renewal process by improving the quality of their own apartment in terms of a “piggyback” renewal.

### **3. The Social Sustainability of Urban Renewal in Vienna**

At the level of the entire city it can be stated that, with regard to improving the quality of apartments, the Viennese Model of urban renewal has been truly successful. Even though not all apartments have been improved in the course of the gentle urban renewal program, the number of substandard apartments in Vienna has been reduced considerably. The share of low standard category D apartments decreased from 20% in 1981 to 6% in 2011. In the neighborhoods,

dominated by category C and D apartments in 1991, these low standard apartments had more or less disappeared by 2001 (see Hatz et al., 2016).

However, it is essential to note that with an obvious improvement of the building fabric of the apartments and the standard of the apartments in the affected urban neighbourhoods, societal changes that obviously relate to gentrification could be observed. In the Inner Districts of the Inner City, the share of residents holding a university degree increased by nearly 16 percentage points between 1981 and 2001 (see Hatz, 2009).

This increase is considerably higher than the increase of residents holding a university degree in the entire city, which amounts to about 12 percentage points and reveals an ongoing process of an overlay of a higher social strata in the Inner City, which might be interpreted as “super-gentrification” (See Lees, 2003).

#### **4. Data base and methodology of the analysis**

According to the research question apartment buildings that have been refurbished by the program of gentle urban renewal are the basis of a survey among tenants. Only apartment buildings located in the densely built-up Inner City have been selected for the survey. Out of all buildings in that area that met the criteria, a spatial stratified clustered sample has been selected (see Ma et al., 2012). A questionnaire was sent by mail to all tenants residing in the selected buildings. Finally, 650 questionnaires were available for the analysis. In order to neutralize the diverging effects of different sectors of the housing market, buildings owned by private landlords with apartments for rent have been selected for the analysis.

Following the conceptual design of the analysis a constructive division line is drawn. The division between former – sitting – tenants and new tenants serves to reveal mechanisms of the public sector on the one hand and mechanisms of the real estate market on the other hand, so as to uncover the social effects on the structure of tenants triggered by gentle urban renewal. The category of sitting tenants comprises tenants already living in the buildings before the renewal and staying there during the process of refurbishments. New tenants are those who moved into the building after the completion of the renewal. The significance of differences between the groups in the analysis have been tested by applying the Mann-Whitney U test.

## **5. Discussion of the results of the analysis**

### **5.1 Exchange of tenants by gentle urban renewal**

One of the aims of gentle urban renewal by base renewals is the refurbishment of still inhabited apartments. The analysis shows that this aim has only been accomplished to a relatively low degree. Only slightly more than a tenth (11%) of the tenants in revitalized buildings have participated in terms of a piggyback renewal, 41% of the tenants remained in their apartment without agreeing to any modifications and about one half (48%) of the apartments affected by “gentle renewal” is occupied by new tenants who moved in after renewal had been completed. From this differentiation of the tenants in “gently” renewed apartment buildings the intentions of the private landlords are becoming visible. The most profitable forms of the renewal process – new rental contracts for vacant apartments after renovation or newly constructed apartments – dominate.

These findings reveal that gentle urban renewal in terms of base renewal is by no means neutral according to the structure of the tenants. Renewal triggers a dynamic in the structure of the inhabitants and raises the question if or what kind of mechanisms are at work regarding a change of the social structure in buildings refurbished by base renewal, in particular why only such a small number of tenants have participated in the renewal in terms of a piggyback renewal. The reasons can primarily be found in the structure of the apartments.

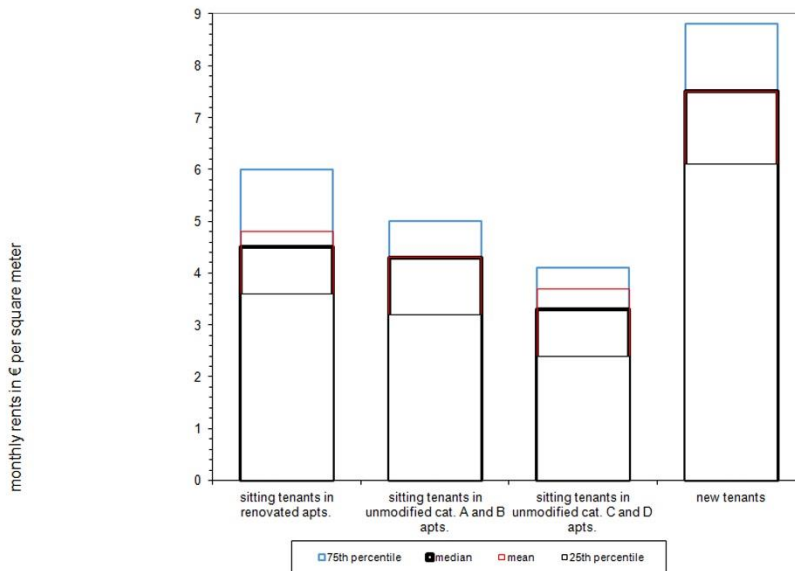
### **5.2 Expected profits for the landlords? Rents per m<sup>2</sup>**

Different sizes of the apartments and related effects on the expenses for rents in ‘gently’ renewed buildings are controlled by the indicator expenses for rents in Euros per square meter.

The analysis of this indicator shows the reasons for the low percentage of piggyback renewals. In buildings having undergone base renewal significant differences in rents can be found. These differences can be related to given differences as results of real estate market forces before the “gentle renewal” process even started. The rents per m<sup>2</sup> of sitting tenants in unimproved low standard apartments (category C and category D apartments) are significantly lower than those of sitting tenants who have remained in their unimproved but already much better equipped Category A and B apartments. Their rents do not differ significantly from those for apartments that have been improved in terms of a piggyback renewal. By far the highest rents can be found in apartments in remodeled buildings that are occupied by new renters. This illustrates the expectations of the landlords for higher profits following gentle urban renewal.



The mechanisms of gentle urban renewal are becoming unfolded by comparing rents of former renters in unimproved category C and category D apartments showing that it was still possible for low-income households to stay in the building even after the renewal, although without improving the standard of the apartments. Consequently, the chances of the possible relocation of lower-income residents due to renewal have decreased (see chapter conclusion). Thus, the relatively small share of piggyback renewals can be explained. The rents per m<sup>2</sup> for previous renters in renewed apartments are significantly above the rents of previous renters in unimproved category C and D apartments. As the household income of residents of unmodified category A and category B apartments is significantly the highest of all respondents in the survey, piggyback renewals are seemingly an option for these households. Higher rents for remodeled apartments are not only a result of improvements to the quality of the apartment, but in particular an enlargement of the floorspace, which for the total monthly costs is a multiplier of the rents per m<sup>2</sup> (Figure 1).



**Figure 1. Rents per m<sup>2</sup> in renewed apartments by gentle urban renewal, by status of the tenants**

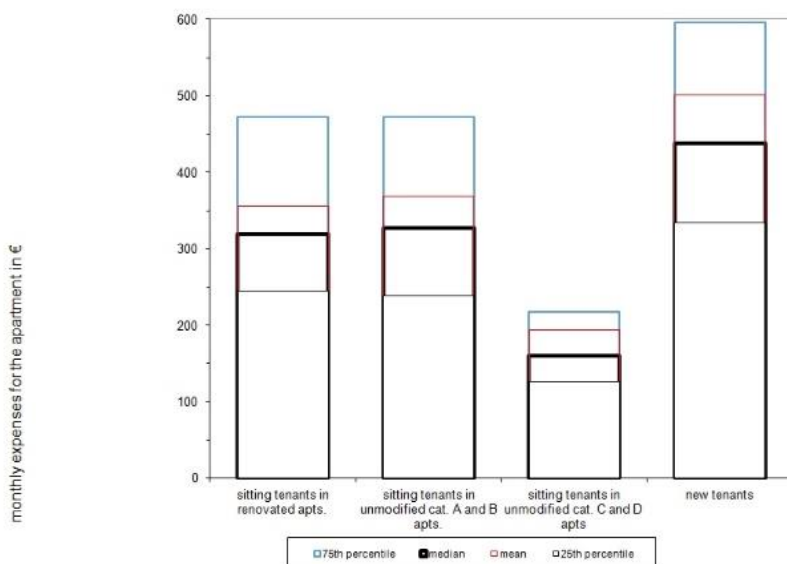
*Source:* Data base: own survey.

### 5.3 Monthly expenses for apartments

With respect to the monthly expenses for the apartments, the analysis reveals that no statistically significant difference between sitting tenants in renovated apartments and sitting tenants in unmodified category A and B apartments can be detected (*see Figure 2*). This fact could indicate that the program of “gentle urban renewal” works. The expenses for renovated ‘high quality’ apartments (cat. A) are not climbing above the level of expenses of unmodified ‘high quality’ apartments (cat. A and cat. B).

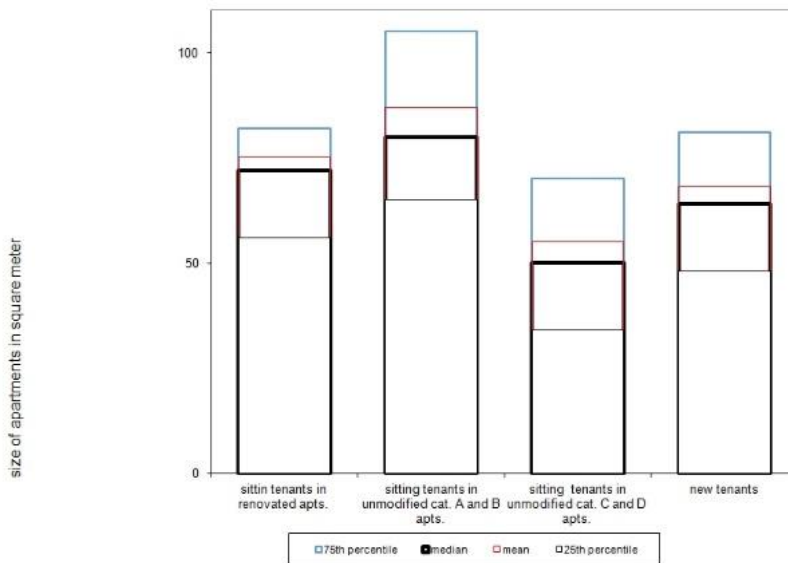
It can be assumed that when tenants moved into their low standard category C and D apartments they chose this low standard on purpose, due to limited financial resources.

The statistically significant difference between the expenses for renewed apartments and unmodified ‘low quality’ apartments (cat. C and D) points to the reason why tenants in unmodified ‘low quality’ apartments show only little inclination to participate in piggyback renewals and to improve their own housing conditions. The median of expenses is twice as high in renewed apartments as the median of expenses of tenants in unmodified ‘low quality’ cat. C and cat. D apartments. So it can be concluded that the financial resources of tenants in unmodified low quality apartments are significantly below those of tenants who participated in piggyback renewals of their apartment (*see also Figure 3*).



**Figure 2. Expenses for apartments after base renewal by housing condition**

Source: Data base: own survey.



**Figure 3. Size of apartments in renewed buildings by status of tenants**

*Source:* Data base: own survey.

In the context of gentrification the landlords' expectations regarding higher profits and the related underlying mechanisms have to be tested. In the course of the analysis it becomes obvious that new tenants have to face the highest expenses for their apartments in buildings remodeled by base renewal. A first glimpse shows that different expenses for apartments are caused by different standards of apartments. The quality of apartments is not only defined by the equipment of apartments (like the type of heating, bathroom, ...) but also by their size. Thus, the size of the apartments in buildings that have undergone base renewals is a substantial filter of social differentiation in the framework of "gentle urban renewal".

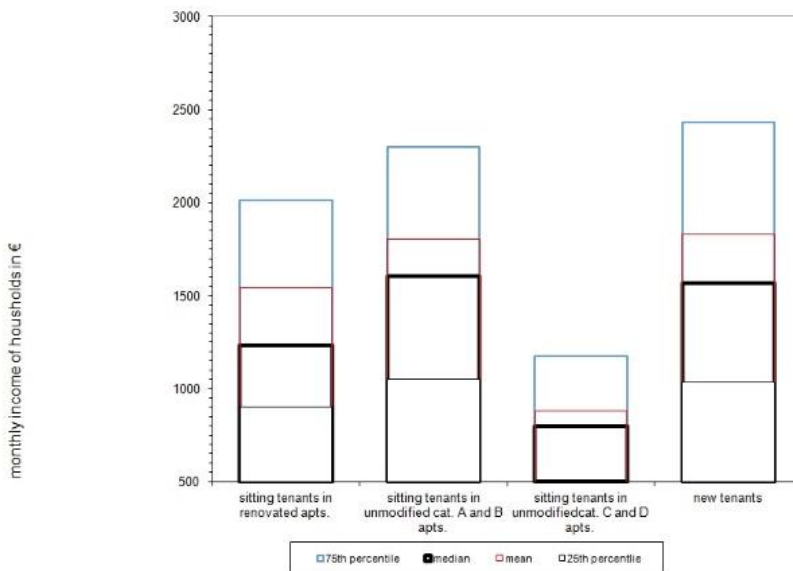
### 5.4 Size of apartments

The size of apartments and the quality of the equipment of apartments are decisive determinants of the rent of apartments and, accordingly, fundamental criteria of their affordability. Besides, both criteria can be interpreted as operational instruments available for tenants to control the expenses for their apartment. Again, the analysis clearly demonstrates the diverging housing conditions in buildings after base renewal. The smallest apartments are those of sitting tenants living in unmodified low standard category C and D apartments – an indicator of the limited financial resources of these households. As expected, the apartments

of sitting tenants who have remained in their unmodified high standard category A and B apartments are significantly larger, which indicates that these tenants are lacking motivation or incentive for piggyback renewal, which is simply not considered as an option in these cases.

This is underlined by the fact that the apartments of sitting tenants who participated in gentle urban renewal by piggyback renewal are significantly smaller, even by the same level of monthly expenses, than those of sitting tenants who have remained in their unmodified high standard category A and B apartments.

But the apartments of sitting tenants in renewed apartments are significantly larger than those of new tenants who moved in when the renewal was completed. The apartments of those new tenants that should meet the private landlords' expectations of additional profits, show by far the highest monthly expense, but in terms of size these apartments are the smallest, just behind the apartments of sitting tenants in 'low quality' unmodified cat. C and D apartments in gently renewed buildings (*Figure 4*).



**Figure 4. Monthly income of households in € by status of tenants**

*Source:* Data base: own survey.

## **6. “Nearly a conclusion”. Discussion – Household incomes in buildings renovated by ‘gentle urban renewal’**

As expected, in buildings renovated by gentle urban renewal, a social differentiation of tenants induced by mechanisms of the real estate market can be detected. The monthly incomes of households of sitting tenants in unmodified ‘high quality’ cat. A and B apartments are significantly higher than the monthly incomes of households of sitting tenants in unmodified low standard category C and D apartments, who have the significantly lowest household income in all buildings renovated by ‘soft urban renewal’. As a result, the question why the share of piggyback renewals is at such a low level can be answered and clearly explained: even if for sitting tenants in low standard category C and D apartments a piggyback renewal might be an attractive option, this is obviously not a feasible option due to the limited financial means. In contrast, piggyback renewal for sitting tenants in larger ‘high standard’ category A and B apartments is simply irrelevant.

The influence of households’ financial resources on piggyback renewal is confirmed by the fact that household incomes of sitting tenants who have participated in gentle urban renewal by piggyback renewal are significantly higher than household incomes of tenants living in unmodified ‘low quality’ category C and D apartments, and are about the same level of the incomes of tenants in unmodified high standard category A and B apartments. Statistically, the incomes of sitting tenants in unmodified high standard, category A and B apartments are not significantly above those of new tenants who moved in the building in newly additional constructed living space after the renewal.

Despite aiming at social sustainability, gentrification by ‘gentle urban renewal’ is triggered by complex mechanisms of selection. What cannot be confirmed by the study are replacements of sitting ‘low income’ tenants. Actual replacements can only be assumed: Nearly 50% of tenants moved into the buildings after renovation had been completed, in addition, 11% of the sitting tenants have participated in piggyback renewal by an enlargement of their apartment, which is only possible if apartments are combined to one apartment. Both of these processes that can be observed in buildings that underwent base renewal require free living space at disposal. If replacements by soft urban renewal are somehow defined by the options that landlords have to offer the tenants before starting the renewal process, (e.g. “moving out in a substitute apartment of the same quality in another building”, or moving out with an adequate financial compensation”) it can be assumed that some of the tenants made use of this option. This assumption is supported by the low share of sitting tenants in unmodified ‘low quality’ category C and D apartments.

Processes of gentrification by base renewals in the ‘gentle urban renewal program’ are generated by socially selective mechanisms. In the buildings that underwent base renewal sitting tenants with distinctly higher incomes in significantly larger apartments of ‘high quality’ category A and B are remaining. In addition, in particular sitting tenants with significantly higher household incomes are participating in base renewal opting for the piggyback version. What is more, additional apartments generated during the renovation process are occupied by new tenants characterized by significantly higher household incomes as well. In any case, the program of ‘gentle urban renewal’ contains mechanisms working in favor of households with higher incomes. The analysis makes it clear that urban renewal is an immense financial effort and even a relatively wealthy community such as Vienna has to struggle with this challenge. So, it appears to be obvious that the private sector has to be involved in urban renewal processes.

The Viennese model of “gentle urban renewal” shows apparent advantages of urban renewal schemes, because the negative consequences of urban renewal and resulting gentrification could be limited. However, by subsidizing objects and not subjects social selective mechanisms favouring the more affluent could not be avoided. Subsidized gentle urban renewal requires an immense financial input by the communities. Small and medium-sized cities in Europe might be overburdened by this challenge. So for small and medium-sized European cities the implementation of “subject oriented “gentle urban renewal programs at the federal level has to be considered, as the question of affordable housing will be a crucial challenge for cities in the future.

## References

- FÖRSTER, W. 2002. Wohnhaussanierung im Wiener Modell der Stadterneuerung. In: STADTPLANUNG WIEN (ed.) Wien, Stadterhaltung, Stadterneuerung. Der Stand der Dinge III. Wien. S. 114f.
- GEBIETSBETREUUNG STADTERNEUERUNG 2019. Milestones der Sanften Stadterneuerung. <https://www.gbstern.at/ueber-uns/was-wir-tun/stadterneuerung/milestones-der-sanften-stadterneuerung/> [30.07.2019].
- GSTÖTTNER, E. 2018. Das Dorf in der Stadt ist ein Luxusviertel geworden. In: *Oberösterreichische Nachrichten*. 13.08.2018. <https://www.nachrichten.at/oberoesterreich/linz/Das-Dorf-in-der-Stadt-ist-ein-Luxusviertel-geworden;art66,2977112>
- HATZ, G. 1998. Sozialraumstrukturen und Sozialer Wandel in Wien 1971–1991. In: *Geographischer Jahresbericht aus Österreich* 55. Wien: Institut für Geographie, pp. 57–82.
- HATZ, G. 2002. Wien im Umbruch – aktuelle Prozesse der Stadtentwicklung. In: *Geographische Rundschau* 9. pp. 93–112.
- HATZ G. 2004. Sozialräumliche Folgen der Stadtsanierung durch Public-Private-Partnerships. Das Modell der „sanften“ Stadterneuerung in Wien. In: *Geographischer Jahresbericht aus Österreich* 60/61, Wien, S. 77–106.

- HATZ, G. 2009: Features and dynamics of socio-spatial differentiation in Vienna and the Vienna Metropolitan Region. In: *Tijdschrift voor economische en sociale geografie*. Vol. 100, No. 4, pp. 485–501.
- HATZ, G., KOHLBACHER, J., REEGER, U. 2016. Socio-economic Segregation in Vienna: A social-oriented approach to urban planning and housing. In: TAMMARU, T., MARCINCZAK, S., VAN HAM, M., MUSTERD, S. (eds.) *Socio-Economic Segregation in European Capital Cities: East meets West*. London: Routledge, Taylor & Francis, pp. 80–109.
- HIRNSTEIN, P. 2013. Gentrifizierung im Kieler Stadtteil Gaarden. Welchen Beitrag kann Soziale Arbeit zur Stadteilaufwertung leisten? Hamburg: Diplomica Verlag.
- HATZ, G., LIPPL, C. 2009. Stadterneuerung: Neues Wohnen in alten Quartieren. In: FASSMANN, H., HATZ, G., MATZNETTER, W. (eds.) *Wien – Städtebauliche Strukturen und gesellschaftliche Entwicklungen*. Wien: Böhlau Verlag.
- HEINIG, S. 1998. Verteilungsmuster öffentlich geförderter Wohnhaussanierung in Wien. Grundlagen und Ergebnisse eines empirischen Erklärungsmodells. In: *Mitteilungen der Österreichischen Geographischen Gesellschaft* 140. pp. 73–96.
- LEES, L. 2003. Super-gentrification: The case of Brooklyn Heights, New York City. In: *Urban Studies*. Vol. 40, No. 12. pp. 2487–2503.
- SEMERAD, S. 2002. Stadtverfall und Stadterneuerung. In: FASSMANN, H., HATZ, G. (eds.) *Wien. Stadtgeographische Exkursionen*. Wien: Verlag Ed. Hölzel GmbH. pp. 11–34.
- SMITH N. 2005. *The New Urban Frontier. gentrification and the revanchist city*. London and New York: Routledge.
- STADTPLANUNG WIEN (ed.) 2000. *Wien, Stadterhaltung, Stadterneuerung. Der Stand der Dinge III*. Wien.
- STATISTIK AUSTRIA. *Volkszählung 1981, 1991 und 2001*. [www.statistik.at](http://www.statistik.at)
- STATISTIK AUSTRIA 1981. Häuser- und Wohnungszählung 1981.
- STATISTIK AUSTRIA 2011. *Registerzählung 2011*.
- STEINER D., RIHA, G. 1992. Wohnungen für Wien. Der Wiener Bodenbereitstellungs- und Stadterneuerungsfonds 1984–1991. Wien: Picus Verlag.  
[wbsf.wien.at](http://wbsf.wien.at) [23.7.2004]
- WEIST, T. 2006. Aufwertungsprozesse in Magdeburger Altbauquartieren: Erklärungsgehalt der Gentrification-Theorie unter Schrumpfbedingungen. In: *Europa Regional*. Vol. 14. No. 4, pp. 181–193. <https://nbn-resolving.org/urn:nbn:de:0168-ssoar-48083-8>
- WIENER BODENBEREITSTELLUNGS- UND STADTERNEUERUNGSFONDS (ed.) 2002. Die geförderte Wohnhaussanierung in Wien. Ein Leitfaden zur Sanierungsförderung nach dem Wiener Wohnbauförderungs- und Wohnhaussanierungsgesetz und den letztgültigen Landesverordnungen. 9. Auflage. Stand Jänner 2002. Wien: Eigenverlag.
- WOHNBAUFORSCHUNG.AT 2018. *Wiener Wohnbau. Jahresbericht 2016* (23.01.2018).
- WOHNSERVICE WIEN, 2018. *Geförderte Sanierung* (<https://wohnservice-wien.at/wohnen/geofoerderte-sanierung> [17.01.2018]).

# Territorial Capital-Based Approach to Land Use

KATALIN MEZEI<sup>1</sup>, SZABOLCS TROJÁN<sup>2</sup>, NÓRA GOMBKÖTŐ<sup>3</sup>

**Abstract:** In the course of necessity and continuous reinterpretation of the capital concept, territorial capital appeared as a new approach at the turn of the millennium (in 2001), which focuses on spatial characteristics of certain forms of capital. Modelling of territorial capital elements is promoted by R. Camagni (2008). Although the OECD applies the territorial capital approach to the OECD's territorial research and EU regional policy, the model received many criticisms on a theoretical level. These focused partly on the composition of capital factors and the method of quantification. With regard to the composition, questions arise concerning the modern capital types of the so-called “innovation network” and the immaterial elements of the “classic square” too. Regarding the content of the traditional parts of the “classic square” (including the land itself) there is no discourse. At the same time, apart from the recommended methodology, studying the issue of land use at the settlement level instead of regional, there are several problems with regard to interpretation, detection and evaluation as well.

The novelty of our approach comes from the horizontal, regional aspect of our research in connection with a traditional sectoral topic of land use. The limiting factors of a land use database at settlement level are enumerated in the study. This database would be necessary for the local self-government to be able to use the available lands with responsibility for the local community.

**Key words:** territorial capital, land use, renewable resource, agriculture

**JEL Classification:** Q15, R14

## 1. Introduction

Reinterpretation of the classical capital concept used in economics became necessary especially at the turn of the 21st century, however, social, human, cultural, relationship, etc. capital concepts had appeared in sociology decades earlier. Besides, capital had much earlier been connected to spatiality in regional science (e.g. regional mobility of production factors), during which new capital concepts

---

<sup>1</sup> KATALIN MEZEI, Széchenyi István University Faculty of Agricultural and Food Sciences, Hungary, mezei.katalin@sze.hu

<sup>2</sup> SZABOLCS TROJÁN, Széchenyi István University Faculty of Agricultural and Food Sciences, Hungary, trojan.szabolcs@sze.hu

<sup>3</sup> NÓRA GOMBKÖTŐ, Széchenyi István University Faculty of Agricultural and Food Sciences, Hungary, gombkoto.nora@sze.hu



appeared (productive capital, human capital, social capital, creative capital, ecological capital, etc.) (Lengyel, 2012). The concept of territorial capital appeared in regional science at the beginning of the 2000s; initially it was mentioned in a regional policy context. Territorial capital encompasses the invisible (immaterial) capital factors typical for a particular region (e.g. local community, geographical and regional environment, habit, connectedness, identity, culture, etc.) besides traditional (physical, visible) capital elements. Territorial capital is numerically measured, like the previous ones. The capital stock of a particular region is constituted by the combination of these two factors essentially determining the competitiveness and developmental directions of the region (Jóna, 2013). To date, there is no consensus on which work the introduction of the definition of territorial capital can be connected. According to some researchers it could be derived from Italy where it is found in the Italian literature, others consider a reference in a 1999 expert material of LEADER European Observatory as its first mention. However, since the widespread use of the term was initiated by a conceptual definition in a 2001 OECD edition entitled *Territorial Outlook*, the OECD is considered by many to be the creator of the territorial capital concept. Accordingly, territorial capital is the capital stock of a particular region, which essentially determines the competitiveness and endogenous development opportunities of the region. According to the theory, these do not only contain visible (physical), but also immaterial factors and invisible connections (institutions, ways of decision making, expertise, etc.) (OECD, 2001). Nevertheless, the OECD's approach raises some questions. Notably, the model lists two-dimensional criteria and characterizes a region according to these and mainly on the basis of development policy and subsidy policy. In addition, this kind of approach studies capital elements only at the regional level, so it does not give guidance to other territorial levels (country, macro-region, micro-region, city and its area, rural areas, etc.) (Dombi et al., 2017). On the other hand, Camagni's theoretical work (2008) organizes territorial capital elements along two dimensions, either according to rivalry among possessions depending on the scarcity of factors or referring to their materiality (*Figure 1*).

According to the degree of rivalry, the two extreme capital types are pure private goods characterized with a high degree of rivalry and public goods characterized with a low degree (or absence) of rivalry. Impure public and impure private goods can be placed in between the two; and moderate rivalry can be found between them. The other dimension of the examination of capital goods is the level of their materialization, in which the two extreme cases include tangible (material) and intangible (immaterial) goods. The previous ones are already known from the classical economic conceptualization while the latter are made up of human and social capital elements. Accordingly, materialized capital goods can be seen as defined, while in the case of immaterialized ones (especially social

<b>High rivalry</b>	<b>Private fixed capital stock</b> <b>Pecuniary externalities (hard)</b>  <b>Toll goods (Excludable)</b>	<b>Relational private services:</b> <ul style="list-style-type: none"> <li>external linkages for firms</li> <li>transfer of R&amp;D results</li> </ul> <b>University spin-offs</b>	<b>Human capital:</b> <ul style="list-style-type: none"> <li>Entrepreneurship</li> <li>Creativity</li> <li>Private know-how</li> </ul> <b>Pecuniary externalities (soft)</b>
Private goods			
Club goods	<b>Proprietary networks, owners' networks</b>  <b>Collective goods: landscape</b> <ul style="list-style-type: none"> <li>cultural heritage (private 'ensembles')</li> </ul>	<b>Cooperation networks:</b> <ul style="list-style-type: none"> <li>strategic alliances in R&amp;D and knowledge p/p partnerships in services and schemes</li> </ul> <b>Governance of land and cultural resources</b>	<b>Relational capital (associationism)</b> <ul style="list-style-type: none"> <li>cooperation</li> <li>collective action capability</li> <li>collective competencies</li> </ul>
Impure public goods			
Public goods	<b>Resources:</b> <ul style="list-style-type: none"> <li>natural</li> <li>cultural (punctual)</li> </ul> <b>Social overhead capital:</b> <ul style="list-style-type: none"> <li>infrastructure</li> </ul>	<b>Agencies for R&amp;D transfer</b> <b>Receptivity enhancing tools</b> <b>Connectivity</b> <b>Agglomeration and district economies</b>	<b>Social capital: (civicness)</b> <ul style="list-style-type: none"> <li>institutions</li> <li>behavioural models, values</li> <li>trust, reputation</li> </ul>
Low rivalry			
	<b>Tangible goods (hard)</b>	<b>Mixed goods (hard+soft)</b>	<b>Intangible goods (soft)</b>

**Figure 1. Classification of territorial capital according to materiality and rivalry**

*Source:* Adapted from Camagni (2008, p. 38.)

capital) even the content of the capital factor is disputed (Bodor, Grünhut, 2014). The possible components of territorial capital can be placed in a 3 x 3 matrix thus divided into nine bigger classes altogether. The four corners of the model are called “traditional square” (squares marked white). These are the basic factors of classical endogenous regional development. These factors can be measured easily and can be inserted in the classical production function. The “innovative cross”, marked grey, is indispensable to establish the innovative conditions for a certain region, as well as to create and utilize knowledge. They are typically quite difficult to measure, and there are no clear boundaries between them (Camagni, 2008; Dombi et al., 2017; Jóna, 2013). For the quantification of territorial capital, Capello’s new (2007) regional prediction model, the MASST-model (Macro-economic, Sectoral, Social, Territorial model) is usually used, according to which

regional growth is a competitive, endogenous, cumulative process, in which social and spatial elements play a significant role. It measures regional growth with two basic models; on the one hand, with the national economic component, on the other hand, with regionally differentiated changes in growth, then compares the two. The model separates endogenous and exogenous variables and is thus able to analyse local and interregional processes. At the same time, it is still being reviewed and tested due to its novelty; besides, its appropriateness is disputed, since it can only quantify on the level of bigger territorial units (NUTS-2 and NUTS-3) (Capello, 2007). Dombi et al. (2017) dealt with examinations on lower levels (district, municipality), however, their research is built on data collected by the Hungarian Central Statistical Office (Központi Statisztikai Hivatal – KSH) and it does not take immaterial capital factors into account.

## **2. Objective**

Our research was a part of a large-scale basic research, the aim of which was to create a sort of territorial capital model at the municipal level. The development of the basic scheme of the model took place within the “Local competitiveness development research program” with KÖFOP-2.3.3-VEKOP-16-2016-00001 identification mark. Our research group examined land as a capital factor. Our objective is to determine a relevant land evaluation method, then determine the most optimal way of the utilization of a land after evaluation and quality classification, at municipal level. Our hypothesis was that we were going to face different kinds of problems (related to methodology, interpretation, detection, evaluation).

## **3. Results and their evaluation**

Land as a non-produced factor for production qualifies as material capital and classical economy classifies it as a natural resource and considers it to have the same characteristics as the other elements of the category, so it can be placed at the bottom left corner in the model. In the period of classical economy, land was considered as a factor of production of unlimited accessibility, and it has only been considered as a renewable resource with the risk of the critical zone since the end of the Industrial Revolution and the mechanisation of agriculture. However, from the point of view of quality, land was not considered as a homogenous factor of production, since the amount of rental fees and land-rent that the owner was entitled to varied in function of land quality. Literature mainly applies the concept of soil instead of land. Though in everyday contexts these two expressions are used as synonyms, the Act CXXIX of 2007 on the Protection of Arable Land

(2007. évi. CXXIX. törvény) makes a clear distinction between the two. So the two definitions are not mutually exclusive, they just give two different approaches to the same resource. The concept of soil relates to productivity determined by the ecological characteristics of the ground surface, while the concept of land defines the resource according to its geographical situation.

In the classification of land, it must be noted that land is not a pure public good since it can also be regarded as a partially private good. This is one of the main problems with the evaluation of land.

We divided the land into two large groups from the point of view of land-use: utilised agricultural and unutilised agricultural areas. We defined it as land on the utilised agricultural areas, while unutilised agricultural areas are fields covered by municipalities. Utilised agricultural areas are made up of arable, lawn, vineyard, orchard, garden, forest and reed, while unutilised agricultural areas include industrial areas, residential areas, areas for infrastructure, services, public services, as well as the green belt and water surfaces. In the typification of unutilised agricultural areas, several solutions were tested but eventually this division was most suitable for the requirements of basic research, and that is why we decided to use this.

Agriculture and forestry areas can be divided into different conversions. According to the KSH's (see above) definition (KSH STADAT Módszertani Útmutató '*Methodological Guidance*') "conversion is the characteristic of the land, means the actual way of use, which can be arable, kitchen garden, orchard, vineyard, lawn (intensive, extensive), forest, reed, fish pond and non-farmed environment". This classification is the same as in Act CXXIX of 2007 on arable land and the categories defined by the Hungarian Research Institute of Agricultural Economics (Agrárgazdasági Kutató Intézet) as well as international standards. We did not find a quasi-standard solution in connection with the resource categories that could generally be applicable to unutilised agricultural areas. Concepts applied by the legislation in this field (1997. évi LXXVIII. törvény 'Act LXXVIII of 1997 on the Formation and Protection of the Built Environment; Government Decree No. 253/1997 (XII. 20.) of the Government on the National Requirements of Town Planning and Building') are not consistent with either the Hungarian Central Statistical Office's (KSH) statistical categories of land use linked to the census, the urban land use categories of EUROSTAT CLUSTERS, or the land cover indicators of the EU-harmonised CORINE database. Other colleagues dealing with modelling Land use change (LUC) already faced this problem (Farkas, Lennert, 2015). They applied a division appropriate for their own research objectives, which obviously does not match ours, at the same time it can highlight the need for harmonisation.

In the case of utilised agricultural areas it must be noted that we use hectare-based statements, while in the case of unutilised agricultural areas the choice is not always evident, so there are different enumeration possibilities.

Valuation of land as a resource provides the basis for the determination of the mode of land use that is possible from a physical point of view and relevant from an economic and social viewpoint. According to the FAO's (1976) definition, land evaluation refers to the assessment of land performance when used for a specified purpose, involving the execution and interpretation of surveys and studies of landforms, soils, vegetation, climate and other aspects of land in order to identify and make a comparison of promising kinds of land use in terms applicable to the objectives of the evaluation. Land evaluation can take place, depending on the objective, on different levels (local, national, regional (e.g. European), global) and with different levels of quantification (i.e. qualitative vs quantitative). Studies on the national level may be useful in setting national priorities for development, whereas those targeted at the local level contribute to selecting specific projects for implementation (Hubert, 2003).

For the classification of the agricultural utilisation of land there are several globally available land evaluation methods, from which one of the most well-known is the so-called framework for land evaluation, elaborated by the FAO. Eliasson (2007) and Rossiter (1994) discuss in detail the characteristics and evaluation criteria of the agricultural land evaluation method. However, these methods only provide an ecology-based approach to the land, they do not examine economic (market) factors at all, which would be indispensable from the perspective of resource management. To demonstrate quality differences in case of agricultural land use types, the golden crown value is used, whereas in case of non-agricultural land use types, quality indicators cannot be constituted in the current state of the model. Basically, a unified enumeration method and a proper database would be required for the creation of further quality indicators. During the determination of the golden crown value, not only the productivity of lands but economic connections and market relations of land use were taken into consideration by determining the benefits and net income of the lands. Although there are newer and more modern soil evaluation systems ("100 point" rating system, D-e-Meter system) these qualify the land according to the characteristics of the soil and cropped area and do not concern economic or even market relations. (This kind of modernisation of the golden crown system is still awaited.) Hermann and Dömsödi (2008) highlight that besides the above-mentioned reasoning, the obsolescence of the golden crown system is demonstrated by its inability to provide precise estimates of crop-specific productivity or production potential (*Table 1*).

**Table 1. Findings to the related Land Evaluation approaches**

Land Evaluation System/ Applied Approach	Approach			
	Ecologic	Economic	Contemporary	Outdated
FAO's Framework for land evaluation	+	–	+	–
Golden Crown system	+	+	–	+
100 points' rating system	+	–	+	–
De-meter system	+	–	+	–

*Source:* Edited by the Authors.

Methodological problems also arose due to the lack of availability of land-related surveys and registers on a lower than sub-regional level (but mostly available on a higher aggregated regional level). The Farm Management Logbook (Gazdálkodási Napló), kept by farmers, could be a potential data source for quantitative and qualitative indicators in case of agriculturally utilised areas. The 97/2015 (XII. 23) Regulation of Hungarian Ministry of Agriculture (97/2015. (XII. 23.) FM rendelet) containing the structure of the Farm Management Logbook came into effect on 1<sup>st</sup> of January 2016. The Logbook does not contain any information about the quality of land and the golden crown value. Regarding the possible usage of data for the identification of land utilisation, the lack of a publicly available integrated database compiled from the data of the Logbook can be a further disadvantage. Previously, the county branches of Agriculture and Rural Development Agency (MVH) collected and processed the Logbooks, but since 2017, with the termination of the Agriculture and Rural Development Agency, the National Food Chain Safety Office (NÉBIH) only took over the tasks of data collection while the issue of data integration has still not been resolved. District offices of NÉBIH only keep a land use (public credit) register about land use and users but there is no further available information. Another possible data source is the Hungarian Land Parcel Identification System (called MePAR), run by the Department of Geodesy, Remote Sensing and Land Offices under the Government Office of the Capital City Budapest, which is the only national land identification system related to agricultural support procedures. The MePAR ensures the clear identification of agricultural parcels that form the basis of land-related support, and the simple and exact specification of certain regions with the help of data related to the area of boards. As a main reference for the identification of boards, broader units with timely, less changeable borders, so-called blocks are used across Europe in many places. So in our country, the reference framework of the agricultural parcel is the physical block, which is a larger unit than a board. MePAR is used by holdings and offices, after signing in. The disadvantage of the

information system is that it does not show the golden crown value of specific lands, so no information is available on it (*Table 2*).

**Table 2. Land Evaluation Systems examined in the study and their characteristics**

Land Evaluation Systems and their Characteristics	Applied indicators		Responsible Organization	Area of use	Integrated national database	Public database
	Quantitative	Qualitative				
Farm Management Logbook (Gazdálkodási Napló)	+	-	National Food Chain Safety Office (NÉBIH)	Checking the regularity of agricultural production	-	-
Land Registry Records (Földkönyv)	+	+	District Government Office	Estate records	+	-
Hungarian Land Parcel Identification System (MePAR)	+	+	Budapest Government Office	Control of agricultural support entitlement	+	-

*Source:* Edited by the Authors.

#### 4. Conclusion

During our examinations we concluded that the determination of optimal land utilisation of a certain region is an extremely difficult task, limited by factors beyond the possibilities of surveying. The first problem is the unclear definition of land (land, soil, agricultural land, non-agricultural land) and unclear classification of the land as a resource (material-immaterial, public good-private good). Registration data related to land evaluation are not available on the level of municipalities. Besides, there are problems with detection as those that are used in agricultural management (MePAR, Landbook) are not in accordance with detections of the Hungarian Central Statistical Office (KSH). In addition, land evaluation is also questionable because the currently available land evaluation methods (except for the golden crown evaluation method) take only ecological viewpoints into consideration, however, the evaluation of non-agricultural use areas is extremely difficult and complex.

#### Acknowledgements

The publication is supported by the KÖFOP-2.3.3-VEKOP-16-2016-00001 “Local competitiveness development research program”.

## References

- BODOR, Á., GRÜNHUT, Z. 2014. Dilemmák a területi tőke modelljének alkalmazhatóságáról. A társadalmi tőke problémája Camagni elméletében. In: *Tér és Társadalom*. Vol. 28, No. 3, pp. 3–17.
- CAMAGNI, R. 2008. Regional competitiveness: towards a concept of territorial capital. In: CAPELLO, R. et al. (eds.) *Modelling regional scenarios for the enlarged Europe. European competitiveness and global strategies*. Berlin-Heidelberg: Springer. pp. 33–47.
- CAPELLO, R. 2007. A forecasting territorial model of regional growth: the MASST model. In: *The Annals of Regional Science*. Vol. 41, pp. 753–787.
- DOMBI, G., HORVÁTH, Á., KABAI, G., FODOR-KUN, E., OLÁH, M., SÁPI, Z., SZABÓ, P., TÓTH, B. I. 2017. *A területi tőke és magyarországi dimenziói*. Balatonfüzfő: Nyicita Alapítvány.
- ELIASSON, A. 2007. *Review of Land Evaluation Methods for Quantifying Natural Constraints to Agriculture*. European Commission, Joint Research Centre, Institute for Environment and Sustainability. Joint Research Centre, Ispra (Italy)
- FAO 1976. *A Framework for Land Evaluation*. FAO Soils Bulletin 32. Soil Resources Development and Conservation Service Land and Water Development Division
- FARKAS, J., LENNERT, J. 2015. A földhasználat-változás modellezése és előrejelzése Magyarországon. In: CZIRFUSZ, M., HOYK, E., SUVÁK, A. (szerk.) *Klímaváltozás – Társadalom – Gazdaság. Hosszútávú területi folyamatok és trendek Magyarországon*. Pécs: Publikon Kiadó. pp. 193–221.
- HERMANN, T., DÖMSÖDI, J. 2008. Új földminősítő rendszer bevezetésének szükségessége, a föld értékeléssel összefüggő földügyi feladatok elősegítése. In: *Geodézia és Kartográfia*. Vol. 60. No. 11, pp. 24–28.
- HUBERT, G. 2003. An overview of land evaluation and land use planning at FAO. Accessed: <http://www.fao.org/ag/agl/agll/landuse/>
- JÓNA, GY. 2013. A területi tőke fogalmi megközelítései [Conceptual approaches to territorial capital]. In: *Tér és Társadalom*. Vol. 27, No. 1, pp. 30–51.
- LENGYEL, I. 2012. Regionális növekedés, fejlődés, területi tőke és versenyképesség. In: BAJMÓCZY, Z., LENGYEL, I., MÁLOVICS, GY. (szerk.): *Regionális innovációs képesség, versenyképesség és fenntarthatóság*. Szeged: JATEPress. pp. 151–174.
- OECD, 2001: Territorial Outlook. OECD Publications Service, Paris
- ROSSITER, D. G. 1994. Land Evaluation. Part 7: Non-FAO Land Classification Methods. Lecture Notes. Cornell University College of Agriculture and Life Sciences Department of Soil, Crop, and Atmospheric Sciences, August 1994.
1997. évi LXXVIII. törvény az épített környezet alakításáról és védelméről [Act LXXVIII of 1997 on the Formation and Protection of the Built Environment].
2007. évi CXXIX. törvény a termőföld védelméről [Act CXXIX of 2007 on the Protection of Arable Land].
- 97/2015. (XII. 23.) FM rendelet a termeléshez kötött közvetlen támogatások igénybevételének szabályairól szóló 9/2015. (III. 13.) FM rendelet, valamint az éghajlat és környezet szempontjából előnyös mezőgazdasági gyakorlatokra nyújtandó támogatás igénybevételének szabályairól, valamint a szántóterület, az állandó gyepterület és az állandó kultúrával fedett földterület növénytermesztésre vagy legeltetésre alkalmas állapotban tartásának feltételeiről szóló 10/2015. (III. 13.) FM rendelet módosításáról [97/2015 (XII. 23) Regulation of Hungarian Ministry of Agriculture].
- KSH STADAT Módszertani útmutató [Methodological Guidance]  
(<https://www.ksh.hu/docs/hun/modsz/modsz41.html>)



# Characteristics of Community Supported Agriculture

NÓRA GOMBKÖTŐ<sup>1</sup>, KATALIN MEZEI<sup>2</sup>

**Abstract:** Community Supported Agriculture (CSA) is strongly related to rural communities. It has many benefits at micro and macro level as well. At micro level, cost and benefits are taken into account from the point of view of the farmers and the shareholders. The costs most often appear as opportunity costs, such as cost of direct marketing or customer relationships from the farmers' side, and commitment for the whole season or unpredictable yields from the members' side. CSAs have far more benefits than costs, such as fix market access, stable and decent income, products with favourable properties (fresh, healthy, safe). All of these opportunity costs and benefits will be introduced in the presentation. At macro level, CSAs have also many benefits. From this point of view, the effects of CSAs on the communities and the environment are examined. Among these benefits must be mentioned the environmental effects of local production, support of local identity and rural development, creating new jobs, and strengthening of social relations. All of these are also described in detail.

**Key words:** Community Supported Agriculture, costs, benefits, farmers, consumers, society, environment

**JEL Classification:** Q19

## 1. Introduction

In response to increasing environmental damage, the first movements of Community Supported Agriculture (CSA) emerged in the 1960s in Japan and in Europe, becoming a farming mode in the 1970s. Later, in the 1980s, it started to be used in the United States as well. CSA is an alternative farming mode with health and environmental benefits that is local, safe and sustainable. It places emphasis on local products, environmentally friendly production methods, and sustainable farming. The essence of the method is the direct relationship between the producer and the customer, and the importance of trust in personal relationships. In contrast to long supply chains, it reduces the physical distance between the producer and the customer, furthermore personal relationship, trust, and often ecological certification are built in the system as a guarantee of quality.

---

<sup>1</sup> NÓRA GOMBKÖTŐ, Széchenyi István University Faculty of Agricultural and Food Sciences, gombkoto.nora@sze.hu

<sup>2</sup> KATALIN MEZEI, Széchenyi István University Faculty of Agricultural and Food Sciences, mezei.katalin@sze.hu

In addition, it can have a positive impact on the local landscape, environment (environmental benefits, less transport, fewer packaging materials, improved animal welfare, etc.), as well as the growth of the local economy (employment, local processing, keeping money in local consumption). It provides small farmers with the opportunity to produce and sell local, high-quality food, and provides consumers with convenient access to delicious, reliable local food.

The essence of CSA is that a group of people commit to buying shares in advance from a farmer who grows food in an ecological way. This is necessarily a small-scale system whose central decision-making body is the farmer-consumer group. Members of the CSA require a contract to be made at the start of a growing season and pay an advance on the “share” of agricultural products produced by a participating farm. In contrast, the farmer distributes these products weekly to CSA members during the growing season. By paying all weekly shares, members provide the farmer with the capital needed to run the farms. By purchasing from local farmers, members are consistently guaranteed fresh and seasonal food. There is a different degree of commitment between the two parties and different CSA types depending on the degree of commitment (community supported farm, box systems, buying groups).

It is difficult to determine exactly in which country in Europe this type of farming was first introduced. Individual initiatives were observed in the 1960s, mainly in Germany but later in the Netherlands, Ireland and Slovenia. Currently, at least one form of CSA is observable in almost all European countries. However, this type of farming has evolved differently in some European countries, as culture, health, society, and education vary from country to country. In some countries, these communities have been specifically created by social solidarity (in some countries it is called “social economy”). At present, there is no mature form of this type of farming in Hungary; it would require changes in many areas and wider support as well. It can be presumed that most Hungarian farmers and decision-makers do not have enough information about this farming type. Nevertheless, professional information for these actors would be desirable, because this method has a lot of benefits both at the microeconomic and macroeconomic level. Additionally, this form of sales is becoming increasingly popular among consumers, there is clearly an overdemand in this market, but its availability is limited due to the insufficiency of supply. Furthermore, there is a demand for it, especially in metropolitan, agglomeration areas, which may give a new interpretation to rural development in periurban areas. However, given the limited availability and the gaps in the currently available domestic and international literature, it would be difficult to approach the subject in a coherent way.

In this research, a comprehensive review of the related literature was carried out in order to identify the results, shortcomings, and further opportunities

inherent in this method. Following this, experiences were compared with some results from the literature, taking into account Hungarian territorial specificities. The aim of the research is to explore all characteristics and effects of CSAs, including effects on farmers, consumers, society, and the environment as well. The main purpose of this literature review is to provide comprehensive and practical information for farmers and decision-makers. Therefore, the study is based on the main literature of this topic.

## **2. Effects of Community Supported Agriculture**

Community supported agriculture is more than food production and distribution. Besides, it considerably changes the lifestyle of the farmer and the consumer, it also has significant impact on society and the environment. Of course, like all types of production, CSA has its advantages and disadvantages as well. The effects of CSA may be examined at two level. At microeconomic level, both farmers and consumers are stakeholders, while at macroeconomic level, society and environment are affected. During CSA many costs may arise, which includes materialized and opportunity costs as well. These may be also direct and indirect (negative externalities). On the other side a lot of benefits may be gained by farmers, by consumers, by the society and by the environment as well. In order to characterize the CSA in one way, these costs and benefits should be taken into account and consider.

### **2.1 Farmers**

There are a lot of motivations of farmers to establish a CSA farm (including conscious behavior, environmental protection, targeting a special niche market, etc.), in most cases, the primary goal of farmers joining CSA is to maximize profit. Therefore, they are mainly interested in their costs and benefits. They have materialized costs that are related to the production closely (production costs). Some of these costs may be higher than costs in industrial farming, while some of them may be lower. CSA farming is based on organic or biodynamic method, thus it requires more labour, so labour costs increase. Other principle of CSA farmers is that they offer a wide range of products, often with special varieties that may have higher purchase costs. Because they adapt their agricultural activities to the needs of CSA partnerships, there are many other additional costs, for instance initial investment costs for setting up organic farming, drip irrigation, etc. On the other side, some production costs are lower than in industrial agriculture, such as machine operating costs and there are not any costs of pesticides, fertilizer, and

other chemicals, in case of animal breeding the costs of antibiotics, medicines, and hormones.

Since in the framework of CSA consumers get their commodities from the farmer, without any intermediary, CSA is characterized by direct marketing. Direct marketing involves additional costs, such as packaging and weekly delivery. In addition, there is a need for thorough accounting on the management side, which also may increase the costs.

Farmers have to face some opportunity costs as well that can not be materialized. For instance, there is a need to open the farm to visitors and to build customer relationships that can lead to changes in the family's personal lifestyle (Moellers, Birhala, 2014).

CSA also offers many benefits to farmers. Because of the committed consumers, farmers can count on a stable consumer base and prepayment for their products. This provides for the farmer a stable and decent income, a stable market for a whole year, the control of pricing, low production risk, and low market competition. In addition, consumers support the farmer financially and morally, thus the farmer can concentrate on production and food processing. Because CSA is a kind of short food supply chain, there is no need for an intermediary on a retailer. Thanks to the CSA, a close personal relationship can be established between farmers and consumers, who provide regular feedback and also can manage the farm themselves. In the framework of CSA, it is common phenomenon that farmers cooperate (sharing products, experiences, and knowledge), it allows a community to be built among the farmers as well. And last but not least, it provides a safety net for farmers (Tegtmeier, Duffy, 2005).

According to Perry and Franzblau (2010), benefits for producers include advance payment, guaranteed markets, direct consumer contact, pricing, special crop production, convenience, low risk of new or small producer involvement, community building among producers, and safety net.

In their case study, Flora and Bregendhal (2012) found that financial benefits were the most important motivation for farmers to join the CSA. The expected benefits of social capital are the second most important driver of joining the CSA, followed by reasons of cultural/value conviction, the expected growth of human capital, while environmental and political reasons are less significant.

## **2.2 Consumers**

On consumer side, there are also costs and benefits of joining a CSA. There are two main revealed costs. On the one hand, they probably have to pay a higher price for products than in supermarkets. In this case, products from CSA farms should be compared to the same amount of organic product that can be bought in bio shops or supermarkets. In their research, Brown and Miller found that organic

products cost nearly as much on the market as consumers gain from the CSA farm (and in some cases were more expensive). On the other hand, they may have travel costs, because they have to travel to the farm or to a meeting point to pick up their products. This second one is a disadvantage compared to the distribution form of home delivery.

Although there are only two revealed costs on the consumer side, there are also many opportunity costs that consumers have to cope with. They have to be committed for the whole season, thereby take the risk of crop damage or loss. Furthermore, they have to abandon the wide range of products offered by traditional food distribution channels. The quality and quantity of vegetables is unpredictable, but according to Flora and Bregendahl (2012) it is not the main reason of hesitancy of the consumers, rather financial aspects (prices). They also mentioned the inconvenience of weekly pick up of the share. Consumers get a box with fix varieties of agricultural products every week, but the content of the box is not chosen by the consumers. The box may contain unknown varieties of vegetables and may also be difficult to store, process and cook. Overall, they are facing a major change in their consumer routine and their everyday lifestyle as well (Cone, Myhre, 2000).

On the other side, consumers may get much more benefits from CSA. One of the most common reason to join a CSA is that they can get products with beneficial properties more often than in shops or in supermarkets. These products have beneficial properties such as organic, safe, fresh, healthy, and delicious. These products have higher quality than products from supermarket. Consumers get fresh fruits and vegetables every week. They can get organic food at reasonable prices as well as seasonal and special products, which provides a varied, healthy, and vitarian meal. It is usually typical, that consumers are absolutely aware of benefits of seasonal food consumption.

In addition, there is a positive change in consumer behavior, because they have healthier eating habits, eat fresh and varied vegetables and fruits, and buy less food. However, if there is a surplus product in the share, it can be passed on to neighbors and friends.

Another important consideration for conscious consumers is that they know the farm and the farmer they are buying from, so they know the origin of the products. Furthermore, consumers become part of a community and directly support the local farmer as part of that community. They can visit the farm and work there, therefore, they get education, information, and stress relief. They have direct contact with the farm, the farmer and the rural area. And last but not least, this farming method also addresses the environmental concerns of environmentally conscious consumers (Flora, Bregendahl, 2012; Brown, Miller, 2008).

According to Perry and Franzblau (2010), CSAs offer consumers benefits such as healthy and safe food, competitive pricing, local shopping, joining the land, reducing risk, and convenience.

In their research, Bloemmen et al. (2015) found that for consumers, non-financial benefits (such as participating in a project or increasing their autonomy through the obtaining of knowledge or skills) are more important than financial benefits.

All in all, as for costs and benefits of farmers and consumers, it can be stated, that for both producers and consumers, the benefits of CSA membership outweigh the costs, and are in a field that is more important to producers and consumers than financial aspects.

### 2.3 Society

The impact of the CSA on society cannot be ignored either. Namely, this type of farming has many benefits for society.

The CSA meets the requirement of social integration, that is, the activities of business organizations provide fair living for employees, deliver fair value to customers, ensure fair trade with suppliers, and work with local communities.

In the framework of the CSA, partnerships are being built not only between farmers, but also with other governmental and non-governmental organizations as well.

Because CSA members become members of a community, one of the most important benefit of CSA for society is that it builds a relatively strong community with member in constant contact (online or offline), sharing experiences, knowledge, recipes, and creating a community space on the farm. This community is based on mutual trust. Common knowledge is shared among each other by the farmers and the members as well. Thus, a civil renewal and cooperation at community level is also being built. Because CSA farms are based on relationships between farmers and consumers, the quality and continuity of the relationship is extremely important, even if in the form of newsletters or letters related to weekly product boxes. Electronic communication is gaining popularity, which is important not only for promoting communication between farmers and consumers, but also for creating a community of CSA economies.

Because one of the most important principles of CSA is that “local products from local farmers to local consumers locally”, CSA strongly support also the local identity. Furthermore, it establishes a personal connection with the place of residence, and promotes rural and regional development with the support of local farmers.

According to Flora and Bregendahl (2012) and Henderson (2007) there are some CSA partnerships that give the poor surplus or take measures aimed at social inclusion.

Often, CSA farms also play an educational role. This can be done in many ways, such as training volunteers or hosting trainees, but employing an employee can also be integrated into school programs. One of the biggest challenges is developing an ongoing education process so that farmers and consumers can learn what the responsibility of a larger community is. Currently, the farmer provides most of the educational activity, but this must be done extensively through adult education programs, study groups and workshops. In this way, the CSA movement can create a more conscious connection to the broader societal problems. The majority of CSA consumers believe that there is a need for education aimed at raising awareness of local foods and helping them to cook and preserve their products (Sharp et al., 2002).

The great advantage of CSA farms is that they provide new jobs, as organic farming requires more labor than traditional farms. Very often, especially in biodynamic economies, government-supported job opportunities are offered to people with disabilities.

And last but not least, CSA provides a global food security and creates the opportunity of access to healthy food (Baker et al. 2019).

## 2.4 Environment

In the long run, small farms can be more environmentally sustainable. Biologically diverse farms are more likely to succeed on a small scale, operated by a person closely linked to the earth. A multi-cultural economy cannot be cultivated with heavy equipment moving at high speeds (Halweil, 2000). Small local farms also can save energy and reduce carbon dioxide emissions (Pirog et al., 2001).

The CSA meets the requirement of ecological sustainability, that is, that economic organizations work with the ecosystem so that the health of the ecosystem is not damaged. These requirements imply that aggregate demand for natural resources is limited, that the technologies used are environmentally friendly and socially acceptable, and that aggregate waste from businesses is limited.

Although there is no specific requirement that CSAs can only be operated in organic farming, in practice this is common. There is almost no CSA that does not use some kind of semi-natural farming to some extent (ecological, organic, biodynamic) (Bjune, Torjusen, 2005).

As most CSA farms use organic or biodynamic farming, they have many positive effects on the natural environment. It is important that the use of local

breeds helps to maintain biodiversity and landscape diversity. Due to environmentally friendly pest control methods, the accumulation of toxins in the soil is reduced. Finally, since food production and consumption take place locally, so-called food kilometers (or food miles) are much shorter; that is to say, energy demand and the environmental impact of transport are also reduced.

The Community farm is based on the idea of independence, which is closely linked to ecological sustainability. Practically, living across borders and sustainability are one and the same. Every community must achieve ecological sustainability by utilizing the available ecological gap. Ideally, this means achieving some basic goals. Every system used in a community should be continuous and repeat all production cycles in the following years without degradation of the environment. The size of the community should be stabilized at an appropriate level. The Community economy can not depend on economic growth to maintain employment and prosperity. The community must produce at least enough food and raw materials so that its members can live a simple, comfortable life while staying within the boundaries of their environment and not exploiting parts of the world. All the energy used in the community should come from renewable sources. CSA contributes to reduction of ecological footprint.

CSA directly contributes to the maintenance of land, landscape, and the farming traditions in the area. It helps maintain green areas near cities. So, it has a key role in spatial planning as well.

And last but not least, due to the CSA, there is less food waste. It can be observed at farmer and at consumer level as well. Farmers are trying to recycle all waste, usually in the form of green manure or compost. At consumer level, they get a box with a fix amount of vegetable or fruits, so it just covers their weekly needs, so there is no food waste. There is no risk of buying much more than they need.

All revealed benefits of CSA can be seen in *Table 1*.

### 3. Conclusion

Community Supported Agriculture is a pioneering initiative in agriculture with a relatively short history. It began to spread from the second half of the last century, with the primary aim of eliminating the damage caused by industrialized agriculture and global trade. Like all other production systems, it has both costs and benefits for farmers and for consumers as well. The most significant costs of farmers are the costs of agricultural activities adapting to the needs of CSA partnership (e.g. initial investment costs for setting up organic farming, drip irrigation, etc.). The biggest challenge for consumers is trust-based commitment for a whole season that involves taking risks. In extreme cases, the consumer may not get anything for his money. All other costs for the consumer are negligible.



**Table 1. Benefits from the Community Supported Agriculture**

Farmers	Consumers
Stable and decent income Stable market Pricing control Low production risk Low market competition Support from customers Concentration only on production No intermediary or retailer Personal relationship between farmers and customers Safty net	Food with beneficial properties (organic, safe, fresh, healthy, delicious) Higher quality food Reasonable prices Stable food access every week Seasonal and special food Positive change in consumer behavior Well-known farm, safety source of food Community Environmental aspects Possibility to visit the farm and work there Stress relief Direct contact with the farm, the farmer and the rural area
Society	Environment
Social integration Building partnerships Building social communities Sharing knowledge Civil renewal and cooperation at community level Support of local identity Personal contact with the place of residence Promotion of rural and regional development Support of local farmers Social inclusion Education New jobs Access to healthy food Global food security	Environmentally friendly cultivation Ecological sustainability Maintaining of <ul style="list-style-type: none"> <li>– biodiversity</li> <li>– land</li> <li>– farming tradition</li> <li>– landscape</li> </ul> Shorter food kilometers (food miles) Smaller ecological and carbon footprint Less food wastes Role in spatial planning Maintaining green areas near cities

Source: Edited by the Authors.

The lack of education is another challenge for both producers and consumers. Considering the costs and benefits, it can be stated that benefits are far more prevalent and more important to CSA members. The most important benefit for farmers is the stable customer base from which many other benefits arise. The most relevant benefit for consumers is that they can get food with beneficial properties (organic, safe, fresh, healthy, delicious) from a well-known farm every week. It is not clear whether it is positive or negative, but both farmers and consumers have to face a significant lifestyle change.

CSA is developed to provide farmers with a stable livelihood while providing consumers with fresh, healthy, safe, and controllable food at a reasonable price.

However, there are many additional benefits, especially for society and the environment.

As farmers and consumers mentioned, most people do not know or have even heard about CSA. That is one of the reasons why this system is less widespread. Therefore, the importance of education is an essential factor. In the framework of education, any costs and benefits incurred should be disclosed in detail, so that farmers and potential consumers can consider them and decide whether to join. In the long run, entire CSA networks could be established.

The future research goal is to examine the Hungarian CSA farms from this point of view and to determine how well the Hungarian situation fits with the facts revealed in the literature.

### Acknowledgements

The publication is supported by the EFOP-3.6.3-VEKOP-16-2017-00008 „Innovative scientific institutions in domestic agricultural higher education” project.

### References

- BAKER, N., POPAY, S., BENNETT, J., KNEAFSEY, M. 2019. Net yield efficiency: Comparing salad and vegetable waste between community supported agriculture and supermarkets in the UK. In: *Journal of Agriculture, Food Systems, and Community Development*. Vol. 8, No. 4, pp. 179–192.
- BJUNE, M., TORJUSEN, H. 2015. Community Supported Agriculture (CSA) in Norway – A context for shared responsibility. Paper to the Second CCN (Consumer Citizenship Network) International conference 26–27 May at the University of Economics, Bratislava, Slovakia: Taking Responsibility.
- BLOEMMEN, M., BOBULESCU, R., LE, N. T., VITARI, C. 2015. Microeconomic degrowth: The case of Community Supported Agriculture. In: *Ecological Economics*. Vol. 112, April, pp. 110–115.
- BROWN, C., MILLER, S. 2008. The Impacts of Local Markets: A Review of Research on Farmers Markets and Community Supported Agriculture (CSA). In: *American Journal of Agricultural Economics*. Vol. 90, No. 5, pp. 1298–1302.
- CONE, C. A., MYHRE, A. 2000. Community supported agriculture: a sustainable alternative to industrial agriculture? In: *Hum Organ*. Vol. 59, No. 2, pp. 187–197.
- FLORA, C. B., BREGENDAHL, C. 2012. Collaborative Community-supported Agriculture: Balancing Community Capitals for Producers and Consumers. In: *International Journal of Sociology of Agriculture & Food*. Vol. 19, No. 3, pp. 329–346.
- HALWEIL, B. 2000. Where have all the farmers gone? In: *World Watch*. Vol. 13, pp. 12–28.
- HENDERSON, E. 2007. Sharing the harvest: a citizen's guide to community supported agriculture. White River Junction: Chelsea Green, 303 p.
- MOELLERS, J., BIRHALA, B. 2014. Community Supported Agriculture: A promising pathway for small family farms in Eastern Europe? A case study from Romania. In: *Landbauforschung*. Vol. 64, No. 3–4, pp. 139–150.

- PERRY, J., FRANZBLAU, S. 2010. *Local Harvest: A Multifarm CSA Handbook*. Published online: <http://www.sare.org/publications/csa/csa.pdf> [Accessed on 16 May 2019].
- PIROG, R. S., VAN PELT, T., ENSHAYAN, K., COOK, E. 2001. Food, fuel, and freeways: An Iowa perspective on how far food travels, fuel usage, and greenhouse gas emissions. *Leopold Center Pubs and Papers*. 3. online: [https://lib.dr.iastate.edu/leopold\\_pubs/papers/3/?utm\\_source=lib.dr.iastate.edu%2Fleopold\\_pubs/papers%2F3&utm\\_medium=PDF&utm\\_campaign=PDFCoverPages](https://lib.dr.iastate.edu/leopold_pubs/papers/3/?utm_source=lib.dr.iastate.edu%2Fleopold_pubs/papers%2F3&utm_medium=PDF&utm_campaign=PDFCoverPages) [Accessed on 22 May 2019].
- SHARP, J., IMERMAN, E., PETERS, G. 2002. Community Supported Agriculture (CSA): Building Community Among Farmers and Non-Farmers. In: *Journal of Extension*. Vol. 40, No. 3, pp. 1–9.
- TEGTMEIER, E. M., DUFFY, M. 2005. Community Supported Agriculture (CSA) in the Midwest United States: A regional characterization. In: *Leopold Center Pubs and Papers*. 151.

# A general framework for the assessment of planning, implementing and monitoring Nature-based Solution projects

ALESSANDRO ARLATI<sup>1</sup>, ANNE RÖDL<sup>2</sup>, JÖRG KNIELING<sup>3</sup>

**Abstract:** The impacts of cities on global climate and ecological systems are very well-known worldwide. Nevertheless, the efforts of the last decades focused on reducing the effects of human activities on the environment. Only lately, the idea of mimicking nature as model of a perfect cycle made its way into the scientific community and beyond. Hence, the concept of Nature-based Solutions (NbS) has been introduced in the scientific debate in 2009 and since 2015 as a core theme in research and innovation programmes of the European Union. These are defined as living solutions inspired by nature with the aim of addressing societal problems. Implementation of such solutions requires not only a specific expertise, but also many other contextual conditions, such as political will and economic feasibility. Challenges are still present, mainly related to the capacity gap, funding gap, and the lack of a sound accountability framework. The aim of this paper is to focus on the third challenge, i.e. to delineate a possible framework for evaluating the implementation of Nature-based Solutions. This is done by looking at the case study of Hamburg, Germany, which is going to develop NbS in the Neugraben-Fischbek neighbourhood in the frame of the Horizon 2020 Research Project CLEVER Cities. Here, NbS are aiming to re-introduce green into the built environment while focusing on the alleviation of both social differences (integration and inclusion of the weaker population groups) and technical barriers (big infrastructure caesuras, etc.). These results are reached through a process of co-creation, which seeks the inclusion of local stakeholders and experts in the design and decision on the single interventions to be implemented in the project lifespan. The resulting framework encompasses the process from the definition of problems and goals in the area of study, through co-creation and the identification of the type of intervention to implement, concluding with the actual realisation of the project. Each of these steps present guidelines and suggestions for the determination of indicators through which it is possible to assess both the process and outcomes of the single steps. The article offers an overview of the entire framework, specifying the methodology to build a sound set of indicators as well as reflecting on possible limitations and its future development.

---

<sup>1</sup> ALESSANDRO ARLATI, HafenCity Universität, Germany, [alessandro.arlati@hcu-hamburg.de](mailto:alessandro.arlati@hcu-hamburg.de)

<sup>2</sup> ANNE RÖDL, Technische Universität Hamburg, Am Schwarzenberg-Campus, Germany, [anne.roedl@tuhh.de](mailto:anne.roedl@tuhh.de)

<sup>3</sup> JÖRG KNIELING, HafenCity Universität, Germany, [joerg.knieling@hcu-hamburg.de](mailto:joerg.knieling@hcu-hamburg.de)

**Key words:** Nature-based Solutions, indicators, framework, theory of change, assessment

**JEL Classification:** R5

## 1. Introduction

The impacts of cities on global climate and ecological systems are very well-known worldwide (Puppim de Oliveira et al., 2011). Nevertheless, the efforts of the last decades focused on reducing the effects of human activities on the environment. Only lately, the idea of mimicking nature as model of a perfect cycle made its way into the scientific community and beyond. Hence, the concept of Nature-based Solutions (NbS) has been introduced in the scientific debate in 2009 and since 2015 as core theme in research and innovation programmes of the European Union. In 2015, the European Commission set up a research and innovation agenda on nature-based solutions. It is intended that the new concept will contribute to greening the economy and achieving sustainable development. In their report, the Commission first provides a definition of the term “nature-based solutions”. Accordingly, we will define “nature-based solutions” as follows:

*“Nature-based solutions (NbS) are systemic interventions that can be inspired by or support nature in addressing various societal challenges, such as climate change mitigation, water management, land-use and sustainable urban development. This entails planning and designing with natural features, such as trees, plants and green spaces, in a way that can help address the aforementioned urban challenges”* (Maes, Jacobs, 2015).

These are defined as living solutions inspired by nature with the aim of addressing societal problems (Maes, Jacobs, 2015). One of the aims of NbS is to reconnect the built environment with more nature-driven systems, bringing nature back to the cities.

Implementation of such solutions requires not only a specific expertise, but also many other contextual conditions, such as political will and economic feasibility. As a matter of fact, Nature-based Solutions still seem a mere theoretical exercise and a fancy alternative that only few can afford. However, plenty of literature argues the extreme powerfulness and effectiveness of such interventions; as well as their limitations and complexity (Cohen-Shacham et al., 2016; Eggermont, 2015).

Hence, monitoring and evaluation plays an important role in assessing the effectiveness of nature-based interventions and providing guidance and advice for replication. Therefore, the necessity to evaluate the impacts of NbS projects as well as monitoring their performance is argued to be crucial for pursuing sustainable development approaches (Kabisch et al. 2016). To be able to measure

relevant outcomes and characteristics of the implemented interventions, appropriate and meaningful evaluation criteria and indicators have to be selected. Since the finding of suitable criteria and indicators is often subjective, their selection process has to be structured and objectified. This helps to improve the replicability of the criteria and indicator selection and to ensure the comparability of the NbS evaluation results.

However, the complexity of NbS projects and the different contexts of their implementation makes it difficult to generalize the identification and selection of suitable assessment criteria and indicators. The amount of variables is huge and case-dependent.

Nevertheless, attempts to develop overarching NbS evaluation frameworks have already been made. For example, Raymond et al. (2016) and Kabisch et al. (2016) suggested assessment framework attempts, while other authors like e.g. Haapio and Viitaniemi (2007) provided guidance on criteria and indicators. But also the EU funds projects on NbS that are also working on the development of assessment and implementation frameworks like the EKLIPSE consortium (Raymond et al., 2017), UNaLab (2019) or the CONNECTING NATURE (2019) project. However, to date, no generally accepted monitoring framework exists: challenges related to this point are capacity gap, funding gap, and the lack of a sound accountability framework (Zevenberger, 2019). The aim of this paper is to focus on the third challenge, i.e. to delineate a possible framework for evaluating the implementation of Nature-based Solutions: in particular, how the framework supports the identification of criteria and their indicators for assessing NbS projects. At the same time, it can be used to assess the design, implementation and follow-up of NbS. The framework is intended to provide a transparent and replicable structure that is customizable for different use cases. The different phases of project implementation and evaluation are taken into account in the framework. This means that both the outcomes and processes (e.g. decisional processes) of an NbS project are of the same importance and should be monitored and evaluated accordingly.

The article presents the status of the framework in the context of the Horizon 2020 Research Project CLEVER Cities. The authors of this article recognised the need for a more structured framework for the definition of indicators for NbS and the content of this article presents the first attempt that can be refined in the course of the project, although not yet entirely embedded in the project structure. Therefore, in the next pages this framework and its functioning are presented by looking at one of the three main case studies, the one of Hamburg, Germany, which is going to develop NbS in the Neugraben-Fischbek neighbourhood located in the south of the City State. NbS here are aiming to re-introduce green in the built environment while focusing on the alleviation of both social differences (integration and inclusion of weaker population groups) and technical barriers (big

infrastructure caesuras, etc.). These results will be reached through a process of co-creation that seeks the involvement of local stakeholders and experts in the design and decision on the single interventions to be implemented in the project lifespan. The resulting framework encompasses the process from the definition of problems and goals in the area of study, through co-creation and the identification of the type of intervention to implement, concluding with the actual realisation of the project. Each of these steps present guidelines and suggestions for the determination of indicators enabling the assessment of both processes and outcomes of the individual steps. The study concludes with the drawing of conclusions.

## **2. Description of the development of the framework**

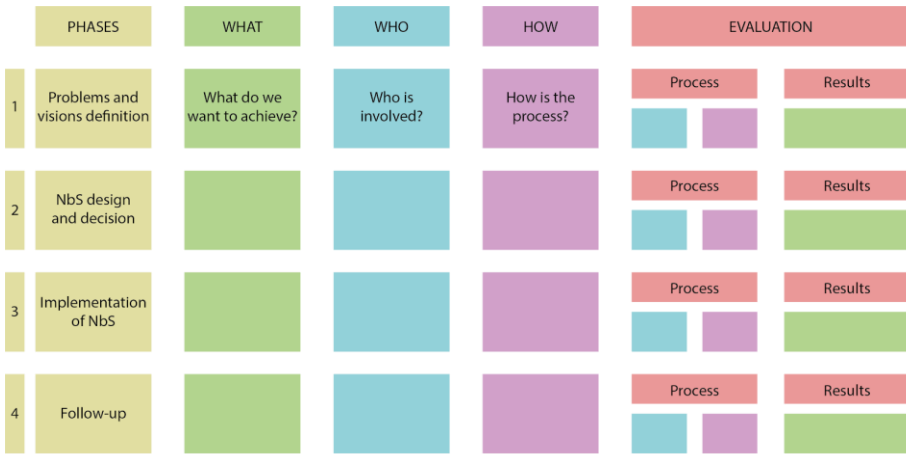
In the following section the main structure of the framework is presented. This framework has been conceived to respond to two aims: 1) providing a sound guidance for practitioners to decide upon criteria and indicators for the evaluation of NbS, and 2) serving as a reference point for the entire project implementation process. As follows, the framework structure allows a cyclical procedure favouring a trial and error logic. Furthermore, as highlighted in the previous chapter, outputs and processes should have an equal importance. This framework is still a work in progress and therefore not yet entirely tested in the project.

In order to facilitate the understanding of the following descriptions, some important terms are defined below. We define the term “criteria” as a distinguishing feature or characteristic of a system, product or process that is considered to be important. Whereas “indicators” are measures that are specifying criteria. One criterion can have more than one indicator. An indicator can be considered as vehicles of information aiming at describing an element (Haase et al., 2014) and shows the direction of change and can be a quantitative or a qualitative measure. Indicators are auxiliary variables that are intended to reflect a complex issue that cannot be measured easily in another way (Dusseldorp, 2014). Indicators should be understandable and comprehensible, they should further adequately reflect facts and should be based on available data. The term “KPI – key performance indicator” is used in the following to point out very important indicators characterizing the respective evaluation criteria. In the CLEVER Cities project KPIs are used to monitor and evaluate the project-related outcomes and processes. The framework attempts to provide a guideline for the definition of KPIs and at the same time it can be used to monitor the project development process. The project development process is as important as the results and it is thus necessary to record it.

In the next sections, the three elements of the framework are presented: the phases, selection of indicators, and the process of assessment.

### 2.1 Framework phases

The framework is presented as a process, which guides the users from the problem identification to the final assessment of the NbS project. It is composed of four main phases, as illustrated in *Figure 1*. Each phase is subdivided into four parts: the first three aim at answering the what, who and how questions; the last is the evaluation of the single phases in terms of the performance of the process and the achieved results. Depending on the topics to address in each phase, those that can be composed by steps (see the first phase where the identification problems and vision constitute two separate steps, for instance). It is important to state that this framework is especially suitable for processes with a strong inclusive character. If no involvement is foreseen, several steps might be omitted.



**Figure 1. Schematic view of the framework**

*Source:* Own construction 2019.

The first phase is dedicated to the definition of the main problems (step 1) of the area under study and the definition of a vision (step 2). The way in which a problem is understood is crucial, since this will inevitably affect the direction of the project. This direction should be conceived as a vision (or visions), which serves as a compass for the following decisions in the process. Such process can be performed in different ways (brainstorming, public debates ...) and with different level of involvement (consultation, participation ...). As an example, the CLEVER Cities project has adopted the Theory of Change (ToC) method, which foresees the involvement of local stakeholders and citizens for the common definition and agreement of problems and visions (Weiss, 1995). The use of citizen



science is frequently used in sustainability projects (see Dickinson and Bonney, 2012) and is set as a requirement for European research projects (e.g. EU 2019).

The involvement process per se has enormous importance because it affects problem identification and definition. Therefore, the method for selecting stakeholders and for conducting the process plays a relevant role in here. Indicators relating to stakeholders' involvement are in the focus in this phase. Once problems and vision(s) are defined, a backward check must be performed with the question: have all the identified problems (or at least the main ones) been addressed by the vision(s)?

The main elements to consider in the analysis of this phase are a) stakeholder types (participants), b) methods of selection of stakeholders, c) methods of conducting the process, and d) feedback to the process from the stakeholders.

As previously stated, the vision(s) must serve as guidelines to follow. To fulfil it, the steps to attain the vision(s) have to be defined. In this second phase, the focus is on the generation of the single interventions (step 1) and the identification of the most suitable ones (step 2) with reference to visions and problems stated in Phase 1. In this case, we want our interventions to be nature-based solutions and we are aiming at a participative process.

To be better able to decide on the solution to choose, it is necessary to clearly state what to do and who will be in charge of its realisation. Therefore, having a profound knowledge of the NbS to be realised and a clear view of which stakeholders have an interest in the project realisation is imperative. This is also relevant for what concerns decision-making processes, as already shown in Phase 1. Aspects to keep in mind when selecting NbS are economic, technological feasibility, social acceptance and political will (Xing, Jones and Donnison, 2017; Kabisch et al., 2016). Another aim of the description is to explain to what extent a solution can be considered nature-based, given the rather complex and multi-faceted nature of the topic. So indicators should be considered from these aspects in the evaluation, especially when it comes to the decision on alternative solutions. As a further element it is important to demonstrate (and link) to what extent the selected NbS are able to address the problems identified in the previous phase and fulfil the vision(s). The elements to be taken into account in order to arrive at the right decision on NbS implementation can relate to a) economic feasibility, b) technological feasibility, c) social acceptance, and d) political will.

The first two refer to the necessity of solutions to be feasible both economically and technologically. Social acceptance refers to the degree of acceptance of NbS by the stakeholders and the population. The last one refers to social network theory, which examines the network of stakeholders capable of realising the solution. Furthermore, it suggests ways to increase the possibility of success for the solution to be implemented. All these elements form the information pool enabling decision-makers to make a decision on the NbS to be realised.

The decision on the NbS to be realised is followed by its implementation. Herein aspects to take into consideration are timing and means of implementation, and stakeholders' roles and responsibilities. The RASCI method and the power-interest matrix (Eden and Ackermann, 2004) can be useful to foresee and organise this phase.

The final phase (phase 4) aims at assessing the impacts of the solutions implemented. In this sense, the assessment is generally outcome-related. However, the evaluation procedure itself and who carries it out are also important.

Here, the results must be examined in relation to the definition of problems and vision(s), in order to demonstrate the achievement of the expected outcomes. This phase is composed of two main steps: once the criteria and indicators are defined, the status quo must be assessed first; after a certain period of time, when the first impacts of the interventions are becoming visible, the assessment of the future status can be performed.

## 2.2 Definition of Evaluation Criteria and Indicators

To understand which criteria and indicators are useful, it is vital to state what exactly one wants to evaluate and in relation to what. Therefore, the method aims at defining a set of criteria first that are most likely to be useful to characterise the process/outcome to be evaluated. The criteria will serve as general groups in which indicators must be identified to describe these criteria. Indicators can be quantitative or qualitative and show the direction of change, i.e. to what extent the situation has deviated from the status quo.

The approach can be figured as a decision tree. *Figure 2* provides an overview of the procedure of criteria and indicator definition.

First, a detailed description of the desired evaluation object is mandatory and important. Therefore, the questions displayed in *Figure 2* have to be answered:

1. What is the object of the evaluation (short description, scope → process or output)?
2. Aim: what is the aim of the evaluated object?
3. Territory: What is the context in which the process/output will be located?
4. Who 1: who are the stakeholders involved in the process/output?
5. Who 2: who are the target groups of the evaluated object i.e. who profits from it?
6. How: how will be the process/output be executed or implemented?

Once all these points are clear, the search for criteria can proceed. According to points one and two, a basic collection of criteria can occur. A more precise selection is conducted based on points three to six in *Figure 2*: this step is done by local stakeholders with a specific knowledge of the context and their own

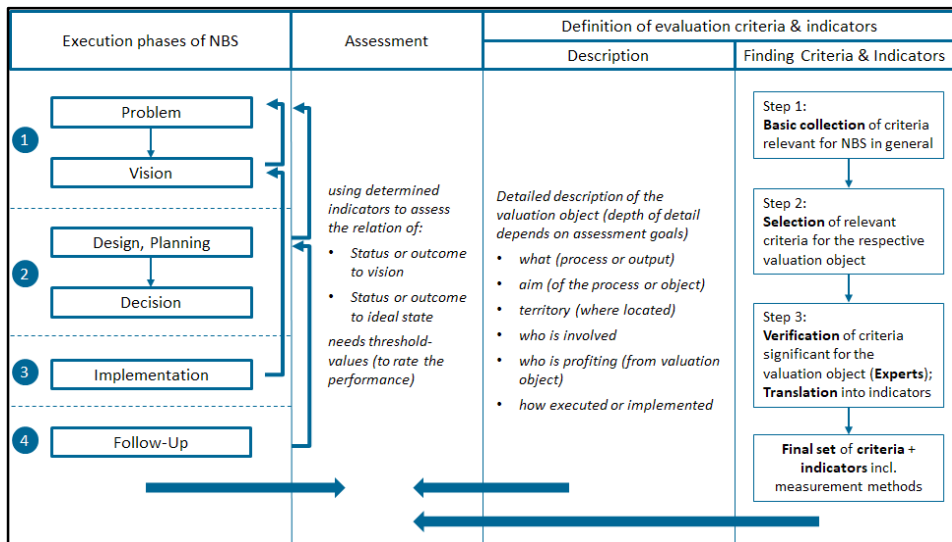


Figure 2. Evaluation criteria and indicator definition process

Source: Own elaboration 2019.

interests in the project. At this point, the identified criteria undergo a process of verification with the help of experts in assessment proceedings. From here on, the final list of criteria is set and the evaluation of the status quo can start. The period between the evaluation of the status quo and the one for the final impacts must be determined carefully. It is important to note that different impacts can emerge in different time spans (e.g. fluctuation in temperature and percentage of shadowed areas): therefore it should be carefully decided when to assess which impacts.

The following criteria and indicators presented in *Table 1* have been deduced from the analysis of the vision, processes and affected stakeholders.

### 3. Case Study – Green facades in Hamburg

In this Chapter, we present an example demonstrating how the previously described framework can be applied. The case study originates from the EU-funded Horizon 2020 project *Clever Cities* (Co-designing Locally tailored Ecological solutions for Value added, socially inclusive Regeneration in Cities). This project aims to improve urban neighbourhoods in Hamburg, London and Milan in order to ameliorate social cohesion, well-being and security of the local residents. To illustrate the implementation of the previously described framework, an example from Hamburg is taken. The project area is located at the southwestern edge of the city. Surrounded by nature reserves, the neighbourhood Neugraben-

**Table 1. Deduced criteria and indicators for processes and results of all phases during the NbS life cycle**

Phase	Evaluation object	Description	Criteria	Indicator
Planning/ decision	Process	– Theory of Change	– Stakeholder involvement	– Number of respective groups
			– Satisfaction of involved persons	– Perceived satisfaction
		– Expert meeting	– Involved Experts – Speed of agreement	– number of respective experts – Time taken for planning
	– Plenary	– Speed of agreement	– Time taken for decision	
	Result	– Final decision	– Suitable to solve the problems/meet the challenges	– Number of Problems/ challenges addressed by NbS
		– Final technical plan	– feasibility	– All parts of the plan clear and technical feasible
– Final financial plan		– Fit to the budget	– The budget is not overrun	
Implementation	Process	– Planting Action	– Stakeholder involvement	– Number of respective groups
			– Satisfaction of involved persons	– Perceived satisfaction
			– Time compliance	– Days taken longer than planned
	– Budget compliance		– Money spent over the budget	
Result	– Finished green façade	– Quality	– Stability of construction – Destruction of the house façade – share of plants survived after planting	
Follow-up	Process	– Maintenance	– Status of the façade one year after installation	– Share of surviving plants
	Result	– Appropriateness of the result	– Improvement of the district  – Improvement of biodiversity	– Increased share of green façades – Knowledge of NbS and marketing of successful projects – Job opportunities for professionals – Number of indicator species

Source: Own construction.

Fischbek is a mixture of old village structures, single family houses, terrace and detached houses from the 1960s and 3-4-storey social housing settlements. One of the project ideas for the area regards green roofs and facades that will be installed in cooperation with the local housing cooperative and other real estate owners in the project area.

The first step in finding suitable criteria and indicators for evaluation and monitoring of the progress and success of the project will be the description of the status quo and the definition of the problems that should be solved by the interventions.

In Neugraben-Fischbek a densification of the building area is currently underway. The proportion of green roofs in the project area is much lower (0.5%) than in central Hamburg (4%) and the building activities even increase the “concrete jungle”. Nevertheless, there are many suitable roof areas and facades available in the project area. Additionally, the city council offers grants to support such interventions. Therefore, the underlying conditions seem to be favourable.

In the long run, the project area should be improved to create a more liveable district. New habitats for plants and animals (biodiversity improvement) will be built not only to enhance the connectivity of ecosystems north and south of the project areas but also to connect the old housing areas to the new districts. Another long-term vision is to establish something like an energy improvement district and a NbS Good Practice reference for other Hamburg districts.

Once the vision is formulated the DESIGN AND PLANNING phase can begin. The NbS to be installed are green facades on different multi-storey buildings. At this point, the final shape and features of the NbS and its main characteristics have to be defined. Generally, the characteristics of an NbS are shaped by environmental conditions, technical issues, and stakeholders agendas. Since those issues are restricting the possibilities of an NbS, we call them restrictions. In the project area information can be related to a) environmental conditions (weather, climate characteristics...), b) technical issues (construction details, technology availability...), and c) stakeholders’ agenda (stakeholders’ interests and expectations, concerns of the residents...).

All these restrictions shape the NbS prototype to an ad hoc solution for the area of Neugraben-Fischbek and the consequent choice of characteristics (plant type, gap, maintenance concept, reproducibility, etc.). All these restrictions influence the feasibility of the NbS, which will play an important role in the DECISION phase. The decision phase has as outcome the definition of the solution(s) (WHAT) to implement among a series of alternatives (green roof or green facade? green facade attached to the walls or detached? and so on); by WHOM this(ese) specific solution(s) must be implemented; and HOW (called in the literature “content of the decision”). To reach this “final decision”, several steps must be taken: these steps are referred to as “decision process”. Given the entire

information on the alternatives (in other words, the WHAT), WHOM and HOW are to be considered. Factors such as economic feasibility, environmental impacts, social acceptance and technological feasibility play a role here.

Before this phase, all characteristics of the proposed NbS have to be verified in order to achieve a proper basis for the pre-greening evaluation.

After having defined the solution(s) to be implemented, it must be verified if actors capable of putting such solutions into practice agree on its realisation. The network of actors able to implement the green facades in Neugraben-Fischbek are: SAGA, the social housing company (as owner), BUE, ministry of environment (for grants), District of Harburg (as promoter of the project and giving permission), FHH, the city council of Hamburg (as overall director), Citizens (as users), realisation company (as realizer), management company (as maintenance actor).

It might be the case that one or several of these key actors is/are against the realisation of the solution(s) for some reason(s). If so, a process of overcoming these problems (called bargaining) may begin. The criteria for evaluating this process are related to the type of stakeholders involved and to the relations/exchange between them during the decision-making process.

The following phase is IMPLEMENTATION. The implementation of green roofs and facades in the area follows a certain standard and procedure. In this case, evaluation of the process would have to take into consideration the projected time, funds and design of the intervention but also how residents have been involved in the implementation and will be involved in the maintenance process.

In the period between the implementation and the post-greening a refining of the criteria chosen might occur. The final set of criteria with the indicators will be then available to evaluate the intervention (FOLLOW-UP).

#### **4. Conclusions**

To date, many projects at the level of the European Union and worldwide are faced with the challenge of finding the suitable indicators for measuring the effectiveness of NbS. No list of indicators has been compiled yet. We suggest that there won't be any. NbS entails so many factors and potentially triggers so many effects generating even more impacts that it seems impossible to create a thorough list. Furthermore, it can be argued that impacts are context-dependent, the list could potentially become even longer. Last but not least, besides the evaluation of outcomes, the process of achieving the results is also important: this fact introduces other variables and mechanisms through which to examine the assessment activities.

Instead of an “all-feed-in” approach we intend to propose a more comprehensive one, which, through different steps, might enable an incremental selection reducing the number of indicators to be selected.

In particular, the framework hereby presented was designed to be suitable for the project CLEVER Cities, one with a strong focus on stakeholder involvement. Being in the first year of this five-year project, we assume that a possibility for the further improvement of the framework might arise. However, we can state that the skeleton of this framework could represent an inclusive spectrum of elements applicable for multiple purposes.

### Acknowledgement

The authors would like to thank the partners of CLEVER Cities project for their important feedback on the development of the framework.

### References

- COHEN-SHACHAM, E., WALTERS, G., JANZEN, C., MAGINNIS, S. 2016. *Nature-based Solutions to address Global Societal Challenges*. Gland, Switzerland: IUCN.
- CONNECTING NATURE. 2019. Home Page. (Website). From: <https://connectingnature.eu/>.
- DAGMAR HAASE, D., LARONDELLE, N., ANDERSSON, E., ARTMANN, M., BORGSTRÖM, S., BREUSTE, J., GOMEZ-BAGGETHUN, E., GREN, A., HAMSTEAD, Z., HANSEN, R., KABISCH, N., KREMER, P., LANGEMEYER, J., RALL, E.L., MCPHEARSON, T., PAULEIT, S., QURESHI, S., SCHWARZ, N., VOIGT, A., WURSTER, D., ELMQVIST, T. 2014. A Quantitative Review of Urban Ecosystem Service Assessments: Concepts, Models, and Implementation. In: *AMBIO*. Vol. 43, pp. 413–433.
- DICKINSON, J. L., BONNEY, R. 2012. *Why citizen science?* In: DICKINSON, J. L., BONNEY, R. (ed.) *Citizen Science: Public Participation in Environmental Research*, pp. 1–14. Comstock Pub. Associates.
- DUSSELDORP, M. 2014. *Kapitel: Nachhaltigkeitsbewertung. Kontaktstudium Technikfolgenabschätzung*. Auflage, Karlsruhe: Karlsruher Institut für Technologie – Fernstudienzentrum. 1.
- EDEN, C., ACKERMANN, F. 1998. *Making Strategy: The Journey of Strategic Management*. London: Sage Publications.
- EGGERMONT, H., BALIAN, E., AZEVEDO, J., BEUMER, V., BRODIN, T., CLAUDET, J., FADY, B., GRUBE, M., KEUNE, H., LAMARQUE, P., REUTER, K., SMITH, M., VAN HAM, C., WEISSER, W. AND LE ROUX, X. 2015. Nature-based Solutions: New Influence for Environmental Management and Research in Europe. In: *GAIA – Ecological Perspectives for Science and Society*, Vol. 24, No. 4, pp. 243–248.
- EUROPEAN UNION 2019. *Citizen Science for Environmental Policy: Development of an EU-wide Inventory and Analysis of Selected Practices*. [Online] Available at: <https://ec.europa.eu/jrc/en/science-update/eu-wide-inventory-citizen-science-environmental-policy>.
- HAAPIO, A., VIITANIEMI, P. 2007. Environmental Criteria and Indicators use in Environmental Assessment of Buildings. In proceeding of the *CIB World Building Congress, Construction for Development 2007*, pp. 2406 – 2416. Cape Town: South Africa.

- KABISCH, N., FRANTZESKAKI, N., PAULEIT, S., NAUMANN, S., DAVIS, M., ARTMANN, M., HAASE, D., KNAPP, S., KORN, H., STADLER, J., ZAUNBERGER, K. AND BONN, A. 2016. Nature-based Solutions to Climate Change Mitigation and Adaptation in Urban Areas: Perspectives on Indicators, Knowledge Gaps, Barriers, and Opportunities for Action. In: *Ecology and Society*, Vol. 21, No. 2.
- MAES, J., JACOBS, S. 2015. Nature-Based Solutions for Europe's Sustainable Development. In: *Conservation Letters*. Vol. 10, No. 1, pp. 121–124.
- PUPPIM DE OLIVEIRA, J. A., BALABAN, O., DOLL, C. N. H., MORENO-PENARANDA, R., GASPARATOS, A., IOSSIFOVA, D., SUWA, A. 2011. Cities and biodiversity: Perspectives and Governance Challenges for Implementing the Convention on Biological Diversity (CBD) at the City Level. In: *Biological Conservation*, 144, No. 5, pp. 1302–1313.
- RAYMOND, C. M., FRANTZESKAKI, N., KABISCH, N., BERRY, P., BREIL, M., NITA, M. R., GENELETTI, D., CALFAPIETRA, C. 2016. A Framework for Assessing and Implementing the Co-benefits of Nature-based Solutions in Urban Areas. In: *Environmental Science and Policy*, Vol. 77, pp. 15–24.
- RAYMOND, C. M., BERRY, P., BREIL, M., NITA, M. R., KABISCH, N., DE BEL, M., ENZI, V., FRANTZESKAKI, N., GENELETTI, D., CARDINALETTI, M., LOVINGER, L., BASNOU, C., MONTEIRO, A., ROBRECHT, H., SGRIGNA, G., MUNARI, L., CALFAPIETRA, C. 2017. *An Impact Evaluation Framework to Support Planning and Evaluation of Nature-based Solutions Projects*. Report prepared by the EKLIPSE Expert Working Group on Nature-based Solutions to Promote Climate Resilience in Urban Areas. Wallingford, United Kingdom: Centre for Ecology & Hydrology.
- UNaLab. 2019. Home Page. (Website). From: <https://www.unalab.eu/>.
- WEISS, R. S. 1995. *Learning from Strangers: The Art and Method of Qualitative Interview Studies*. New York: The Free Press.
- XING, Y., JONES, P., DONNISON, I. 2017. Characterisation of Nature-Based Solutions for the Built Environment. *Sustainability*, Vol. 9, No. 149.
- ZEVENBERGER, C. 2019. *Introduction*. (Webinar). IUC: Integrating nature-based flood management into urban planning, 27th March 2019.



# Urbanization Requirements Towards Road Pricing Acceptability – Preliminary Survey Results from Five Countries

MOHAMAD SHATANAWI<sup>1</sup>, FERENC MÉSZÁROS<sup>2</sup>

**Abstract:** Road pricing schemes successfully contribute to tackling the problems of road congestion as a particular challenge of urbanization. Municipalities and authorities around the world started to prepare and adopt such measures for mobility management. However, generally, there is a low acceptability level for both public stakeholders and politicians towards this measure in cities. Nevertheless, acceptability is an essential requirement for the successful implementation of a similar scheme. This paper discusses the different factors which may affect the acceptability of road pricing schemes, relying on a pre-designed survey which was conducted in 5 cities around the world (Budapest/Hungary, Tunis/Tunisia, Amman/Jordan, Damascus/Syria, and Ulaanbaatar/Mongolia) and presents a comparison of factors identified in the mentioned countries. Mainly the factors are grouped into two sections. The first section connects the indirect factors such as the traffic-related problems (e.g., awareness, and ascription of responsibility) and traveling habits and behavior with road pricing schemes; the second section discusses the factors related directly to the schemes (e.g., knowledge, effectiveness, and social norms).

**Key words:** urban road pricing, acceptability, international comparison

**JEL Classification:** R48 – Government Pricing and Policy

## 1. Introduction

The implementation of road pricing schemes (RUC) is considered by many economists and transportation experts as a successful measure in tackling traffic-related problems; however, public acceptability toward this measure was found to be low, and this low acceptability level is considered as one of the main obstacles to implementing similar schemes. Especially, the motorists used roads freely for a long-time, and they refuse to pay for such a thing (Heyns, Schoeman, 2006). For

---

<sup>1</sup> MOHAMAD SHATANAWI, Department of Transport Technology and Economics, Faculty of Transportation Engineering and Vehicle Engineering, Budapest University of Technology and Economics, Hungary, mshatanawi@edu.bme.hu

<sup>2</sup> FERENC MÉSZÁROS, Department of Transport Technology and Economics, Faculty of Transportation Engineering and Vehicle Engineering, Budapest University of Technology and Economics, Hungary, fmeszaros@mail.bme.hu

example, the lack of acceptability was the reason for the scheme's failure in the Netherlands, Copenhagen, and Edinburgh (Vrtic et al., 2007).

Many studies were conducted for studying the acceptability of RUC, where researchers tried to connect different factors or characteristics to the acceptability of RUC in order to understand which of these factors are related and affect acceptability. For instance, the certainty about implementing the scheme increases the acceptability as it is a fact people should deal with (Schade, Baum, 2007). Another study shows females are more open to accepting the scheme than males (Musselwhite, Lyons, 2009), while traveling habits play an essential role as well, as motorists are more likely to reject the scheme than those who use other transport modes (Liu, Zheng, 2013). Regarding the factors assumed to affect acceptability, problem awareness of traffic-related problems in Spain did not have an effect on acceptability, although it was high (Di Ciommo, Monzón and Fernandez-Heredia, 2013).

Positive expectations towards better environmental and traffic conditions after implementing the scheme are positively related to acceptability (Schuitema, Steg, and Rothengatter, 2010). Fairness and freedom were found to be the factors with the highest impact on acceptability in China (Sun, Feng and Lu, 2016). Surprisingly, the income level does not affect acceptability significantly (Hao, Sun and Lu, 2013). On the contrary, the toll amount and charging time have a significant impact on the level of acceptability; as there is a range of toll amount that is acceptable and motorists who drive during weekdays are more open to accepting the scheme than those who commute during the weekend as demonstrated by a study on acceptability in Bosnia and Herzegovina (Glavic et al., 2017). If the authorities used the revenues raised from the scheme in a way that users would find it equitable, that would also have a positive direct effect on acceptability (Jones, 1991; Shatanawi, Szalmáné Csete and Mészáros, 2018).

(Schade, Schlag, 2000) conducted a survey in four European cities to measure road pricing acceptability, applying a unique methodology to identify factors affecting the acceptability of RUC. That is why we chose a part of this survey and distributed it in five cities (Budapest, Amman, Ulaanbaatar, Damascus, and Tunis, capitals of Hungary, Jordan, Mongolia, Syria, and Tunisia respectively).

This paper introduces the theoretical background of factors that may affect the acceptability of RUC and compares these factors among the different cities according to the results of the conducted survey. This work should be extended in the future to connect these factors with the acceptability of the proposed scheme and identify factors that have a significant positive or negative relationship with the acceptability of RUC.

## **2. Theoretical Background**

This section presents the theoretical background of factors likely to influence the acceptability level of RUC, which factors were used in the survey through different questions (Schlag, Teubel, 1997; Schade, Schlag, 2000; Schade, Schlag, 2003).

### **2.1 Awareness of traffic-related problems**

The hypothesis here is that awareness of traffic-related problems motivates the public to find solutions or to accept a measure that would reduce the effects of these problems (Rienstra, Rietveld and Verhoef 1999). However, awareness of traffic-related issues could be high, while the acceptability of RUC can still be low, as people favor solutions that do not require them to pay for increasing road capacity (Schlag, Ulf, 1997).

### **2.2 Travelling behavior and attitude**

The traveling and mobility behavior of people is assumed to affect the acceptability of RUC, people having a positive mobility behavior (e.g., I love going anywhere by using public transport) are supposed to be more supportive of the RUC scheme than those with a negative mobility behavior (e.g., I want to use my car anytime I want), the concept of social dilemmas was used to derive this concept (Van Lange et al., 2013).

### **2.3 Knowledge**

The goals of RUC are benefits to society in the first place, therefore increasing the information level of people about the RUC would contribute to a better evaluation of its effectiveness and benefits, leading to higher acceptability (Owen 2008). However, a lot of information can generate a higher assessment of the proposed scheme and lead to failure in implementing the RUC (Schade, Schlag, 2003).

### **2.4 Effectiveness of the scheme**

People's expectations about the results of implementing the RUC are important in defining the acceptability level, as the ones who expect a positive effect such as improving the environment are more receptive to the scheme than those who expect a negative impact such as less freedom (Ubbels, Verhoef, 2006).

## 2.5 Ascription of responsibility

The people who consider themselves contributors to traffic-related problems show a higher acceptance of RUC than the ones who feel they are victims of these problems (Sun, Feng and Lu, 2016). However, it was found in other researches to be a negligible factor and had no significant effect on the acceptability of RUC (Di Ciommo, Monzón and Fernandez-Heredia, 2013).

## 2.6 Social norms concerning pricing measures

The expected social pressure or social norm (acceptance level of society in general, and the family and friends in particular) affects individual opinions (Jakobsson, Fujii and Gärling, 2000). Thus, if the individual believes that the social norm supports the proposed scheme, their acceptability level will be higher (Schade, Schlag, 2003).

## 3. Methodology

We selected a part of a previous survey made by Jens Schade and Schlag 2000 and distributed it in an online form in the mentioned five capitals after applying a few modifications. The questions examine the variable factors discussed in section 2, besides the socio-economic characteristics.

The proposed scheme suggests creating a restricted zone in congested areas, where cameras will monitor the movement of vehicles to and from the restricted zone. The amount of fees and times are displayed in *Table 1*.

**Table 1. Congestion Fees and Times**

Time	Congestion Fee				
	Budapest	Amman	Tunis	Ulaanbaatar	Damascus
From 06:00 to 09:00	450 HUF <sup>1</sup>	1.0 JOD <sup>2</sup>	1.0 TND <sup>3</sup>	2000 MNT <sup>4</sup>	600 SYP <sup>5</sup>
From 09:00 to 15:00	300 HUF	0.5 JOD	0.5 TND	1000 MNT	300 SYP
From 15:00 to 18:00	450 HUF	1.0 JOD	1.0 TND	2000 MNT	600 SYP
From 18:00 to 21:00	300 HUF	0.5 JOD	0.5 TND	1000 MNT	300 SYP
From 21:00 to 06:00	Free of Charge				

<sup>1,2,3,4,5</sup> prices according to Google (July 18, 2019)

<sup>1</sup> 1 HUF = 0.003 Euro    <sup>2</sup> 1 JOD = 1.26 Euro    <sup>3</sup> 1 TND = 0.31 Euro    <sup>4</sup> 1 MNT = 0.0003 Euro    <sup>5</sup> 1 SYP = 0.0017 Euro

Source: Edited by the Authors.

The revenue from applying this strategy will be invested as follows:  
 50% of the revenue for the enhancement of public transport,  
 50% of the revenue for improving the road network.

## 4. Results

This section discusses the results of the distributed survey in two parts, (1) a descriptive analysis which shows the background characteristics of the respondents in the five countries such as gender, and (2) a multivariate analysis where the factor analysis technique was used to identify the factors mentioned in Section 2 of this paper.

### 4.1 Descriptive Analysis

Respondent's background characteristics are an essential aspect for understanding the sample as a representation of society. The percentage of males is slightly higher than females in all countries (*Table 2*), and respondents' age vary between 21 and 40 years in the five cities. Likewise, the occupation distribution is very similar in all five cities, where the most frequent answer to the question of occupation in every city is employee followed by freelancers and students, the percentage of other occupations such as housewife or retired is low.

**Table 2. Gender**

	All		Tunis		Amman		Budapest		Ulaanbaatar		Damascus	
	Male (M)	Female (F)	M	F	M	F	M	F	M	F	M	F
Valid %	57.2	42.8	55.2	44.8	62.3	37.7	58.2	41.8	54.7	45.3	55.4	44.6

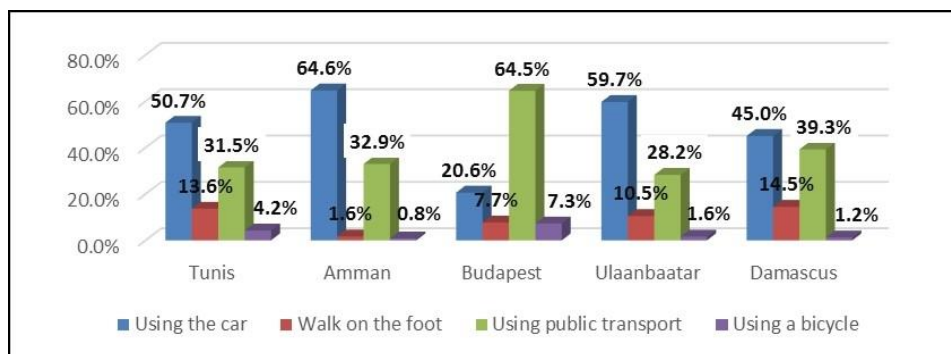
*Source:* Edited by the Authors.

Owning a personal vehicle is dominant in Amman and Ulaanbaatar with about 67%, while it's moderate in Damascus, Tunis, and Budapest with 57%, 56%, and 50%, respectively. On the other hand, the car is the most used transport mode in commuting to work or school in all cities except Budapest (*Figure 1*).

We found that having a personal car affects travel behavior as most of the respondents who own a car use it for commuting in all cities except Budapest (*Table 3*).

The variation of these results can be explained by the quality of the public transport network and the level of dependency on using the personal car in commuting. The public transport network is inadequate and insufficient in all cities except Budapest, which has a public transport network of good quality and high reliability. On the other hand, the respondents in Amman, Damascus, and

Ulaanbaatar believe that it is difficult for them to significantly reduce the number of trips using their personal vehicles, while respondents in Budapest find it possible to reduce the amount of these trips. Therefore, respondents in the other four cities feel the necessity of owning a car and using it as well, in contrast to the case of Budapest.



**Figure 1. Transport Mode Used in Commuting to Work or School**

Source: Edited by the Authors.

**Table 3. Used Transport Mode versus Owning a Car in all Cities**

Transport Mode		Using the car	Walk on foot	Using public transport	Using a bicycle
Do you own a vehicle	Yes	544	35	119	12
	No	29	77	354	23

Source: Edited by the Authors.

## 4.2 Multivariate Analysis

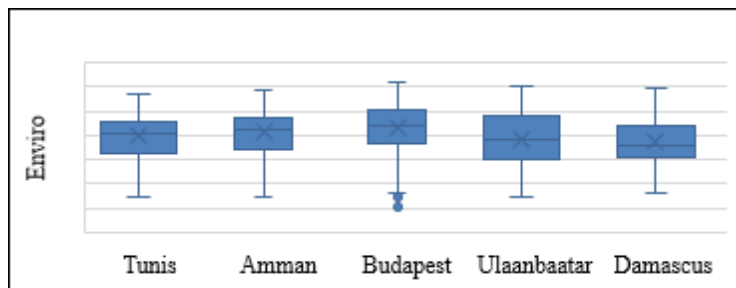
The questionnaire contains a lot of questions and elements to define the factors mentioned in Section 2; therefore, the factor analysis (FA) technique is used here to identify elements which affect acceptability, and to reduce it to the appropriate minimum number of factors.

### *Awareness of traffic-related problems*

The awareness of traffic-related problems is measured through a question consisting of six elements. A factor analysis was applied as the Cronbach Alpha for all elements is 0.72, which shows high reliability of the items and the Kaiser-Meyer-Olkin (KMO) test of 0.741 suggests that FA is possible. Total Variance Explained table retrieved two factors (Eigenvalue >1), explaining more than 60%

of the data. The rotated component matrix shows that three elements are connected with each factor, (1) Environmental factor which includes air pollution, noise annoyance, and unsafe roads, and (2) Service factor which consists of congestion, inadequate public transport system, and a lack of car parking space. The perception of the environmental factor in the five capitals is shown in the following figure.

The box plot in *Figure 2* displays the perception of environmental problems in the five capitals, indicating that people in Budapest and Amman are the most annoyed with these problems. In contrast, people in Damascus are the least interested in these problems. The outliers in the case of Budapest show the low number of people who considered the environmental problems in the city as secondary. On the other hand, awareness of service problems is the highest in Tunis with a small concentration of the answers explaining the severity of the problems, while answers of other cities are of a wider range, and there is the existence of outliers. However, awareness of traffic-related problems in all capitals is high, and people consider these to be major or serious problems. The differences between cities can be attributed to a higher awareness of environmental issues in Budapest than in other cities.



**Figure 2. Awareness of the Traffic-Related Problems\ Environmental Factor**

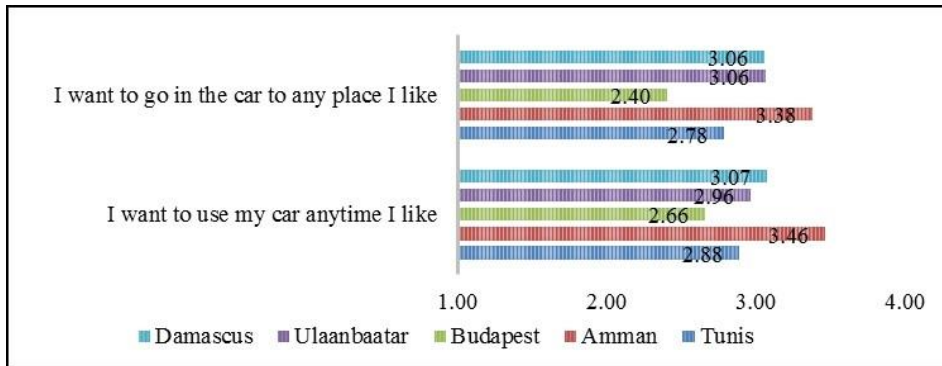
*Source:* Edited by the Authors.

### *Traveling behavior and attitude*

Travel habits are tested in eight elements which divide the travel habits into two groups, those who prefer using personal vehicles in commuting and those who prefer to use other means. The reliability of all elements in the question is acceptable with Cronbach alpha 0.572, and KMO is 0.676; therefore, the FA is used. Total Variance Explained table contains two components (initial Eigenvalue >1), which explain more than 54%, these two factors, according to the rotated component matrix, are (1) positive mobility attitude and (2) negative mobility attitude. The negative mobility attitude is most dominant in Amman, followed by Damascus and Ulaanbaatar, while it is less important for people in Budapest, as

indicated by *Figure 3*. Answers to the questions were rated on a scale from 1 to 4 (1: Unimportant, 4: Very important).

The positive mobility attitude is high in all cities, which expresses the desire of people to have cleaner cities with better traffic conditions. In Budapest, the positive mobility attitude is the highest, possibly due to the availability of alternatives (e.g., cycling routes and good public transport system) to car usage.



**Figure 3. Negative Mobility Attitude**

*Source:* Edited by the Authors.

### *Knowledge*

The question concerning information about the scheme is “Have you ever heard of this strategy?” and it was asked on a 1 to 4 scale (1: nothing at all, 4: too much), then recorded in the binary system (0: No, 1: Yes). Crosstab table (*Table 4*) shows that the level of information about the scheme is rather low in Amman, and the highest in Damascus. In the rest of the cities, answers are moderate.

**Table 4. Information about the Scheme**

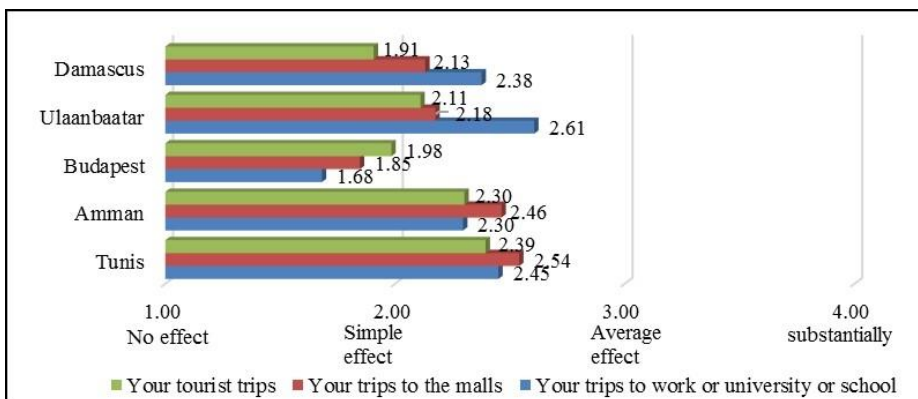
City	Knowledge %	
	No	Yes
Tunis	52.8	47.2
Amman	61.7	38.3
Budapest	49.4	50.6
Ulaanbaatar	46.8	53.2
Damascus	36.8	63.2

*Source:* Edited by the Authors.



### *Effectiveness of the scheme*

The respondents in Budapest and Tunis expect the scheme to have a significant effect in reducing the amount of traffic inside the restricted zone, with 69% and 65.7% of respondents, respectively. The other three cities show similar ratios, about 45% of the respondents in each city think that the scheme could reduce the amount of traffic and a further 55% believe it will not have any significant effect. However, one of the questions concerns the effect of the scheme on respondents' trips, and the mean results of the answers indicate that respondents think implementing the scheme would not have an effect on their trips, as shown in *Figure 4*.

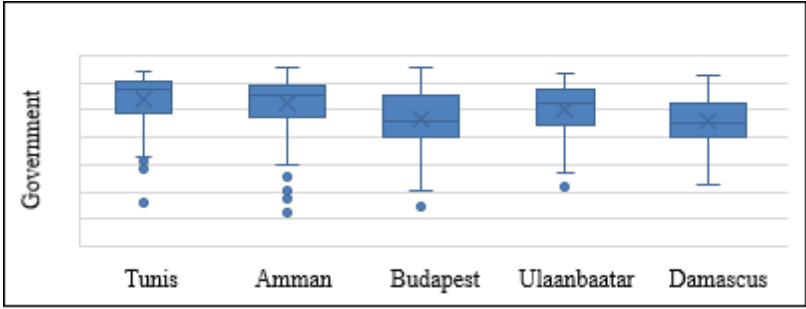


**Figure 4. Expected Effects in Case of Implementing the Scheme**

*Source:* Edited by the Authors.

### *Ascription of responsibility*

Ascription of responsibility for traffic-related problems was examined through questions consisting of seven elements, using factor analysis as the Cronbach's alpha for all elements is 0.668, and the KMO test is 0.744. Two factors were retrieved (1: Government, 2: People), which explain more than 55% of all variables. People in all cities consider the Government (e.g., municipality, the responsible authority for public transport) to be directly responsible for these problems. *Figure 5* shows that the people in Tunis, Amman, and Ulaanbaatar are more disappointed in the government than people in Budapest and Damascus. On the other hand, the people of Ulaanbaatar consider themselves just as responsible as the government for causing these problems. In contrast to the other four cities where people view themselves as victims of traffic problems and not as contributors, they still believe they are responsible, but not to the same extent as the government.

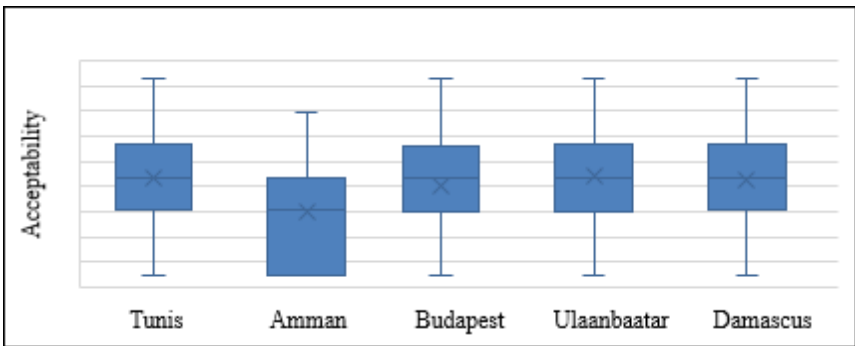


**Figure 5. Ascription of Responsibility to the Government**

Source: Edited by the Authors.

*Social norms concerning pricing measures*

Two questions relate to the social norm, (1) social acceptance of the proposed strategy in general, and (2) acceptance by respondents’ families and close friends. The answers to these two questions are rated on a 1 to 4 scale (1: not acceptable at all, 4: completely acceptable). After combining them together, the results show a very high similarity of answers in each city except Amman, which has the lowest acceptance level (*Figure 6*). People in Amman refuse the idea of implementing the scheme. In contrast, in the other four capitals the answers of the people are moderate, with almost half of respondents thinking it would be acceptable, and the other half believing the opposite.



**Figure 6. Social Norms**

Source: Edited by the Authors.

## 5. Conclusion

Implementing the road pricing scheme (RUC) is a promising strategy to reduce traffic-related problems by motivating motorists to change their travel habits and behavior. One of the main obstacles to successful implementation of a similar scheme is the lack of acceptability. In this research, we identified several factors that may affect the acceptability of RUC. Then we distributed a survey in five capitals around the world that contains among its questions the factors explained in section 2. The results, in this paper, examine these factors in every city and compare them with each other. The future task will be to execute a multivariate analysis to find out how these factors influence acceptability, and which of them contributes the most to enhancing the acceptability level of RUC.

The results show that the tested factors differ from city to city and in some cases split the cities into groups, for instance, people in Budapest and Tunis believe the scheme will be effective in reducing the amount of traffic, moreover, they do not consider negative travel behavior to be necessary or recommended, while in the other three cities the opposite is true. People in all cities believe that the government is responsible for traffic-related problems; moreover, they feel the severity of these problems, and they are in favor of positive travel habits.

Only the people in Ulaanbaatar consider themselves responsible for causing traffic problems. The environmental factor of traffic-related problems is perceived as the most crucial in Budapest, while Tunisians accorded the highest importance to the service factor of traffic-related problems. Regarding the knowledge about the proposed scheme: it was found to be low in Amman, and moderate in the other four cities. This may explain the social norm results whereby the social pressure to accept the proposed scheme is very low in Amman, and moderate in other cities. This is also evident in the relation between the information level and the acceptability of RUC.

## Acknowledgments

We would like to thank everyone who participated in the survey, as well as we Engineer Nagham Taleb, Engineer Souhir Boudhrioua, Engineer Marci András, and Engineer Uyanga Battsolmon who translated the survey to the language of each country and supported us in distributing it in Syria, Tunisia, Hungary, and Mongolia respectively. This work adopted the methodology and questionnaire of a previous work done by Schade and Schlag, 2000.

## References

- Schlag, B., ULF, T. 1997. PUBLIC ACCEPTABILITY OF TRANSPORT PRICING. *IATSS Research*. <https://trid.trb.org/view/570601> [July 20, 2019].
- DI CIOMMO, F., MONZÓN, A., FERNANDEZ-HEREDIA, A. 2013. Improving the Analysis of Road Pricing Acceptability Surveys by Using Hybrid Models. In: *Transportation Research Part A: Policy and Practice*. Vol. 49, pp. 302–316. <https://linkinghub.elsevier.com/retrieve/pii/S0965856413000141> [July 6, 2019].
- GLAVIC, D. et al. 2017. Road to Price: User Perspectives on Road Pricing in Transition Country. In: *Transportation Research Part A: Policy and Practice*. Vol. 105, pp. 79–94. <https://linkinghub.elsevier.com/retrieve/pii/S0965856416305638> [July 6, 2019].
- HAO, X., XIANGLONG S., JIAN, L. 2013. The Study of Differences in Public Acceptability Towards Urban Road Pricing. In: *Procedia – Social and Behavioral Sciences*. Vol. 96, No. 6, pp. 433–41. <https://linkinghub.elsevier.com/retrieve/pii/S1877042813021770> [July 6, 2019].
- HEYNS, W., SCHOEMAN, C. B. 2006. Urban Congestion Charging: Road Pricing as a Traffic Reduction Measure. In: *Urban Transport XII: Urban Transport and the Environment in the 21st Century*, Prague, Czech Republic: WIT Press, pp. 923–32. <http://library.witpress.com/viewpaper.asp?pcode=UT06-089-1> [July 5, 2019].
- JAKOBSSON, C., FUJII, S., GÄRLING, T. 2000. Determinants of Private Car Users' Acceptance of Road Pricing. In: *Transport Policy*. Vol. 7, No. 2, pp. 153–58. <https://linkinghub.elsevier.com/retrieve/pii/S0967070X00000056> [July 10, 2019].
- Schade, J., Schlag, B. 2003. Acceptability of Urban Transport Pricing Strategies. In: *Transportation Research Part F: Traffic Psychology and Behaviour*. Vol. 6, No. 1, pp. 45–61. <https://linkinghub.elsevier.com/retrieve/pii/S1369847802000463> [July 10, 2019].
- Jones, P. 1991. GAINING PUBLIC SUPPORT FOR ROAD PRICING THROUGH A PACKAGE APPROACH. In: *Traffic Engineering & Control* 32(4). <https://trid.trb.org/view/358367> [July 9, 2019].
- Liu, C., Zheng, Z. 2013. Public Acceptance towards Congestion Charge: A Case Study of Brisbane. In: *Procedia – Social and Behavioral Sciences*. Vol. 96, No. 6, pp. 2811–2822. <https://linkinghub.elsevier.com/retrieve/pii/S1877042813024403> [July 6, 2019].
- Vrtic, M., Schuessler, N., Erath, A., Axhausen, K. W. 2007. Design Elements of Road Pricing Schemes and Their Acceptability. <https://trid.trb.org/view/890092> [July 20, 2019].
- Shatanawi, M., Szalmáné Csete, M., Mészáros, F. 2018. ROAD USER CHARGING: ADAPTATION TO THE CITY OF AMMAN. In: Dunaújváros, Hungary. <https://m2.mtmt.hu/gui2?mode=browse&params=publication;30693011> [July 20, 2019].
- Musselwhite, C., Lyons, G. 2009. *Exploring the Public Acceptability of Road Pricing*. London: University College London. <http://eprints.uwe.ac.uk/9945/> [July 10, 2019].
- Owen, R. 2008. *Public Acceptability of Road Pricing. Final Report by the British Market Research Bureau and the University of the West of England to the Department for Transport, May, London*.
- Rienstra, S. A., Rietveld, P., Verhoef, E. T. 1999. The Social Support for Policy Measures in Passenger Transport. A Statistical Analysis for the Netherlands. *Transportation Research Part D: Transport and Environment*. Vol. 4, No. 3, pp. 181–200.
- Schade, J., Baum, M. 2007. Reactance or Acceptance? Reactions towards the Introduction of Road Pricing. *Transportation Research Part A: Policy and Practice*. Vol. 41, No. 1, pp. 41–48. <https://linkinghub.elsevier.com/retrieve/pii/S096585640600053X> [July 6, 2019].
- Schade, J., Schlag, B. 2000. *Acceptability of Urban Transport Pricing*. Helsinki: Valtion Taloudellinen Tutkimuskeskus.

- Schuitema, G., Steg, L., Rothengatter, J. A. 2010. The Acceptability, Personal Outcome Expectations, and Expected Effects of Transport Pricing Policies. In: *Journal of Environmental Psychology*. Vol. 30, No. 4, pp. 587–593.  
<https://linkinghub.elsevier.com/retrieve/pii/S0272494410000538> [July 6, 2019].
- Small, K. A. 1992. Using the Revenues from Congestion Pricing. In: *Transportation*. Vol. 19, pp. 4, pp. 359–381. <https://doi.org/10.1007/BF01098639> [July 9, 2019].
- Sun, X., Shumin, F., Jian. L. 2016. Psychological Factors Influencing the Public Acceptability of Congestion Pricing in China. In: *Transportation Research Part F: Traffic Psychology and Behaviour*. Vol. 41, pp. 104–12.  
<https://linkinghub.elsevier.com/retrieve/pii/S1369847816301103> [July 6, 2019].
- Ubbels, B., Verhoef E. 2006. Acceptability of Road Pricing and Revenue Use in the Netherlands. In: *European Transport/Trasporti Europei*. No. 32, pp. 69–94.  
[https://econpapers.repec.org/article/sotjournal/y\\_3a2006\\_3ai\\_3a32\\_3ap\\_3a69-94.htm](https://econpapers.repec.org/article/sotjournal/y_3a2006_3ai_3a32_3ap_3a69-94.htm) [July 20, 2019].
- Van Lange, P. A. M., Joireman, J., Parks, C. D., Van Dijk, E. 2013. The Psychology of Social Dilemmas: A Review. In: *Organizational Behavior and Human Decision Processes*. Vol. 120, No. 2, pp. 125–141. <https://linkinghub.elsevier.com/retrieve/pii/S0749597812001276> [July 14, 2019].

# Disruptive Mobility Trends: Impacts and Potentials for Urban Areas

GABRIEL AYOBAMI OGUNKUNBI<sup>1</sup>, FERENC MÉSZÁROS<sup>2</sup>

**Abstract:** The efficient transportation of people and goods is acknowledged as the foundation of economic progress across cities in various parts of the world. To boost the economy, cities and regions provide transport infrastructure and services to meet the mobility needs of the citizenry in an inclusive, fair, accessible, and flexible way. Transportation has thus experienced unprecedented development to cater for the demand that is made of it notably through increased motorization. This has come with undesirable impacts on the quality of human life, biodiversity and the environment, majorly because of fossil-fuel combustion in the powertrain of automobiles. Recognizing this, policymakers at various levels have taken the mandate to reduce these impacts by focusing on strategies at reducing pollution and lowering the carbon footprint of transportation without hampering the mobility of the people. In response, the automotive industry has made improvements through the production of energy-efficient greener vehicles and provision of sharing economy-based mobility solutions. Beyond the direct benefits and impacts of these new trends in energy conservation and environmental protection, there are growing concerns about its effects on the mobility needs of the people and impact on the economy. This paper, therefore, aims to discover and analyse the broader impacts of these new disruptive urban transport technologies on mobility and the economy of urban areas, highlight the implications for urban policy and planning and suggest policy integration pathways to harness the full benefits.

**Key words:** mobility management, disruptive mobility, sustainability

**JEL Classification:** R4; R41; R42

## 1. Introduction

The world is growing rapidly at an uneven rate. This necessitates the need for interaction and integration among people, firms and governments to meet demands which are commonly sourced in urban areas. As a result of this about 55% of the world's population lives in urban areas and this is expected to increase to about 68% by 2050 with the most urbanized regions of the world being

---

<sup>1</sup> GABRIEL AYOBAMI OGUNKUNBI, Budapest University of Technology and Economics, Hungary, gaogunkunbi@edu.bme.hu

<sup>2</sup> FERENC MÉSZÁROS, Budapest University of Technology and Economics, Hungary, fmeszaros@mail.bme.hu

Northern America, Latin America and the Caribbean, Europe and Oceania (United Nations Population Division, 2018). The expected interaction and integration among people is achieved through transportation and communication, with the former enjoying more patronage as economic growth is of utmost importance to all parties. Transportation is thus acclaimed to be the foundation of the modern economy. A well-functioning transport sector enables the creation of sophisticated supply chains and effective delivery of goods and movement of people, thereby improving the functionality of markets for goods and labour and contributing to economic growth. Private and public transport makes urban mobility quite easy. With private transport giving more comfort, flexibility and being perceived as a symbol of affluence to some and a typical consumer commodity to many others, its adoption has been higher and has led to increased motorisation in urban travel (Hebel, 2016).

To accommodate the increased motorization, transportation planners often match infrastructural supply with transportation demand, for both goods and passengers. They often use a planning approach that emphasizes road transport, with a preference for private transport over public transport and a limited effort made to promote non-motorised travel (Da Silva, Costa and Macedo, 2008).

Unfortunately, road vehicles are among the most important sources of air pollution (due to the discharge of nitrogen oxides, sulphur oxides and particulate matter) leading to adverse health effects, acidification of soils and surface water, damage to buildings, and eutrophication (Sadler Consultants, 2006). Furthermore, road transportation harms the climate, particularly in the short term, as a result of almost exclusive dependence on fossil fuel combustion which leads to the emission of greenhouse gases, especially carbon dioxide and the formation of ozone (Renne, 2013). This contemporary transport practice increasingly compromises the well-being of existing populations. Also, it constrains the environment for generations still to come, especially as climate change is primarily driven by human activity, and transport is highly implicated (Mulley, 2017). Due to the high adverse risks associated with traffic-related air pollution, climate change and other effects of transport, it becomes essential to set the transport sector on a sustainable course for the sake of today and the future yet to come.

Transport has thus been at the centre of several discussions and policy formulation addressed at air quality improvement and global climate change mitigation across the globe in recent decades. Efforts are being geared towards a low-carbon development pathway for global climate change mitigation efforts to stabilize global warming below 20C, as agreed by nations under the United Nations Framework Conventions on Climate Change (UNFCCC). To achieve this, nations will have to decarbonize their transport sector up to 80% by 2050 and developing, and emerging countries will have to curb growth up to 170% by 2050, which will require substantial policy action (Lah et al., 2019). Similarly, the EU

has implemented two legislative instruments to reach its climate mitigation targets. The first is a trading scheme (the EU Emission Trading Scheme, ETS), imposing caps on CO<sub>2</sub> emissions of large emitters (Directive 2009/29/EC). The second is legislation assigning targets for non-emissions trading sectors on a national level, covering transport, residential, services and some industry (Decision 406/2009/EC). Regarding the latter, emission reductions are to be achieved through various mechanisms, including, in urban areas, a phasing out of vehicles with internal combustion engines (ICEs), smaller road passenger vehicles, higher shares of collective transport, and urban mobility and infrastructure designs that facilitate walking and cycling (European Commission, 2011). Overall, the European Commission (2011), projects that emissions from transport will decline, compared to 2008, by 60% by 2050, with an interim goal of 20% reduction by 2030. The EU, however, intends to achieve this without limiting mobility, but rather employing the advances in data collection, computing, navigation systems, communication and mobile technologies, and other technologies as a potential to change the pattern of travel and the delivery of goods and services.

This strategy has made the transportation sector comparable to an open-source project. It has thus, provided an enabling environment for new players, other than the regular government policymakers and the automotive industry, to develop innovative and technological solutions to the negative externalities of transport. This has given birth to many of the existing and evolving trends, transitions, innovations and disruptions in the transport sector, including Mobility-as-a-Service (MaaS), Cooperative Intelligent Transport Systems (C-ITS), automation, new and shared mobility services, active travel, Urban Freight and Logistics (UFL), access regulations, electrification, hydrogen propulsion solutions, among others in urban areas (POLIS, 2018). Despite the tremendous positives associated with these disruptive mobility options by the proponents, there are growing concerns about its effects on the mobility needs and safety of the people, effects on the economy and other impacts of deploying such innovations at a full-scale into the society. This paper, hence, seeks to discover and examine the wider impacts of these new disruptive urban transport technologies on mobility, highlight the implications for urban policy and planning and suggest policy integration pathways to harness the full benefits, by aggregating information from previous researches on different aspects of the trend.

The following section enumerates the efforts of the traditional key players in the transport sector. Section 3 gives a background on the onset of new players triggering disruption in transport. The implications for urban policy and pathways for integrating the new technologies into urban areas are suggested in Section 4, while the paper concludes by stressing the importance of interventions required for the emergence of disruptive trends.



## 2. Efforts at Achieving Sustainability

The importance of achieving sustainable mobility cannot be overemphasised. It has therefore been the crux of several discussions within and between governmental organizations, automotive industries, academia and other stakeholders, all engaged to seek ways of meeting the mobility needs of urban areas and regions without endangering the environment. As identified by Tan et al. (2014), these discussions are either focused on reducing environmental impact through technological innovations such as a reduction in emission or inspiring behavioural change through innovations driven by a change in policies to contribute towards the economic, social and environmental goals of sustainability. Policy and innovation are thus the main tools of achieving sustainability with the government and automotive OEMs being the traditional key players.

The government, whose fundamental business is the provision of public goods and services, formulates a mobility strategy requiring the implementation of policies, actions, and instruments that favour the integration of sustainable mobility (Ostrom, Tiebout and Warren, 1961; Da Silva, Costa, and Macedo 2008). The popular policies and instruments can range from focusing on non-motorized travel to access control of transport through urban vehicles access regulations such as the use of road pricing, establishment of low emission zones (LEZ), lorry ban, pedestrianized areas, car-free days and odd-even license plate schemes (Homrighausen, Tan, 2016; Ogunkunbi, Mészáros, 2019). Various legislations are also made to this effect. As evident in the EU case, such legislation, under the framework of Transport, Energy and Environment, includes the Transport Protocol of the Alpine Convention, Clean and energy-efficient road transport vehicles, reduction of carbon dioxide emissions from light commercial vehicles, reduction of pollution from light motor vehicles, reduction in CO<sub>2</sub> emissions of new passenger cars and certification rules for emissions from heavy-duty vehicles (Euro VI).

Driven by the government policies and legislation with pressure from other stakeholders, the automotive sector is compelled to design and manufacture fuel-efficient, environment-friendly and sustainable vehicles (Jasiński, Meredith and Kirwan, 2016). Automotive OEMs also partner with other institutions like the academia in research, design and innovation projects to reach the demands of the government and boost their business efficiency.

The policies and technological innovations championed by these traditional transport key players have, however, proved to be inadequate to achieve sustainability, especially as regards the environmental goal of reducing transport emission due to various barriers as identified by past research works (Anable et al., 2012; Banister, 2011; Buuren, Edelenbos, 2004; Gossling, Cohen, 2014; Rietveld, Stough, 2005; Stephenson et al., 2018; Zöldy, Török, 2015). This has further

justified the advent of new key players in the transport sector who are conceptualising and creating solutions using non-transport technologies and approaches.

### **3. New Transport Key Players: Birth of Disruptive Mobility**

With the advancement in technology, development in emerging markets, diversification of different sectors of the global economy, and the drive for sustainable mobility, transportation has witnessed the influx of new players who are postured to spike the current trends of innovation in the automotive industry. These new entrants, made up of new OEMs, technology start-ups, venture capitalists with research laboratories using a mix of new technology and business models focused on personal mobility, are creating new products and markets which are transforming the industry and could bring about the most significant transport disruption in history as asserted by Hewitt (2018). Meanwhile, they are making different innovations in self-driving systems, navigation and communication systems, sharing vehicle platforms, car dealing platforms, driver assistance systems, electric vehicle systems, data processing, combustion vehicle systems, parking technologies and other car services as identified by Ferràs-Hernández et al. (2017). The categories of most significant impact in mobility disruption, however, are Mobility-as-a-Service (MaaS) and shared mobility, electromobility and autonomous mobility. This study will, however, not delve into explaining the concepts as researchers have adequately provided an overview of MaaS and shared mobility (Hietanan, 2014; Jittrapirom et al., 2017; Murphy, 2016; Shaheen, Chan, 2016), electric vehicles and electromobility (Dijk et al., 2013; Larminie, Lowry, 2012), and autonomous mobility (Fagnant, Kockelman, 2015; Bonnefon, Shariff and Rahwan, 2016; Litman, 2017).

## **4. Implications for Urban Policy**

### **4.1 Shared Mobility and MaaS**

Passenger transport today is a highly regulated but open market with stiff competition between individual and public transport. The public transport service as a public service remit is defined by a specific, multi-level regulatory framework, which allows public passenger transport services to be present simultaneously in niche markets, ensuring accessibility for people with disabilities and being a full competitor to other modes of transport available on the open market, such as individual motorised transport.

Mobility as a Service (MaaS) needs to be integrated into this specific market environment, which is, in fact, a new competitor to the already known ways of

service provision, but also means a new level of the integrated transport market stemming from European transport policy. MaaS is part of the sharing economy, where the economy has not only an economic but also a social dimension: the participants in this unique market provide each other with open access to goods and services available on the market and to data and knowledge that can be mapped from market processes. An essential feature of the market is that even the profit-oriented businesses involved are an integral part of the network. Cooperation is based on mutual trust and the equitable sharing of resources and benefits based on it. The drivers of market development are changes in the regulatory framework (gradual transformation of the role of the state and local governments: from the owner to the owner), increasing social sensitivity to resource constraints and undesirable market distorting effects (e.g. air pollution, noise pollution) and information-communication technology (ICT).

Social expectation towards MaaS is that shared resources shall serve both the interests of individuals and the community. One innovative element of the available and shared resources is the data collection on smart devices, which serve travel information to others. One of the critical issues to operating the market is to maximize benefits from the collection and utilization of travel-specific data, i.e. the acquisition and sharing of knowledge. With the advancement of ICT, knowledge and information are becoming increasingly of a collective value (Bencsik, Juhász, 2016). The process of building trust between users or, more generally, society is much slower (Aapaoja, Eckhardt and Nykanen, 2017). Users of mobility services are both data providers and consumers of systematically processed data. The sharing economy's mechanism is based on the premise that the user can access information only if s/he has provided information to others, i.e. user trust is expressed towards the system by voluntarily supplying information about individual travel patterns, hoping that the entire community will derive benefits from the shared information. This kind of user confidence is a necessary and essential criterion for the efficient operation of the market. Trust also carries risks, winning user trust is one thing, an other, equally important thing is maintaining this trust, which can best be achieved through transparent and reliable system operation and the use of confidence-building tools (such as ex-post public comments). The key to all this is a properly regulated market environment (Bencsik, Juhász, 2016).

## **4.2 Electric vehicles**

Electric vehicles are generally considered as the best alternative of internal combustion engine-powered vehicles, aiming at mitigation of local air pollution. Depending on the source of electricity generation and the transition to electrified personal transportation, electric vehicles can significantly contribute to the

reduction of greenhouse gases (GHGs) emission, consequently to the mitigation of climate change risks as well. However, electric cars are nowadays expensive, have short-range and need long refuelling time, which hinders their market penetration. The government incentive policies besides the socio-economic and socio-demographic status of the country could reduce the market failures and encourage their adoption rates. The presence of electric vehicle manufacturing facility, the level of income, the availability and extent of electricity charging infrastructure, the level of value-added tax exemption are significant factors and they positively influence the electric vehicle markets. Other factors such as the existence of purchase subsidies and the level of registration tax are also significant as they influence market penetration (Meszaros, Shatanawi and Ogunkunbi, 2020).

Key steps towards remarkable growth in the electric vehicle market that decision-makers should follow are: provision of available, reliable and accessible electric power sources on a 24/7 basis, breaking the oil and petroleum product dependence of a country's economy and re-calibrating it in a sustainable way, the existence of a political will towards EV market expansion, designing a valid business model incorporating both public and private stakeholders.

### **4.3 Autonomous mobility**

Even with researches on, autonomous mobility is a field in vast expansion, and the scientific literature presents several justifications for its development. Preeminent problems must be treated to ensure that its adoption is a massive success. The expected impacts of autonomous mobility are generally positive and may bring many gains to society in general. Cost-benefit analysis reveals that even despite higher costs of autonomous vehicles compared to conventional ones, the benefits brought to society will be more significant. However, the implementation of autonomous mobility will face several barriers, from the side of governments to change legislation, policies and even infrastructures, from the part of companies in making a vehicle that takes better decisions than a human being. The idea of having a driverless vehicle may seem distant. However, automation technologies are developing faster and faster and promise to reduce congestion, parking costs, crashes, and provide more mobility for people.

One point to be raised is that all research and development activities and technology investments in autonomous industry generally come from rich and developed countries, so autonomous mobility is expected to rise first in the developed part of the world. Nevertheless, even in these countries, the transition until autonomous vehicles mostly replace the fleet of vehicles would take years or decades, perhaps even more than a century. Consequently, the long-awaited benefits will be achieved only in the long term. If this possible barrier is already

enormous for these countries, for the developing countries experiencing higher negative impacts of the slow transition, reaping all the expected benefits from autonomous mobility could be a utopia.

## 5. Conclusion

Earlier studies, cited herein and many others, have discussed and stressed the positives and negatives that may be derived from the ongoing trend of disruption in the transportation sector. This paper, therefore, examined approaches to harnessing the potentials to achieve more sustainable transport in urban areas by focusing on the identified major disruptive trends in the sector: shared mobility, electromobility and autonomous mobility. It emphasizes the need for trust and reliability in shared mobility, and the importance of favourable government policy and infrastructural provision to enhance electromobility and autonomous mobility.

## References

- AAPAOJA A., ECKHARDT J., NYKANEN L. 2017. Business models for MaaS. In: *ICoMaaS 2017 Conference Proceedings*. pp. 8–20.
- ANABLE, J., BRAND, C., TRAN, M., EYRE, N. 2012. Modelling transport energy demand: A socio-technical approach. In: *Energy policy*. Vol. 41, pp. 125–138.
- BANISTER, D. 2011. Cities, mobility and climate change. *Journal of Transport Geography*. Vol. 19, No. 6, pp. 1538–1546.
- BENCSIK A., JUHÁSZ, T. 2016. Organisational trust and mistrust in sense of sharing economy (in Hungarian). In: *LIM 2016 International Scientific Conference, Zalaegerszeg, Hungary, 2016*.
- BONNEFON, J. F., SHARIFF, A., RAHWAN, I. 2016. The social dilemma of autonomous vehicles. In: *Science*. Vol. 352, No. 6293, pp. 1573–1576.
- BUUREN, A. V., EDELENBOS, J. 2004. Why is joint knowledge production such a problem? In: *Science and public policy*. Vol. 31, No. 4, pp. 289–299.
- DA SILVA, A. N. R., DA SILVA COSTA, M., MACEDO, M. H. 2008. Multiple views of sustainable urban mobility: The case of Brazil. In: *Transport Policy*. Vol. 15, No. 6, pp. 350–360.
- DIJK, M., ORSATO, R. J., KEMP, R. 2013. The emergence of an electric mobility trajectory. In: *Energy Policy*. Vol. 52, pp. 135–145.
- EUROPEAN COMMISSION 2011. Roadmap to a Single European Transport Area: Towards a Competitive and Resource Efficient Transport System: White Paper. Publications Office of the European Union, 2011.
- FAGNANT, D. J., KOCKELMAN, K. 2015. Preparing a nation for autonomous vehicles: opportunities, barriers and policy recommendations. In: *Transportation Research Part A: Policy and Practice*. Vol. 77, pp. 167–181.
- FERRÁS-HERNÁNDEZ, X., TARRATS-PONS, E., ARIMANY-SERRAT, N. 2017. Disruption in the automotive industry: A Cambrian moment. In: *Business Horizons*. Vol. 60, No. 6, pp. 855–863.

- GÖSSLING, S., COHEN, S. 2014. Why sustainable transport policies will fail: EU climate policy in the light of transport taboos. In: *Journal of Transport Geography*. Vol. 39, pp. 197–207.
- HEBEL, K. 2016. Cars and urban travel. In: BAK, M. (ed.) *Transport Development Challenges in the Twenty-First Century*. Springer Proceedings in Business and Economics.
- HEWITT, D. 2018. *We're on the cusp of the biggest transport disruption in history: here's why*. Available at: <https://www.sageautomation.com/blog/were-on-the-cusp-of-the-biggest-transport-disruption-in-history-heres-why->
- HIETANEN, S. 2014. Mobility as a Service. In: *The new transport model*, 2–4.
- HOMRIGHAUSEN, J. R., TAN, W. G. Z. 2016. Institutional Innovations for Sustainability Mobility: Comparing Groningen (NL) and Phoenix (US). *Transport Research Procedia*, Vol. 19, pp. 151–163.
- JASIŃSKI, D., MEREDITH, J., KIRWAN, K. 2016. A comprehensive framework for automotive sustainability assessment. In: *Journal of Cleaner Production*, Vol. 135, pp. 1034–1044.
- JITTRAPIROM, P., CAIATI, V., FENERI, A. M., EBRAHIMIGHAREHBAGHI, S., ALONSO GONZÁLEZ, M. J., NARAYAN, J. 2017. Mobility as a service: A critical review of definitions, assessments of schemes, and key challenges. In: *Urban Planning*. Vol. 2, No. 2, pp. 13–25.
- LAH, O., ALVERANO, S., ARIOLI, M., CHESTERTON, V. 2019. Sustainable Urban Mobility Solutions for Asia, Latin America and the Mediterranean Region. In: *Sustainable Urban Mobility Pathways*, pp. 23–63. doi:10.1016/b978-0-12-814897-6.00002-8
- LARMINIE, J., LOWRY, J. 2012. *Electric vehicle technology explained*. John Wiley & Sons.
- LITMAN, T. 2017. *Autonomous vehicle implementation predictions*. Victoria Transport Policy Institute, Victoria, Canada
- MESZAROS, F., SHATANAWI M., OGUNKUNBI G.A. 2020. Challenges of the Electric Vehicle Markets in Emerging Economies. *Periodica Polytechnica Transportation Engineering*, doi:10.3311/PPtr.14037
- MULLEY, C. 2017. Mobility as a Services (MaaS)—does it have critical mass? In: *Transport Reviews*. Vol. 37, No. 3, pp. 247–251.
- MURPHY, C. 2016. Shared mobility and the transformation of public transit (No. TCRP J-11/TASK 21).
- OGUNKUNBI, G., MÉSZÁROS, F. 2019. Access Control of Urban Transport and the Environment: The Past, Present and Prospects. *Conference on Transport Sciences Győr 2019*, Hungary. Available at: [http://ktkonf.sze.hu/cikkek/24\\_Ogunkunbi\\_Mészáros.pdf](http://ktkonf.sze.hu/cikkek/24_Ogunkunbi_Mészáros.pdf)
- OSTROM, V., TIEBOUT, C. M., WARREN, R. 1961. The organization of government in metropolitan areas: a theoretical inquiry. *American political science review*. Vol. 55, No. 4, pp. 831–842.
- POLIS 2018. Securing the future of urban mobility research & innovation in Europe. *TOWARDS HORIZON EUROPE: THE 9TH FRAMEWORK PROGRAMME FOR RESEARCH AND INNOVATION*, June 2018.
- RENNE, J. L. 2013. *Transport beyond oil: policy choices for a multimodal future*. Island Press.
- RIETVELD, P., STOUGH, R. R. 2005. *Barriers to Sustainable Transport: institutions, regulation and sustainability*. Routledge.
- SADLER CONSULTANTS, 2006. Assessment of the impact on costs and emissions of technical measures on existing heavy-duty vehicles and captive fleets. EU Technical Measures final report from Sadler Consultants ENV.C.1/SER/2006/0013r
- SHAHEEN, S., CHAN, N. 2016. Mobility and the sharing economy: Potential to facilitate the first- and last-mile public transit connections. *Built Environment*. Vol. 42, No. 4, pp. 573–588.
- STEPHENSON, J., SPECTOR, S., HOPKINS, D., MCCARTHY, A. 2018. Deep interventions for a sustainable transport future. In: *Transportation Research Part D: Transport and Environment*. Vol. 61, pp. 356–372.

- TAN, W. G., JANSSEN-JANSEN, L. B., BERTOLINI, L. 2014. The role of incentives in implementing successful transit-oriented development strategies. In: *Urban policy and research*. Vol. 32, No. 1, pp. 33–51.
- UNITED NATIONS POPULATION DIVISION, 2018. *World Urbanization Prospects: 2018 Revision*.
- ZÖLDY, M., TÖRÖK, Á. 2015. Road transport liquid fuel today and tomorrow: literature overview. In: *Periodica Polytechnica Transportation Engineering*. Vol. 43, No. 4, pp. 172–176.

# Contemporary Residential Structure and Future of Metropolitan Areas in V4 Countries

LENKA MALIČKÁ<sup>1</sup>

**Abstract:** Fragmented residential structure might decelerate the economic development of localities and the whole country. Besides, small structures often suffer from insufficient social and cultural infrastructure. Economists promote higher size of residential structures to ensure the sustainable level and quality of public goods provision. With the exception of Poland, the V4 countries are frequently characterized with a large number of small municipalities. In the Czech Republic, 76.7% of municipalities have above 1,000 inhabitants covering only 17% of the population. In Slovakia it is 66% covering 16.1% of the country's population. In Hungary it is 55.1% of municipalities covering 7.6% of the population. A simultaneous effect known as shrinkage or dying of small municipalities can be observed due to their depopulation. Expectations about the development of the residential structure attach importance to metropolitan areas. Projections of population in V4 countries' metropolitan and non-metropolitan areas in the period of 2020-2050 show a reduction of population in non-metropolitan areas. On the contrary, a dynamic increase of population in metropolitan areas is expected, with the evident gravity of the capital city metropolis in the Czech Republic and Hungary.

**Key words:** Local government, municipality size, residential structure, fragmentation, local tax, local expenditure, metropolis

**JEL Classification:** H11, H73

## 1. Introduction

At the early beginning, the arrangement of the world on the local level was stressed by Plato (Charbit, 2002). The "Platonic City" involves many aspects of human life (employment, marriage, decision-making processes), but also excludes many of them (such as arts or culture). However, this utopia had been inspiring for many ideas including the context of local governance due to its interest in the optimal size of municipalities. Currently, the optimal size of municipalities is commonly discussed issue in countries where the residential (territorial) structure is visibly fragmented. Many European countries dealt with this problem in the last decades of the 20<sup>th</sup> century (Denmark, Finland, Germany). Reforms in this field were also implemented in the Australia, New Zealand and Israel. In certain Central

---

<sup>1</sup> LENKA MALIČKÁ, Technical University of Košice, Faculty of Economics, Department of Finance, Slovakia, Lenka.Malicka@tuke.sk



and Eastern European countries (CEE) the problem of fragmented residential structure persists (the Czech Republic, Slovakia, Hungary, etc.). Many economists mention the menace of its inhibitive effect on the subnational and national economy. Additionally, in the period of 2021–2027, the EU is interested in the development of cities and metropolitan areas where the EU's population is concentrated.

This paper analyzes the fragmented residential structure in V4 countries. The problem of the large number of small municipalities is added to the context of the development of existing metropolitan areas in V4 countries. The GDP per capita of metropolitan areas (GDP pc) is compared to those of non-metropolitan areas. Finally, the projection of the population in the mentioned areas according to the database of Eurostat is presented at the end of the paper.

## 2. Research background

The optimum size of a local government is often discussed in literature focusing on public finance and fiscal federalism. Seminal works interested in the group size (in the context of providing public goods) were published by Buchanan (1965) and Olson (1969, 1971). Buchanan's Economic Theory of Clubs is famous for its contribution to the analytical solution of optimal group (club) size and optimal public good size provided by the club. Olson's Principle of Fiscal Equivalence (1969) and Theory of Groups (1971, in *The Logic of Collective Action*) arranges the conditions of the required connection between paying for public goods and receiving related benefits. The Theory of Groups concludes that due to the free-rider problem, the incentives for collective action increase with the diminishing of group size. It is partially in accordance with Oates' Decentralization Theorem (1972), whereby through dividing the nation into smaller but more homogenous groups the welfare losses are minimized. On the contrary, economies of scale and economies of scope are not applicable in the field of the decentralized provision of public goods. Additionally, the tax base of too small jurisdictions (despite their homogeneity) is not sufficient to cover all expenditures on constitutionally guaranteed local public goods. That is why the question of optimum size of local government and the question of residential structure and its spatial distribution are commonly discussed.

Many empirical researches confirmed the positive correlation between the economic conditions of municipalities and their size. The strongest argument is given in favour of economies of scale in terms of administrative costs (Dollery et al., 2008). Many of these researches were performed on the sample of Scandinavian municipalities, while the most cited ones are realized in the case of Denmark (Hansen, 2014; Blom, Hansen et al., 2011; Christoffersen, Larsen, 2007) or

Finland (Moisio, Uusitalo, 2013). A part of the researches were also made on the sample of Australian municipalities (e.g. Dollery et al., 2008), New Zealand (McKinlay, 2006) and Israel (Reingewertz, 2012). Amalgamations were realized in Germany as well, the effects of which are discussed by Blesse and Baskaran (2013) or Blume and Blume (2007). An overview of empirical research done in the field of optimal local government size is made by Mouritzen (1989), Keating (1995), Swianiewicz (2002), Baldersheim and Rose (2010) or Šebová (2012).

Swianiewicz (2010) mentions that territorial fragmentation has been a recent trend in the Czech Republic, Slovakia, Hungary and other Central and Eastern European countries (CEE). In their case (after the post-1990 public sectors reforms that have given higher local autonomy to sub-national governments), attempts to establish larger territorial self-government units were considered as a violation of local autonomy. According to him, contrary to the Czech Republic, Slovakia or Hungary, Poland is territorially consolidated.

The residential structure in V4 countries is analysed in Grešová (2015) or Hajdú et al. (2017). This problem in the Czech Republic is discussed e.g. by Illner (2010). In the case of Slovakia, the researches of Klimovský (2009, 2010) or Čerňenko et al. (2017) are noteworthy. Somlyódyne Pfeil (2010) is concerned with the situation in Hungary. Poland is examined by Swianiewicz and Herbst (2002), Klimovský (2011) or Neupauerová (2013).

However, the general findings of the related economic theory recommend large-sized local governments. The praxis reveals certain barriers which might prevent any bottom-up movements toward amalgamation in CEE countries. The advantages of amalgamation and its barriers are mentioned in Swianiewicz (2010) (*see Table 1*).

### **3. Contemporary residential structure in the EU and in V4 countries**

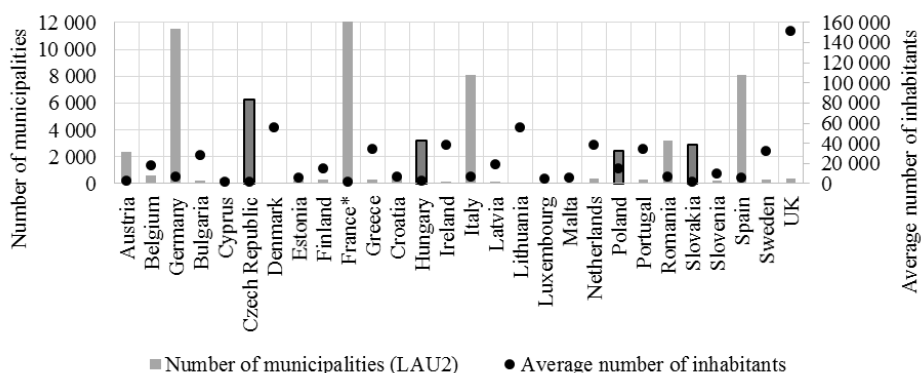
In the EU, France is the country with the largest number of municipalities (36,697). It is followed by Germany, Italy, Spain and the Czech Republic. The lowest number of inhabitants per municipality is observed in the Czech Republic, France, Slovakia and Cyprus. The lowest average size of municipalities can be observed in Malta, Croatia, the Czech Republic or France. The average number of inhabitants per municipality in the EU countries is shown in *Figure 1*. The average size of municipalities in EU countries is shown in *Figure 2*.

A handbook example of municipal reform is illustrated by Denmark. The problem of fragmented residential structure was resolved stepwise through municipalisation. Amalgamation in three phases was realized after World War II. In the first phase (legislatively assigned in 1958, realized in the 1960s), the total number of Danish municipalities was reduced by 20% (reduction from 1,398 to 1,098

**Table 1. Advantages and barriers of creating larger municipalities**

Advantages of larger local governments	Potential barriers of creating larger local governments
Higher capacity to provide a wider range of functions	Lower accessibility of local administration in terms of larger physical distance of inhabitants to town halls
Economies of scale	Loss of identity of local communities by cancelling local administrations as centres of local social life
Promoting local democracy (higher participation of citizens in local politics)	Fear of local communities of not being represented in the distant municipal (probably core) centre
Reducing income disparities among localities decreases the demand on horizontal equalization	Conflicts among areas of the amalgamated municipalities in the case of joined core area and suburbs
Higher effectiveness in planning and economic development policies	
Elimination of the free-rider problem (when locally provided services are consumed by non-residents)	

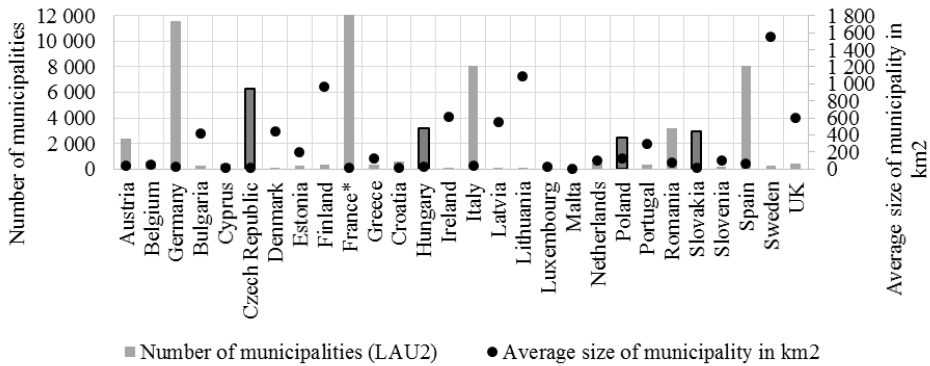
Source: Elaboration according to Swianiewicz (2010, p. 3 and p. 10)



**Figure 1. Number of municipalities (left axis) and average number of inhabitants of municipalities (right axis) in EU 28 countries with an emphasis on V4 countries**

\*Value of number of municipalities for France exceeds the axis spread (36,697).

Source: Based on Provazníková (2015)



**Figure 2. Number of municipalities (left axis) and average size of municipalities (right axis, in km<sup>2</sup>) in EU 28 countries with an emphasis on V4 countries**

\*Value of number of municipalities for France exceeds the axis spread (36,697).

Source: Based on Provazníková (2015).

municipalities). In the second phase (since 1970), the number of municipalities was reduced quite dramatically to 277 (in 2006 even to 270 municipalities). The third phase was realized in 2007 when the number of municipalities was reduced to 98 municipalities (Klimovský, 2010). The condition of optimum of 30,000 inhabitants per municipality was implemented. The minimal size of municipalities' population was set to 20,000. In the context of the Danish amalgamations, the number of elected local authorities diminished simultaneously with the decrease of the number of municipalities. In 1997, 4,685 local authorities were established, in 2005 it was only 2,522. Concomitantly, the number of regions was reduced from 14 to 5.

#### **4. Fragmented residential structure in the context of metropolitan areas' development in V4 Countries**

As *Figure 1* and *Figure 2* present, in the EU in the group of the three countries with the lowest average number of inhabitants per municipality (the Czech Republic – 1,680, France – 1,760, Slovakia – 1,850) there are two V4 member countries (the Czech Republic and Slovakia). The situation is better in Hungary (3,465 inhabitants per municipality). Problems with fragmented residential structure are not present in Poland (15,390 inhabitants per municipality). Although the problem of fragmented residential structure in the mentioned V4 countries is often discussed by their governments, potential solutions are still lacking.

In Slovakia, Čerňenko et al. (2017) published a research related to the possible reduction of the ineffectiveness of local public good provision. The authors point

out that small municipalities do not have sufficient capacities to exercise all of their competencies. They suffer from a limited (and insufficient) tax base. However, their dependency on central government is evident. Albeit the Theory of Fiscal Federalism considers the inter-governmental transfer system as an integral part of local sector financing (Oates, 1972; Ebel, Yilmaz, 2002), the situation when the only municipal revenue is created by grants (and eventually by receipts from shared tax) does not allow municipalities to promote their further socio-economic development. The problem of fragmented residential structure in Slovakia persists, even if certain activities in the field of amalgamation were promoted. Klimovský (2009) mentions inter-communal cooperation. Other forms of consolidation or merging were not adopted by the praxis. Reasons include the barriers mentioned in *Table 1*. Currently, in Slovakia, approximately 66% of municipalities have less than 1,000 inhabitants (for more details see Appendix) covering 16.1% of the population. The situation in the Czech Republic and Hungary does not differ greatly from the situation in Slovakia.

Currently, in the Czech Republic, 76.7% of municipalities have less than 1 000 inhabitants. They concentrate approximately 17% of the population. Before 1989 (since the 1960s), in accordance with the socialist ideology and regime, the concept of nodal localities (providing public services as education, health, local bureaus, etc.) was adopted (Klimovský, 2009). Since the change of the regime in 1989, the residential structure became more fragmented due to administrative decentralization and the related restoration of autonomous decision-making to local governments. Even nowadays, as mentions Novotná (2009), it is not rare in the praxis of local public sector to find certain examples of the separation of municipalities (e.g. in the Czech Republic the municipality of Želechovice separated from Zlín in 2008 on the basis of historical origin, similarly, Vyšný Medzev separated from Medzev in Slovakia in 1999).

In Hungary, 55.1% of municipalities have above 1,000 inhabitants and approximately 7.6% of the population lives in these municipalities. Since the 1990s, the number of autonomous local units in Hungary increased, similarly to the Czech Republic, when after the change of regime certain localities gained back their independence (Kocsis, Schweitzer, 2009). Due to the abandonment of the agricultural style of life and transition to industrialization, the population decreased in rural areas and a “shrinkage” of small villages began. The low potential of small villages to provide a sufficient quantity and quality of local public goods has a strong impact on their development. A worsening of local conditions was observed also after the decentralization process, when the excessive burden of competences was shifted to local authorities. Small villages have the same competences as capital cities (Provazníková, 2015).

Possibilities of residential structure consolidation are mentioned also in the European Charter of Local Government signed in 1985. In the EU's current

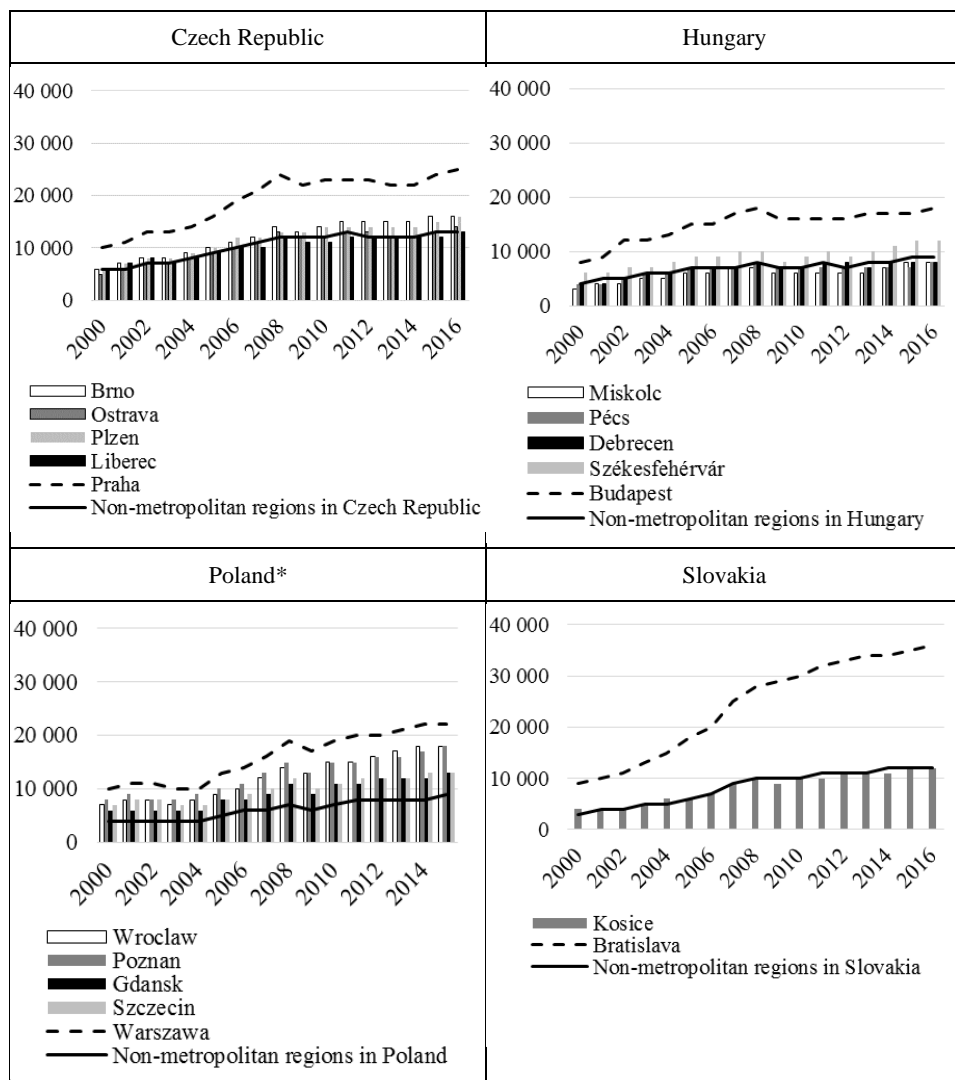
programming period (2014–2020) the city initiative was created to support the needs of cities, because certain trends in the development of metropolitan areas are obvious. Metropolitan area (or metropolis), is defined as a major city together with its suburbs and nearby cities, towns, and environs over which the major city exercises a commanding economic and social influence (Encyclopaedia Britannica). It is an area of population usually with a central or core city and surrounding towns or suburbs (Your Dictionary). Currently, 2/3 of the EU's population lives in cities, in 2020 the EU expects this value to increase to 80%. 59% of the EU's population lives in metropolitan areas where 62% of all working places are concentrated and 85% of the EU's GDP is created (European Commission). *Table 2* mentions metropolitan areas in V4 countries. *Figure 3* shows the dynamics of GDP pc in V4 countries distinguishing among metropolitan and non-metropolitan areas in the period 2000–2016. Certain common trends are observable: 1) A widening gap in GDP pc between capital cities and the rest of the settlements in each V4 country (the biggest gap is observed in the case of Slovakia), 2) The inferiority of GDP pc (total sum) in non-metropolitan areas compared to GDP pc produced in metropolitan areas and an increasing gap (the most remarkable gap is seen in Poland), 3) The disruptive effect of the recent financial crisis (2008) (in Slovakia, the growth of GDP pc of the Bratislava metropolitan area decelerates, but is still increasing).

**Table 2. Metropolitan areas in V4 countries**

Country and number of metropolitan areas		Metropolitan areas
Czech Republic	5	Praha (Capital), Brno, Ostrava, Plzeň, Liberec
Hungary	5	Budapest (Capital), Miskolc, Pécs, Debrecen, Székesfehérvár
Poland	19	Warszawa (Capital), Łódź, Kraków, Wrocław, Poznań, Gdańsk, Szczecin, Bydgoszcz-Torún, Lublin, Katowice, Białystok, Kielce, Olsztyn, Rzeszów, Opole, Częstochowa, Radom, Bielsko-Biala, Tarnów
Slovakia	2	Bratislava (Capital), Košice

*Note:* Hungarian national delimitation of agglomerations differs from Eurostat (2018), for more see Hungarian Central Statistical Office (2020).

*Source:* Eurostat (2018).



**Figure 3. Comparison of the GDP pc (in Eur) of metropolitan and non-metropolitan areas in V4 countries in the period of 2000–2016**

\*Selected metropolitan areas according to highest GDP pc in 2000 (over 6 000 Eur pc), data for 2016 are not available.

Source: Eurostat (2018).

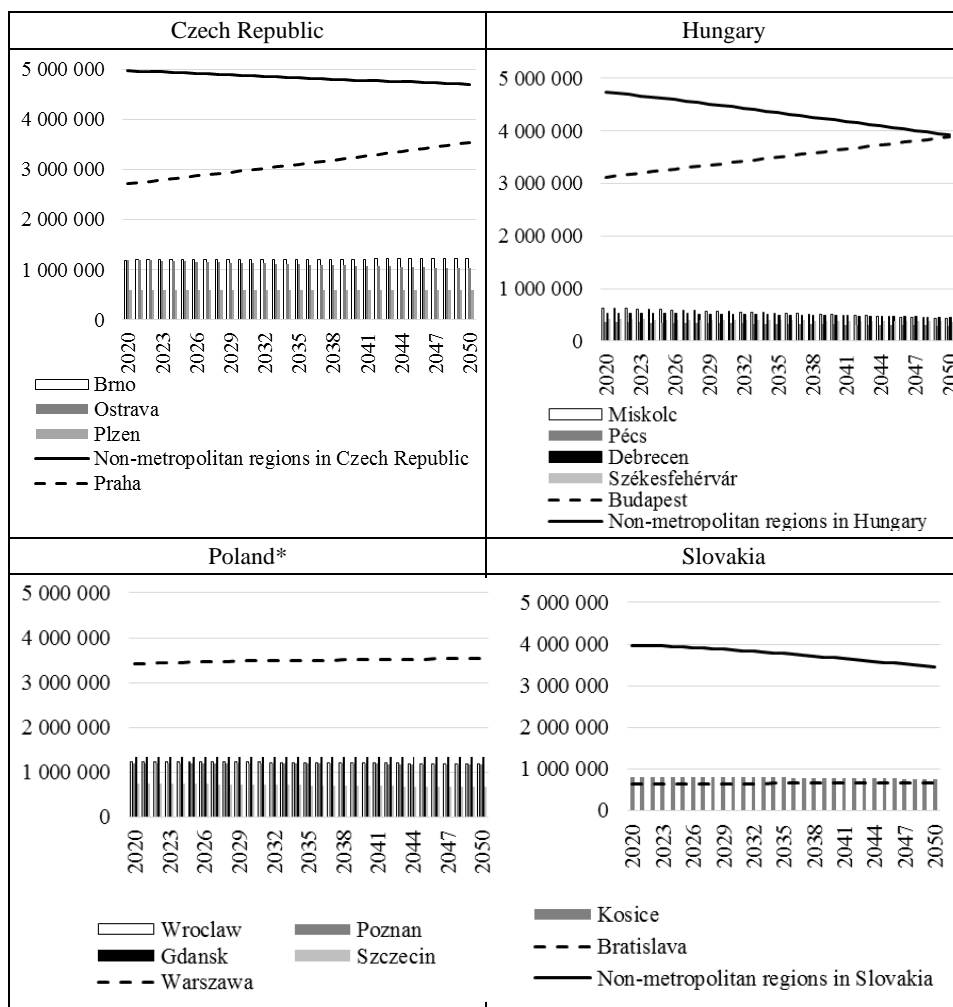
## 5. The future of residential structure and projections of population in V4 countries

The future of residential structure in the V4 countries might be influenced by overall demographic processes. According to data from Eurostat (2018), in the Czech Republic an increase of population of 4% is expected between 2020 and 2050. On the contrary, a decrease of population in the upcoming 30 years' period is expected in Hungary (decrease by 4.6%), Poland (9.3%) and Slovakia (10.1%). Projections of the population in metropolitan areas in comparison to non-metropolitan areas in the Czech Republic, Hungary, Poland and Slovakia are presented in *Figure 4*.

In the Czech Republic, a gentle decrease of the population of non-metropolitan areas will be counterbalanced by the increase of population in metropolitan areas in the next 30 years. The most massive increase of population is expected in the Prague metropolis (30.3%). The most massive decrease of population is expected in the Ostrava metropolis (15%, eastern part of the country, paradoxically with a high population density comparable to the area of Prague). In Slovakia, the current ageing of the population is accompanied by a decrease of fertility. The projection of the population for 2050 reveals an important decrease of the population in non-metropolitan areas (13.3%) and in the Košice metropolitan area (5.7%). A gentle increase of population is expected in the capital city of Bratislava metropolis (4.3%). In the Czech Republic and Slovakia, a decrease of fertility is observable since the 1990s. Several factors affected the rate of fertility. The massive support of young families (housing, fertility) in the former Czechoslovakia during communism since the 1970s was abandoned. The change of regime opened the borders and many young people went abroad to find better living conditions after 1989. Currently, impacting the future population, the generation of strong population growth (born in the 1970s and 1980s) ended its reproduction cycle, causing a the decline in fertility in the next period. The question based on the projection of population is why the increase of population in the Czech Republic is expected (especially in the Prague metropolis), contrary to a wide decrease of population in Slovakia. According to Bajtler (2016), an important part of Prague's new population will be created by foreigners and in the Prague metropolitan plan certain solutions such as brownfields or micro-unit housing are considered.

In Hungary the shrinkage (or dying) of small settlements might lead to a massive decrease of population in the Hungarian Great Plain (Kocsis, Schweitzer, 2009). It is important to note that with the exception of the capital city of the Budapest metropolitan area, in the rest of the metropolises the population will decrease, too. Data (Eurostat, 2019) reveal the abysmal decrease of the population in the Miskolc metropolis (eastern part of Hungary, reduction of about 200,000 inhabitants (31%). The increase of population in the Budapest metropolis





**Figure 4. Projection of the population in V4 countries (number of inhabitants) in period of 2020–2050**

\*Selected metropolitan areas, a population of a non-metropolitan area in Poland is not displayed due to high value.

Source: Eurostat (2018).

(24.5%) at the expense of other metropolitan areas elevates Budapest to the position of the gravity area, similarly to Prague metropolis.

In Poland the population in non-metropolitan areas is expected to decrease from 18,952,295 inhabitants in 2020 to 16,933,311 inhabitants in 2050 (11%, not displayed in *Figure 4*). The change of the number of inhabitants in metropolitan

areas is not very clear. There is a little increase of population in the capital city of Warsaw metropolis (3%) in the period 2020–2050, in other areas a decrease of population is expected. These are the causes of the total decrease of population expected up to 2050.

## 6. Conclusion

In the EU, differences among countries considering the residential structure are evident. In the western and northern parts of the EU, examples of successful consolidation of residential structure could be found, e.g. amalgamation in Denmark or Germany.

The character of residential structure might result from several factors. Certain CEE post-communist countries, V4 members, had overcome a turbulent period when the decline of local autonomy in the period of communism was reversed after the change of regime (1989) and localities regained their autonomy. The increase of the number of municipalities was accompanied by lower fertility as well (while during communism fertility was supported by targeted government arrangements in Czechoslovakia since the 1970s) and by the movement of a part of the population from east to west. Abandoning the agricultural way of live and migration to areas of industrial concentration might be a further reason explaining the deepening of differences in the number of inhabitants in settlements (e.g. Hungary). All these factors might contribute to the current undesirable fragmented residential structure in the major part of V4 countries – Czech Republic, Hungary or Slovakia. Poland does not suffer from a high number of small municipalities (with less than 1000 inhabitants). From an economic point of view, in small municipalities the effectiveness of public good provision, as well as their quality, are questionable due to the insufficiency of creating own revenues. A limited tax base causes the transfer dependency of such municipalities and inhibits their possibilities of further socio-economic development.

In the Czech Republic, 76.7% of the municipalities have less than 1000 inhabitants covering only 17% of the population. In Slovakia it is 66% covering 16.1% of population. In Hungary it is 55.1% of municipalities covering 7.6% of the population. An unfavorable number of small municipalities in the mentioned countries has been aggravated in the context of the dynamic development of metropolitan areas enjoying the attention and support of the EU. Currently, the dominant part of the population, GDP and workplaces are concentrated in metropolitan areas in the V4 countries as well. Expectations about the development of metropolitan areas, based on the Eurostat projections of population, in the period of 2020–2050 show a reduction of population in non-metropolitan areas in

all V4 countries. On the contrary, a dynamic increase of population in metropolitan areas is expected. Evident is the gravity of capital city of Prague metropolis in the Czech Republic and Hungary (Budapest) where the highest rise of population is expected. In the city of Prague an increase of about 0.5 million inhabitants, in Prague metropolis an increase of about 0.8 million inhabitants is expected, in Budapest metropolis an increase of about 0.8 million inhabitants is expected. An important decrease of population in metropolitan areas located in the eastern part of Hungary (Miskolc and Debrecen metropolis), Slovakia (Košice metropolis) or the Czech Republic (Ostrava metropolis) is expected.

### Acknowledgements

This paper was published within the framework of the project VEGA no. 1/0806/18.

### References

- BAJTLEK, M. 2016. *Praha bude mít o půl milionu lidí více. Odborníci řeší, kam s nimi* [Prague will have more about half of million people. Experts are solving, where will they live]. June 21, 2016. Available at: [https://www.idnes.cz/praha/zpravy/narust-poctu-obyvatel-v-praze.A160620\\_2254603\\_praha-zpravy\\_nub](https://www.idnes.cz/praha/zpravy/narust-poctu-obyvatel-v-praze.A160620_2254603_praha-zpravy_nub) [Accessed 11 December 2018].
- BALDERSHEIM, H., ROSE, L. E. 2010. *Territorial Choice: The Politics of Boundaries and Borders*. London: Palgrave-Macmillan.
- BLESSE, S., BASKARAN, T. 2013. *Do Municipal Mergers Reduce Costs? Evidence from a German Federal State*. Discussion Paper 176. Centre for European Governance and Economic Development Research, Georg-August Universität Göttingen.
- BLOM-HANSEN, J., HOULBERG, K., SERRITZLEW, S. 2011. *Scale effects in local governments? Evidence from local government amalgamations in Denmark*. Paper presented at XX NORKOM conference, November 24–26, Gothenburg, Sweden.
- BLUME, L., BLUME, T. 2007. The economic effects of local authority mergers: empirical evidence for German city regions. In: *Annals of Regional Science*. No. 41, pp. 689–713. <https://doi.org/10.1007/s00168-007-0118-6>.
- BUCHANAN, J. M. 1965. An Economic Theory of Clubs. In: *Economica*. Vol. 32, No. 125, pp. 1–14. DOI: 10.2307/2552442.
- CHARBIT, Y. 2002. The Platonic City: History and Utopia. In: *Population-E*. Vol. 57, No. 2, pp. 207–235.
- CHRISTOFFERNSEN, H., LARSEN, K. 2007. Economies of Scale in Danish Municipalities: Expenditure effects Versus Quality Effects. In: *Local Government Studies*. Vol. 33, No. 1, pp. 77–95. <https://doi.org/10.1080/03003930601081283>.
- ČERNĚNKO, T., HARVAN, P., KUBALA, J. 2017. *Skrýty poklad v samospráve: Alternatívne možnosti sústredenia výkonu správy v samosprávach* [Hidden treasure in self-government: Alternative possibilities of concentrating the administration in self-government units]. Bratislava: Inštitút finančnej politiky MF SR a Katedra verejnej správy a regionálneho rozvoja NHF EUBA. Available at: <http://www.finance.gov.sk/Default.aspx?CatID=11457> [Accessed 26 November 2018].

- CZECH STATISTICAL OFFICE (ČSÚ). Undated. *Malý lexikon obcí České republiky – 2017* [Short lexicon of villages in the Czech Republic – 2017]. Available at: <https://www.czso.cz> [Accessed 12 December 2018].
- DOLLERY, B., BYRNES, J., CRASE, L. 2008. Australian Local Government Amalgamation: A conceptual analysis Population Size and Scale Economies in Municipal Service Provision. In: *Australian Journal of Regional Studies*. Vol. 14, No. 2, pp. 167–175.
- EBEL, R.D., YILMAZ, S. 2002. *Concept of Fiscal Decentralization at Worldwide Overview*. Washington, D. C.: World Bank Institute.
- ENCYCLOPAEDIA BRITANNICA. Undated. *Demography – Metropolitan area*. Available at: <https://www.britannica.com> [Accessed 20 December 2018].
- EUROPEAN COMMISSION. Undated. *Urban development*. Available at: <https://ec.europa.eu> [Accessed 12 January 2019].
- EUROSTAT 2018. *General and Regional Statistics*. Available at: <https://ec.europa.eu> [Accessed 27 January 2018].
- GREŠOVÁ, L. 2015. *Fragmentation of local structures in the V4 countries: What way to choose?* Slovak University of Agriculture in Nitra. Nitra: Mladá veda.
- HAJDŮ, Z., HORECZKI, R., RÁCZ, SZ. 2017. Changing settlement networks in Central and Eastern Europe with special regard to urban networks. In: Lux G., Horváth Gy. (eds.) *The Routledge Handbook to Regional Development in Central and Eastern Europe*. London–New York: Routledge. pp. 123–140.
- HANSEN, S. W. 2014. Common pool size and project size: an empirical test on expenditures using Danish municipal mergers. In: *Public choice*. Vol. 159, No. 1–2, pp. 3–21. DOI 10.1007/s11127-012-0009-y
- HUNGARIAN CENTRAL STATISTICAL OFFICE 2020. *Regional Atlas – Other territorial delimitations*. Available at: [https://www.ksh.hu/regionalatlas\\_other\\_territorial\\_delimitations](https://www.ksh.hu/regionalatlas_other_territorial_delimitations) [Accessed 03 April 2020].
- ILLNER, M. 2010. The Voluntary Union of Municipalities: Bottom-Up Territorial Consolidation in the Czech Republic. In: Swianiewicz, P. (ed.) *Territorial Consolidation Reforms in Europe*. Budapest: Open Society Institute, pp. 219–236.
- KEATING, M. 1995. Size, Efficiency and Democracy: Consolidation, Fragmentation and Public Choice. In: JUDGE, D., STOKER, G., WOLMAN, H. (eds.) *Theories of Urban Politics*. London: Sage.
- KLIMOVSKÝ, D. 2009. O možných riešeniach fragmentovanej lokálnej sídelnej štruktúry (Inšpirácia pre Slovensko) [About possible solutions of fragmented residential structure (Inspirations for Slovakia)]. In: *Acta Politologica*. Vol. 1, No. 2, pp. 182–213.
- KLIMOVSKÝ, D. 2010. Territorial Consolidation and Intercommunal Cooperation at the Local Level in the Slovak Republic. In: SWIANIEWICZ, P (ed.) *Territorial Consolidation Reforms in Europe*. Budapest: Open Society Institute, pp. 237–254.
- KLIMOVSKÝ, D. 2011. Samosprávy v EÚ: Poľsko – konsolidovaná štruktúra silných obcí a “experimentovanie” na regionálnej úrovni [Self-governments in EU: Poland – consolidated structure of strong municipalities and “experiments” on regional level]. In: *Územná samospráva*. Vol. 7, No. 1, pp. 46–51.
- KOCSIS, K., SCHWEITZER, F. (eds.) 2009. *Hungary in Maps*. Geographical Research Institute. Budapest: Hungarian Academy of Sciences.
- MCKINLAY, D. 2006. *Local Government Structure and Efficiency: A Report Prepared for Local Government New Zealand*. Available at: [www.lgnz.co.nz](http://www.lgnz.co.nz). [Accessed 06 December 2018].
- MOISIO, A., UUSITALO, R. 2013. The impact of municipality mergers on local public expenditures in Finland. In: *Public Finance and Management*. Vol. 13, No. 3, pp. 148–166.

- MOURITZEN, P. E. 1989. City size and citizens' satisfaction: Two competing theories revisited. In: *European Journal of Political Research*. Vol. 17, No. 6, pp. 661–688. <https://doi.org/10.1111/j.1475-6765.1989.tb00212.x>
- NEUBAUEROVÁ, E. 2003. *Finančné aspekty decentralizácie verejnej správy* [Financial aspects of public administration decentralization]. Bratislava: Ekonóm.
- NEUPAUEROVÁ, Z. 2013. Responsibilities of Government Levels in Poland. In: *Sociálno-ekonomický obzor*. Vol. 1, No. 3, pp. 51–62.
- NOVOTNÁ, A. 2009. *Želechovice: 8 miliónů od Zlína? To je málo.* [Želechovice: 8 millions from Zlín? It is few.]. Zlínský deník. October 27, 2009. Available at: [https://zlinsky.denik.cz/zpravy\\_region/zelechovice--milionu-od-zlina-to-je-malo20091027.html](https://zlinsky.denik.cz/zpravy_region/zelechovice--milionu-od-zlina-to-je-malo20091027.html). [Accessed 11 December 2018].
- OATES, W. E. 1972. *Fiscal Federalism*. New York: Harcourt Brace Jovanovich.
- OLSON, M. 1969. The Principle of Fiscal Equivalence. The Division of Responsibilities Among Different Levels of Government. In: *The American Economic Review*. Vol. 59, No. 2, pp. 479–487.
- OLSON, M. 1971. *The Logic of Collective Action: Public Goods and the Theory of Groups*. Cambridge MA: Harvard University Press.
- PROVAZNÍKOVÁ, R. 2015. *Financování měst, obcí a regionů: teorie a praxe* [Financing the cities, municipalities and regions: theory and practise]. 3. edition. Praha, Grada,
- REINGEWERTZ, Y. 2012. Do municipal amalgamations work? Evidence from municipalities in Israel. In: *Journal of Urban Economics*. Vol. 72, No. 2–3, pp. 240–251. <http://dx.doi.org/10.1016/j.jue.2012.06.001>.
- SLOVAK STATISTICAL OFFICE (ŠÚ SR). 2016. *StatDat Public database: Size Groups of Municipalities*. Available at: <http://statdat.statistics.sk> [Accessed 12 December 2018].
- SOMLYODYNE PFEIL, E. 2010. Hungarian Public Service Reform: Multipurpose Microregional Associations. In: Swianiewicz, P. (ed.) *Territorial Consolidation Reforms in Europe*. Budapest: Open Society Institute, pp. 255–264.
- SWIANIEWICZ, P. (ed.) 2002. Consolidation or Fragmentation? The Size of Local Governments in Central and Eastern Europe. Budapest: Open Society Institute.
- SWIANIEWICZ, P., HERBST, M. 2002. Economies and Diseconomies of scale in Polish Local Governments. In: Swianiewicz, P. (ed.) Consolidation or Fragmentation? The Size of Local Governments in Central and Eastern Europe. Budapest: Open Society Institute.
- SWIANIEWICZ, P. (ed.) 2010. *Territorial Consolidation Reforms in Europe*. Budapest: Open Society Institute.
- ŠEBOVÁ, M. 2012. *Úspory z rozsahu v samospráve obcí.* [Economies of scale in municipal self-government]. In: ŠEBOVÁ, M. et al.: *Aktuálne koncepty ekonomiky a riadenia samosprávy*. Košice: Technical University of Košice, pp. 7–27.
- YOUR DICTIONARY. Undated. *Definitions – Metropolitan-area*. Available at: <http://www.yourdictionary.com> [Accessed 20 December 2018].

## Appendix

### Fragmentation of the Residential structure in the Czech Republic, Hungary and Slovakia

CZECH REPUBLIC Size category	Number of municipalities	% of total municipalities	Number of municipalities (cumul. %)	Number of inhabitants	% of total population	Number of inhabitants (cumul. %)
Up to 199	1,432	22.9	22.9	178,327	1.7	1.7
200 – 499	1,992	31.8	54.7	650,760	6.1	7.8
<b>500 – 999</b>	<b>1,379</b>	<b>22.0</b>	<b>76.7</b>	<b>974,837</b>	<b>9.2</b>	<b>17.0</b>
1,000 – 1,999	755	12.1	88.8	1,052,794	9.9	26.9
2,000 – 4,999	427	6.8	95.6	1,288,242	12.1	39.1
5,000 – 9,999	142	2.3	97.9	969,575	9.1	48.2
10,000 – 19,999	69	1.1	99.0	967,946	9.1	57.3
20,000 – 49,999	44	0.7	99.7	1,317,144	12.4	69.7
50,000 – 99,999	12	0.2	99.9	870,531	8.2	77.9
Over 100,000	6	0.1	100.0	2,339,899	22.1	100.0
Total	6,258	100.0	-	10,610,055	100.0	-

*Note:* Minimum – 15 inhabitants is registered in municipality Vysoká Lhota (district Pelhřimov, Vysočina region), maximum in capital city Prague (Praha) 1,281,000 inhabitants.

*Source:* ČSÚ (2017)

HUNGARY Size category	Number of municipalities	% of total municipalities	Number of municipalities (cumul. %)	Number of inhabitants	% of total population	Number of inhabitants (cumul. %)
Up to 199	362	11.5	11.5	43 585	0.4	0.4
200 – 499	700	22.2	33.7	237 842	2.4	2.8
<b>500 – 999</b>	<b>674</b>	<b>21.4</b>	<b>55.1</b>	<b>486,438</b>	<b>4.8</b>	<b>7.6</b>
1,000 – 1,499	640	20.3	75.4	921,012	9.2	16.8
1,500 – 1,999	496	15.7	91.1	1,484,595	14.8	31.6
2,000 – 4,999	138	4.4	95.5	960,713	9.6	41.2
5,000 – 9,999	81	2.6	98.1	1,139,728	11.3	52.5
10,000 – 19,999	41	1.3	99.4	1,202,742	12.0	64.5
20,000 – 49,999	11	0.3	99.7	708,831	7.1	71.5
50,000 – 99,999	7	0.2	99.9	952,552	9.5	81.0
Over 100,000	2	0.1	100.0	1,907,381	19.0	100.0
Total	3,152	100.0	-	10,045,419	100.0	-

*Note:* Minimum – 10 inhabitants is registered in municipality Debréte (Edelény district, Borsod-Abaúj-Zemplén region), maximum in capital city Budapest (1,756,000 inhabitants).

*Source:* Kocsis, Schweitzer (2009)

HUNGARY Size category	Number of municipalities	% of total municipalities	Number of municipalities (cumul. %)	Number of inhabitants	% of total population	Number of inhabitants (cumul. %)
Up to 199	259	9.0	13.73	39,888	0.7	1.6
200 – 499	733	25.4	39.1	253,256	4.6	6.2
<b>500 – 999</b>	765	26.5	65.6	544,637	9.9	16.1
1,000 – 1,499	367	12.7	78.3	453,143	8.2	24.3
1,500 – 1,999	205	7.1	85.4	354,164	6.4	30.7
2,000 – 4,999	289	10.0	95.4	844,481	15.3	46
5,000 – 9,999	62	2.2	97.5	471,849	8.5	54.5
10,000 – 19,999	33	1.2	98.7	465,166	8.4	62.9
20,000 – 49,999	29	1.0	99.7	833,692	15.1	78.0
50,000 – 99,999	8	0.3	99.9	554,879	10.0	88.0
Over 100,000	2	0.07	100.0	665,064	12.0	100.0
Total	2,890	100%	–	5,529,231	100.0	–

*Note:* Minimum – 7 inhabitants is registered in municipality Příkra (district Svidník, Prešov region), maximum in capital city Bratislava (472,966).

*Source:* ŠÚ SR (2016)

# Comfortable City Environment on the Example of the Best Urban Practices in Ekaterinburg City

VIOLA LARIONOVA<sup>1</sup>, NATALIA STEPANOVA<sup>2</sup>, KEN BROWN<sup>3</sup>

**Abstract:** The availability of a comfortable, safe living environment is a desire of all citizens and city populations. An emphasis has been placed on the specific socio-cultural code of the Ural region, providing scope for an analysis of the traditions of the Urals: history and modernity. Reflecting on the authenticity of the region in modern socio-economic projects we provide an evaluation of the impact of business and cultural traditions on the environment to study the interaction of business and government. In the field of urban planning and strategic planning, the primary focus is on the management of urban planning activities and the development of territories within the boundaries of market relations. It is territorial planning and the formation of a comfortable urban environment that ensures the development of the construction market in the region. Planning provides a set of tools enabling an optimal use of resources in the field of development, as well as suggesting approaches for their effective use, the identification of strategic objectives and the discussion of social demands. A scenario is proposed to determine the directions for improving the comfort of the urban environment, the links between all the infrastructural objects of the urban environment, and to incorporate the methods of change into the concept. Based on the analysis of the urban environment, the area requiring improvement was determined. As an applied aspect, the rationale for the park area improvement project “Stone Tents” in the city of Ekaterinburg is discussed. Experiences gained from the project can be used to create a comfortable urban environment in other localities.

**Key words:** territory, landscaping, management, project

**JEL Classification:** R58

## 1. Introduction

Modern cities have become a place of life for most of humanity. The urban area has its own distinctive features. These are primarily a high population density and heavy pollution – chemical, bacterial, noise, electromagnetic, information. Currently, the formation of a comfortable urban environment is one of the most important problems.

---

<sup>1</sup> VIOLA LARIONOVA, Ural Federal University (UrFU), Russia, viola-larionova@yandex.ru

<sup>2</sup> NATALIA STEPANOVA, Ural Federal University (UrFU), Russia, n.r.stepanova66@gmail.com

<sup>3</sup> KEN BROWN, School of Engineering Letterkenny Institute of Technology, Ireland, Ken.Brown@lyit.ie



Based on the study of different approaches to creating the comfort of the urban environment, we can identify some negative factors: natural and climatic conditions, quality of resources, noise level, traffic problems, and density of settlement.

The issue of the improvement of Russian cities is becoming more urgent in our days.

How to make our cities and villages as comfortable as possible, enabling them to meet the most modern requirements? This is a question and a challenge that we all face.

Nowadays, the organization of a comfortable urban environment is one of the most important problems of the territorial management of settlements and is one of the most important large-scale state development programs in Russia (Website of the Ministry of construction of Russia, 2020).

The Federal target program for the formation of a comfortable urban environment is aimed at the sustainable development of Russian cities (Federal project “Formation of comfortable urban environment”, 2020).

The aim of the study is to present the methods of creating a comfortable urban environment on the example of the city of Ekaterinburg.

Objectives of this study, in accordance with the goal:

- Examine territorial planning and the formation of a comfortable urban environment;
- Study the macroeconomic situation of the region, the level of social and economic development and its prospects;
- Identify the territory of the urban environment of the city of Ekaterinburg requiring improvement;
- Develop the project of the improvement of a territory;
- Assess the financial aspects of the implementation of the project of improvement of the territory;
- Identify the main results of the proposed improvement project.

As a theoretical and methodological basis for the study the author has used as a reference scientific literature, periodicals, statistical sources, relevant expert studies, Internet resources and other sources exploring the theme of the development of a comfortable urban environment.

The following well-known methods of data collection and processing were used as research tools: data comparison, statistical analysis, data grouping, comparison and analysis.

Many cities in Russia pay a great attention to the formation of a comfortable city, for example, large cities such as Moscow, St. Petersburg, Kazan, Krasnodar, Novosibirsk, Ekaterinburg, etc. These cities are also leaders in the integration of new ideas and technologies into the living conditions of residents. The application

of foreign experiences of cities and support and promotion of their own ideas will contribute to the success of improvements in the formation of a comfortable urban environment. But before moving on the path towards creating a comfortable environment, we need to understand the problem areas and their relationship with all spheres of life.

Social and techno-economic research is required to identify problems. Social studies can be based on surveys, public hearings, etc. Technical and economic studies are based on well-defined indicators and their values showing growth or decline. The data obtained require Desk expert processing to obtain the results. The creation of an expert group can help to solve this problem, it should be a matrix model of management, where each participant is an expert in their field, whether an architect, economist or philosopher. According to the results, it is necessary to develop a concept of the future improvement of the life of the city (Landry, 2011).

The city of Ekaterinburg has great potential in the implementation of the project of the formation of a comfortable urban environment. The city has a huge number of areas that need improvement: from the reconstruction of courtyards to the creation of significant public spaces. The infrastructure of the city needs improvements, because they will affect the social and economic climate of the city. For example, in a city with a population of more than 1.46 million people, the level of motorization accounts for more than 40% of the total population and it increases every year. As a result, the congestion of streets becomes higher, free space for pedestrians in the yard and local areas becomes more scarce. This affects the quality of life of residents. For example, liberating streets from car transit, the creation of neighborhoods are maximally adapted to the needs of residents, pedestrians and cyclists, as in case of the municipality of Barcelona, triggering an improvement of health statistics of residents and the sustainability of the environment (Gershman, 2018).

## **2. Theoretical Bases**

### **2.1 Research methodology**

Currently, in many cities of Russia the level of landscaping has been reduced. The current low quality of the urban environment in most settlements of the Russian Federation is due to a number of objective and subjective reasons, mainly the lack of local and regional funds allocated for improvement.

Another reason for these processes was the degradation and collapse of the previously established system of improvement of most urban settlements.

From 2017 onwards, Russia has launched the implementation of the priority national project for the development of a comfortable urban environment, which

should become the most important funding resource and increase people's trust in state authorities.

The project “Formation of a comfortable urban environment” is one of the priority projects in the field of housing and communal services. Cities are created for people, their inhabitants and visitors. A comfortable urban environment is a space that is maximally adapted to the needs of citizens. The comfort of the city for its residents is determined by factors such as transport accessibility, availability of necessary services, availability of facilities for all categories of the population, availability of organized public spaces, convenient layout of the street network. Indicators of satisfaction with the place of residence, quality of life, health and safety of residents are also associated with a comfortable urban environment.

There are number of new approaches to the formation of modern urban environment, which include:

- Wide participation of the population in improvement projects, involvement of public structures and business representatives in these processes;
- Adoption of new or updating of the existing rules of improvement of the territories of settlements;
- Designing of five-year regional and municipal programs for the formation of a comfortable urban environment for each settlement in Russia for 2018–2022;
- The development of an index of the quality of the urban environment;
- Creation of the Federal register of the most successfully implemented improvement projects in order to disseminate best practices in the field of improvement and ensure priority funding, as well as a number of other objectives (New approaches to the development of the urban environment, 2018).

The list of some best practices for improving the city environment of Ekaterinburg and the Sverdlovsk region is presented in *Table 1*.

The main purpose of the registry is the exchange of experience and best solutions in the formation of comfortable urban space.

All of the above in most of the proposed projects of improvement of yard areas is virtually absent, which receives fair complaints and complaints of the population.

Today there is an active work on the program of the formation of a comfortable urban environment.

We can state with confidence that this is a purely technical project, and it is aimed at changing and improving the appearance of cities, but first of all we must take into account that the problem lies much deeper. We need to raise a new generation of people, it is very important what young people see, our younger generation in

the world around us. In the space where our children will be brought up, play and grow up (Putin, 2019).

This is very important because a person who sees the beautiful, as a rule, is not capable of breaking the laws and other illegal actions.

We must understand that the task is very serious and global.

**Table 1. Best projects in Ekaterinburg and Sverdlovsk region**

Implemented project	The essence of the project	Link to the project
“City without dirt” (Ekaterinburg city)	Project for improving courtyards and street areas that reduce the appearance of dirt	<a href="http://gorodsreda.ru/upload/files/Gorod_bez_grjazi.pdf">http://gorodsreda.ru/upload/files/Gorod_bez_grjazi.pdf</a>
Complex improvement of the yard territory of apartment buildings in the city of Asbest	Implementation of complex landscaping of the yard territory at the addresses Makhneva street, house 9, Kalinina street, house. 43/1, Fizkulturnikov street, house 28	<a href="http://gorodsreda.ru/upload/iblock/540/presentation_asbest.pdf">http://gorodsreda.ru/upload/iblock/540/presentation_asbest.pdf</a>
Comprehensive improvement of the public territory of the city Park of Volchansk	The Park is located at the address: ulitsa Karpinskogo, 18. Design, improvement and recreation of the City Park territory for the population	<a href="http://gorodsreda.ru/upload/iblock/e88/presentation_volchansk.pdf">http://gorodsreda.ru/upload/iblock/e88/presentation_volchansk.pdf</a>
“Walk of Fame” on the Youth street in the city of Severouralsk	Street as a public space. The main role of this project is to involve the residents of the city district themselves in the construction and in the conceptualisation	<a href="http://gorodsreda.ru/upload/files/presentation-%D0%A1%D0%B5%D0%B2%D0%B5%D1%80%D0%BE%D1%83%D1%80%D0%B0%D0%BB%D1%8C%D1%81%D0%BA.pdf">http://gorodsreda.ru/upload/files/presentation-%D0%A1%D0%B5%D0%B2%D0%B5%D1%80%D0%BE%D1%83%D1%80%D0%B0%D0%BB%D1%8C%D1%81%D0%BA.pdf</a>
Improvement of public spaces in the city of Bogdanovich	The project of the Park as a place for recreation and sports has been implemented	<a href="http://gorodsreda.ru/upload/files/presentation-%D0%91%D0%BE%D0%B3%D0%B4%D0%B0%D0%BD%D0%BE%D0%B2%D0%B8%D1%87.pdf">http://gorodsreda.ru/upload/files/presentation-%D0%91%D0%BE%D0%B3%D0%B4%D0%B0%D0%BD%D0%BE%D0%B2%D0%B8%D1%87.pdf</a>

*Source:* Edited by the Authors.

## **2.2 Implementation of the Project in the Sverdlovsk Region and Ekaterinburg**

In the Sverdlovsk region in 2018, the regional project “Formation of a comfortable urban environment in the Sverdlovsk region” was implemented. More than eight thousand events were held in this project. More than three million people participated in these events.

The project “Formation of a comfortable urban environment in the Sverdlovsk region” has an essential goal – to provide every citizen with safety, comfort, functionality and aesthetics.

This will help reduce social tensions, keep crowded streets below the average crime rate, increase the proportion of the population involved in sports in modern sports facilities, and also reduce the incidence of crime. After all, for every citizen it is important to provide street lighting, street cleaning quality, and the safe disposal of municipal waste.

### **2.3 Social and Cultural Code of Ekaterinburg**

Ekaterinburg is a city located in the Western part of Asia near its border with Europe, 1667 km East of Moscow, the administrative center of the Ural Federal district and Sverdlovsk region. The city is a cultural, administrative, scientific and educational center of the Urals, one of the largest economic centers in Russia. It is also one of the most important transport and logistics hubs in Russia.

The city is densely populated but compact. According to Rosstat for the year 2018 the population is 1,468,833 (Federal state statistics service, 2019).

The city is an attractive area for foreign direct investment. However, there are many factors that do not contribute to the development of business and attracting external investments in the settlement.

The very concept of Uralets refers to the socio-cultural term and reflects the great tradition of the origin of cities in the Urals. Usually it is a river, blocked by a dam, where the factory city was built. The existence of such mining and industrial development centers in the Urals were the determining factor in the education of a democratic society. Factory Ural implied polycentricity and autonomy. Traditions (merchant, business, cultural and historical) of mutually beneficial partnerships between business, government and society have been preserved until today. There is a great demand for them and they contribute to the development of the Urals today.

Ekaterinburg is also a major scientific and educational center.

In addition, Ekaterinburg is a cultural city of museums and theaters (Abdullaev, Gunina, 2016).

The main initiator of the revival of the Ural traditions today are regional authorities, business associations, public organizations, informal groups and, of course, young people. The young population of the city, seeks in every way to defend the traditions and develop their hometown of Ekaterinburg. The last statement is confirmed by social surveys of young people.

We conducted surveys among students. In one of them we asked university students to name the very first three associations related to Ekaterinburg.

*Opinion of a group of students of the Ural Federal University*

Twenty-seven people took part in the survey. Among them, seven people associated Ekaterinburg with monuments and famous buildings. Six associated it with the image of a modern city. Six associate it with education and opportunity. Five think the city is beautiful. Four think the city is gray. Four young men are reminded of Plotinka. Three people associate the city with scale, culture, winter and cold, or famous personalities living in the city. The rest of the students associate it with the Iset river, the square, cleanliness, etc.

*Opinion of a group of students of the Ural Institute of the State fire service*

Twenty-four people participated in the survey. Among these, seven students associate it with Plotinka. Five people associate the city with administration and its history. Five associate Ekaterinburg with education and opportunities. Five – with culture (circus, theater). Five – with the shopping and entertainment center Greenwich. Four – with different parks. Four people associate the city with Vysotsky skyscraper. Four believe Ekaterinburg to be a large city. Three students consider the city modern. Three associate the city with the district of Uralmash. Three of them associate it with holidays and summer. Two people think the city is beautiful. The other two think the city is gray and cold. One answer named the former mayor Roizman, a lot of grocery stores, bad roads, millionaire, fences, paint, center, normal, dating, sincerity, cohesion, entertainment city, heat, far from home, love, employment, square.

### **3. Research. Macroeconomic Situation of Russia, the Region and Ekaterinburg**

#### **3.1 Ratings of investment attractiveness of territories**

In the national rating of the investment climate created by the Agency for strategic initiatives, Sverdlovsk region, having improved its position, occupies only the 20th place among 85 regions (Official portal of the Agency for strategic initiatives, 2019). This study is based on calculations of 44 indicators in 4 areas: regulatory environment (quality of public services), business institutions (their efficiency), infrastructure and resources (availability and quality of infrastructure), support for small business (the level of development of small businesses and the effectiveness of various types of support). According to the results of the ratings of 2017, Sverdlovsk region is a possible carrier of the best practices in the following indicators:

- Average number of procedures required for registration of legal entities;
- Satisfaction with the activities of the registration of legal entities;
- Evaluation of the quality of telecommunication services by entrepreneurs;

- Evaluation of investment infrastructure by entrepreneurs, the number of small businesses per one thousand people.

Fitch Ratings has confirmed the long-term Issuer default ratings (IDR) of Sverdlovsk region at the BB+ level with a “stable” forecast. According to analysts of the Agency, the rating “BB+” reflects the developed industrial economy of the Sverdlovsk region – indicators of socio-economic development in the region are above the average level in the country, the region has a moderate amount of debt and acceptable operational indicators.

The same long-term rating in foreign and national currency was assigned to the Sverdlovsk region in 2016. At the same time, the region received a short-term foreign currency rating “B” and a national long-term rating “AA (rus)”.

Then Fitch noted that the Sverdlovsk region has acceptable budget indicators and predicted the restoration of the operational balance of the region. An increase was predicted in the growth rate of tax revenues due to the developed tax base in the region and strict control over expenses (Information Agency “RBC”, 2019).

Expert RA rating Agency assigns the category “1B” to the Sverdlovsk region in the rating of the investment climate of the Russian regions in 2017, which refers the high potential and moderate risk of the region. The study is based on official information of Rosstat and statistics of Federal agencies: Ministry of Finance, Bank of Russia, Ministry of communications, Ministry of internal Affairs and Ministry of natural resources. Investment attractiveness in the rating is estimated by two parameters: investment potential and investment risk (Portal “Sklad man US”, 2019).

The potential shows what share the region occupies in the all-Russian market, the risk – what the scale of certain problems in the region may be for the investor. The total potential consists of nine factors: labor, financial, industrial, consumer, institutional, infrastructure, natural resource, tourism and innovation.

Integral risk consists of six private risks: financial, social, managerial, economic, environmental and criminal. The contribution of each private risk or potential to the final indicator is assessed on the basis of a survey of representatives of the expert, investment and banking communities. The rating used statistical data as of 01.01.2017 (Official website of the Ministry of economic development, 2019).

## **3.2 Level of Social Development of the Russian Federation, Sverdlovsk Region and Ekaterinburg**

### *3.2.1 Population Dynamics, Sex and Age Structure*

According to official statistics, the population of the Russian Federation as of April 2, 2018 is 146.9 million people. In Russia, 74% of the population is urban, 26% – rural. 46% of the population are men and 54% are women. Of the total population under the age of able-bodied is 27,254 thousand people older than able-bodied – 37,362 thousand people, able-bodied – 82,264 thousand people. For ten years (from 2008 to 2018) there has been a steady increase in the population. The increase in the total population of Russia is due to the growth of the number of migrants. This is a negative factor.

In 2018, 4,325,256 people lived in the Sverdlovsk region, 1,984,167 men and 2,341,089 women. The total number of working-age population is 2367093, the number of younger working people is 841,741 and the number of people of retirement age is 1,116,422. The population decreased in 2018 compared to 2016 by 4,750 people (Official website of the Ministry of economic development, 2019).

The population of Ekaterinburg is 1,468,833 people (in 2018). The city is one of the 15 cities with millionaires of Russia.

### *3.2.2 Development Prospects of the Region and Ekaterinburg*

Sverdlovsk region is one of the largest regions in terms of population, a highly urbanized region of Russia with high-quality infrastructure. It has developed industry, trade, there are many large educational institutions involved in the training of good professionals. However, in the region there are a huge number of problems that require immediate response from the authorities and business. Residents do not believe that the standard of living in the region is high (see table 2). Sverdlovsk region consistently takes the leading positions in the ratings of the most polluted regions. Another problem is that of single-industry towns, people living in such towns do not see their future prospects and believe that they are not able to move.

A SWOT analysis presented in *Table 2* clearly demonstrates the advantages, disadvantages and prospects of the development of Ekaterinburg.

Ekaterinburg is a modern, dynamic, rapidly developing city, a real cultural and economic center of the Urals. Ekaterinburg has a high potential due to its history, excellent location near picturesque places, rich lands. It is home to a large number of smart, enthusiastic, creative people with an active lifestyle. Many cultural



centers, annually held unique entertainment events, educational institutions with high performance, make the capital of the Urals an attractive place for people seeking improvement and fulfillment of life. However, in order to meet its ambitions, to increase the pace of development, to sustain competition, to attract residents from other settlements not only in Russia but the whole world, the city needs to quickly and effectively cope with current problems, to keep up with global trends in the development of urban space, or even to stay ahead of them. All this will not work without a constructive dialogue between the authorities, the population and business representatives (Lapteva, Stepanova, 2017).

**Table 2. SWOT analysis of Ekaterinburg**

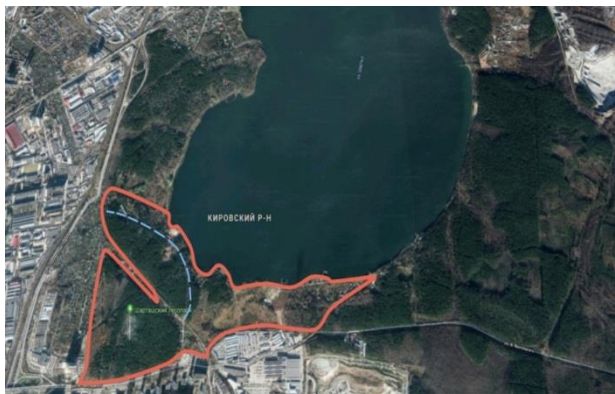
STRENGTHS		WEAKNESSES	
S1	The labor market, which supplies highly qualified personnel	W1	The labor market is in a tense state
S2	Concentration of scientific and educational institutions	W2	Low level of medical services
S3	Developing the economic center of the Ural region	W3	Deterioration of the environmental factor in the city
S4	The interest of the city authorities in the development of areas related to the replenishment of the local budget	W4	Idle city squares and spaces with unattractive appearance
S5	The practice of policy to provide the population with comfortable living conditions	W5	Destruction of cultural heritage
S6	High investment attractiveness	W6	The workload in the field of road traffic
S7	Developed high-tech complex	W7	Increasing the level of criminality
S8	High level of income of the population	W8	A small number of large investors ready to invest in innovative projects
S9	Developed construction industry		
OPPORTUNITIES		THREATS	
O1	Solving social problems of providing the population with comfortable living conditions	T1	Instability of the global and national economic and political situation
O2	Formation of modern social and business space in Yekaterinburg	T2	Possible competition among developing cities
O3	Increase of investment attractiveness of the city	T3	Lack of investment in urban funds
O4	Development of innovative sectors in the city	T4	The decrease of the population in the more developed cities
O5	Attracting labor from nearby cities	T5	Distance from the capital
O6	Location in picturesque places	T6	The predominance of the Ural and climatic anomalies

*Source:* Edited by the Authors.

#### 4. Practical Part. The Project for Improvement of Park Areas Stone Tents in Ekaterinburg

Today the Park Stone tents is one of the most popular and favorite vacation spots of citizens. At the same time, the state of the Park is lagging behind. Visitors want to see it neat, clean, modern and convenient for spending time (Ekaterinburg Parks, 2019).

In our work, we offer a project for the improvement of the Western part of the Park from Vysotsky street to the left Bank of lake Shartash (*see Figure 1*).



**Figure 1. Landscaped territory on the map of Ekaterinburg**

*Source:* Edited by the Authors.

The problem highlighted by us can be considered a possible refusal of the residents of the city to visit the Park because of the lack of grooming and neglect in favor of other, more landscaped areas.

The relevance of this problem lies in the fact that with the modern pace of life, many people need to rest in the open air.

The aim of the project is to justify and propose an effective program for the development, renovation and modernization of the Park.

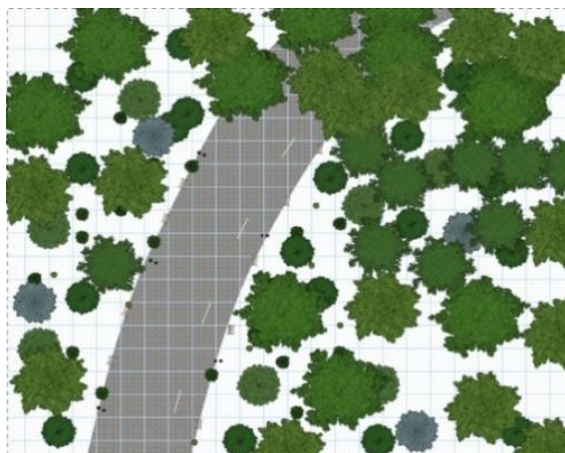
When creating our project, we took into account the opinion of local residents, conducted sociological surveys, as well as field surveys of the Park (*see Figure 2*). Based on the survey of residents, we have identified a number of pressing issues: debris in a forested area; insufficient lighting; insufficient number of ballot boxes and benches; drawings of graffiti on ancient stone rocks; uncontrolled dogs; the lack of well-maintained Parking; General neglect of the Park (overgrown path, destroyed main stage, etc.) (Shartash Stone Tents, 2019; Survey. Parks Of Ekaterinburg, 2019).



**Figure 2. Skewed steps at the entrance to the Park in summer**

*Source:* Edited by the Authors.

The project should start with the improvement of the main road of the Park (*see Figure 3*), namely, the installation of lights every 20 meters and benches every 10 meters; the creation of a special strip for cyclists (Shartash Forest Park, 2019).



**Figure 3. Plan of the Park's landscaped main road**

*Source:* Edited by the Authors.

For the sake of clarity, the layout of the finished main road was developed in the landscape design program “Real-time landscaping architect” (*see Figure 3*). this program also built 3D models of the main road spark with lighting at different times of the day (*see Figure 4*).

*a) in the daytime*



*b) at night*



**Figure 4. The main road of the Park**

*Source:* Edited by the Authors.

The children's area will consist of small separate children's complexes, which will perform certain developmental functions (*see Figure 5*). It is also proposed to update the volleyball and streetball grounds, from scratch to create a small skate Park (*see Figure 6*).



**Figure 5. Obstacle Course with rope elements**

*Source:* Edited by the Authors.



**Figure 6. Prototype of a small Skate Park for Stone tents**

*Source:* Edited by the Authors.

Not far from the secondary paths of the Park will be located recreation areas for the whole family: benches, hanging wicker chairs, hammocks and wooden swings in the summer. There will also be areas for barbecues, equipped with protection against forest fire.

For a clearer picture of the real state of the Park area Stone tents, we have identified its strengths and weaknesses using the method of SWOT analysis, identifying the main factors that constrain the development of the Park area.

To determine all of the costs were used the collections of consolidated ratios of prices of construction, namely NCS 81-02-16-2017, 2019. An integrated cost estimate has been prepared. The stakeholders of this project were listed (Zilberstein, Neustroev, Semeniuk, Shklyar, Yurkovski; 2016; Greenwich, 2019; Ural mining and metallurgical company, 2019; Uralstroykompleks, 2019). Then there was a preliminary presentation of the work done, which was welcomed by potential visitors.

As a result, the project should cost a little less than twenty million rubles. This amount of money is justified by the presence of a beautiful Central alley with artificial night lighting and a dedicated space for cyclists, secondary paths of the Park, modern complexes for families, as well as an updated General concept of the Park. We hope that our project will find support and after implementation will become a favorite place of rest for local residents and visitors of our city.

Thus, as a result of the implementation of the improvement project proposed by our team, the Park Stone tents will acquire an attractive appearance for potential visitors and will become a favorite place for family entertainment.

## 5. Results and Suggestions

To date, there are many projects that primarily provide for more active participation of citizens in the formation and implementation of these programs. One of the main conditions of the successful implementation of such projects is the involvement of masses of the population, public discussions, an active use of virtual resources.

It is the participation of citizens that will make it possible to develop program measures for the formation of a comfortable urban environment, to develop a systematic approach to improving the quality and comfort of life of citizens, to create a positive social atmosphere in the cities of our great country.

## Acknowledgements

The authors would like to express their deepest gratitude to the Russian Foundation for Basic Research (RFBR) for the support of the research within the project No. 17-22-07001 “The complex algorithm of culture-based regeneration of minor industrial cities in the context of agglomeration processes in Russia and Europe”.

## References

- ABDULLAEV, T., GUNINA, V. (eds.) 2016. *100 thoughts about Ekaterinburg. Collection of Essays*. Ekaterinburg: Tatlin.
- EKATERINBURG PARKS ARE THE BEST PLACE FOR REST AND WALKS [Electronic resource]. URL: <https://www.ekmap.ru/parks?page=2> [Date accessed: 10.03.2019].
- FEDERAL PROJECT “FORMATION OF COMFORTABLE URBAN ENVIRONMENT” [Electronic resource]. URL: <https://www.gov.spb.ru/gov/otrasl/blago/regionalnyj-prioritetnyj-proekt-formirovanie-komfortnoj-gorodskoj-sud/> [Accessed: 23.03.2020].
- FEDERAL STATE STATISTICS SERVICE [Electronic resource]. URL: [http://www.gks.ru/free\\_doc/new\\_site/vvp/vvp-god/tab1.htm](http://www.gks.ru/free_doc/new_site/vvp/vvp-god/tab1.htm) [date of application: 21.03.2019].
- GERSHMAN, A. Revolution of the streets of Barcelona. [Electronic resource]. URL: [livejournal.com; https://gre4ark.livejournal.com/610126.html](http://livejournal.com; https://gre4ark.livejournal.com/610126.html) [Date accessed: 10.03.19].

- GREENWICH. RESIDENTIAL REAL ESTATE [Electronic resource]. URL: <http://www.grinvich.ru/apartments/zhk-park-kamennye-palatki/> [Accessed 10.03.19].
- INFORMATION AGENCY “RBC” [Electronic resource]. URL: <https://ekb.rbc.ru/ekb/freenews/5bd6e1d29a79474f5d930c28> [Date accessed: 23.03.2019].
- LANDRY, H. 2011. The Creative city [Креативный город] (Moscow: Publishing house “Classics–XXI”).
- LAPTEVA, E., STEPANOVA, N. 2017. On the organization of public spaces of cities. Collection of reports of the international conference of students, postgraduates and young scientists of UrFU. Ekaterinburg: UrFU, pp. 271–276.
- NCS 81-02-16-2017 “Small architectural forms”, Ministry of construction of Russia [Electronic resource]. URL: [http://www.minstroyrf.ru/upload/iblock/0f0/ntss-81\\_02\\_16\\_2017-malye-arkhitekturnye-formy.pdf](http://www.minstroyrf.ru/upload/iblock/0f0/ntss-81_02_16_2017-malye-arkhitekturnye-formy.pdf) [Date accessed: 21.03.2019].
- NEW APPROACHES TO THE DEVELOPMENT OF THE URBAN ENVIRONMENT [Electronic resource]. URL: <http://ekogradmoscow.ru/novosti/novye-podkhody-k-razvitiyu-gorodskoj-sredy> [Date accessed: 23.03.2019].
- OFFICIAL PORTAL OF THE AGENCY FOR STRATEGIC INITIATIVES [Electronic resource]. URL: <https://asi.ru/investclimate/rating/> [Date of application: 24.3.2009].
- OFFICIAL WEBSITE OF THE MINISTRY OF ECONOMIC DEVELOPMENT [Electronic resource]. URL: <http://economy.gov.ru/wps/wcm/connect/200155e6-1852-43f9-844a-175d57465910/181017.pdf?MOD=AJPERES&CACHEID=200155e6-1852-43f9-844a-175d57465910> [Date of application: 17.03.2019].
- PORTAL “SKLAD MAN US” [Electronic resource]. URL: <http://sklad-man.com/ru/analitics> [Date accessed: 29.04.2019].
- PUTIN TO THE YOUNGER GENERATION OF RUSSIA [Electronic resource]. URL: <http://www.molod39.ru/news/putin-podrastayushchemu-pokoleniyu-rossii-my-vidim-v-vas-neposredstvennyh-uchastnikov> [Date accessed: 23.03.2019].
- SHARTASH FOREST PARK. [Electronic resource]. URL: <http://shartash-park.ru/> [Accessed 10.03.2019].
- SHARTASH STONE TENTS. SHARTASHSKYE KAMENNYE PALATKI [Electronic resource]. URL: [https://www.tripadvisor.ru/Attraction\\_Review-g298540-d6677571-Reviews-Shartashskye\\_Kamennye\\_Palatki-1](https://www.tripadvisor.ru/Attraction_Review-g298540-d6677571-Reviews-Shartashskye_Kamennye_Palatki-1) [Date accessed: 10.03.2019].
- SURVEY. PARKS OF EKATERINBURG [Electronic resource]. URL: <https://docs.google.com/forms/d/e/1FAIpQLScUcbnDUkhVHYUvRoiHrvHrruehtkWOGB6dcQtsJaUQV6ndw/viewform> [Accessed 21.03.19].
- THE RATING AGENCY “EXPERT RA” [Electronic resource]. URL: <https://raexpert.ru/ratings/regions/2017/att1> [Date accessed: 29.03.2019].
- URAL MINING AND METALLURGICAL COMPANY [Electronic resource]. URL: <https://www.ugmk.com/> [Date accessed: 10.03.19].
- URALSTROYKOMPLEKS, CONSTRUCTION COMPANY (SK) [Electronic resource]. URL: <https://www.google.com/search?tbm=lcl&ei=nXOFXMGVKYPIrgTsk> [Accessed 10.03.2019].
- WEBSITE OF THE MINISTRY OF CONSTRUCTION OF RUSSIA [Electronic resource]. URL: <http://www.minstroyrf.ru> [Date accessed: 23.03.2020].
- ZILBERSTEIN, O., NEUSTROEV, K., SEMENIUK, D, SHKLYAR, T., YURKOVSKI, A. 2016. Stakeholder Analysis on the example of Russian companies. Internet-journal “science of SCIENCE” [Electronic resource]. URL: <http://naukovedenie.ru/PDF/42EVN316.pdf> [Date accessed: 21.03.2019].

# International models and best practices of regional development – an analysis from the perspective of the rural development of South Zala

BENCE CSEKE<sup>1</sup>, KRISZTINA KELLER<sup>2</sup>,  
ZOLTÁN BIRKNER<sup>3</sup>

**Abstract:** Regarding statistical and sociographic analyses, demographic crises of rural areas in the forms of depopulation, extreme ageing and outflux towards urban centrum areas – generated by the emergence of urban agglomeration and the structural change of the economic framework – can be considered a global phenomenon for more than 3 decades, seriously eroding the competitiveness and sustainability of peripheral regions. In the case of Hungary, rural society is also facing the same demographic and developmental challenge since the beginning of the 90s, thus, the Hungarian countryside and borderland areas became the most endangered areas in terms of demographic and economic sustainability. For this reason, national governments must enact adequately implemented policy measures against this demographic process so that declining rural areas may protect their remaining potentials and provide new initiatives for raising rural competitiveness by economic and social means. In this engagement, well-designed development models – such as the tetrahedron, rhombus, pyramid or helix models – can serve as an optimal basis for policy planning and implementation. However, even if these models are proven to be both scientifically and practically confirmed, in general, there is a lack of special “borderland” aspects in the identified basic models in terms of developing marginalized rural areas especially in areas in the proximity of borders. Therefore, the analysed models cannot be applied conveniently in these areas with special burdens due to their borderland status. For this aim, our analysis is making an attempt to establish an upgraded model structure incorporating both the most relevant aspects of the analysed basic models and the most important segments of the borderland’s social and economic status. Thus, we intend to provide a meaningful added value for supporting rural development efforts in Hungarian and European border territories as well.

**Key words:** rural development, borderland areas, demographic crises, Hourglass model, rural competitiveness, South Zala

**JEL Classification:** indicate appropriate JEL classification codes ([http://www.aeaweb.org/journal/jel\\_class\\_system.html](http://www.aeaweb.org/journal/jel_class_system.html))

---

<sup>1</sup> BENCE CSEKE, University of Pannonia Doctoral School of Management Sciences and Business Administration, Hungary, csekebence@gmail.com

<sup>2</sup> KRISZTINA KELLER, Corvinus University of Budapest, Hungary, keller.krisztina@gmail.com

<sup>3</sup> ZOLTÁN BIRKNER, University of Pannonia Nagykanizsa Campus, Hungary, birkner.zoltan@uni-pen.hu

## 1. Introduction

The topic of our paper is the now five-decades-old and ever-deepening demographic crisis which, by today, has escalated into becoming one of the greatest challenges of domestic rural development. This process began in the early 1960s, when, due to the effects of the National Urban Network Development Strategy (*Országos Településhálózat-fejlesztési koncepció*), the population of small rural villages started to relocate to newly industrialized city centers (Szabó, 2011). This [process] kept improving the demographic situation of such rural cities for more than two decades, however, due to the societal and economic changes of the early 1990s, the rural population started moving towards major urban centres or took on jobs abroad. This tendency was given further impetus by the economic recession that started in 2008 and Hungary's joining of the European Union (Albert-Hárs, 2012; Kovács, 2017). Consequently, the share of Hungarian city dwellers had risen from 40% in the 1960s to 70% – with 30% constituted by people living in Budapest and cities with a population above 100,000. This causes major distortions in the spatial structure of Hungarian society, with an increasing gap between the depopulating, mostly border-area small villages and city areas that are most targeted by internal migration (Gerse, Szilágyi, 2015). Besides migration, there is the increasing tendency of commuting from small villages to nearby cities – which is not only connected to the workforce but also to children commuting to school (Szóke, Kovács, 2016). Commuters may live in rural areas, but their lives' focus is partially in the city where they spend most of their days.

The drastic depopulation of rural areas – and especially that of border areas – is best exemplified by Nagykanizsa and its 90,000-strong border region population, where, according to 2001 and 2011 census data, depopulation can be considered significant (KSH, 2012a; KSH, 2012b). Data provided by the Hungarian Central Statistical Office (KSH) proves that the number of live births per 1000 population had shown the greatest negative deviation in Zala County, standing at 7.5, compared to the national average of 9.5. 2015 statistics of the [Hungarian] Regional Information System (TeIR) indicate that population growth figures have seen a decline in South Zala's Nagykanizsa District and Letenye District, falling by 9.99 per 1000 and 6.23 per 1000, respectively. This rate stands at 4.54 per 1000 in the West Pannon Region, while the national average is 4.02 per 1000. If we also consider migration statistics besides the negative population growth figures, we can observe that the 2015 outward migration data from the Nagykanizsa and Letenye Districts have shown a decrease of 2.58 per 1000 and 6.89 per 1000, respectively, while the average rate of migration surplus in the West Pannon Region stood at a 3.28 per 1000. Due to this process, depending on the actual intensity of outward migration, the population of South Zala had



suffered a loss of 270–550 people per annum, with most of those leaving being young and highly skilled people.

The lack of effective rural policy answers to these processes means that depopulation and, consequently, the economic marginalization of the Southern Zala region will continue to intensify. However, population problems of South Zala are not unique, since several marginalizing Hungarian border regions or near-border regions are struggling with the same demographic challenges. This is why we believe that from a professional/expert political viewpoint, it is crucial to shed more light on international (or even domestic) regional development models and best practices regarding the ever-deepening [demographic] crisis of border regions and near-border regions. By implementing these, the demographic situation and economic potential of such regions can be greatly enhanced.

At the end of our study, parallel with formulating our conclusion, we shall propose the creation and utilization of an alternative regional development model that blends in the most important characteristics of the models we had studied [during our research], in order to provide a more palpable examination framework to help the catching-up of rural regions which lag behind in competitiveness.

## **2. Review of relevant regional development models**

The most important policy expectation regarding regional development is that it must be capable of managing the to-be-developed region's social, economic, geographic infrastructural, educational and cultural capacities in an integrated manner in order to create appropriate conditions for proper strategic planning, while also adequately implementing the set goals of synergistic development policy (Hodge, Midmore, 2008). The most important trait of successful and balanced regional development models is their ability to integrate particular interests and their capability of managing these in a synergistic and successive manner. Implementing these means that the [creation of] isolated, in themselves, uncompetitive developments that lack significant territorial integration can be avoided.

Another important characteristic of a successful regional development model is that – besides taking part in the elaboration and implementation of rural policy measures, besides integrating local actors – they build upon increased state participation/state intervention (Nemes, 2005). This is necessary because of the agglomeration spiral generated by innovation. Accordingly, the social and economic inequalities between rural areas and urbanized central areas will not level off on their own, since economic development brought on by innovation

creates agglomerations and geographically definable bands that, through concentrating synergistic innovation and economic development, cause large-scale competitive lag in rural areas (Moretti, 2014, 8–15; Carlino, Kerr, 2014).

In the light of the above, in the further parts of this paper, we shall examine regional development models and best practices that properly blend the integration of local interests which consider active governmental support as well.

## 2.1 The tetrahedron model

Among the most consolidated, integrated and inclusive regional development models is the system approach-based, internationally recognized tetrahedron model, elaborated and published by József Tóth in 1981 (Tóth, 1981).

In comparison to earlier development and settlement geography concepts (e.g. town/area as a product of the division of labor – Pál Beluszky, or the town/area as a spatial union where people work and reside – Tibor Mendöl), the tetrahedron model's main innovation is that it views the to-be developed region and the spheres dynamically interacting with it (natural, societal, economic and environmental spheres) as an organically intertwined system, a territorial symbiosis. The model represents these spheres and their interrelatedness by a tetrahedron, which, along its edges, shows all spheres being in direct contact and interaction with each other.

The model emphasizes that ideal and harmonic realization of regional development can only be achieved by harmonizing four basic factors. This means that during the planning and implementation phase of development efforts, none of them can be given greater prominence over the other three, since this would disrupt their dynamic balance. Accordingly, it can be stated that thanks to the dynamism of the model, any potential change in one of the aforementioned spheres will draw a reaction from the other three, thus – in an ideal situation – all components affect each other, so the system corrects itself without any external intervention (Kozma, 2017).

Of course, as is the case with all basic models, the tetrahedron model can also be extended with new spheres along additional viewpoints. A palpable example for an improved version of the four-component tetrahedron model is the five-component truncated pyramid model, which complements the structure of the tetrahedron model with the inclusion of the public sector as that is a defining factor of the regulatory and legal environment of the given area (Kozma, 2017).

Such an improvement can be explained by the fact that localities and unique characteristics gained more importance with the implementation of local societal and public sector changes of the post-Fordist era that occurred in the economic, social and political landscape of the 1970s (Avdimiotis et al., 2009). By expanding the model, we were given a basic model that is universal and complex at the same

time, and one that, beyond the original concept of the tetrahedron model, provides a framework that allows for a more detailed examination of developmental spheres regarding the region it is applied to. Consequently, the truncated pyramid model's flexible and extensive applicability – that is territorially undetermined – makes it explicitly appropriate for supporting regions struggling with developmental challenges.

## **2.2 Porter's rhombus model and the Helix-type cooperation**

Among the internationally relevant regional development models we need to mention Michael Porter's cluster theory, which originally focused on corporate development and competitiveness, however, it is also capable of coordinating certain geographical regions' development policy, as corporate and regional competitiveness share many main factors. Besides this, an important characteristic of Porter's cluster theory is that its structure supports local and medium-sized planning, so it can be well applied to developments based on local features (Porter, 1998).

According to Porter, lasting corporate competitiveness advantages within global economic frameworks are, paradoxically, based on predominantly local factors, such as [the availability of] highly skilled human resources, institutional flexibility and a selective, geographically concentrated segment of consumers. Consequently, these are the factors that, if managed on a cluster-based level collectively and cooperatively, shall pave the way for professional policy to increase corporate concentration in the given region (Swords, 2013). Economic integrations based on the rhombus model, however, can only be formed if – besides the factors outlined within the model and beyond the macroeconomic environment – an innovation atmosphere suitable for investments is available.

This can be achieved most effectively if there is a lasting cooperation between the political/public sector, economic/corporate, educational/research and mediated civil spheres as well as viewpoints of environmental sustainability, and when circular knowledge transfer and exchange of experiences is achieved (Carayannis, 2010). Such cooperations are called Helix-type cooperations in academic literature, which can be versions of triple, quadruple and quintuple types. The one consisting of three components focuses on cooperation between public administration, education/research and corporate spheres, while the quadruple version complements it by adding the civil sphere, and the quintuple one involves environmental sustainability viewpoints too. The point of such a cooperation is that decision-makers and institutes involved in it create a shared planning and implementation practice, which enables complex and deep planning of development policy strategies as well as the synergistic realization of certain measures. Accordingly, several institutions and spheres can be involved in the

development of the given region, paving the way for the positive effects of extended societal and economic development policies (Carayannis, 2012).

### 2.3 The pyramid model

We shall now examine an area development model, which, much like the cluster theory, focuses on localization/regionalization and their interrelatedness with rural competitiveness in global economic frameworks. This is the pyramid model, published by Hungarian economist Imre Lengyel in 2000, which analyses factors of rural competitiveness (Lengyel, 2000). Lengyel created a threefold structure that incorporates 1) the basic categories of competitiveness (income, productivity), 2) basic factors that determine the basic categories (research and development, infrastructure and human capital, foreign investments, small and medium-sized enterprises, institutional and social capital) and 3) the success factors that affect basic factors (economic structure, social structure, innovation culture, decision-making centres, regional accessibility, environment quality, readiness of workforce, social cohesion level of the region). Due to the reinterpretation of the basic model in 2016, the structure can more flexibly follow the multisectoral nature of rural developments by incorporating more endogenous components into the model (Lengyel, 2016). An example of such an endogenous component is “strategic leadership” representing regional policy management, or “agglomeration advantages” representing the strength of cluster networks replacing SMEs and institutional/social factors from the former model. Changes in component labelling are considered further innovations within the model – they became more endogenous, as seen below (Lengyel, 2016):

- success factors -> *factors with long-term effects* (inputs -2)
  - Apart from a few minor modifications in labelling – which also reflect upon increased endogenous features (e.g. “social cohesion of the region” → “regional identity” or “preparedness of workforce” → “social capital”) – the structure of the renewed model does not show any major changes in this segment.
- basic factors -> *motives* (inputs -1)
  - Endogenous components have been added to the earlier basic factors (agglomeration advantages, strategic control) in a way put forward earlier, which constitute a much more sophisticated and accentuated image of the region in question – especially of its institutional and corporate potential.
- **basic categories** -> realized competitiveness (output)

- In this segment, the basic categories of the earlier model (labour productivity, regional income) that affect the region's standard of living directly or indirectly, have been taken unchanged.

All in all, regarding the area of the set regional development goals, the renewed pyramid model does not deviate from the original structure in any ways. As seen, the reinterpreted model's main innovation is the inclusion of endogenous components that aim to better assess the hitherto less mapped out development potentials of a given region. In light of all this, we can outline the function of regional development as shown below (Lengyel, 2016):

$$\textit{regional competitiveness} = \textit{research and technological development level} + \textit{human capital} + \textit{physical capital} + \textit{agglomeration advantages} + \textit{strategic control and institutions}$$

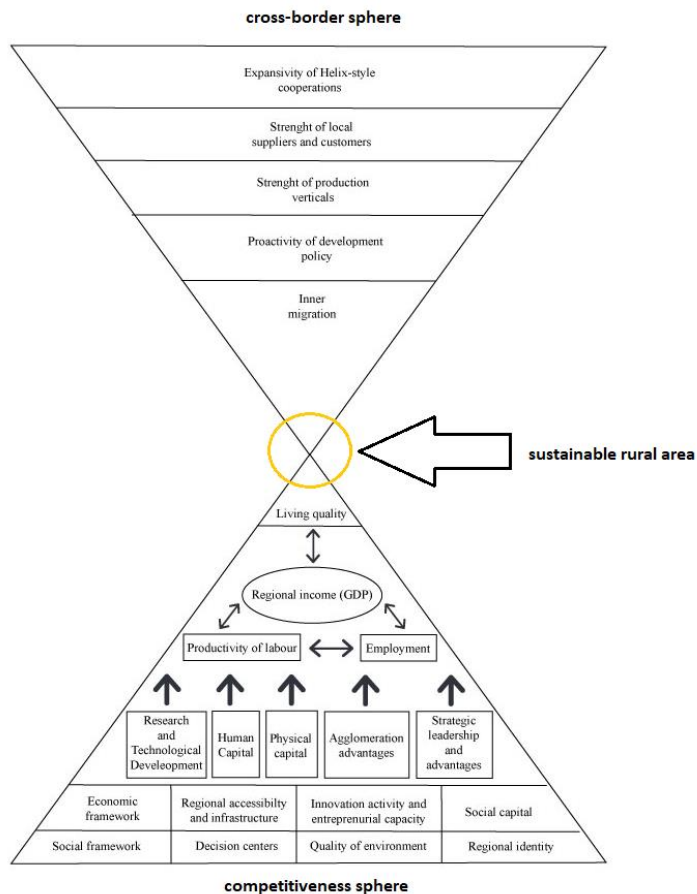
### 3. Conclusion – edifications regarding South Zala

By reviewing theoretical and practical examples, we outlined the factors of successful rural development policy implementation. Our findings can be summarized as follows:

1. Rural development policy can only be implemented successfully if [issues of] planning and realization of strategies (economy, society, infrastructure, environment, public administration, and culture) are solved by managing them collectively (see tetrahedron and truncated pyramid models). This is the only way to make sure that rural development reforms bring about synergistic effects that are able to ensure their long-term sustainability.
2. In an operational sense, regional development policy – acting as a sort of regional “engine function” – can live up to expectations most efficiently if, in accordance with the Helix model, it forms a tight and deep cooperation by engaging organically with actors in the public administration, education, corporate and civil sectors alike. All this makes the reconciliation of interests and practices, and knowledge transfer possible so that the synergistic effects of rural development can be expanded even further. The cooperation of the Helix model also promotes regional specialization and the creation of sectoral clusters, which, from the perspective of increasing rural competitiveness, is also indispensable.
3. In order to increase rural competitiveness, rural policy must focus on developing employment [opportunities] and increasing [worker] income – simply put, the emphasis should be on increasing productivity, since it is these system-level categories that can be defined as sources of other [various] factors. The pyramid model provides palpable help for this with

its 13 components: it offers a suitably detailed framework for the synergistic development of the basic factors of competitiveness.

However, models introduced in our study are primarily applicable effectively in regions where partial results in clusterization or in laying down synergistic development frameworks have already been achieved. Then again, in the case of border regions such as South Zala, where neither regional level clusterization nor implementation of synergistic strategies or Helix model-type development cooperations can be considered surging practices, a new model must be created – one that focuses more on the specific challenges of these regions (that mostly arise from them being border regions) and strives to include further endogenous components.



**Figure 1. Our suggested model, based on the conclusion of our research: the hourglass model**  
 Source: own creation based on Lengyel’s pyramid model (Lengyel, 2016).

According to our interpretation, it is recommended to feature the upper part of the hourglass model with the following components:

- *Extension of Helix-type cooperations*: Since the pyramid model, regarding innovation culture, primarily focuses on the relationships between the public and corporate sectors, relationships with educational and civil spheres [which tend to receive less attention] must also be examined thoroughly, as cooperations formed within these fields are capable of boosting regional catch-up.
- *Regional sales*: When creating local clusters and sectoral chains, it is essential that vital market relationships form between local producers and consumers (see Malota, 2011), which create the opportunity for sustainable sales for local producers, or in other words, enable them to rely on income they generate within their own region. The paradigm shift in sales from transaction-oriented marketing towards relationship marketing, with the aim of building close, cooperative relationships with buyers is something that regional sales can harvest from (Gáti et al., 2018, 167).
- *Development level of production chains*: One of the most important indicators of regional competitiveness is the capability of a given region to realize sectoral specialization. This is why it is crucial that regions which are struggling with structural lag, focus more on organizing regional sectoral chains (suppliers, subcontractors, supplementary services, etc.).
- *Proactive development policy*: In order to make catching-up possible for regions that struggle with increased competitiveness lag, political decision-makers in the given region must proactively strengthen it by forming trust-based development partnerships, constantly drawing up constructive [and relevant] recommendations while involving local organizations – especially actors of the civil sphere.
- *Development level of regional and cross-border economic relationships*: In the case of border regions – such as South Zala – exploiting the competitiveness potentials and cross-border relationships (mainly in the fields of culture, tourism, trade, research and service development, see Malota, 2015) can greatly enhance regional competitiveness.
- *Inner migration*: Generally, an influx of workforce is observable into dynamically developing regions, mostly because these provide better, higher paying jobs and more modern services. The inner migration trend enables the given region to stockpile significant human capital which, through its spillover effect, greatly stimulates regional labour market, social, research and identity circulation alike. Despite [understanding] all this, internal migration trends are not included in the regional development

models examined in this paper, so we consider integrating them into the economic development potential model justified.

Accordingly, by integrating these viewpoints (the pyramid model and, primarily, the rhombus model, together with the internal migration trends taken into consideration) into the hourglass model, the latter becomes capable of managing endogenous synergies required for the growth of border regions and regional competitiveness in a single uniform framework simultaneously. Sustainable rural development facilitated by harmonized developments and which represents the region's economic growth and the sustainability of its demographics, is found in the synergistic centre of the [hourglass] structure.

As a result of the upgraded structure, we are now able to assess the development needs of border regions that are struggling with significant competitiveness lag more precisely, by utilizing the hourglass model. Our hourglass model is, of course, meant to be understood as an alternative analysis method that is constructed based on local needs and as one that can be further detailed, since the essence of our model is not the selection of analytical factors, but rather its ability to examine competitiveness and clusterization viewpoints in a uniform framework. That is to say, by utilizing it, the regional synergies of regional policy can be explored at a deeper level. We consider this an added value, which makes our model's utilization possible in case of other regions struggling with challenges similar to those of South Zala.

## References

- ALBERT, F., HÁRS, Á. 2012. Social Impact of Emigration and Rural-Urban Migration in Central and Eastern Europe. Final Country Report – Hungary. European Commission. DG Employment, Social Affairs and Inclusion. Brussels
- CARAYANNIS, E., CAMPBELL, D. F. J. 2010. Triple Helix, Quadruple Helix and Quintuple Helix and How Do Knowledge, Innovation and the Environment Relate To Each Other? *International Journal of Social Ecology and Sustainable Development*, Vol. 1, No. 1, pp. 41–69.
- CARAYANNIS, E., CAMPBELL, D. F. J., THORSTEN, D. B. 2012. The Quintuple Helix innovation model: global warming as a challenge and driver for innovation. In: *Journal of Innovation and Entrepreneurship*, 1:2.
- CARLINO, G., KERR, W. R. 2014. Agglomeration and Innovation. In: *Handbook of Regional and Urban Economics*, Vol. 5A.
- GÁTI, M., MITEV, A. Z., BAUER, A. 2018. Investigating the impact of salespersons' use of technology and social media on customer relationship performance in B2B setting. In: *Market/Tržište*. Vol. 30, No. 2, pp. 165–176.
- GERSE J., SZILÁGYI, D. 2015. *Magyarország településhálózata 2. Városok-falvak*. Budapest: KSH.
- HODGE I., MIDMORE, P. 2008. Models of Rural Development and Approaches to Analysis Evaluation and Decision-Making. In: *Économie Rurale*. No. 307.
- KOVÁCS, Z. 2017. Városok és urbanizációs kihívások Magyarországon. *Magyar Tudomány*. Vol. 178, No. pp. 302–310.



- KOZMA, G. 2017. *A posztindusztriális települések modern funkcióinak társadalomföldrajzi vizsgálata*, MTA doktori értekezés, tézisek, [http://real-d.mtak.hu/1015/1/dc\\_1352\\_6\\_tezisek.pdf](http://real-d.mtak.hu/1015/1/dc_1352_6_tezisek.pdf) [2019.07.07].
- KÖZPONTI STATISZTIKAI HIVATAL, 2012a. *A belföldi vándorlás főbb folyamatai, 1990–2011*. Statisztikai Tükör, VI. évf. 85. szám.
- KÖZPONTI STATISZTIKAI HIVATAL 2012b. *Magyarország Társadalmi Atlasza*, <https://www.ksh.hu/docs/hun/xftp/idoszaki/pdf/tarsatlasz.pdf> [2019.07.06].
- LENGYEL, I. 2000. A regionális versenyképességről. In: *Közgazdasági Szemle*, XLVII. évf.
- LENGYEL, I. 2016. A kutatás-fejlesztés és a versenyképesség térbeli összefüggései a visegrádi országokban. In: *Tér és Társadalom*. Vol. 30. No. 4.
- MALOTA, E. 2011. Magyar termék-hazai fogyasztó. In: *Fogyasztóvédelmi Szemle*. Vol. 5, No. 2, pp. 13–20.
- MALOTA, E. (szerk.) 2015. *Marketing nemzetközi szinten: Esettanulmányok a hazai és külföldi piacokról*. Budapest: Alinea Kiadó.
- MORETTI, E. 2014. *Cities and Growth, Evidence Paper*. London: International Growth Centre.
- NEMES, G. 2005. Integrated Rural Development – The Concept and its Operation, KTI/IE *Discussion Papers*. No. 6. Magyar Tudományos Akadémia
- PORTER, M. E. 1998. *Clusters and the new economics of competition*, Harvard Business Review, 76, No. 6
- SWORDS, J. 2013. Michael Porter's Cluster Theory as a local and regional development tool – the rise and fall of cluster policy in the UK. *Local Economy*, 28 (4)
- SZABÓ, SZ. 2011. *Vidéki térségek Magyarországon, Társadalom és Gazdaságföldrajzi Tanulmányok 5*. Budapest: ELTE Társadalom- és Gazdaságföldrajzi Tanszék, Trefort Kiadó.
- SZŐKE, V., KOVÁCS L. 2016. Klassische Modelle der Raumstruktur und der räumlichen Beziehungen am Beispiel des Bildungswesens im westungarischen Komitat Vas. *A NYME Savaria Egyetemi Központ Tudományos Közleményei 21.*; *Természettudományok 16*. 81–89.
- TÓTH, J. 1981. A településhálózat és a környezet kölcsönhatásának néhány elméleti és gyakorlati kérdése. In: *Földrajzi Értesítő*. Vol. 30, No. 2–3, pp. 267–292.

# The Impact of Foreign Direct Investment on Greenhouse Gas Emissions: Regional and Industrial Aspects

NATALIA DAVIDSON<sup>1</sup>, OLEG MARIEV<sup>2</sup>, DENIS BAEV<sup>3</sup>,  
DMITRY GLADYREV<sup>4</sup>

**ABSTRACT:** While foreign direct investment (FDI) plays an important role in the economic development of countries, foreign firms tend to affect negatively the host economies' environment. The aim of our research is to analyze the factors determining the impact of FDI on the environment. To do this, we study the impact of FDI on greenhouse gas emissions across different types of countries and groups of industries. This allows us to find out how specific features of various regions of the world and various industries determine the significance and value of FDI's impact on the host economy's environment. Based on country-level panel data for 1996–2013, we estimate an econometric model with CO<sub>2</sub> emissions defined as a dependent variable, affected by FDI inflows, GDP per capita, corruption control level and population size. Our study relies upon the theory of the Kuznets curve, the Pollution Haven hypothesis and the Halo effect. Generalized method of moments (GMM) is chosen for the model under consideration in order to address the endogeneity issue. Results show that when FDI inflows increase, the level of CO<sub>2</sub> emissions also increases. Besides, the environmental Kuznets curve hypothesis is confirmed for some countries: with GDP growth CO<sub>2</sub> emissions also grow until the GDP reaches a certain level, and with further GDP growth CO<sub>2</sub> emissions start decreasing. Concerning the regional level analysis, the World Bank classification of countries into high, upper-middle, low-middle and low income economies is applied to analyze specific features of FDI's impact on CO<sub>2</sub> emissions. Further, to account for industrial characteristics in terms of greenhouse gas emissions, the effects from FDI in manufacturing, agriculture, transport services and power generation sectors are estimated. The results are useful for the development and analysis of economic policy measures aimed at decreasing greenhouse gas emissions while attracting FDI.

**Key words:** greenhouse gas emissions, foreign direct investment, environmental Kuznets curve, halo effect, pollution haven hypothesis, country income classification

**JEL Classification:** F21, F64, O44, Q56

---

<sup>1</sup> NATALIA DAVIDSON, Graduate School of Economics and Management, Ural Federal University, Russia, natalya.davidson@gmail.com

<sup>2</sup> OLEG MARIEV, Graduate School of Economics and Management, Ural Federal University, Russia, o.s.mariev@urfu.ru

<sup>3</sup> DENIS BAEV, Friedrich-Alexander-Universität Erlangen-Nürnberg, Faculty of Business, Economics, and Law, School of Business, Economics and Society, Germany, denis.baev@yahoo.com

<sup>4</sup> DMITRY GLADYREV, Graduate School of Economics and Management, Ural Federal University, Russia, unc-dg@mail.ru

## 1. Introduction

The topic deserves attention because, on one hand, foreign direct investment (FDI) is an essential component of globalization and significantly contributes to economic development of countries worldwide.<sup>5</sup> On the other hand, FDI affects the environment, primarily that of the host countries. This influence is reflected in the theory of the Kuznets curve, the Pollution Haven hypothesis and the Halo effect (Doytch, Uctum, 2012; Doytch, Uctum, 2016; Eskeland, Harrison, 2003; Grossman, Krueger, 1995; Millimet, Roy, 2011; Zarsky, 1999; Zhu et al., 2016).

While foreign direct investment (FDI) plays an important role in the economic development of the countries, according to the UN and OECD reports, foreign firms tend to affect negatively host economies' environment, namely, to contribute to an increase in greenhouse gas emissions.<sup>6</sup> Negative environmental consequences of greenhouse gas emissions such as global warming affect countries with various income levels (Doytch, Uctum, 2016). These effects are associated with health problems, difficulties for agricultural activities and other issues essential for the well-being of people and for economic development. Moreover, if the increase in greenhouse gas emissions is due to FDI, not only host countries are affected but the world in general. Therefore, for sustainable economic development and the improvement of the quality of life a responsible attitude towards CO<sub>2</sub> and other greenhouse gas emissions is one of the key issues.

The aim of our research is to analyze the factors behind the impact of FDI on the environment, taking into account specific features of various regions across the world and various industries. Regional level analysis in our paper implies the study of countries with different income levels according to the World Bank classification. Based on country-level panel data for 1996–2013, we estimate an econometric model with CO<sub>2</sub> emissions defined as a dependent variable, affected by FDI inflows, GDP per capita, corruption control level and population size. For the purposes of industry level analysis greenhouse gas emissions are analyzed. The next section is devoted to the study of effect of FDI on the environment. Then data and econometric models are presented. Analysis of the results and the conclusion follow.

---

<sup>5</sup> World Investment Report 2016: Annex Tables. UNCTAD. [Electronic resource]. URL: <http://unctad.org/en/Pages/DIAE/World%20Investment%20Report/Annex-Tables.aspx>

<sup>6</sup> Emissions Gap Report. The United Nations. URL: <http://www.unep.org/emissionsgap/resources>  
The Economic Consequences of Outdoor Air Pollution. OECD Publishing, 2017. URL: [http://www.keepeek.com/Digital-Asset-Management/oecd/environment/the-economic-consequences-of-outdoor-air-pollution\\_9789264257474-en#.WQYpR8ZeM3g#page1](http://www.keepeek.com/Digital-Asset-Management/oecd/environment/the-economic-consequences-of-outdoor-air-pollution_9789264257474-en#.WQYpR8ZeM3g#page1)

## 2. Factors affecting the environment: a theoretical background

The impact of economic activities on the environment is described with the help of the *pollution haven hypothesis*, the *environmental Kuznets curve* and the *halo effect*. These concepts connect economic growth, FDI and environmental issues.

According to the *pollution haven hypothesis*, transnational corporations move environmentally unfriendly production to the developing countries. It becomes possible under free trade and due to the low level of environmental legislation and control in these countries (Temurshoev, 2006). The hypothesis was confirmed empirically (Tobey, 1990; Jaffe et al., 1995; Levinson, Taylor, 2008; Eskeland, Harrison, 2008).

The *Halo effect* hypothesis was first introduced by American psychologist Edward L. Thorndike in 1920 (Eskeland, Harrison, 2008). He claimed that if someone is good in a certain sphere, he will be good in other spheres as well<sup>7</sup>. In case of FDI, foreign firms own technologies and management practices that meet high environmental standards in their home country. Therefore they can contribute to the improvement of environmental conditions in the host countries. This effect can arise if foreign investors compete with each other while environmental issues are taken seriously by the host country (Zarsky, 1999). The *Halo effect* hypothesis mitigates the previous two effects stating that countries can both get access to FDI and improve their environment at the same time (Doytch, Uctum, 2016).

Another concept considered in the literature is the *Environmental Kuznets curve*. According to it, countries in earlier stages of economic development tend to show increasing income inequality. However, with further development, inequality tends to diminish (Kuznets, 1955). Grossman and Krueger (1991) introduced the application of the Kuznets curve in environmental policy. The *Environmental Kuznets curve* is an inverted U-shaped function of environmental pollution affected by economic growth. This relationship implies that lower-income countries experience an increase in CO<sub>2</sub> and other greenhouse gas emissions, for example, but after some point of economic development the level of emissions starts decreasing. Meanwhile, economic growth is interrelated with globalization and FDI.

Based on the theories described above, along with FDI inflows we pointed out the following factors affecting environment: the country's economic development level, per capita income, industrial and international trade structure, industries dominated by FDI activities, environmental legislation and various institutional factors, use of renewable energy, ideas and practices associated with the environment in society. In our research we study the impact of FDI inflows on

---

<sup>7</sup> The halo effect. The Economist. 2009. URL: <http://www.economist.com/node/14299211>

CO<sub>2</sub> and other greenhouse gas emissions, taking into account the GDP of the country, demographic and institutional factors.

### 3. Data and econometric model

The regression model was estimated based on panel data for 133 countries for the years 1996-2013. The data for FDI inflow is taken from the UNCTAD<sup>8</sup> database. The data on CO<sub>2</sub> emissions, GDP per capita, population density and population size is taken from WDI<sup>9</sup>. The data on greenhouse gas emissions is taken from OECD.<sup>10</sup> To reflect institutional quality, an indicator 'control over corruption' provided by ICRG<sup>11</sup> is used.

The variables included in the regression are: POL – the volume of CO<sub>2</sub> emissions in kilotons, FDI – FDI inflows in mln US dollars, GDP – GDP in US dollars (in 2010 prices), Y – GDP per capita in US dollars (in 2010 prices), CORR – level of corruption control (where 0 is the lowest level, and 1 is the highest level), POP – population, number of people. Below, the clouds of observations for the dependent and independent variables are presented (*Figure 1*).

Graphical analysis shows that the strongest connection among the variables under consideration is between CO<sub>2</sub> emissions and FDI and between CO<sub>2</sub> emissions and population. This connection is confirmed by an analysis of correlations between the variables as well. Based on the Levin-Lin-Chu Panel-Data Unit-Root test the variables included in the regression were found to be stationary. We used generalized method of moments (GMM) (Doytch, Uctum, 2012) to estimate the following model:

$$\ln(POL_{i,t}) = \beta_0 + \beta_1 \ln\left(\frac{FDI}{GDP}\right)_{i,t} + \beta_2 \ln(Y_{i,t}) + \beta_3 [\ln(Y_{i,t})]^2 + \beta_4 \ln(CORR)_{i,t} + \beta_5 \ln(POP_{i,t}) + \varepsilon_{i,t} \quad (1)$$

where index  $i$  stands for countries;  $t$  – time periods.

We analyze the ratio of FDI to GDP to take into account the overall size of the economy while analyzing the impact of FDI on the environment. GDP per capita,  $Y$ , is included in order to test the environmental Kuznets curve hypothesis. The

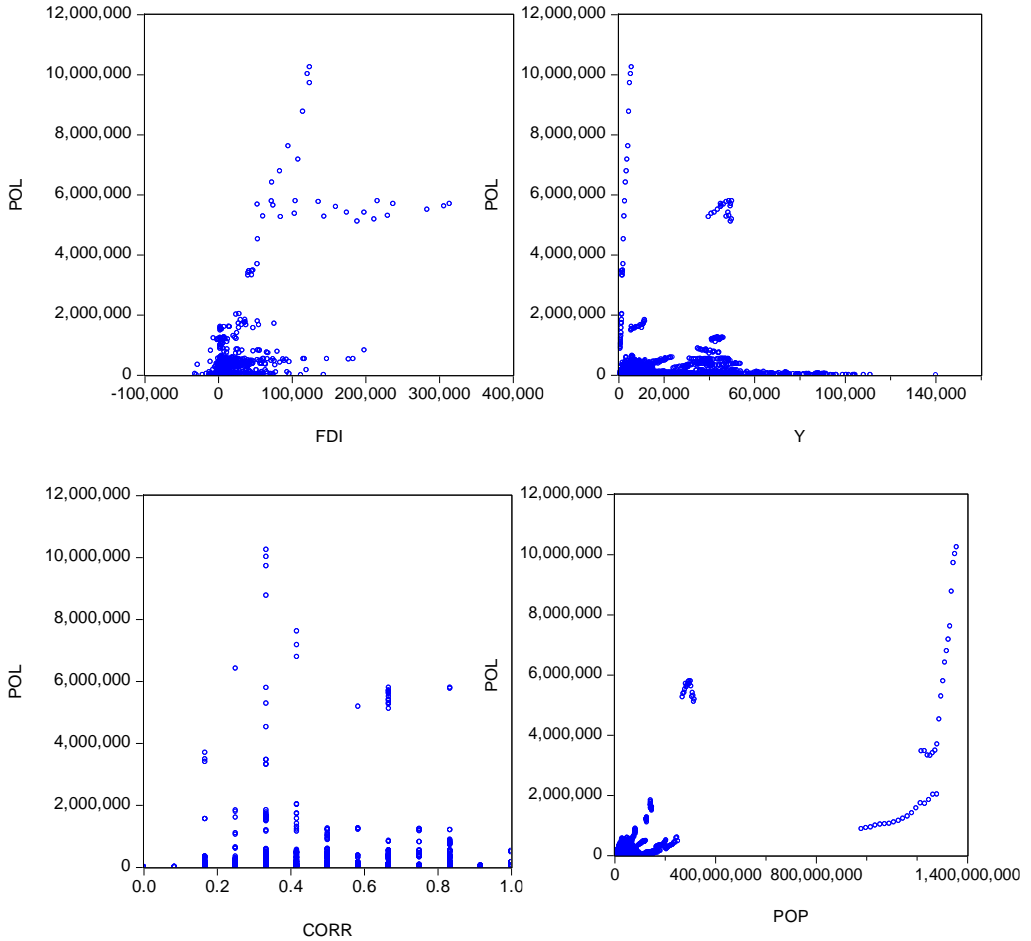
<sup>8</sup> World Investment Report 2016: Annex Tables. UNCTAD. URL: <http://unctad.org/en/Pages/DIAE/World%20Investment%20Report/Annex-Tables.aspx>.

<sup>9</sup> World Development Indicators. The World Bank. URL: <http://data.worldbank.org/data-catalog/world-development-indicators>.

<sup>10</sup> Greenhouse gas emissions. OECD. Stat. URL: [http://stats.oecd.org/viewhtml.aspx?datasetcode=AIR\\_GHG&lang=en](http://stats.oecd.org/viewhtml.aspx?datasetcode=AIR_GHG&lang=en).

<sup>11</sup> International Country Risk Guide (ICRG). The PRS Group. URL: <https://www.prsgroup.com/about-us/our-two-methodologies/icrg>.

variable ‘population’ is included to account for various sources of air pollution associated with population size. The next section is devoted to a discussion of the results.



**Figure 1. Clouds of observations for the dependent and independent variables**

*Source:* Edited by the Authors

## 4. Results

The model is estimated for all countries and for the subsamples of regions and industries, i.e. for groups of countries with different income levels and for FDI in different industries. More precisely, estimation is carried out for high, upper-middle, lower-middle, and low income countries based on the World Bank classification.<sup>12</sup> The income classification is based on a measure of GNI per capita. To account for specific features of various industries, the effects from FDI in manufacturing, agriculture, transport services and power generation sectors are estimated. For industry-level analysis, OECD data on greenhouse gas emissions is used.<sup>13</sup>

The model was estimated using the GMM method.<sup>14</sup> Arellano-Bond test for autocorrelation of the first-differenced residuals allows to accept the null hypothesis that there is no autocorrelation of order 2 in all the estimated models. For the sample that includes all countries with a 1%-increase of FDI share in GDP, CO<sub>2</sub> emissions increase by 0.03%. With a 1% increase of GDP per capita, CO<sub>2</sub> emissions increase by 1.56%, and when a certain level of GDP per capita is reached, they start decreasing. In other words, the environmental Kuznets curve hypothesis is confirmed. This hypothesis is also confirmed for high income countries (model 5).

Overall, for the sample of all countries as well as for the majority of subsamples, FDI inflows lead to an increase in CO<sub>2</sub> emissions. Concerning regional level results, analysis based on the data used in our research shows a similar impact of FDI on CO<sub>2</sub> emissions for low-middle, high-middle and high income countries. For high and high-middle income countries, the effect can result from the sample containing countries such as the USA, China or Japan with relatively large FDI inflows and relatively large CO<sub>2</sub> emissions. However, this issue deserves further attention, as it can be assumed that high income countries exercise stricter control over environmental issues (Doytch, Uctum, 2012). In low income countries, the effect was found to be insignificant, while the negative sign might have confirmed the Halo effect. However, this result should be treated cautiously since activities associated with FDI in low income countries deserve

---

<sup>12</sup> Classifying countries by income. World Bank. October 4, 2018 <https://datatopics.worldbank.org/world-development-indicators/stories/the-classification-of-countries-by-income.html>

<sup>13</sup> The Economic Consequences of Outdoor Air Pollution. OECD Publishing. 2017. URL: [http://www.keepeek.com/Digital-Asset-Management/oecd/environment/the-economic-consequences-of-outdoor-air-pollution\\_9789264257474-en#.WQYpR8ZeM3g#page1](http://www.keepeek.com/Digital-Asset-Management/oecd/environment/the-economic-consequences-of-outdoor-air-pollution_9789264257474-en#.WQYpR8ZeM3g#page1)

<sup>14</sup> Kripfganz, S. (2017). XTDPDGMM: Stata module to perform generalized method of moments estimation of linear dynamic panel data models *Statistical Software Components S458395*, Boston College Department of Economics, revised 09 Sep 2018.

special attention due to less developed environmental legislation there (Temurshoev, 2006).

Concerning the various groups of industries, FDI inflow into power generation and manufacturing proved to be not environmentally friendly. The Coefficient of FDI in transportation services has a positive sign but is not significant. FDI inflow into agriculture was found not to contribute to greenhouse gas emissions. Moreover, the Kuznetz curve hypothesis was confirmed for agriculture and partly for transportation services.

Corruption control proved to decrease CO<sub>2</sub> emissions in the sample for all countries. While the sign for the subsamples of low-middle income countries, high-middle and high income countries is also negative, the variable is not significant. For the different groups of industries, the impact of corruption control varies. The reason might be the heterogeneous effectiveness and fairness of corruption control measures in various industries.

## 5. Conclusion

The results show that FDI inflows lead to an increase in CO<sub>2</sub> emissions in countries with various income levels. Our regional level analysis shows that FDI inflows lead to an increase in CO<sub>2</sub> emissions for countries with various income levels, although there is no evidence concerning the impact of FDI on emissions for low income countries. This outcome emphasizes the necessity of environmental protection for all countries while attracting FDI. However, from the standpoint of economic policy it is also important to take into consideration that foreign firms might be interested to bring environmentally less friendly technologies to low income countries.

Concerning the various groups of industries, FDI in power generation and manufacturing proved to be not environmentally friendly. The Environmental Kuznets curve hypothesis was confirmed for the sample of all countries, indicating that with the increase of GDP there is also an increase in greenhouse gas emissions, but after some level of GDP is attained the emissions start decreasing.

Corruption control proved to decrease CO<sub>2</sub> emissions in the sample for all countries. As corruption level reflects various issues of the institutional environment including legislative issues, further studies in this area would be useful. As expected, in countries with a larger population CO<sub>2</sub> emissions are relatively higher. However, in high-middle income and high income countries, CO<sub>2</sub> emissions are found to increase relatively less with an increase in population than in low-middle income countries.

As expected, the effects of FDI on greenhouse gas emissions for manufacturing, agriculture, transport services and power generation sectors were variable.



FDI inflows into power generation and manufacturing were found not to be environmentally friendly. This leads to the policy recommendation to design and implement strict environmental regulations, particularly in sectors belonging to these groups.

While FDI plays an important role in the economic development of countries, our study confirms that foreign firms tend to affect host economies' environment negatively. It is important to take this issue into account so that countries could benefit from FDI and preserve the environment and provide high quality of life for their citizens at the same time. Both technological and economic policy issues are important for decreasing the negative impact of FDI on the environment.

Namely, on one hand, it is essential to develop environmentally friendly technologies on the firm level, while state support and cooperation with research institutions would also be helpful. On the other hand, further improvement of the legislative framework is needed to create incentives and opportunities for environmentally friendly behavior. Legislation and law enforcement should be transparent in order to prevent corruption practices. On the firm level, social corporate responsibility is important. Personal awareness of citizens about environmental issues and activities of non-governmental organizations is also important in order to keep the impact of FDI on emissions of CO<sub>2</sub> and other greenhouse gases under control.

### Acknowledgments

Research was supported by the grant of the Russian Science Foundation № 19-18-00262 “Empirical modelling of balanced technological and socioeconomic development in the Russian regions”.

### References

- DOYTCH, N., UCTUM, M. 2012. Globalization and the environmental spillovers of sectoral FDI. In: *Economic Systems*. Vol. 40, No. 4, pp. 582–594.
- DOYTCH, N., UCTUM, M. 2016. *Globalization and the environmental impact of sectoral FDI*. (Working Paper No. 12). CUNY Graduate Center PhD Program in Economics.
- ESKELAND, G.A., HARRISON, A. E. 2003. Moving to greener pastures? Multinationals and the pollution haven hypothesis. In: *Journal of Development Economics*. Vol. 70, No. 1, pp. 1–23.
- GROSSMAN, G. M., KRUEGER A. B. 1995. Economic growth and the environment. In: *The Quarterly Journal of Economics*. Vol. 110, No. 2, pp. 353–377.
- GROSSMAN, G. M., KRUEGER, A. B. 1991. *Environmental impact of a North American Free Trade Agreement* (Working Paper, 3914). NBER.
- JAFFE, A. B., PETERSON, S. R., PORTNEY, P. R., STAVINS, R. N. 1995. Environmental regulation and the competitiveness of US manufacturing: what does the evidence tell us? In: *Journal of Economic Literature*. Vol. 33, pp. 132–163.

- KUZNETS, S. 1955. Economic growth and income inequality. In: *The American Economic Review*. Vol. 45, No. 1, pp. 1–28.
- LEVINSON, A., TAYLOR, M. S. 2008. Unmasking the Pollution Haven Effect. In: *International Economic Review*, Department of Economics, University of Pennsylvania and Osaka University Institute of Social and Economic Research Association. Vol. 49, No. 1, pp. 223–254.
- MILLIMET, D. L., ROY, J. 2011. Three new empirical tests of the Pollution Haven Hypothesis when environmental regulation is endogenous. (Discussion Paper No. 5911). IZA.
- TEMURSHOEV, U. 2006. Pollution Haven Hypothesis or Factor Endowment Hypothesis: theory and empirical examination for the US and China. (Working Paper No. 292). CERGE-EI.
- TOBEY, J. 1990. The effects of domestic environmental policies on patterns of world trade: an empirical test. In: *Kyklos*. Vol. 43, No. 2, pp. 191–209.
- ZARSKY, L. 1999. Havens, halos and spaghetti: untangling the evidence about foreign direct investment and the environment. OECD, *Foreign Direct Investment and Environment*, pp. 47–73.
- ZHU, H., DUAN, L., GUO, Y., YU, K. 2016. The effects of FDI, economic growth and energy consumption on carbon emissions in ASEAN-5: Evidence from panel quantile regression. In: *Economic Modelling*. Vol. 58, pp. 237–248.

# Adaptation is educated?

## Level of education beyond expectations and practices of farmers in adaptation to climate change<sup>1</sup>

MÓNIKA HOSCHEK<sup>2</sup>, NIKOLETTA NÉMETH<sup>3</sup>

**Abstract:** The ever-increasing food demand of the growing population and the increasing amount of waste resulting from consumption are driving changes in every area of the economy. Hungarian agriculture is able to supply the country with healthy products on a high quality. The composition and quantity of agricultural production have been affected by many changes. Agriculture and food industry, like other sectors, are responding to increased demand with increasing supply. The main task is to serve the needs of consumers, to protect natural resources, and to reduce waste by adapting to changes in environmental conditions, including climate change, during agricultural production.

The aim of the study is to examine what characterizes Hungarian farmers' adaptation to climate change, what determines their adaptation steps and how climate awareness is observed. One of the basic assumptions of our research is that farmers with higher education qualifications read more professional magazines and researches and thus choose from a wider range of options, with green solutions in mind when making their decisions. The research is based on a questionnaire survey.

**Keywords:** adaptation, education, climate change, agriculture

**JEL classification:** I20, Q10, Q54, Q56

*“Tertiary agricultural education objective must be to produce graduates who are technologically competent and relevant, equipped with the necessary “soft skills” and business skills and able to work with local, especially rural communities”*  
(Chakeredza et al., 2009, p. 22)

### 1. Introduction

Global natural, social and economic problems requires adaptation in all sectors of the economy. Food security relies on agriculture, which is influenced by several internal and external factors. Highlighting climate change as an external factor,

---

<sup>1</sup> This article was made in frame of the „EFOP-3.6.1-16-2016-00018 – Improving the role of research+development+innovation in the higher education through institutional developments assisting intelligent specialization in Sopron and Szombathely”.

<sup>2</sup> MÓNIKA HOSCHEK, University of Sopron Alexandre Lamfalussy Faculty of Economics, Hungary, hoschek.monika@uni-sopron.hu

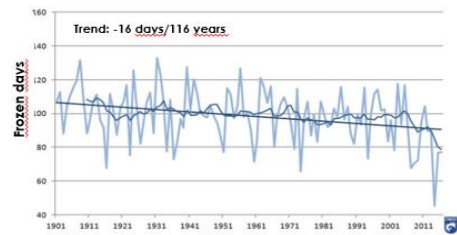
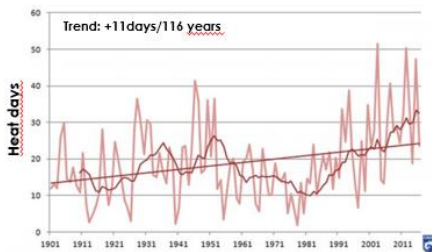
<sup>3</sup> NIKOLETTA NÉMETH, University of Sopron Alexandre Lamfalussy Faculty of Economics, Hungary, nemeth.nikoletta@uni-sopron.hu

the connection between adaptation ability of farmers to this phenomenon and their educational level was examined.

Climate change influences agricultural production causing a reduction in crop yields and also proliferation of weeds and pests are expectable. Climate change usually described by the changes in temperature, precipitation and weather conditions (Harnos, 2005).

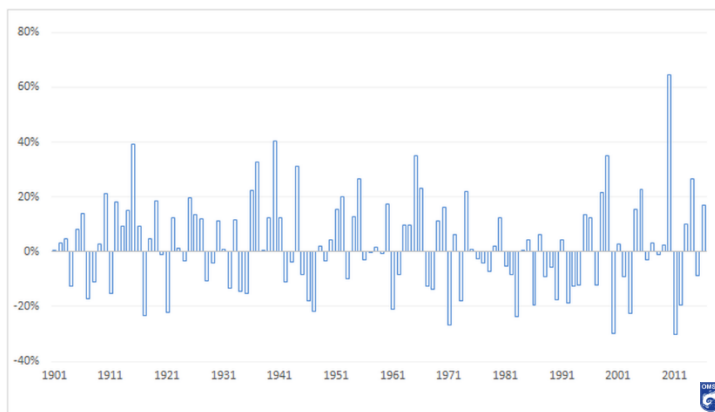
According to the following figures the rising temperature is convinced, while *Figure 1* shows the increasing number of heat days in the last 116 years, *Figure 2* refers to the decreasing number of frozen days in the same period of time.

Also the extreme weather conditions appear more frequently, while the unequal distribution of precipitation is observed (*Figure 3*).



**Figure 1. Number of heat days in Hungary**      **Figure 2. Number of frozen days in Hungary**

Source: OMSZ (2016).



**Figure 3. Average precipitation in Hungary (1991–2011)**

Source: OMSZ (2016).

Additionally, internal factors, for example the size of the business, the level of owned technology and the educational level of labour forms working in agriculture are also determining the adaptation to external changes (next to climate change, legal regulations, demand and supply, level of technological development and economic factors like employment). Without reacting quickly and efficiently, farms cannot stay viable.

In our study we focused on the influencing role of farmers' educational level.

## **2. Scientific background and theoretical considerations**

In addition to technical factors, agricultural labour still plays a decisive role in agricultural production, significantly influencing agricultural production, competitiveness, quality and the quality and quantity of the products (Villányi-Vasa, 2017).

Based on the above, and due to the specifications of agricultural production, the role of workforce training is outstanding. Crop production, which is exposed to weather conditions (temperature, rainfall, etc.) requires constant adaptation to prevent changes in the climate from having a negative impact on business performance. While the effects of these factors may be reduced or mitigated by technical means, they cannot be eliminated. The situation is similar in the field of animal husbandry, where due to biological processes animal husbandry and breeding provide even more specific working conditions (Széles, 2001). The working conditions of livestock farms and buildings, feeding, animal care and access to animal products require different knowledge and practices. However, livestock farms produce relatively continuously, but in crop production there are seasonal and fertile periods combined with dormant periods (Buzás, 2011). According to Pfau (1998), this requires adaptation, problem-solving, autonomy, quick decision-making, knowledge of opportunities and adaptability.

Integrating climate adaptation in agricultural education, the followings has to be covered (*Table 1*).

Therefore, in order for domestic agricultural enterprises to be internationally competitive, professional qualifications are needed. Despite the fact that agricultural education in Hungary is mainly lacking at secondary level (*Table 2*) and mainly based on practical experience, the knowledge level of students leaving higher education does not necessarily meet the requirements of the world market.

Just as companies in all sectors of the economy are looking for innovative, ready-to-renew professionals and adaptation skills to environmental changes, so agricultural productivity can also benefit from higher education.

**Table 1. Integrating climate change into the curriculum**

Area	Aspects to be covered
Introduction to Climate change	Implications of climate change to people's livelihoods and the world economy.
Global warming	The causes of global warming and projections under different scenarios.
Agrobiodiversity	The need to maintain agrobiodiversity under climate change threat; Impact of land use change on agrobiodiversity at ecosystems, species and within-species levels; Adaptation to climate change: agrobiodiversity options; Approaches for putting adaptation strategies into practice in research, extension and policy implementation
Biofuels	The need for reduced carbon emissions. Alternative fuel production with special focus on biofuels. Socio-economic implications
Adaptation Strategies	Options available to adapt to the adverse effect of climate change by different groups of people
Mitigation Strategies	Current thinking on climate change mitigation strategies. Reduction of carbon emissions; Geo-engineering concepts and practices
Global policy issues on climate change	Global policy framework. UNFCCC; Kyoto protocol; CDM; NAPA

Source: Chakeredza, 2009, 19.

**Table 2. Level of farmers' highest education in Hungary**

Level of highest education	Type of farming (in 2010, in 1000 capita)			All
	Crop production	Animal husbandry	Both	
None	23,1	12,8	9,3	45,2
Practical experience	219,0	101,9	126,2	447,1
Basic level	11,1	4,7	13,2	28,9
Secondary level	16,4	4,7	15,0	36,0
Tertiary level	11,9	1,0	5,9	18,8
All	281,4	125,1	169,5	576,1

Source: KSH, 2015.

### 3. Research method and main findings

In a questionnaire survey 276 Hungarian farmers were interviewed personally and via Internet. Half of the farmers included in the research had to a maximum secondary education (139, 50.4%) and half of them completed a degree in higher education (137, 49.6%). At the time of the communication of the results, the first data are always those with a maximum level of secondary education, and the second information applies to tertiary graduates.

In terms of gender, we have found that at most secondary graduates, the proportion of women is barely higher than the 1/6, whereas for tertiary graduates it is almost 1/4.

There is also a large difference in age between the two investigated groups. For up to secondary graduates, the two youngest farmers are 25 and the oldest is 80 years old. Under the age of 29, the rate is 7.2%, but together with those under 40, only the sub-population is 20.9%, similar to those of 62 years (19.4%). 41 to 51 years is 27.3%, and 52–62 age groups of 32.4%. For tertiary graduates, the youngest is also 25 years old, but the oldest is already 83 years old. Under the age of 29, they represent only 2.2%, but under the age of 40, more than the sub-population 1/4. It is similar to the 41–51 and 52–62 age groups (26.3%, 27.7%). However, the proportion of people aged 62 to 83 years is similar to that of up to secondary education (19.0%).

The largest area used for farming in both subgroups is arable land (65.5%; 53.3, 1%) followed by the horticulture and orchard together (10.0% and 20.4%), the meadow being only 7.9% and 11.7%. All other 16.5% and 14.6% are distributed within the level of educational attainment groups.

If we examine our groups on the basis of the main objective of farming, then nearly a small proportion (7.2% and 6.6%) represent the only self-sufficiency producers. More than half of the group (55.4%) for up to secondary graduates also produces for sale in addition to self-sufficiency and slightly more (37.4%) than the proportion of those who only produce for sale. For tertiary graduates, the proportions are similar, only conversely, 35.8% of those who produce for themselves and for sale and 57.6%, who only carries out the production of goods.

72.7% traditional small-scale producers of those with a maximum secondary education, 18.7%, sole proprietorship and only 8.6% of them are members of a joint venture. It is much lower than that of tertiary graduates, only 43.8% of the traditional small-scale producers, and 32.8% and 23.4% are sole proprietorship and joint ventures.

On the question of how many years of farming activity he/she has, we have been conducting three categories surveyed: less than 10 years, between 10 and 20 years and more than 20 years. In the case of up to secondary graduates, 27.3% of

those who had been farming for less than 10 years, 43.2% were less than 20 years and 29.5% over 20 years. For tertiary graduates, the ratio is almost 1/3-1/3-1/3.

#### 4. Results

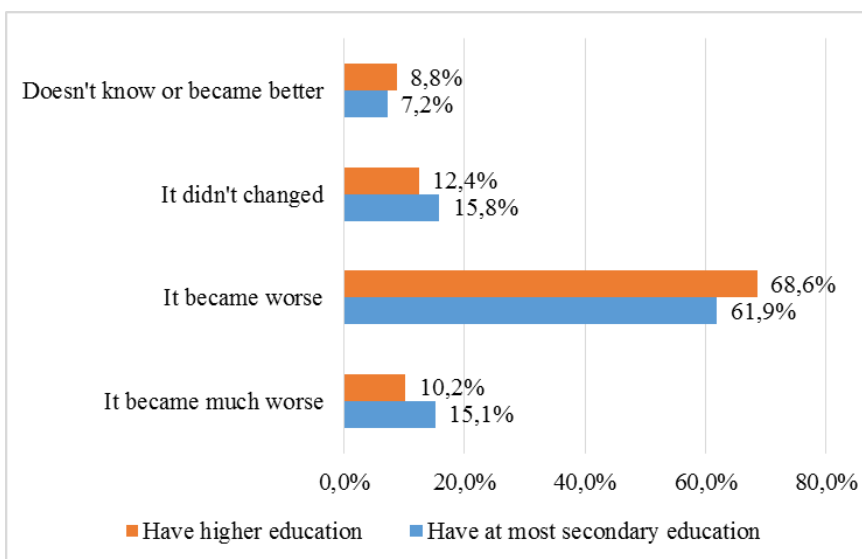
On climate change, we were first interested to see if the surveyed farmers were to perceive the changes and if so, since when. There is a statistically justifiable difference between the maximum secondary graduates and the tertiary graduates ( $W = 17880$ ;  $p = 0,0026$ ).

Only a few percentages (1.4 and 3.6) are issued by the 2 and 5 farmers who have not experienced climate change at the time of the interview. The highest proportions (55.4%, 38.7%) were those in both subpopulations who had already perceived the problem in the last few years. Also close to one third (28.1%, 34.3, 1%) have experienced the change in the past 10 years.

If we look at what kind of changes the farmers have experienced, then the disappearing seasons will be the effects which is perceived by more than 4/5 (82.7%, 83.2%) of respondents in both groups. Similarly high rates (79.1%, 81.8%) were observed to increase the number of drought periods. Higher levels of pest growth in higher secondary education (80.6%) is higher than higher education attainment (70.1%). In both groups, close to 3/4 (74.8%, 78.8%) is the proportion of those experiencing a decrease in the number of days covered by snow cover. Almost similar (74.1%, 73.0%) high rate of heat wave frequency observers. 2/3 above the ratio in both subpopulations to those experiencing medium-temperature increase in the year (67.6%, 78.1%) and the emergence of new pests (69.8%, 72.3). On the question of how important the problem of climate change feels, the two sub-population answered differently ( $W = 17886,5$ ;  $p = 0,017$ ). Only 31 and 47 people (22.3%, 34.3%) said that the effects of climate change have already been felt on his own skin, he sees his eyes. Most people (90 to 64.7%; 79 main 57.7%) It is believed that the changes will only affect the lives of their children/granddaughters. A total of 20 people (12 people 8.6%; 8 people 5.8%) Considers that only the distant question of how important it feels, the problem of climate change is given by the two sub-population examined differently ( $W = 17886,5$ ;  $p = 0,017$ ). Only 31 and 47 people (22.3%, 34.3%) said that the effects of climate change have already been felt on his own skin, he sees his eyes. Most people (90 people 64.7%; 79 people 57.7%) believed that the changes will only affect the lives of their children/granddaughters. A total of 20 people (12 people 8.6%; 8 people 5.8%) believes that only in the distant future will the effects of humanity be affected by climate change. In the past and in the future it has been affected/has the change of people according to 6 people (4.3%) and 3 persons (2.2%).



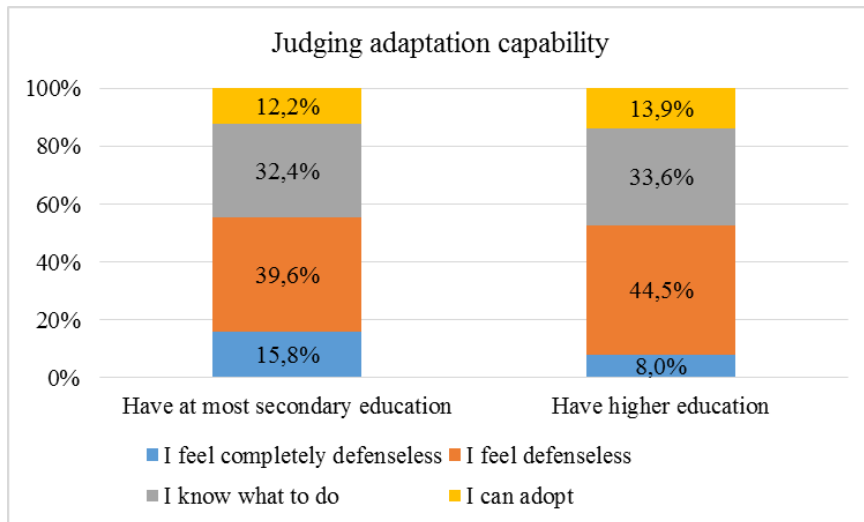
It has therefore been proved that most of the farmers surveyed have experienced the effects of climate change. The question now is whether the change has influenced the effectiveness of their work? A statistically similar response ( $W = 18996$ ;  $p = 0,649$ ) was given to graduates with higher secondary education and tertiary education (*Figure 4*). A total of 22 people (10, 12) were unable to decide whether to feel such a change or had a positive direction. 39 people (22, 17) felt they had no influence on their management of climate change. Almost 2/3 of the farmers, 180 people (86, 94) felt a definite deterioration in the effectiveness of farming, and there were 35 people (21, 14) who experienced many spoilage.



**Figure 4. The effects of climate change on the efficiency of farming**

*Source:* Edited by the Authors.

If someone has experienced a change in the year and that it degrades the effectiveness of farming, it is legitimate to research how it assesses its ability to adapt to the situation. As regards this issue, the two sub-groups examined gave similar responses ( $W = 18579$ ;  $p = 0,279$ ) 12.0% (15.8%, 8.0%) of all surveyed feels completely vulnerable and does not know what to do. The large majority (39.6%, 44.5%) are so unchallenged, they think they have only few possibilities to change and are therefore vulnerable. 32.4% and 33.6% believe that you know what to do and only it depends on the amount of money invested successfully. 13.0% (12.2%, 13.9%) of farmers confidently claiming that he can adapt to changes (*Figure 5*).



**Figure 5. Judging adaptation capability**

*Source:* Edited by the Authors.

If we examine how much of the farmers have already done something, i.e. how much they have adopted the situation, we see that only 18 people (12.9%) and 36 people (26.3%) in the two subpopulations who are already adopted, the other 222 people are not yet. At most secondary graduates and tertiary graduates, the question was statistically demonstrated differently ( $W = 17982,5$ ;  $p = 0.005$ ).

The adaptation was also examined through another question, the farmer's supply of machinery, following the idea that anyone who can do more with their own tools is better able to adapt to the changes. No one of the respondents was able to machine anything, otherwise the proportion of the low-equipped, moderately installed and well-equipped farmers in both subpopulations were nearly 1/3-1/3-1/3. Nevertheless, the responses of the two subpopulations are statistically different ( $W = 17982,5$ ;  $p = 0.005$ ).

In connection to education the sources of getting information about climate change seemed to be important to review. According to the answers, media (60) and informational discussions with colleagues (50) as information sources are more widespread by farmers with secondary education, while the ones with higher education have already adapted or next to the above mentioned options (30, 41), more often takes part on professional events (44) or read studies (40).

Finally as an open question the ways of already completed and for the future planned ways of adaptation were explored.

To the number of answers it has to be added that only a low percentage of the questioned farmers answered the open questions. Often farmers follow hidden

adaptation. These cases were not mentioned as an answers because they are presented as obvious changes. The answers varied widely and it was necessary to group them together. Following similar principles, we have identified five possible modes of adaptation.

Farmers with tertiary education have already adapted, using mainly the possibilities of changing species (14), irrigation (10) and preserving soil moisture (10), but technological changes and other options were also mentioned.

In the case of irrigation it has to be highlighted that most of the farmers emphasized to built out reservoirs for rainwater and using water-efficient types of irrigation.

As technological development we took into account for example the options of building greenhouse, solar system or using ice-net. Also the investment into more energy- and time-efficient equipments to reach shorter cultivating time or completing more activities at once in the same time. In connection to animal husbandry it could mean building covered sheds or better (isolated) hives.

Changing species aims to plant drought-tolerant plants, planting in autumn and plants with shorter growing season. Also species of animals could be changed.

Other methods are for example the usage of organic manure and biopesticides and the development of pest control.

The answer are in line with the forms and possibilities of adaptation according to Smit-Skinner (2002, 96–97), Akinagbe-Irohibe (2014) and Székely (2010).

The results are different, because the number of farmers with secondary education describing planned adaptation increased. Both subgroups put irrigation to the first place (with answers 31 and 44) and changing species to the second (21, 28). Preserving soil moisture with different technologies (covering with green manure, cultivating instead of ploughing) seem also to widespread, while technological development had 13 and 16 mentions.

## 5. Conclusion

Educational level of farmers has a determinant influencing role on the adaptation capability and also on completed or planned adaptation. Although the most frequently mentioned adaptation method is irrigation, it is important to know, support, introduce and apply other options. In addition to being more efficient, other factors such as water scarcity should be considered when taking the possible options into account.

However, knowing the alternatives and choosing the most effective possibility or the combination of different methods will require appropriate training, so developing the right level of education and encouraging the participation of farmers can be significant in adaptation and in efficient farming.

## References

- AKINNAGBE, O. M., IROHIBE, I. J. 2014. Agricultural Adaptation Strategies to Climate Change Impacts in Africa: A Review. *Bangladesh Journal of Agricultural Research*.
- CHAKEREDZA, S., TEMU, A. B., YAYE, A., MAKUNGWA, S., SAKA, J. D. K. 2009. Mainstreaming Climate Change into Agricultural Education: Challenges and Perspectives. World Agroforestry Centre, Kenya.
- HARNOS, ZS. 2005. A klímaváltozás és lehetséges hatásai a világ mezőgazdaságára. *Magyar Tudomány*. Vol. 166, No. 7, pp. 826–832.
- PFAU, E. 1998. *A mezőgazdasági vállalkozások termelési tényezői, erőforrásai*. Debrecen: DATE.
- SMITH, B., SKINNER, M. W. 2002. Adaptation Options in Agriculture to Climate Change: A Typology. In: *Mitigation and Adaptation Strategies for Global Change*. Vol. 7, No. 1, pp. 85–114.
- SZÉKELY, CS. 2010. *Agrár-gazdaságtan 7., A mezőgazdasági ágazatok ökonómiája és szervezése*. Székesfehérvár: Nyugat-magyarországi Egyetem, Geoinformatikai Kar.
- SZÉLES, GY. 2001. Az állattenyésztő ágazatok szervezése és ökonómiája. In: PFAU, E., SZÉLES, GY. (szerk.): *Mezőgazdasági Üzemtan II*. Budapest: Mezőgazdasági Szaktudás Kiadó. pp. 132–159.
- VILLÁNYI, L., VASA, L. (szerk.) 2007. *Agrárgazdaságtan, EU Agrár és Környezetpolitika*. Debrecen: Debreceni Egyetem Agrár- és Műszaki Tudományok Centruma Agrárgazdasági és Vidékfejlesztési Kar.
- <http://www.banglajol.info/index.php/BJAR/article/view/21984>
- KSH, <https://www.ksh.hu/docs/hun/xftp/idoszaki/pdf/mkepzes.pdf>
- OMSZ, [https://www.met.hu/eghajlat/eghajlatvaltozas/megfigyelt\\_valtozasok/Magyarorszag/](https://www.met.hu/eghajlat/eghajlatvaltozas/megfigyelt_valtozasok/Magyarorszag/)

## **Chapter 4**

### **Geopolitical challenges and cohesion polic**



# Residential attitudes about the European Union in the Szécsény district

JUDIT SÁGI<sup>1</sup>, ISTVÁN ENGELBERTH<sup>2</sup>

**Abstract:** Following the regime change, the county of Nógrád significantly lost competitiveness, falling from the medium range in the 1990s to the less developed ones in these days. Catching up is difficult in the case of its Northern parts (i.e. the Szécsény district alongside the river Ipoly), due to the nearness to the border. However, many believed in the return of the EU subsidies after 2004, and in the revitalisation of the Hungarian-Slovakian relations.

Several previous researches and studies demonstrated through statistical indicators the specific development of Nógrád county during the past decades. Despite its closeness to the innovation base of the capital, Nógrád county's development lag has accelerated. Statistical data-based studies often indicate that investments mainly in tangible infrastructure did not accomplish their intended purpose, and that catching up with other regions did not succeed. Our research focused on assessing what the local community in the Szécsény district perceives from the changes around the world. How do they deem their environ and the previous years' investments? From this point of view, how do they evaluate the country's European Union membership? To what extent do the inhabitants recognise that their location is lagging behind compared to other domestic and European Union regions? What do they consider as a chance to act or as a possible breakthrough point?

The authors intended to find answers to these questions around three themes. First, how the inhabitants assess their living circumstances in pursuit of the country's accession to the EU. Secondly, whether the inhabitants perceive the development of their district throughout the past couple of years as an upturn or a downturn. Third, how the inhabitants view Hungary's EU membership. These themes were accompanied with the development aspects of the district and the region, in a European-wide comparison.

**Keywords:** Nógrád county, Szécsény district, rural development, economic developments after the EU accession

**JEL Classification:** R11, R12, R13, O47, O18

---

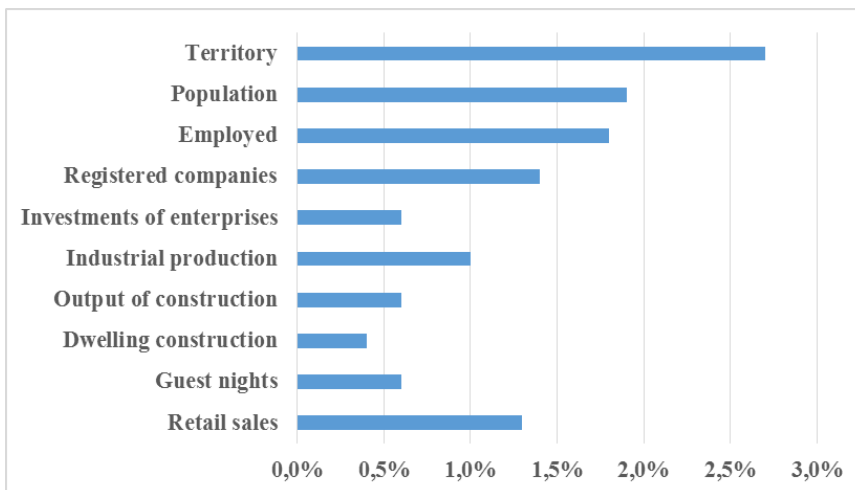
<sup>1</sup> JUDIT SÁGI, Budapest Business School, University of Applied Sciences, Hungary, [sagi.judit@uni-bge.hu](mailto:sagi.judit@uni-bge.hu)

<sup>2</sup> ISTVÁN ENGELBERTH, Budapest Business School, University of Applied Sciences, Hungary, [engelberth.istvan@uni-bge.hu](mailto:engelberth.istvan@uni-bge.hu)

## 1. Introduction

Recent studies about Nógrád county within the Northern Hungarian region demonstrated the development gap that pertains to the socio-economic conditions of the location (Engelberth, Sági, 2016, 2019). In a regional comparison, the county is distancing itself from the surrounding domestic sub-regions as well as from the Eastern-Slovakian regions (Sávai, Kiss, 2017). The development lag has increased not only relative to other counties, but also to the average of the EU regions since the country joined the European Union (Sági, Engelberth, 2018). At the time of EU accession, the neighbouring Slovakian region was set among the poorest, whilst nowadays it has showed an improvement. Nógrád county's development is hindered by low levels of entrepreneurship, private investments, construction and employment (*Figure 1*). There are six districts within the county (Bátorterenye, Balassagyarmat, Pásztó, Rétság, Salgótarján and Szécsény); among them, the Szécsény district has the smallest number of population as a consequence of the trend of the outflow of the inhabitants during the last decade.

Nógrád county is considered peripheral from several aspects of development, within which the authors aimed to find out whether the inhabitants most affected by the downturn and poverty perceive these circumstances as temporal or see any opportunities for catching up. Our question was whether the local society was aware of the missed opportunities they faced in a recession region.



**Figure 1. Macro data on Nógrád county, as a % of total Hungary (1Q 2019)**

Source: Own construction based on Hungarian Central Statistical Office (<http://www.ksh.hu/docs/hun/xftp/megy/191/index.html>)



As an outcome of a 2018–2019 university research project, this paper summarises the results of a questionnaire coming from the Szécsény district. The novelty of this research lies in the application of place-based regional development strategies with respect to a peripheral location within the Northern Hungarian region.

## **2. The perception of development in a district of Nógrád county**

In their research project the authors prepared an own questionnaire about the socio-economic issues of the sub-regions concerned, i.e. the districts of Balassagyarmat and Szécsény. Around 200 filled questionnaires were received for each of the districts, representative to gender, age, educational level, employment status and place of residence (town or village). Importance has been put upon representativeness due to the relatively large portion of the aging, impoverished and undereducated population within the region, and especially, in the sub-regions.

The geographic, economic, demographic, employment and housing conditions gave a clear picture about the peripheral nature of the sub-regions in Northern Hungary. Within their research, the authors proposed socio-economic actions for local governments to enhance development (or, at least, to prevent further decline). This paper summarises the main results of the questionnaire from the Szécsény district.

### **2.1 Literature background**

A starting point of our research has been that a distinct location's socio-economic characteristics, measured by the behaviour of its residents, represent an important source of knowledge and innovation that can drive economic development. Cortright (2002) argues that local tastes and preferences may be a source of the new knowledge, a connection that has important implications for development policy. Kozár and Neszmélyi (2018) point out the significance of consumer purchases in generating incomes locally, and adding value to development.

The place-based regional development policies initiate well-prepared, tailor-made regional development concepts that are crucial for peripheral regions. The development of these type of regions will require more decisive and harmonised governmental policies at the central, county and local levels. The different regional development programs claim that the ability to retain population should be increased by developing attractive living spaces (Sági, Engelberth, 2018), and by providing advances for corporations to help them prosper (Medvéne Szabad, Kozák, 2014).

According to Barca et al. (2012), the place-based approach is based on the idea that geographical context really matters, in terms of its social, cultural, and institutional characteristics. Besides, the place-based approach also focuses on the issue of knowledge in policy intervention. As described, the place-based approach assumes that the interactions between institutions and geography are critical for development, as these interactions foster development. In order to assess the likely impacts of a policy, the interactions between institutions and geography, therefore, require policymakers to consider the specifics of the local and wider regional context (see more in Aboelnaga et al., 2019).

The place-based approach concludes that development strategies should target mechanisms which build on local capabilities (both human and industrial ones) and promote innovative ideas through the interaction of local and general knowledge and of endogenous and exogenous actors in the design and delivery of public policies. Therefore, regional disparities remain constant and inequality rises among different regions (Boldrin et al., 2001).

Noguera (2009) admits that public action conditions a range of processes and activities that continuously influence the intensity and direction of development; among which, the study considered (a) the implementation and use of Information and Communication Technologies, (b) the development of innovation processes related to the proper functioning of business networks; (c) the nature and conditions of social capital, or the effectiveness of relations between local society; (d) the model of governance; and (e) the integration of tourism in development strategy.

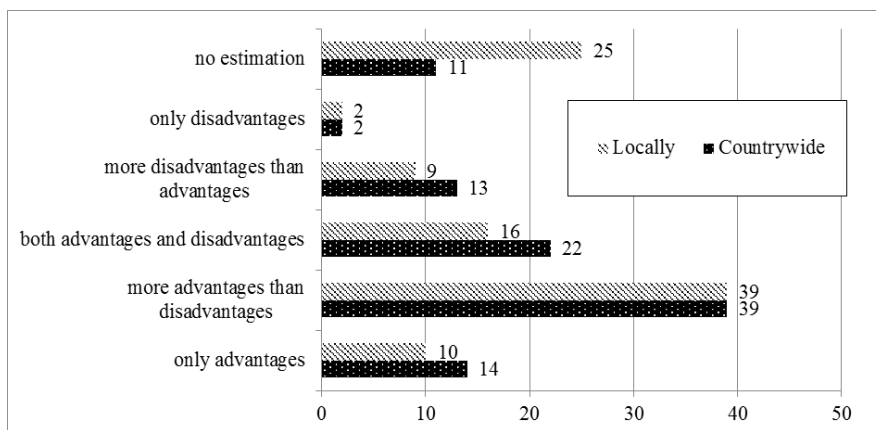
Camagni and Cappello (2014) point out that the winning strategy in regional development is neither to focus on champion places and regions, in search of the highest efficiency, nor on lagging areas only, in search of equity, but on the development potential of all places, represented by their territorial capital – material, human, cognitive, social and relational. Our paper is also tracking these territorial issues, as well as their availability and efficiency potentials. As the literature suggests (e.g. Foddi et al., 2013), policies should be tailored to each region's specificities, competitive advantage and needs, engaging all possible assets and enlarging existing excellences.

In analysing the drivers of regional development, Storper (2011) suggests constructing of structured, in-depth comparisons of the growth trajectories of the different areas. In this regard, e.g. geographies in space (Pike et al., 2010), features of the local industry and agriculture (Korom, Sági, 2005), local society and income redistribution (Sági et al., 2017; Fenyvesi, Pintér, 2020) should be taken into consideration.

## 2.2 Results from the own questionnaire

A highly problematic issue of Nógrád county is the constant outflow of financial and human resources to richer areas. This phenomenon is highly prevalent in the Szécsény district. For this reason, questions we were asked about the inhabitants' general perception of development.

In one aspect, we intended to detect the inhabitants' views about the country's EU accession, the perceived advantages and disadvantages arising from the allocation of EU funds to the sub-region, and to the country, respectively (*Figure 2*).



**Figure 2.** How the residents of the Szécsény district see Hungary's accession to the EU

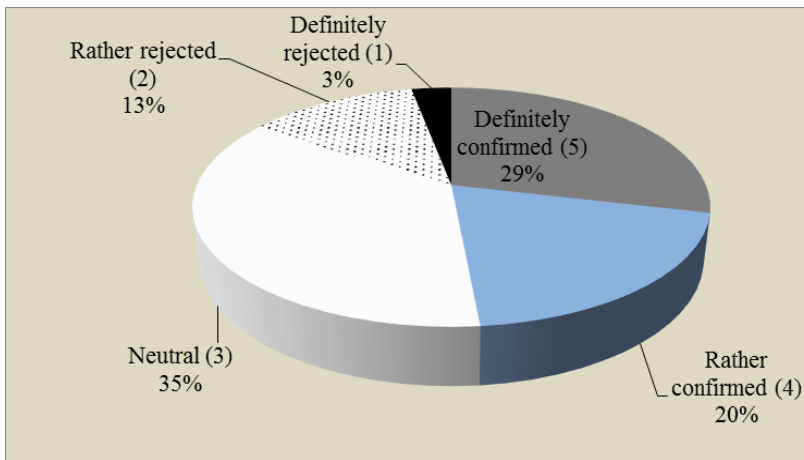
Source: Own questionnaire.

On the other hand, we wanted to investigate the perceived utilisation of external funds; whether the developments in infrastructure, production of assets and the environment were considered to be useful and sufficient in the previous years (*Figure 3*).

Based on the responses we found that – though substantially more inhabitants viewed the outcomes of the developments as positive – the higher educated and those living in towns are more doubtful about the prospects of their sub-region. These developments have been made even in situations where the local municipalities faced strict governmental constraints in the past years (Hegedűs et al., 2019).

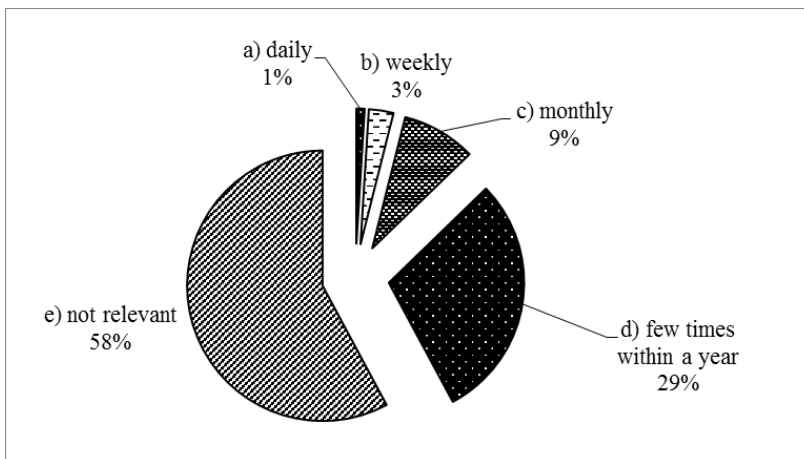
Hereby it is important to note that local development policies in the sub-region throughout the past couple of years meant expenditures mainly on physical infrastructure. For example, two bridges were built on the river Ipoly, with the purpose to connect the sub-region to the neighbouring Slovakian territories. In

order to get feedback about the use of these infrastructures, we asked if the inhabitants were commuting or travelling through the border (*Figure 4*). Based on the answers we found that only a few people travelled frequently to the neighbouring Slovakian region, those from the younger generation and for tourism and shopping.



**Figure 3. How satisfied were the inhabitants of Szécsény district with the past years' developments**

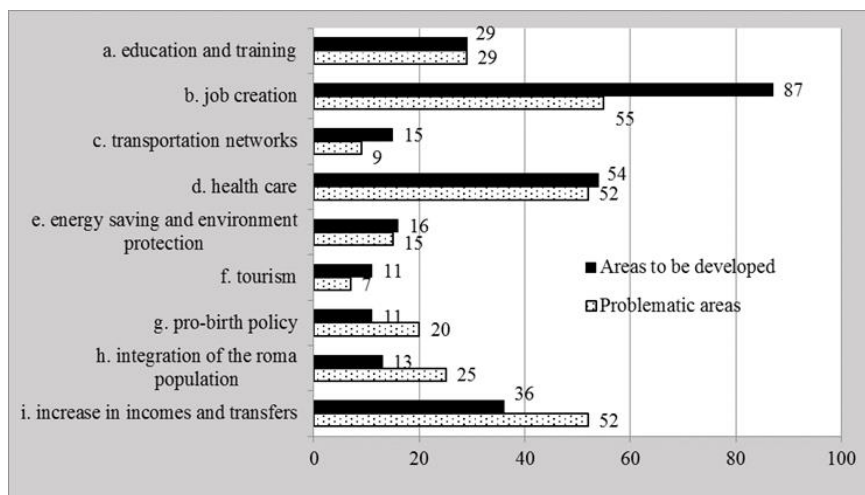
Source: Own questionnaire.



**Figure 4. Frequency of visits of inhabitants of the Szécsény district to the neighbouring Slovakian territories**

Source: Own questionnaire.

Lastly, we intended to map the different kinds of developments, to rank them with respect to their importance and need (*Figure 5*). We found that job creation was deemed to be the most important factor explaining why the Szécsény district was lagging behind the other districts and sub-regions of Hungary. In addition, the development of the health care system was considered to be essential to well-being. Finally, an increase in incomes and transfers was perceived to be important in the future development of the district.



**Figure 5. The opinion of the residents of the Szécsény district about the crucial areas that need to be developed in the territory**

Source: Own questionnaire.

### 3. Conclusion

Our results display the characteristics of the peripheral Szécsény district with respect to the problematic areas or the areas to be developed. In contrast to the current trends of an impoverished and aging population, the young professional labour force should be retained, via creating jobs, improving health care services, and providing transfers to the settlement. The previous years' infrastructural developments did not meet the inhabitants' demand for improvement; instead, they should be diverted to the development of infrastructure and institutions supporting the production and sale of local agricultural products.

## Acknowledgements

The authors made investigations on the basis of a recent survey (questionnaire), with the support of the university Research Fund of the Budapest Business School. The project lasted from September 2017 until September 2018.

The above mentioned research can be extended in the future with the comparison of the Szécsény district with neighbouring districts, alongside with a cross-border comparison with a carefully selected Slovakian micro-region.

## References

- ABOELNAGA, S., TOTH, T., NESZMELYI, Gy. I. 2019. Land use management along urban development axis as one of urban regeneration principles. In: *Engineering for rural development*. Vol. 18, pp. 944–953.
- BARCA, F., MCCANN, P., RODRIGUEZ-POSE, A. 2012. The case for regional development intervention: place-based versus place-neutral approaches. In: *Journal of Regional Science*. Vol. 52, No. 1, pp. 134–152.
- BOLDRIN, M., CANOVA, F., JÖRN-STEFFEN, P., PUGA, D. 2001. Inequality and Convergence in Europe's Regions: Reconsidering European Regional Policies. In: *Economic Policy*. Vol. 16, pp. 207–253.
- CAMAGNI, R., CAPELLO, R. 2015. Rationale and design of EU cohesion policies in a period of crisis. In: *Regional Science Policy & Practice*. Vol. 7, No. 1, pp. 1–20.
- CORTRIGHT, J. 2002. The Economic Importance of Being Different: Regional Variations in Tastes, Increasing Returns, and the Dynamics of Development. In: *Economic Development*. Vol. 16, pp. 2–16.
- ENGELBERTH, I., SÁGI, J. 2016. Catching up or lagging behind? The case of a Hungarian sub-region at the Slovakian border: The Szécsény sub-region. In: *Ladislav, Mura; Monika, Bumbalová; Monika, Gubáňová (eds.) Sustainability of rural areas in practice: Conference Proceedings from International Scientific Conference, Nitra*. Slovak University of Agriculture, pp. 158–166.
- ENGELBERTH, I., SÁGI, J. 2019. Az európai uniós fejlesztések és az ezzel kapcsolatos lakossági attitűdök a Szécsényi járásban. In: *Karlovit, János Tibor (szerk.) Tanulmányok a kompetenciákra épülő, fenntartható kulturális és technológiai fejlődés köréből*. Komárno, Szlovákia: International Research Institute s.r.o., pp. 117–127.
- FENYVESI, É., PINTÉR, T. 2020. The characteristics of Hungary's hidden economy before and after the change of regime. In: *TIPURIĆ, D., RADIĆ, M. (eds.) Abstracts of the proceedings: From Corporations to Social Entrepreneurs: Exploring the Different Faces of Social Innovation*. p. 26.
- HEGEDŰS, SZ., LENTNER, CS., MOLNÁR, P. 2019. Past and Future: New Ways in Municipal (Property) Management after Debt Consolidation: In Focus: Towns with County Rights. In: *Public Finance Quarterly*. Vol. 64, No. 1, pp. 51–71.
- KOROM, E., SÁGI, J. 2005. Measures on competitiveness in agriculture. In: *Journal of Central European Agriculture*. Vol. 6, No. 3, pp. 375–380.
- KOZÁK, T., NESZMELYI Gy. I. 2018. Trendek, trendváltások a kereskedelemben. In: *Jura*. Vol. 24, No. 2, pp. 468–482.
- MEDVÉNÉ SZABAD, K., KOZÁK, T. 2014. The site selection strategies of enterprises. In: *International Journal of Business and Management Studies*. Vol. 6, No. 2, pp. 18–28.

- NOGUERA, J. 2009. An analysis on the subjective perception of policy action on peripherality: A comparative assessment in accessible and peripheral areas of six countries of the EU. In: *Regional Science Policy & Practice*. Vol. 1, No. 2, pp. 159–176. doi:10.1111/j.1757-7802.2009.01011.x
- PIKE, A., RODRIGUEZ-POSE, A., TOMANEY, J. 2007. What Kind of Local and Regional Development and for Whom? In: *Regional Studies*. Vol. 41, No. 9, pp. 1253–1269. <https://doi.org/10.1080/00343400701543355>
- STORPER, M. 2011. Why Do Regions Develop and Change? The Challenge for Geography and Economics. In: *Journal of Economic Geography*. Vol. 11, pp. 333–346.
- SÁGI, J., ENGELBERTH, I. 2018. Regional Development and Well-Being of Regions in Hungary. In: *Polgári Szemle: Gazdasági és társadalmi folyóirat*. Vol. 14, Special issue, pp. 184–174.
- SÁGI, J., TATAY, T., LENTNER, CS., NEUMANNÉ, V.I. 2017. Certain Effects of Family and Home Setup Tax Benefits and Subsidies. In: *Pénzügyi Szemle/Public Finance Quarterly*. Vol. 62, No. 2, pp. 171–187.
- SÁVAL, M., KISS, G. D. 2017. A V4 és GIPS országcsoportok összehasonlító elemzése egylépéses dinamikus panelregresszió segítségével – Comparative Analysis of the V4 and GIPS Countries Using One-step Dynamic Panel Regression. In: *Pénzügyi Szemle/Public Finance Quarterly*. Vol. 62, No. 4, pp. 444–461.

# Science Diplomacy of the EU member states in Israel – the Startup Nation – with a special regard to the V4 countries

SZABOLCS SZOLNOKI<sup>1</sup>, ÁRPÁD PAPP-VÁRY<sup>2</sup>

**Abstract:** Since the global economic crisis in 2008 showed that classical western capitalism was not able to provide rapid and stable growth, implementation of new strategies is required (Jacobs, Mazzucato, 2018). Recognizing this need, forward-thinking nations make efforts to increase the productivity of domestic-owned enterprises through innovation and the use of new technologies. The goal is to move economic players towards the production of higher added value and increased efficiency, which can ensure sustainable economic growth over the long term. In the age of globalized markets and dependency on international economic trends, science diplomacy and country (recently metropolitan regions’) brands have become a key factor. Science diplomacy has various definitions. A decade ago, the Royal Society and the American Association for the Advancement of Science identified three main types of activities: science in diplomacy; diplomacy for science; science for diplomacy. Nevertheless, it is undergoing a continuous transformation from a “presenting results of the past” approach to a “business-oriented, future result generating” approach. With the help of science diplomacy in introducing nation branding strategies, attracting foreign direct investment (FDI), individual talents, entrepreneurs and researchers to settle down, and fostering the establishment of research and development centers and high value-added workplaces are all heavily important goals. Israel is a great example for well-designed branding activities and a never running out storehouse of best practices. Numerous governmental and non-governmental players are forming a mature ecosystem aimed at maintaining and developing the Startup Nation brand. The high-tech export of the 72-year-old, 20,000 sqm and 9-million citizen state represented over 45% of the 102 billion USD in total exports of goods and services in 2017. The number of startups is over 6200 and more than 340 multinationals have research and development centers in the country. The outstanding performance and impressive innovation based country brand of Israel – the “Startup Nation” urges diplomatic missions to establish science diplomacy and innovation agencies, to appoint specialized diplomats and to set up bilateral funds. A peculiar type of tourism has also been created by the massive growth of study tours – governmental, corporate and scientific, expert delegation visits partially initiated by innovation and trade attachés (Lautman, 2015). The Authors’ study strives to outline the aspirations of scientific and technological cooperation activities of the EU member states in Israel with an emphasis on the V4 countries. Based on the Authors’ ecosystem visits, personal interviews and secondary information, their study

---

<sup>1</sup> SZABOLCS SZOLNOKI, Pécsi Tudományegyetem Földtudományi Doktori Iskola, Hungary, szabolcs.szolnoki@protonmail.com

<sup>2</sup> ÁRPÁD PAPP-VÁRY, Budapest Metropolitan University, Hungary, apappvary@metropolitan.hu



attempts to outline an overall picture about the innovation dominated elements of the Israeli Public Diplomacy (Hasbara), the science diplomacy activities of the diplomatic missions of EU member states in Israel, especially the V4 cooperation, which has created a Working Group in Research, Development and Innovation together with Israel. Authors believe that exploring the science diplomacy of Israel can unfold several good practices that can be implemented in the V4 region as a tool of high value-added investments' promotion.

**Key words:** science diplomacy; international cooperation; V4 region; Israel; startup nation

**JEL Classification:** F50, F53

## 1. Introduction

Science diplomacy is an excellent tool for developing good relations among nations. Joint research programs, knowledge sharing trainings, scientific exhibitions and exchange programs – just to mention a few activities, can contribute to mutual understanding of different cultures. Furthermore, the bilateral and multilateral applied research, development and innovation projects may end in monetized results. Shared patents, scientific and business outcomes often increase pride and strengthen ties – not only among the collaborative team members, since these activities provide valuable inputs for news articles and PR campaigns that may influence the public. It is non-negligible that governmental administration personnel can establish effective professional connections by the coordination of tasks. Based on the history of former duties, the evolved trust is most likely to flow through to other areas of diplomatic relations.

Israel, the world's 5<sup>th</sup> most innovative nation according to Bloomberg's latest ranking, the country which is often called the "Startup Nation" or "Silicon Wadi" is much less divisive in the eyes of the international community when the topics are innovation, scientific and high-tech cooperation (Bloomberg, bloomberg.com, 2019). Of course, political positions manifest themselves within the field of science diplomacy, too, but are much less detectable. Even trade and commercial affairs are affected more largely – for instance, by applying government directive special labeling for settlement products.

In the field of academic relations, we have to mention that Israeli organizations located in the West Bank (pro-Israeli term: Judea and Samaria; pro-Palestinian term: occupied territories), such as Ariel University in North Israel are not eligible for EU grants (for example Erasmus+ or Horizon 2020 program). The Boycott, Divestment and Sanctions (BDS) campaign has a specific sub-campaign launched in April 2004 – called the Palestinian Campaign for the Academic and Cultural Boycott of Israel (PACBI). The academic boycott has achieved partial success among a few organizations from the US to South Africa, but it did not jeopardize

and freeze many organizations – the attempt to isolate the Israeli academic community failed (Forbes, forbes.com, 2019).

Twenty-seven members of the European Union (including the United Kingdom) have bilateral governmental level agreement on cooperation related to science – in many cases together with culture, science and education. Eighteen countries are involved in an industrial R&D cooperation program with Israel which provides funding for joint applied research and market-oriented projects. Our study focuses on the bilateral and multilateral agreements of the Visegrad Group (V4) countries – Hungary, Slovakia, the Czech Republic and Poland.

The aim of our study is to provide a descriptive summary of the V4 – Israel relations in the scientific and high-tech field and to draw attention to the importance, versatility and practical usefulness of science diplomacy of small countries that are captured in the prison of geography. Due to limitations of this article the authors did not examine several challenges related to this topic, for example the yet not defined economic philosophy of internet age.

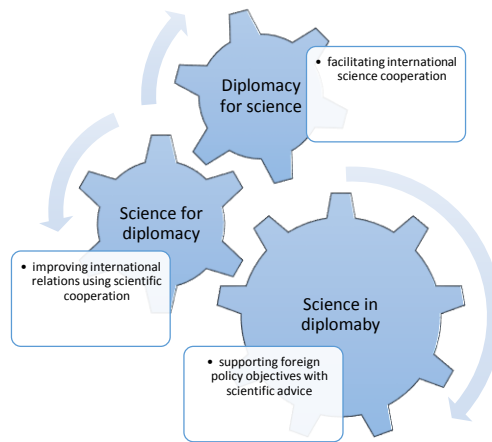
## **2. Science diplomacy and nation branding – soft super-power in international relations**

Science diplomacy is considered apolitical; it addresses important issues which are relevant to all societies, furthermore, it can contribute to various goals of geopolitics and geo-economics. Since it is a greatly empowering instrument of soft power and country branding, science diplomacy is one of the most relevant and recognized elements of public diplomacy today (*Figure 1*).

Israel is a great example for well-designed science diplomacy and branding activities and provides many interesting good practices for the V4 countries. Numerous governmental and non-governmental players are forming a mature ecosystem aimed at maintaining and developing the Startup Nation brand. The high-tech export of the 72-year-old, 20,000 sqm and 9-million citizen state represented over 45% of the 102 billion USD in total exports of goods and services in 2017.

Data became the new oil and thanks to the World Wide Web, low-cost, high-yield, export-oriented products targeting the global market can be instantly sold without the need for containers, packaging materials, complicated customs procedures and insurances (Csizmadia, 2016). It soon became clear that investing in innovation, research, development and software engineering has enormous economic potential – not to mention the contribution to Israel's national security capabilities.

Israel is the home of networks and platforms. This is the case with country branding too – all the actors working professionally on the positive international



**Figure 1. Definition of science diplomacy by the Royal Society and the American Association for the Advancement of Science in 2010**

*Source:* Edited by the Authors.

perception of the “Startup Nation” and “Silicon-wadi” are divided into informal and formal networks. Their nation branding strategy is, on the one hand, an immense support in attracting foreign investments and talents. On the other hand, it proved to be an excellent solution to fight against the negative perception of the Middle East and Israel.

Science diplomacy is done mostly but not only by specialized and well-prepared attachés. The Israeli Ministry of Foreign Affairs (MFA) also puts a strong emphasis on the process of training their diplomats. During the Foreign Service, they can contribute to the promotion of the innovative-economy-focused country brand at their diplomatic missions. In addition, foreign diplomats accredited to Israel are also involved in innovation-oriented country branding programs organized by the MFA.

### **3. Science diplomacy in the Startup Nation – Cooperation of the European Union and the Members States with Israel**

Israel has a long history in EU partnerships and funding programs – the state as the first non-European country which joined has been a partner in the research and innovation framework programs since 1996. The current, so-called Horizon 2020 program with an approximately 80 billion EUR budget for 7 years is the largest research and innovation program in the world. One of the most spectacular and effective EU-Israel scientific cooperations is realized in its framework. From the

beginning of the program until the end of 2018, grants of over 742 million EUR total value have financed 1062 Israeli projects. Over 400 Israeli companies and researchers won Horizon 2020 grants in 2018 and received 180 million EUR funding from Brussels (Delegation of the European Union to Israel, [eeas.europa.eu](http://eeas.europa.eu), 2019).

The next framework program named Horizon Europe, according to the Commission's proposal, is remarkably ambitious with its 100 billion EUR budget. The role and share of Israel in the program is still not clear since the EU plans to concentrate innovation efforts on European beneficiaries rather than associated members. Israel invests some 1 billion EUR into the Horizon2020 program and receives around 1.5 billion EUR in grants for R&D projects. Thirteen members of the European Parliament (MEP) visited Israel in November 2018 and during their ecosystem study tour, they had meetings with Israeli governmental representatives. Based on the feedbacks and the press articles about the MEPs' visit their conclusion was supportive. A provisional agreement on Horizon Europe was reached by the European Parliament and the Council of the EU in March and April 2019. The provisional agreement was endorsed by the European Parliament on 17 April 2019, thus its outcome was still unknown at the time this study was written (Globes, [en.globes.co.il](http://en.globes.co.il), 2018).

Israel is also a partner in the EUREKA network since joining the program as a full member in 2000. Over 40 countries are members of the publicly funded intergovernmental network, a leading open platform for international cooperation in innovation. As one of the most active countries in the program, the country was elected to be the chair of the program for 2010. Israeli companies take part in more than 10% of the projects (Science Business, [sciencebusiness.net](http://sciencebusiness.net), 2011).

Israel participates in the Erasmus + Education Cooperation Framework Program, which contributes, inter alia, to EU-Israel researcher relationships through joint projects and exchanges – 177 winning projects in 2017, 1322 Israeli travelers to Europe and 1064 European to Israel (European Commission, [ec.europa.eu](http://ec.europa.eu), 2018).

International cooperation programs can contribute to increasing the productivity of domestic-owned enterprises through innovation and the use of new technologies. To achieve these goals, many countries have created their own bilateral programs with Israel. Twenty-seven EU Member States (including the United Kingdom) signed bilateral research, development and innovation agreements with Israel. In many cases, the main framework for cooperation is publishing calls for proposals financing applied research. Between Hungary and Israel, the seventh call for proposals for joint R&D projects has already been published. In 2019, based on the agreement of the Israeli and Hungarian Prime Ministers, the budget has been increased to 3+3 million EUR.

Our study focuses on the Visegrad countries. Since the Heads of States have recognized the importance of exchanging best practices in research, development and innovation, their cooperation – both on bilateral level and as a group is emerging with the most innovative nations, and Israel is among them. The goal is to move the V4 regions' economic players towards the production of higher added value and increased efficiency, which can ensure sustainable economic growth over the long term. With the help of such international programs, company representatives and experts from the region can greatly benefit from learning more about innovation management and entry strategies to the global market.

The five countries have established a working group as a follow-up of the decision made by the Prime Ministers of the Visegrad countries and the State of Israel at the V4-Israel Budapest Summit on the 19<sup>th</sup> of July, 2017. Their aim is to deepen their partnership in building innovative and creative economies. The task of the Working Group is to identify relevant cooperation areas and launch concrete projects. The first meeting's initiatives concentrated on mobility, training of young entrepreneurs, RDI knowledge sharing, capacity building for SMEs and technology transfer (Department for Science Diplomacy, tdf.kormany.hu, 2017).

The Visegrad countries (V4), the State of Israel and the International Visegrad Fund (IVF) signed a Memorandum of Understanding on Training Cooperation in the Field of Innovation in Jerusalem on June 18, 2018. The document is the very first result of the multilateral cooperation in the field of innovation. By agreement in December 2018, a three-week-long training program offered short-term, intensive courses for pre-selected entrepreneurs and incubator managers to familiarize themselves with the best practices of the excellent Israeli innovation ecosystem (Department for Science Diplomacy, tdf.kormany.hu, 2018).

Examining the topics and dates of the agreements signed by the Visegrad countries and Israel on a bilateral level we can declare that the first period in science diplomacy relations was in the early 1990s after the dissolution of the Soviet Union when the direct diplomatic ties were re-established.

The second period was between the late 2000s and early 2010s when the innovation ecosystems of the V4 countries started to flourish and their hunger for knowledge, skills and international cooperation in RDI management was increasing. Applied research and joint R&D programs with dedicated budgets were established at that time.

In a few years, we will be able to tell if the third generation started in 2017/2018 or not. The V4 countries, the International Visegrad Fund and the State of Israel have signed and implemented a successful training program for 27 entrepreneurs and ecosystem managers (Izraelinfo, izraelinfo.com, 2018). In case the extent and depth grows, e.g. by organizing complex training and knowledge sharing programs for bigger groups on a regular basis and/or by creating a five-state multilateral funding program, the third period of relations can be identified.

One thing is certain – V4+Israel format will (and should) never replace the bilateral agreements and programs, however, their improvement in specific topics and industries is mutually beneficial for all the participants and their stakeholders (*Table 1*).

**Table 1. V4 bilateral and multilateral RDI-related agreements, self-edited**

COUNTRY	TITLE OF AGREEMENT
Czech Republic	Joint Declaration by Deputy Prime Minister for Science, Research and Innovation of the Czech Republic and the Ministry of Science, Technology and Space of the State of Israel on Cooperation in the Field of Research and Development (2014)
	Agreement between the Government of the State of Israel and the Government of the Czech Republic on Bilateral Cooperation in Private Sector, Industrial Research and Development (signed in 2009 renewed in 2017)
	Work Plan for Support of Czech-Israeli Joint Projects for the Years 2019-2022 on scientific cooperation (signed in 2012, renewed on 2018)
	Programme of Co-operation in the Field of Education, Science and Culture between the Government of the Czech Republic and the Government of the State of Israel for the Years 2012 – 2015 (signed in 2011)
	Agreement between the Government of the Czech and Slovak Federal Republic and the Government of the State of Israel on Cooperation in the fields of Culture, Education and Science (signed in 1991)
	Agreement between the Government of the Czech Republic and the Government of the State of Israel on co-operation in the fields of health and medical science (signed in 1995)
Hungary	Agreement between the Government of the State of Israel and the Government of the Republic of Hungary on Cooperation in the Field of Culture, Education and Science (signed in 1991)
	Agreement Between the Government of the State of Israel and the Government of the Republic of Hungary on Bilateral Cooperation in Private Sector Industrial Research and Development (signed in 2009)
	Joint Declaration of Intent in the Field of Innovative Industry Development between the Government of the State of Israel and the Government of Hungary (signed in 2017)
Poland	Agreement between the Government of the Republic of Poland and the Government of the State of Israel on Cooperation in Culture, Science and Education (signed in 1991)
	Agreement between the Government of the Republic of Poland and the Government of the State of Israel on Economic, Scientific and Technology Cooperation in the fields of agriculture and food industry (signed in 1991)

COUNTRY	TITLE OF AGREEMENT
	Agreement between the Government of the Republic of Poland and the Government of the State of Israel on Cooperation in the fields of Health and Medicine (signed in 2006)
	Cooperation Plan to the Agreement between the Government of the Republic of Poland and the Government of the State of Israel on Cooperation in the fields of Health and Medicine for the years 2011–2015 (signed in 2011)
	Agreement between the Government of the Republic of Poland and the Government of the State of Israel on Cooperation in Industrial Research and Development (signed in 2014)
Slovakia	Agreement between the Government of the Slovak Republic and the Government of the State of Israel on cooperation in private industrial research and experimental development in the process of coordination (signed in 2011)
	Agreement between the Government of the State of Israel and the Government of the Czech and Slovak Federative Republic on Cooperation in the fields of Culture, Education and Science (signed in 1991) - Work Program for Scientific and Technological Cooperation between the Ministry of Education, Science, Research and Sport of the Slovak Republic and the Ministry of Science, Technology and Space of the State of Israel (signed in 2019)
V4+Israel	Memorandum of Understanding on Training Cooperation in the Field of Innovation

*Source:* Israel Ministry of Foreign Affairs, mfa.gov.il, 2019.

#### 4. Conclusion

The Authors of the article share the view about the potential influence of science diplomacy and nation branding in international relations, and at the same time, they are aware that it should not be overestimated or mystified, but rather it should be viewed as an important, but not the only and almighty skeleton key in the toolbox of diplomacy. From their perspective – formed after several study visits, interviews, and analysis of modern geopolitical codes and statements by heads of opposing states – placing technological supremacy in the spotlight serves the targets of geopolitics and geo-economics.

Some states are miles ahead of other developed ones, and there is no shame in learning about their best practices. Israel is among the frontrunners – one of the most innovative countries in the world, owner of the Startup Nation Brand, famous all over the world for its combat capability, intelligence and secret services – despite its indigence in natural resources, small size in land and population, lack of strategic depth, and constant break-in attempts at the borders (Marshall, 2018).

The study reviewed the major agreements and latest activities in science diplomacy relations of Israel and the Visegrad countries – the Czech Republic, Hungary, Poland and Slovakia. The Authors foresee moderate and judicious broadening and deepening progress in the cooperation. They believe that the activities will focus on knowledge sharing, trainings, and will be characterized by easy commitment. Multilateral grants and funding programs are not necessary – on one hand, their contribution to the core goal is not strong enough and such a program would be a competitor of the bilateral funds. Nevertheless, Horizon 2020 and other EU funds may be suitable for five-country R&D partnerships. The authors remind their readers that science diplomacy in international relations is dynamically growing and is in the state of continuous renewal, thus it raises plenty of exciting research questions although it is and will remain a tool and not a goal in itself.

## References

- CSIZMADIA, N. 2016. *Geopillanat: A 21. század megismerésének térképe*. Budapest: L'Harmattan Kiadó
- JACOBS, M., MAZZUCATO, M. 2016. *Rethinking capitalism. Economics and Policy for Sustainable and Inclusive Growth*. Wiley-Blackwell, John Wiley & Sons
- LAUTMAN, O. 2018. *Israeli Business Culture. Building Effective Business Relationships with Israelis*. Jerusalem, OLM Consulting
- MARSHALL, T. 2016. *Prisoners of Geography. Ten Maps That Tell You Everything You Need To Know About Global Politics*. London: Elliott and Thompson Limited.
- Delegation of the European Union to Israel 2019. *EU celebrates 423 Israeli achievements under Horizon 2020 programme* (URL: [https://eeas.europa.eu/delegations/israel/63767/eu-celebrates-423-israeli-achievements-under-horizon-2020-programme\\_en](https://eeas.europa.eu/delegations/israel/63767/eu-celebrates-423-israeli-achievements-under-horizon-2020-programme_en) released: 07. 06. 2019., downloaded: 21. 08. 2019.)
- Eureka meeting in Israel agrees to fund €33 M of new projects* (URL: <https://sciencebusiness.net/news/74823/Eureka-meeting-in-Israel-agrees-to-fund-%E2%82%AC33-M-of-new-projects> released: 02. 03. 2011., downloaded: 22. 08. 2019.)
- European Commission 2018. *Erasmus+ for higher education in Israel* (URL: [https://ec.europa.eu/assets/eac/erasmus-plus/factsheets/neighbourhood/erasmusplus\\_israel\\_2017.pdf](https://ec.europa.eu/assets/eac/erasmus-plus/factsheets/neighbourhood/erasmusplus_israel_2017.pdf) released: 03. 2018., downloaded: 21. 08. 2019.)
- GERTSMANN, E. 2019. *Why An Academic Boycott Of Israel Is Hypocritical* (URL: <https://www.forbes.com/sites/evangerstmann/2019/02/21/why-an-academic-boycott-of-israel-is-hypocritical/#4058dabc5f04> released: 21. 02. 2019., downloaded: 22. 08. 2019.)
- Globes – Israel Business News 2018. *EU mulls reducing Israeli access to European R&D program* (URL: <https://en.globes.co.il/en/article-eu-mulls-reducing-israeli-access-to-european-rd-program-1001259132> released: 05. 11. 2018, downloaded: 22. 08. 2019.)
- Israel Ministry of Foreign Affairs 2019. *Israel's Bilateral Relations* (URL: <https://mfa.gov.il/MFA/AboutTheMinistry/Pages/Israel-Bilateral-Relations.aspx> downloaded: 22. 08. 2019.)
- JAMRISKO, M., MILLER L. J., LU, W. 2019. *These Are the World's Most Innovative Countries* (URL: <https://www.bloomberg.com/news/articles/2019-01-22/germany-nearly-catches-korea-as-innovation-champ-u-s-rebounds> released: 22. 01. 2019., downloaded: 22. 08. 2019.)



- Ministry of Foreign Affairs and Trade 2018. *First meeting of the V4-Israel working group on research development and innovation* (URL: <https://tdf.kormany.hu/first-meeting-of-the-v4-israel-working-group-on-research-development-and-innovation> released: 16. 04. 2018., downloaded: 20. 08. 2019.)
- Ministry of Foreign Affairs and Trade 2018. *The V4 and Israel launching training program for innovative entrepreneurs* (URL: <https://tdf.kormany.hu/the-v4-and-israel-launching-training-program-for-innovative-entrepreneurs> released: 20. 06. 2018., downloaded: 21. 08. 2019.)
- National Erasmus+ Office Israel (URL: <https://www.erasmusplus.org.il/> downloaded: 21. 08. 2019.)
- SHIRI, ZS. 2018. Tel-Avivban lesik el a high tech gazdaság titkait fiatal magyar cégek (URL: <https://izraelinfo.com/2018/12/11/tel-avivban-lesik-el-a-high-tech-gazdasag-titkait-fiatal-magyar-cegek/> released: 11. 12. 2018., downloaded: 22. 08. 2019.)

# The Comparative analysis of Russian Black Sea Maritime Strategy and Chinese South China Sea Strategy: the Geopolitical Challenges and their Implications in the Region

HNIN MYA THIDA<sup>1</sup>

**Abstract:** In today's world, maritime power plays an important role that can transform a country into a leading country. Each major power is trying to improve its maritime policy and capability as a strategy to enhance its influence in the region and global rivalry. In this case, Russia and China are no exceptions. They try to reposition themselves from being a land power into being a sea power by using strategic maritime policy. They attempt to formulate and announce their maritime strategies, then, practice those as their national priorities. Consequently, the implications of this scenario have a great impact on contested areas and related regions as well as regional organizations. This paper presents the maritime strategies used by Russia and China in a comparative analysis and explores the geopolitical challenges and regional implications of these strategies.

**Key words:** China, Russia, Maritime Strategy, Black Sea, South China Sea dispute, NATO

## 1. Introduction

The maritime environment strongly impacts both economic and geopolitical factors globally (Horrell et al., 2016). Maritime power can be defined as “military, political, and economic power or influence exerted through an ability to use the sea” (McDevitt, 2016). According to McDevitt (2016), the maritime power of a state reflects sea-based military capabilities, such as ships and submarines, as well as a range of military land-based assets and space-based systems that may or may not be operated by the navy. It also includes civilian capabilities such as a coast guard, port infrastructure, merchant shipping, fishing, and shipbuilding. A slight difference between sea power and maritime power is that sea power focuses more on naval dimensions while maritime power equally emphasizes the naval and civil elements of a nation's maritime capability.

Currently, most of the littoral countries make efforts to become powerful maritime powers for the sake of their national interests. They view the maritime strategy as a way to achieve their national goals. Small coastal countries in the contested maritime zone as well as the neighboring region with big powers have

---

<sup>1</sup> HNIN MYA THIDA, Corvinus University of Budapest, Hungary, hninmyathida.85@gmail.com

mostly triggered geopolitical instability on the playground of the great powers' maritime game.

China and Russia have been applying and improving their maritime strategies and naval capabilities to enhance their influence in the regional and international environment. Each country seems to be harboring the dream of achieving a great power status by using all possible methods. They are trying to modify their maritime policies and their focus that creates serious concern to regional and global order. China has long-standing disputes with many claimant states in the South China Sea. Its assertive acts like building artificial islands and taking military exercises in the disputed waters have led to regional instability provoking the external interference of other great powers. Likewise, Russia has sought to extend its influence and power in the Black Sea region by formulating new strategies creating the same impacts as China. These two cases are serious geopolitical challenges in each region that involved the participation of related regional players and global actors.

## **2. Russia's Maritime strategy**

The new version of the 2014 Russian Military Doctrine has encouraged Russia to enhance its maritime power. According to the 2010 Military Doctrine, the movement of military infrastructure of NATO member states towards Russian borders as well as the development and deployment of strategic missile defense systems were perceived as military threats by Moscow (Sinovets, Renz, 2015). The persistence of this perception can still be observed in the 2014 Russian Military Doctrine. But there was a little deviation from the previous 2010 Military Doctrine in which Moscow no longer regards cooperation with NATO as a means to reinforce collective security as before but sees NATO merely as a potential partner for 'equal dialogue'. It means that Moscow shifts its relations with NATO towards competition rather than collaboration. Additionally, the new doctrine viewed the regime change in the neighborhood and military exercises and military mobilization therein as military dangers to Moscow. Consequently, Russia focused on preserving the bordering territories as its vital sphere of influence to be maintained as an important buffer zone, concurrently, to control NATO's enlargement at its near borders. Under these perceptions and concerns, Russia views the Black Sea maritime strategy as a key strategic project to be implemented. On the other hand, Kremlin seeks to regain its status as a blue water force through a large-scale development of its navy (Hunter, 2017).

According to the Maritime doctrine of the Russian Federation, there are six regional priorities of the Atlantic, Arctic, Caspian, Indian Ocean and Antarctic areas ("Black Sea Geography", n.d.). The foundation of the National Maritime

Policy in this area is the implementation of the long-term objectives in the Atlantic Ocean, the Baltic, Black, and Azov Seas, as well as in the Mediterranean Sea (Davis, 2015). In this maritime strategy, there are short-term and long-term objectives. The short-term objectives are determined by:

- a) changes in geopolitics, the military-political situation, and financial economics in the world;
- b) the socio-economic situation in the Russian Federation and its regions;
- c) economic conjuncture of the world market – freight, marine biological, hydrocarbon, and other resources within the World Ocean;
- d) achievements in science and technology;
- e) level of effectiveness of the maritime activities of the Russian Federation.

Long-term objectives are the substance of the National Maritime Policy at the functional and regional areas of Policy implementation (David, 2015, 9–10).

### **3. Russia's aims in the Black Sea**

The coasts of Russia are washed by 12 seas: Atlantic Ocean, Arctic Ocean and the Pacific Ocean (“Russian Trade Representation/Russian Federation: General Information,” n.d.). The Black Sea region is situated in the Atlantic Ocean region.

Under the Vladimir Putin Presidency, Moscow's primary strategic objective is to create Eurasian “Pole of Power” or a bloc of states under Russian predominant influence by containing and undermining NATO's influence through Eastern Europe. The Kremlin's objectives in the Black Sea are twofold. First, by 2020 the Black Sea Fleet must be a ‘fortress fleet’ able to carry out anti-access and area-denial operations in case of a crisis in the Black Sea basin. Second, the Black Sea Fleet must be able to support the permanent deployment of the Russian Mediterranean Squadron (Learschi, 2016).

The black sea region is an important crossroads and a strategic intersection of east-west and south-north corridors. This major inland sea is bordered by six countries – Romania and Bulgaria to the west; Ukraine, Russia, and Georgia to the north and east; and Turkey to the south (“Black Sea Geography,” n.d.). The growing strategic significance of the Black Sea is the result of the proximity to and importance of developments in the Middle East, the eastward expansion of the EU (European Union) and NATO (North Atlantic Treaty Organization) and a more active approach of the United States and the EU toward Central Asia, and the external energy of consumer countries and hydrocarbon resources and routes in the wider region (Lembke, Voinescu, 2006). It can be stated that the one who can control the Black Sea can build its power projection toward mainland Europe, especially the Balkans and Central Europe, as well as the Eastern Mediterranean, the South Caucasus and the northern Middle East (Learschi, 2016).

In the Black Sea Strategic report No.1 (2016), Learschi reported the following: Russia's supremacy in the Black Sea becomes critical for restoring its east European and Eurasian dominion, as well as projecting power toward the Mediterranean and the Middle East. Its offensive in and around the Black Sea is a part of a larger anti-NATO strategy in which naval forces play a significant and growing role. Russia is using the Black Sea as a more advantageous method of revisionism than extensive land conquests. Control of ports and sea lands deliver several benefits: it prevents NATO from projecting sufficient security for its Black Sea members; deters the intervention of littoral states on behalf of vulnerable neighbors; threatens to choke the trade and energy routes of states not in compliance with Russia's national ambitions; and give Moscow an enhanced ability to exploit fossil fuels in maritime locations (Learschi, 2016).

In 2010, Russia launched the State Armament Program 2020, embarking on an ambitious fleet modernization program including new nuclear-powered attack submarines and conventional submarines with air-independent propulsion (Horrell et al., 2016). Control over the Black Sea is essential for Russia to fulfill its political, economic and military goals as well as to restore its international power.

Russia's takeover of Crimea in March 2014 is its next effort to push forwards its expansionist policy. Crimea's annexation by Russia has not only overthrown the Black Sea maritime context, but it has reshaped Russia's Mediterranean ambitions as well (Delanoë, 2014). That has changed the regional balance of power following its attempt to develop its naval infrastructure and firepower on the peninsula (modernization of Black sea fleet, deployment of new weapon system to challenge NATO's presence and undermine the security of littoral states). The modernization of the Black Sea fleet is one of the most important elements of the Russian State Arms Procurement program of 2011–2020. The fleet's firepower doubled in the period from 2014 to 2017 (Kuczyński, 2019).

Moscow's maritime ability has rapidly developed after the annexation of Crimea. Russia needs a politically, economically and socially weak Ukraine, which would not be able to defend itself, will be vulnerable to Russian pressure on internal and foreign policy and will not be able to solve the conflict in Donbas in which Moscow supports Ukrainian separatists (Velenciuc, 2015). By occupying Crimea, Moscow accomplished its dual objectives of deterrence of Ukraine's rapprochement to NATO and the EU and the development of Russia's naval facilities and strategy. Russia's annexation to Crimea is one of the supporting factors to its grand ambitions of rebuilding Russia as a great world power and to renew the Soviet concept of the Black Sea as Russia's 'inner lake' (Kuczyński, 2019). But, the seizure of Crimea delivered Moscow both gain and loss. Russia lost its relations with the West which supported Ukraine in the 2014 issue and also Belarus and Kazakhstan that have been forced by the West. So, the 2013–2014

Ukraine crisis caused Russia to lose its strategic partners not only in the West but also in its own neighborhood (Trenin, 2019). Nonetheless, Russia at present has gained a full control of the northern Black Sea by annexation and occupying Crimea from the Ukraine.

On the other hand, Georgia, Ukraine, Azerbaijan and Moldova (GUAM) raised a security issue for Russia because of its strategic aims to be a part of the Euro-Atlantic and European integration as well as its establishment of the Commonwealth of Democratic Choice (CDC). Besides, the bilateral relations of Georgia and Ukraine with NATO and the United States became a geopolitical headache for Russia. In 2008, Russia undertook the de facto partitioning of Georgia and militarization of Abkhazia province. Since that time, Moscow has controlled the eastern littoral states of the Black Sea and extended its power throughout the South Caucasus and northern Middle East (Learschi, 2016).

#### **4. NATO's Counterbalance to Russia**

Under the competition of Russia, NATO and the EU, the Black Sea has become a critical contested zone in regional geopolitics. Russia's focus on the Black Sea is its attempt to exert a greater pressure on Romania and Bulgaria which are NATO members and it is also an effort at the containment of NATO. The US' missile defense base in Romania has been the most important target for Russia in the Black Sea region. The entrance of Romania and Bulgaria, the adjacent states to the Black Sea, into NATO has been an impetus for Russia to raise its strategy. Controlling the Black Sea not only undermines the independence and territorial integrity of Ukraine, Moldova and Georgia but also directly challenges the security of Romania, Bulgaria and Turkey.

Noticing Moscow's assertive acts trying to change the European security order, NATO has faced the new security environment concurrently with violent extremism, refugee flow and instability within and outside Europe. These situations paved the way for NATO to shift its focus from decade-long ground centric to oceanic strategy. As an effort to consolidate its Alliance's maritime effort and priorities, NATO released its Alliance Maritime Strategy (AMS) in 2011 (Horrell et al., 2016). However, the AMS didn't fully cover NATO's strategic ambition because it couldn't deter Russian military action in Ukraine, crises in the Middle East and North Africa or the rising geopolitical importance of the European Arctic. Russia's revanchist aggression and increased willingness to confront the West is the main driving force for promoting NATO's new modified maritime strategy (Horrell et al., 2016).

In July 2015, Russia formulated a revised maritime doctrine focusing on the A2/AD (anti-access/ anti-denial) that aimed at NATO's accessing the Black Sea.

Russia's developing anti-access/area-denial (A2/AD) capabilities in the North Atlantic, the Baltic Sea, the Mediterranean Sea and the Black Sea have challenged NATO to update its maritime strategy. Russia's assertive use of force and armed intimidation triggers NATO's counter-reaction followed by the rise of geopolitical competition in the region. However, having countered Moscow's strategic plan, NATO has limited access to these waters due to stipulations in the 1936 Montreux Convention, which limit the naval presence of non-littoral states in the Black Sea and Moscow has gained an advantage from that power vacuum. NATO's main objective in the Black Sea is to deter Russia's assertiveness and to turn Russia's neighbors into its allies. On the occasion of its 70<sup>th</sup> birthday this year, 29 NATO members will have continued 'to deter and to defend themselves against Russia' as one of the five priorities consisting of supporting the countries around the Black Sea and also countering a potential Russian incursion into Allied territory by the recent "Readiness Initiative" (Tardy, 2019).

The Russian economy plays a primary role in the reformulation of Russian foreign policy, taking a more-aggressive stance under President Putin and the recent economic growth has been underpinned by its new assertiveness (Oliker et al., 2015). The EU is the most important economic partner of Russia and trade with and investment from the EU have been key to Russian growth since the dissolution of the Soviet Union in 1992 (Oliker et al., 2015). Russia has exported oil, natural gas, steel and chemicals to the EU and imported machinery and equipment, food, and other consumer items. Nowadays, energy security is one of the most prioritized factors emphasized by all countries. By its naval presence, the Russian Black Sea strategy is directly related to this energy game by controlling and disrupting the energy supplies through pipeline connections between the Caspian basin and Europe and setting back the EU's attempts to pursue energy diversity. Subsequently, it will interrupt the connection of the US and Europe with Central Asia and also reduce the prospects of future natural gas deliveries from Turkmenistan and Azerbaijan to Europe. Moreover, Moscow uses the Black Sea strategy for achieving many purposes, to choke the trade and energy routes of wayward states, prevent NATO's projection in security with the regional countries and have a larger stake of exploiting fossil fuels in maritime locations (Learschi, 2016).

## **5. The Development of China's Maritime Strategy**

Geographically, there are three directions in China's outward maritime strategy: the East China Sea, the South China Sea, and the Indian Ocean. The Chinese attitude towards regional maritime issues has been developing since 2005 and China's 2005 National Defense White Paper noted that China should build a

strong and modernized navy to protect its growing maritime interests (Chan, Li, 2015). The changing behavior of Chinese maritime policy largely depends on the intention and perception of Chinese leadership. In 2008, former President Hu Jintao first pointed out that China must make a transition from being a land power to becoming a maritime power. The Chinese Communist Party's 18 National Congress in 2012 states that China has soon to "increase its exploitation of water resources, develop a maritime economy, protect the oceanic ecosystem, persist in protection the national maritime interests, build up maritime power" (Yizhou, 2014). The report sent to the international society states that China will set the building of sea power as its national strategy (Xie, 2014). At the meeting, President Hu Jintao announced that we must "improve the ability to develop ocean resources, protect national interests in the sea, and build a strong sea power". The slogan of "building a maritime power" has appeared from that Congress report. International concerns have been rising from the time of China's official announcement.

This new maritime strategy covers the following aspects:

- 1) formulating an effective control, management and protection of previously neglected maritime domain, particularly the ECS (East China Sea) and SCS (South China Sea);
- 2) exerting significant influence on regional and international maritime regulations and practices with assertive maritime diplomacy;
- 3) becoming a powerful maritime economy through the effective use of maritime resources within and outside of China's sovereign space (Yizhou, 2014; Chan, Li, 2015).

President Xi Jinping also plays a pivotal role in making Chinese maritime policy and influencing public discourses on China's maritime rights (Chan and Li, 2015). After President Xi Jinping had assumed power in 2003, Beijing was seen to be more confident in handling major power relations and more inclined to assert Chinese interests (Chan, Li, 2015). The Xi Jinping administration also formulates and practice the maritime strategy as the national goal to build a strong sea power. Under his administration, Xi made several statements which aimed at promoting Chinese military and security capabilities. In 2013, President Xi Jinping advised the maritime militia members not only to lead fishing activities but also to collect oceanic information and support the construction of islands and reefs particularly in the South China Sea (Office of the Secretary of Defense, 2019).

Many distinct reasons of national security, economic development and the shift of foreign policy are behind the Chinese strategy of building a strong maritime power. Historically, China had faced much greater threats from the sea than from the land (Xie, 2014). While the United States, Japan and Russia have been



increasing their maritime power, China has also transformed its existing continental power into sea power.

Maritime policy is an integral and essential part of Chinese foreign policy. After the 2008 economic crisis, there was a distinctive change in the foreign policy direction of China. China's resistance to the 2008 financial crisis that exposed the vulnerability of western countries had prompted China to push forward its 'China Dream' vision to become a more influential power. Similarly, most of the Asian powers were faced with economic recession while China could maintain a high rate of economic development. According to Xie (2014), that situation gave an impulse to Chinese foreign policymakers to launch more calling for the outward and aggressive diplomacy with the result of the rising maritime strategy in the disputed waters.

Economically, the government's focus on leveraging economic growth is closely linked with its desire to expand its power and influence over neighboring countries (Gong, 2014). The concept of "economic diplomacy" was initiated in the 2004 foreign policy white paper. By using this, China is aimed at influencing other countries by its economic power. As the significant evidence of using economic diplomacy to maintain its power in the South China Sea, China welcomes dialogue and initiates the project of "the ASEAN-China Maritime Cooperation Fund" to keep maritime cooperation within Asia only (Gong, 2014).

## **6. China and the South China Sea Dispute**

The South China Sea dispute is the maritime and territorial dispute between the seven claimants of China, Brunei, Indonesia, Malaysia, the Philippines, Vietnam and Taiwan. The overlapping claims over sovereignty in the SCS are mainly driven by geopolitical interests such as ample energy resources, its rich fish productivity and being an important route for international trade (Kosandi, 2014). It is the world's busiest waterway of seaborne trade as 50 percent of the world annual trade of \$ 5 trillion a year passes through the region. Furthermore, the South China Sea plays an important role in security considerations across East Asia because more than 80 percent of crude oil to Japan, South Korea and Taiwan regularly passes through the region. Therefore, it is also the economic hub of Northeast Asian countries for the flow of oil and commerce. The interests of the claimant states are the possession of fishing areas around the Spratly and Paracel archipelago, the potential exploitation of crude oil and natural gas in SCS and the strategic control of critical sea lines of communication (SLOC) (Chan and Li, 2015). The dispute becomes a 'regional flashpoint' for the potential for political and military conflict not only among the claimants but also the regional powers. It also causes regional instability and rising tensions resulting from those

contestants. In 2009, China and other claimant states attempted to solve the issue diplomatically by submitting the extended continental shelf claims to the United Nations Commission on the Limits of the Continental Shelf (CLCS). China submitted its nine-dash line map which it claimed as its historical right and it has been viewed as controversial and unacceptable by non-claimant states so far. Indonesia strongly opposed and denied China's inconsistent claim to sovereign rights and jurisdiction based on the nine-dash line.

## **7. The Role of ASEAN in South China Sea Dispute**

As most of the claimant states included in the South China Sea dispute are ASEAN member countries, ASEAN is inevitably involved as a crucial stakeholder in the issue. However, the conflict has not been resolved yet because of the complex relations between China and ASEAN as well as ASEAN members themselves. As a successful regional institution, ASEAN has significant achievements in comparison to other countries and organizations in generating political and economic and social progress, but not in the South China Sea maritime dispute.

ASEAN itself carries the three main features of the institutional cultures formally known as the so-called 'ASEAN Way': consensus-based decision making, mutual respect for domestic affairs and non-intervention principles (Kosandi, 2014). The vulnerability to conflict resolution in ASEAN is due to the lack of non-binding agreement and the fact that decisions in the Association are made by consensus that has to be signed by all members. Without consensus and unity, ASEAN can't make any agreements. In addition to the ASEAN's loose decision-making mechanism, it is China's economic 'divide and influence' strategy engaging individual countries through economic incentives for support that can generate unsuccessful and incomplete negotiations over the SCS dispute. In 2012, the 45<sup>th</sup> ASEAN Foreign Minister meeting held in Cambodia failed to issue a joint communique due to disagreements in settling the dispute (Chan and Li, 2015). At that time, Cambodia served as the chair of the meeting and it tried to exclude the dispute in the communique. It was the first time in 45 years and significantly underlined the disunity and weakness of the Association.

China's relations with ASEAN countries can be roughly defined as China uses the 'carrot and stick policy' as a means to achieve both its economic and political interests. Under the agreement on China-ASEAN Early Harvest Programs, China lifted some trade barriers to the ASEAN states on specific goods, according favorable treatment for them (Wong, 2011). As for ASEAN countries, each has firm economic relations and also huge economic dependence on China. China has used economic diplomacy as an essential tool in its relations with the SCS claimant states. Although this economic diplomacy may not have a direct impact

on the disputed countries, its indirect effects on the stakeholders can influence the outcome (Gong, 2014).

The United States' involvement is also an important geopolitical challenge in the region. According to the statement of the US Department of State "as a Pacific nation and resident power, the US has a national interest in the maintenance of peace and stability, respect for international law, freedom of navigation, and unimpeded lawful commerce in the South China Sea" (Chan, Li, 2015). The United States continually calls for the 'Freedom of Navigation' in the South China Sea, including in disputed waters. On the other hand, the US 'Pivot to Asia' or 'Rebalance' strategy energized China to place more emphasis on the SCS maritime security than before. China has perceived the US' attempt as the maritime containment to deter and threaten its interests and security. Consequently, China's security concern with the US's involvement in the regional territorial waters has stimulated it to strengthening its naval capability. Alternatively, China's South China Sea strategy gets confused with the United States' strategic focus on the Indian and Pacific Ocean.

## **8. Sino-Russian Cooperation**

By 1996, China and Russia had already established strategic cooperative partnership and later in 2011, the level of relations was raised to 'Comprehensive Strategic and Cooperative Partnership'. Sino-Russian strategic partnership is motivated by two driving factors: dissatisfaction with the US-led world order and a wish to undermine the liberal emphasis on human rights and minority self-determination followed by the erosion of sovereignty that these entail (Bolt, 2014). China and Russia have the most important economic exchange in the energy sector with Russia being the major energy exporter. The two countries are engaged in military cooperation and have been conducting military exercises. Under the 2014 Russian maritime doctrine, Russia turned its emphasis from cooperation with the West to greater cooperation with the Shanghai Cooperation Organization (SCO), the Collective Security Treaty Organization (CSTO) (Sinovets, Renz, 2015). In 2016, China and Russia were planning to deepen military cooperation and increase the number of joint military exercises (Diplomat, 2016). Recently in July 2019, the Chinese People's Liberation Army Air Force (PLAAF) and the Russian Air Force Jointly conducted a long-range aerial patrol in the Indo-Pacific region. China's new national defense white paper states that "the military relationship between China and Russia continues to develop at a high level, enriching the China-Russia comprehensive strategic partnership of coordination for a new era and playing a significant role in maintaining global strategic stability (Diplomat, 2019). However, there is no

formal military pact between the two countries, only a partnership-level, but not an alliance-type cooperation. Both countries see each other as a possible security threat. Nevertheless, Sino-Russian defense cooperation might raise security concerns for the US, NATO and their allies to some extent and create a possible threat.

## 9. Conclusion

In the case of both China and Russia, the maritime strategy and its implications are shaped by three factors: the interests and attitudes of individual small countries, the policy shift of China and Russia and the third powers' involvement such as the US and NATO. Concerning the South China Sea dispute, China is in a more favorable position than Russia in the Black Sea to develop its maritime strategy and capability. In the SCS issue, the claimant states of ASEAN member countries are in a situation of economic interdependence vis-à-vis China, even mostly dependent on China. Each claimant is reluctant to damage the bilateral diplomatic relations with China, particularly economic relations. As a regional organization, ASEAN has tried to organize negotiations between China and these countries. However, ASEAN itself is constituted of these states and half of the members are involved in the issue. Those claimant members that are willing to settle the dispute bilaterally with China may neutralize the importance of the association. Moreover, the institutional weakness of the Association in decision-making processes has advanced Beijing's assertiveness in the issue of disputed waters. As concerns the SCS dispute, ASEAN itself is divided into three groups: pro-China, pro-US and neutral states. Another point is that the SCS dispute does not occur between ASEAN members and China but also among the members themselves in the case of overlapping territorial claims. Therefore, China can gain benefit from the disunity of ASEAN by intensifying its maritime project in the region. Though there have been other regional groups such as ASEAN Plus Three, ASEAN Plus Six and ASEAN Regional Forum (ARF), etc., China has played an important role in all of these. As for ASEAN, it is impossible to exclude and neglect China's role in any way. Chinese enormous influence in the region has pressed the ASEAN, especially the SCS claimant states to reach a rightful decision over the issue. Although the United States plays a major role in the Asia Pacific region, its main focus is its national interest in extending the US's influence and the containment of China instead of the benefits of regional countries. Under these circumstances, Southeast Asian countries may not have the chance to force China to abandon its hegemonic acts in the South China Sea nor is there any reliable and powerful organization to counterbalance China. In the future, China is likely to

maintain and strengthen its favorable position in the South China Sea by developing its maritime strategy and capability.

Unlike China, Russia has to face the two powerful blocs of NATO and the EU, the major Russian rivalry in the region. Among the Black Sea littoral states, Turkey is a member of NATO and both Romania and Bulgaria are members of the EU and NATO. To implement its Black Sea maritime strategy, Moscow has faced confrontation from these two powerful organizations. For instance, it was subjected to heavy embargo by NATO after the annexation of Crimea. By controlling the Black Sea, Russia aims to prevent its neighboring states from developing closer relations with NATO and the EU. It can be seen that Russia, to achieve complete control over the Black Sea, sought to gain the Black Sea littoral countries by using both soft and hard power. Bulgaria is among the most pro-Russian NATO member states, meanwhile the littoral state of Turkey was unwilling to see other NATO forces in the Black Sea outside its own. Although Turkey has expressed its diplomatic support of Ukraine by promoting its naval capability in the region, aiming to counterbalance Russia's activity, it still maintains friendly ties with Russia. Due to its unclear policy, Bulgaria is not a credible ally for NATO in strengthening its military influence in the region. Now, Romania stands as the only reliable ally for NATO and the US and is solely a hindrance for Russia in the region. Under the ambitious revanchist policy, Russia's main strategic goal in the Black Sea is achieve full domination in the region preventing its neighboring states from having closer ties with NATO and the EU. It has exerted pressure on the littoral states such as the Ukraine, the South Caucasus countries, Romania and Bulgaria to gain complete control of the Black Sea.

Both China and Russia can be regarded as a major power in the international community. The Russian attempt to control the Black Sea is likely to revise its former power projection and restore it as the leading superpower in Eurasia. China, by using its military power, intends to establish regional preeminence and expand the country's international influence. Both countries apply use of force to achieve their strategic goals and this leads to regional instability and has a great impact on targeted small countries. China can be expected to become a more influential power with the support of its advancing Belt and Road Initiative (BRI). Furthermore, China's economic development enables it to support its ambitious objectives to a greater extent than Russia. Russia used hard power in the case of Crimea, while China prefers exercising 'use of force' behind its 'Charm Offensive'. To fulfill its long-term ambitious aims, Russia needs to strengthen its economy and develop an attractive plan to persuade the neighborhood. Even though it is impossible to decide whether China and Russia will be the regional aggressor, their assertive acts unavoidably threaten regional security and raise high tensions in the region. In the future, Sino-Russian military cooperation may

also be a threat for the US and NATO in both the Black Sea and Asia Pacific region although they don't regard each other as allies despite growing military partnerships.

## References

- Black Sea Geography [WWW Document], n.d. URL: <https://www.ceoe.udel.edu/blacksea/geography/index.html> [Accessed 8.21.2019].
- BOLT, P. J. 2014. Sino-Russian Relations in a Changing World Order on JSTOR [WWW Document]. URL [https://www.jstor.org/stable/26270816?seq=3#metadata\\_info\\_tab\\_contents](https://www.jstor.org/stable/26270816?seq=3#metadata_info_tab_contents) [Accessed 8.26.19].
- CHAN, I., LI, M. 2015. New Chinese Leadership, New Policy in the South China Sea Dispute? In: *Journal of Chinese Political Science*. Vol. 20, pp. 35–50. <https://doi.org/10.1007/s11366-014-9326-y>
- DELANOE, I. 2014. After the Crimean crisis: towards a greater Russian maritime power in the Black Sea. In: *Southeast European and Black Sea Studies*. Vol. 14, No. 3, pp. 367–382. <https://doi.org/10.1080/14683857.2014.944386>
- Diplomat, F.-S. G., The, 2019. The Significance of the First Ever China-Russia Strategic Bomber Patrol [WWW Document]. The Diplomat. URL <https://thediplomat.com/2019/07/the-significance-of-the-first-ever-china-russia-strategic-bomber-patrol/> [Accessed 8.29.2019].
- Diplomat, F.-S.G., The, 2016. China and Russia to Increase Number of Military Exercises in 2016 [WWW Document]. The Diplomat. URL <https://thediplomat.com/2016/04/china-and-russia-to-increase-number-of-military-exercises-in-2016/> [Accessed 8.29.2019].
- Gong, X. 2014. Asymmetric Economic Interdependence and the South China Sea Dispute. In: *Harvard Asia Quarterly*. Vol. 16, No. 1, pp. 19–27.
- HORRELL, S., NORDENMAN, M., SLOCOMBE, W .B. 2016. *Updating NATO's Maritime Strategy*. Atlantic Council, Washington, DC: US.
- HUNTER, T. 2017. Russian Arctic Policy, Petroleum Resources Development and the EU:: Cooperation or Coming Confrontation? In: LIU, N., KIRK, E.A., HENRIKSEN, T. (eds.) *The European Union and the Arctic*. Brill, pp. 172–199.
- KOSANDI, M. 2014. Conflicts in the South China Sea and China-ASEAN Economic Interdependence: A Challenge to Cooperation (ASEAN-Canada Research Partnership Working Paper series No.7). RSIS Centre for Non-Traditional Security (NTS) Studies, Singapore.
- KUCZYŃSKI, G. 2019. Mare Nostrum Strategy: Russian Military Activity in the Black Sea (Special Report). Warsaw Institute, Poland.
- LEARSCHI, S. 2016. BLACK SEA RISING Russia's Strategy in Southeast Europe (Black Sea Strategic Report No. 1). Center for European Policy analysis, Washington, DC: US.
- LEMBKE, J., VOINESCU, S. 2006. Enlarging the European Union to the Black Sea: Strategic Implications and Prospects. *Studia Diplomatica* 59, 57–75.
- McDEVITT, M. 2016. Becoming a Great “Maritime Power”: A Chinese Dream. CNA Strategic Studies, Washington, DC: US.
- Office of the Secretary of Defense, 2019. Annual Report to Congress: Military and Security Development Involving the People's Republic of China (Annual Report). Office of the Secretary of Defense, People's Republic of China.
- OLIKER, O., CHIVVIS, C. S., CRANE, K., TKACHEVA, O., BOSTON, S. 2015. Russian Foreign Policy in Historical and Current Context [WWW Document]. URL <https://www.rand.org/pubs/perspectives/PE144.html> [Accessed 8.20.2019].

- Russian Trade Representation / Russian Federation: General Information [WWW Document], n.d. URL <http://www.rustradeusa.org/eng/256/> [Accessed 8.20.2019].
- SINOVETS, P., RENZ, B. 2015. Russia's 2014 Military Doctrine and beyond: threat perceptions, capabilities and ambitions. NATO Defense College. Rome, Italy 12.
- TARDY, T. 2019. What priorities for NATO? – Aspenia Online [WWW Document]. URL <https://aspeniaonline.it/what-priorities-for-nato/> [Accessed 8.26.2019].
- TRENIN, D. 2019. It's Time to Rethink Russia's Foreign Policy Strategy [WWW Document]. Carnegie Moscow Center. URL <https://carnegie.ru/commentary/78990> [Accessed 8.20.2019].
- VELENCIUC, S. 2015. A new Russian strategy toward Ukraine? (No. Policy memo no.10). Romanian Academy House, Romania, Black Sea University Foundation.
- WONG, S. 2011. The limits of Chinese power in Southeast Asia. East Asia Forum. URL <https://www.eastasiaforum.org/2011/05/10/the-limits-of-chinese-power-in-southeast-asia/> [Accessed 8.17.2019].
- XIE, Z. 2014. China's Rising Maritime Strategy: Implications for its Territorial Disputes. *Journal of Contemporary East Asia Studies* 3, 111–124. <https://doi.org/10.1080/24761028.2014.11869077>
- YIZHOU, W. 2014. China's New Foreign Policy: Transformations and Challenges Reflected in Changing Discourse. THE ASAN FORUM.

# Direction and magnitude of migration within the EU on a multilateral basis

MÁRIA LAKATOS<sup>1</sup>, BÁLINT MOLNÁR<sup>2</sup>

**Abstract:** Recent research has revealed a new model of migration within the EU as a whole. The European Union offers unique opportunities for its citizens to work abroad, but some studies have revealed that immigration will cause an increasing burden on the public welfare system instead of helping the ageing society to cover its future costs. The fiscal impacts of immigration flow depend on its size, the age structure of foreign-borns, and the level of their labor market integration.

In our analysis, we wanted to predict the direction and magnitude of migration occurring only in the European Union in an economic context. To achieve these targets, we complemented the bilateral approach with multilateral aspects and created an EU multilateral migration matrix that shows the individual's choice in emigration decisions based on special parameters. But for social scientists is unavoidable to have evidences about reliability of their analysis, namely not having spurious relationship under investigation. To control the achievement of our multilateral linear regression models, we implied neural network model regularly used for stock market forecast, proving these method is usefull as a control panel for traditional regression model.

Both methods, regression analysis and neuron network showed that the flow of medium-term emigration from Eastern Europe and simultaneously into Western Europe will accelerate in the coming years. Clearly outlined in the donor and recipient country groups, and from among the recently acceded EU 10 countries Romania, and Bulgaria, depletion is accelerating.

**Key words:** migration, linear regression, social tourism, neural network, modelling

**JEL Classification:** J61, H25, H75, I30, C53

## 1. Introduction

Recent research has revealed a new model of migration within the EU as a whole (Ratha at al., 2007; Ratha, 2011, 2016). The European Union offers unique opportunities for its citizens to work abroad, but some studies have revealed that immigration will cause an increasing burden on the public welfare system instead

---

<sup>1</sup> MÁRIA LAKATOS, Neumann János University, Faculty of Economic and Business, Department of Finance, Hungary, lakatosmaria@gtk-uni-neumann.hu

<sup>2</sup> BÁLINT MOLNÁR, Eötvös Loránd University, Faculty of Informatics, Information System Department, Hungary, molnarba@inf.elte.hu



of helping the ageing society to cover its future costs (Collyer, 2012). The fiscal impacts of immigration flow depend on its size, the age structure of foreign-borns, and the level of their labor market integration.

In our analysis, which was compiled on the basis of empirical evidence, we wanted to predict the direction and magnitude of migration occurring only in the European Union in an economic context in the period, when the third countries migration wave didn't flip over the barriers. To prove the dataset to be analyzed, we have chosen period 2005–2011. (The latest database provides figures till 2013.) (World Bank, 2011, 2016). To achieve these targets, we complemented the bilateral approach with multilateral aspects and created an EU multilateral migration matrix that shows the individual's choice in emigration decisions based on special parameters. In the micro-economic approach, the relative gap (when an individual compares his or her situation to those around him, her) on the individual level is one of the main motivational factors we considered, but our hypothesis widened the number of explanatory and economic factors used for the matrix. The reliability of the forecast called for the use of geo-politically and economically limited units, since we believe that the European Union migration is significantly different from the inflow from the Eastern part of Europe, or the traditional North-South, East-West route characteristics.

## 1.1 The model

We accumulated 25 potential predictor  $x_{ij}$  (regressor variable) assuming a linear approximation of the relationship between  $x_{ij}$  and  $y_i$  (response) variables, where  $i$  is the year,  $j$  is predictor type, (five types, GDP growth, unemployment, minimum wages, children allowances and immigration minus emigration for five years 2005–2009) and  $y_i$  means disparity between immigration and emigration in the predicted year. A linear relationship is assumed a priori, and we created several models with different standard macro-economic parameters, while using the Backward elimination method to reduce their number. The models with the different predictors  $x_{ij}$  have the following assumptions:

The EU as a community forces its member states to harmonize their economic and financial policies, budget revenues and expenditures, and social redistributive policies, including social care systems. One of the pillars of the EU is non-discrimination, and within the member countries, individuals as well as business units enjoy the same rights. For migration decisions, however, this framework significantly reduces the risk of emigrants, and as opposed to micro-economic conclusions, the risk of all individuals is at nearly the same level. Consequently their decision will be affected primarily by the income gap between sending and receiving country citizens, however this factor is not confined only to wages, but also reflected in the money from social benefits as well (Ulrich, 1994). Taylor

underlined the yield from the social welfare system as a decision-making factor, but considered only its risk minimizing role Taylor, 2007). We accepted and used this result. We considered the social benefit as a direct influencing factor on the income level, instead of insisting on its indirect, risk-minimizing role.

Summarizing our perception, since the level of income depends in equal parts on wages and public transfer payments, the latter factor might be considered as a dependent's income.

In our analysis, which was compiled on the basis of empirical evidence (OECD, 2012), we wanted to predict the direction and magnitude of migration occurring only in the European Union in an economic context. To achieve these targets, we complemented the bilateral approach with multilateral aspects and created an EU multilateral migration matrix that shows the individual's choice in emigration decisions based on special parameters. The EU community has a special framework for immigrants, so any of the models reflecting the situation should include these features. The financial conditions on the labor market vary, but the other conditions are the same in the EU labor market, because the community's citizens enjoy the same rights and obligations as natives of the host country, such as individual decisions affecting their livelihood is influenced by salaries and social allowances. The motivation for migration – we predicted on the base of earlier analyses – was linked with relative differentiation between the income level of separate EU countries citizens to the EU average.

The preparation included operations such as characterizing, cleaning, and transforming the data. Particular care had to be taken to determine whether sub-setting the data was needed to simplify the resulting models. A series of alternative models were explored, since all models work well in different situations. Our model contains not only macro-economic data, but we have included the social welfare system as regressor factors. Secondly, to avoid the statistical bilateral approach, our model includes all EU member countries, as their citizens are free to move, and enjoy the same legal rights all over the EU. To achieve a dynamic model, we incorporated the predicted  $y_i$  factor ( $i$ =years, 2010, 2011, 2012) as the  $x_{ij}$  regressor in the next year, using the predicted value as fact for the following year (DeMaris, 2004). The multiple regression model was based on differentiation of country data  $x_{ij}$  from the EU average level, so that we could exclude the basic trend, and show the multiple connections among  $y_i$  and  $x_{ij}$  factors, (labor market, unemployment rate, minimum wage, and social allowances cost). The model indirectly includes such non-numerical features as administrative burdens, which will limit the labor force flow from one country to another.

## 1.2 Data

Migration research studies focus on country level databases collected by the World Bank, the International Monetary Fund (IMF), and the United Nations (UN), using each other's data. They contain some inconsistent data received from member countries, or data which was missing and was subsequently restored by estimation. We have used the World Bank Migration and Remittances Factbook, 2011 and 2016 (Ratha, 2011, 2016), MIRPAL database (World Bank, 2011), IMF Balance of Payment, Migration and Remittances Unit calculation. To acquire the minimum wages figure, International Labour Organization (ILO) offers the widest database, and social cost per capita and child care allowances data are published regularly by Eurostat, in the European Statistical System (ESSPROS) database. Our model consists of 27 lines, equivalent to the number of member countries in the EU, and columns with different macro and microeconomic data, (see below in Methodology) on 2011 and 2016 databases, which are the latest ones.

### 1.2.1 Methodology

The observations were based on data from 2005–2009, and as mentioned above, the number of independent variables was determined to be more than ten in the first step, and Backward elimination model was used to narrow it down to the five presented below. Member countries, during the first phase of the research, were not separated as the 15 old EU member states and the 12 new ones that joined later, after 2004 (EU12), and also, immigration and emigration was not assumed to compensate each other in the long term. We were looking for the best fitting model, using a software called Rapid Miner: macro indicators such as indebtedness and annual inflation dropped out immediately from the first models.

We assume that the difference between immigration and emigration, as the dependent variable was affected not only by the annual value of the independent variables (GDP/capita, unemployment, minimum wages, child care allowances for two children), hence a fifth variable was introduced:  $(Y_{j-1,n})$ , that is, the difference between immigration and emigration figures during the previous year (net migration). The dependent variable shows a difference a priori, that is, by use of *net migration* we wanted to clean the model up from possible trend effects, on the other hand, this variable indirectly reflects such non-quantifiable relationships, that would be difficult to filter out by statistical methods and purify from other effects. The reception capacity is strongly influenced by such non-quantifiable factors as the number of available jobs to foreigners and administrative restriction on the right of residence, for which there is no measure for the time being, or such non-quantitative factor, as the relationship between locals and foreigners. All this, however, will show in the number of immigrants indirectly. For example,

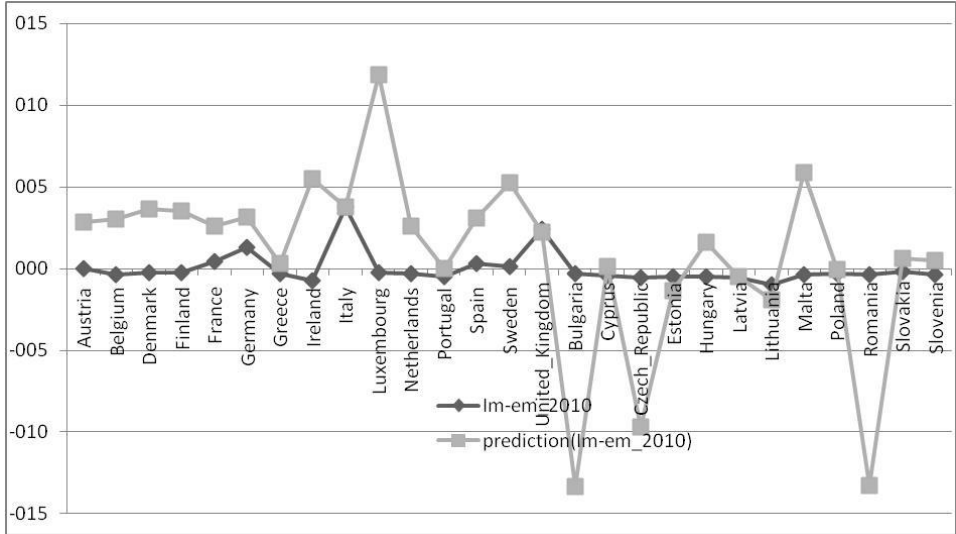
immigrants try to avoid a country where they are confronted with serious problems regularly, but it has the same effect when too many people arrived a year earlier and the host country restricts immigration in some way, or the jobs available for immigrants have run out, while the unemployment rate may even have decreased (Lee, 2000). It is therefore inevitable that previous year's net migration be included in the model as an independent variable. As another assumption, we intended to study the impact of unemployment on  $Y_{ijn}$  variable, since an increase in unemployment would cause a decrease in net migration provided every worker is officially reported. However, when the rate of unreported employment is high, this relation cannot be detected significantly, that is, unemployment will have no significant impact on the dependent variable.

### *1.2.2 Analysis*

The predictive ability of the model was checked by, beyond the traditional multivariate regression model analysis, taking the data from 2005–2009 as the basis for the regression model, then 2010's data series were forecasted based on that, which was then finally compared to the available actual data series. That is, we made an estimation of the migration inside the EU using the model based on the estimated and actual figures of the year 2010 and 2011.

The descriptive statistics showed a slight right skewness and a moderate kurtosis for each variable. Overall, in the case of the  $Y_{ijn}$  variable, the majority of the data from the 27 member states is below average, i.e. the difference between immigration and emigration stays below the average, the kurtosis does not differ too greatly from the normal distribution. Graphical representation of the variable showed a normal distribution and, according to descriptive statistics, the standard deviation is approximately constant. Modell 1, developed after the first experiments, shows a linear relationship and contains data from the 27 countries from 2005 to 2009, by five regressor variables. The high multi-collinearity of the model was predicted by the high  $R^2$  data, as well. A decision could not be made based on the Durbin–Watson test's value of 1.06, but the partial correlation coefficients clearly showed that the variable values measured in each year (like values of unemployment from 2006 to 2009) did strongly correlate with each other and the minimum wage and GDP/capita variables could also not be considered to be fully independent. Despite its detected errors, on the basis of the first full model's regression lines we forecasted the 2010 expected values, which showed almost complete match with the actual data.

Multi-collinearity was eliminated from the model in two steps: first we filtered out outliers by determining the Mahalanobis distance values with probabilities less than 0.05: according to the expectations, Luxembourg, primarily due to the GDP data and Malta, on the other hand, due to its size can be considered as



**Figure 1. The Correctness of Forecast For 2010 – Comparison between the Factual and Predicted Data by the Regression Function (Normalized Data)**  
*Source:* Edited by the Authors.

outsiders. Based on the indicators of net migration Spain is considered outstanding as well, but the explanation for this lies elsewhere, it primarily sticks out due to the still high influx of migrants from former colonies, but the omission of Spain from further analysis would have caused a significant loss of information. As the next step, first, the remaining 25 states were divided into three clusters according to their GDP per capita. Here again, Luxembourg was in its own cluster based on GDP and the minimum wage, so we completely omitted it from the model, together with Malta. After that we reclassified Greece and Portugal into the group of lastly joined countries, so eventually the old member countries’ group had 11 members while the group of the least developed countries, most of which joined after 2004, had 14.

In the second run the model that now had 25 elements (the 25 member states, excluding outliers) was cleared of multi-collinearity by principal component analysis, it was narrowed down to four components using the Varimax method.

The model's reliability was slightly reduced, but the principal component analysis did not provide more information either about the individual components.

After leaving out the two countries that were regarded as outliers, the correlation was checked for 25 member countries in the year 2011 (Model 4), and then the run was repeated in two clusters. (The EU 11 group brings together the more developed ones and the EU 14 group of those lagging behind).

However, in the group of the poorer countries it is clearly one factor, unemployment that determined the difference between immigration and emigration. Moreover, in the group of the more developed countries, it was precisely the annual unemployment data that had the weakest influence as regressor; it could have even been omitted from a statistical point of view. After this peculiarity has been found in each and every case, we needed to conclude that if there is no correlation between the data measuring legal employment and the fluctuation in immigration, then labor migration must be characterized by a significant level of illegal employment.

In the group of developed countries, however, GDP/capita, indicating the richness of the country, was clearly the most important independent variable, whereas the social services of different countries, and within these the studied child benefit differences, fall in a much wider range. One possible explanation is that in spite of the same rights, the Eastern European, mostly illegally employed workers do not get the family allowance they deserve exactly because of their illegal occupation. As a direct consequence, despite our prior assumption, this kind of “income” does not strongly motivate the direction of migration. Finally we tested 9 different model.

As it is shown, with the exception of the eighth model, there is moderate correlation between the regressors and the dependent variables, while the adjusted  $R^2$ s are significantly different from the  $R^2$  indicators, which indicates the model to be applicable only in this closed range, that is, it can be considered robust only in this range. Therefore, we examined the likelihood of quadratic error and found the strength of the model to be 0.83, which is acceptable.

Our research gave ambiguous result, with the high level of multi-collinearity, so we tested them with another tools, with neuron network.

## 2. Justification for Application of Neural Network Model

*Artificial Neural Networks (ANN)* are frequently applied for several domains belonging to economics, finance, social sciences and on-line social networks. In empirical studies of phenomena that are researched by social sciences, it is standard approach to exploit the linear regression technique to create a model for investigation the interrelationship among the variables. We have built a model for the problem of immigration from East utilizing the linear regression technique 0. In this model, we assumed that the underlying relationships among the selected parameters are linear and appropriate for a linear approximation. The research was conclusive, and the model demonstrated such properties that lay ground to infer justified results that were in line with other qualitative and quantitative data.

**Table 1. Summary Statistics of MLR (Multiple Linear Regression)**

	R	R <sup>2</sup>	Adj R <sup>2</sup>	F	p	Std Error of est.
1	0.98	0.96	0.85	9.09	0.003	35.11
2	0.64	0.42	0.28	3.05	0.03	78.159
3	0.74	0.56	0.45	5.39	0.002	67.98
4	0.74	0.56	0.45	5.32	0.002	68.08
5	0.78	0.62	0.38	2.61	0.1	91.16
6	0.86	0.75	0.59	4.81	0.025	73.939
7	0.87	0.76	0.61	5.21	0.02	71.74
8	0.51	0.26	0.18	3.22	0.1	21.5
9	0.87	0.76	0.6	4.85	0.04	12.178

Table footnote:

1. *Multiple regression model one* with the least deviation from factual data, on normalized data.
2. *Multiple regression model two* with the least deviation from factual data, with two outliers, on normalized data. Independent variables: GDP/capita, unemployment, Minimum wages, Children benefit 2006, dependent variable: Im-Em 2010.
3. *Multiple regression model three*, with the least deviation from factual data, without two outliers, on normalized data. Independent variables: GDP/capita, unemployment, Minimum wages, Children benefit 2007, dependent variable: Im-Em 2010.
4. *Multiple regression model four*, with the least deviation from factual data, without two outliers, on normalized data. Independent variables: GDP/capita, unemployment, Minimum wages, Children benefit 2007, dependent variable: Im-Em 2011.
5. *Multiple regression model five*, with the least deviation from factual data, without two outliers, cluster 1 on normalized data (EU14, rich countries), Independent variables: GDP/capita, unemployment, Minimum wages, Children benefit 2006, dependent variable: Im-Em 2010.
6. *Multiple regression model six*, with the least deviation from factual data, without two outliers, cluster 1 on normalized data (EU14, rich countries), Independent variables: GDP/capita, unemployment, Minimum wages, Children benefit 2007, dependent variable: Im-Em 2010.
7. *Multiple regression model seven*, without two outliers, cluster 1 on normalized data (EU14, rich countries), Independent variables: GDP/capita, unemployment, Minimum wages, Children benefit 2008, dependent variable: Im-Em 2010.
8. *Multiple regression model eight*, without two outliers, cluster 2 on normalized data (EU11, poor countries), Independent variables: Unemployment 2007, dependent variable: Im-Em 2010.
9. *Multiple regression model eight*, without two outliers, cluster 2 on normalized data (EU11, poor countries), Independent variables: Unemployment 2009-2010, Minimum wages, 2009-2010, Dependent variable: Im-Em 2011.

Source: Edited by the Authors.

However, the real-world data on the social sciences and economics fields are very frequently nonlinear. Consequently, linear models and linear regression approaches may not estimate adequately the results as it can be done by other methods. The readily available computational tools provide nonlinear methods that can be applied for modeling and predicting large number and complex social and economic relationships.

The ANN approach has been harnessed to investigate empirical cases. One of the reasons is that ANN has an outstanding learning capability (Ho, 1992). The other one is that ANN is suitable for studying such cases where there does not exist accurately described system models, the data are noisy, and the nonlinear dependencies are at high level. Nevertheless, the ANN results frequently in contradictory data and contradictory behavior in the case of noisy data. Sometime, the quantity of data is so enormous that the learning process produces poor quality model. The reduction and transformation of non-essential and superfluous parameters are critical for building-up a “good” model, that yield good run time characteristics and provide opportunity for generalization.

### 3. The Model for Analysis by Neuron Network

The main goal of this phase of research was to examine (aggregate) data for social tourism with the help of a neural network model. We have created a neural network model as an effective and efficient, nonlinear regression method. On one hand, it is to compare the linear regression and neural network techniques in the case of social tourism, and on the other hand in case of existence of non-linear characteristics between the macro economic and social data is to find a better model.

In this paper, the work presented here is to model and predict social tourism in EU. The major contribution of the paper is as it follows:

1. Our model is based on a standard neural network architecture provided by a commercial software tool (SPSS, IBM, 2011). The standard neural network architecture is appropriate for forecasting, the parameters of ANN were tuned to the size and other empirical characteristics of the model to find the best fitting result. (Witten et al., 2005)
2. We have used the “*trial and error*” approach only to determine the relevant variables, fine tune the number of layers and within layers the number of processing nodes, the related activation functions and other necessary architectural properties.

During the model creation, the critical issue was to find the relevant variables or features. On setting up a suitable ANN, a subset of features had to be selected that are relevant to the target concept. The insignificant and outlier variables representing feature had to be left out. The ANN that has come into existence characterized by its topology, the computation executed by nodes within the layers of the topology; the topology is created during the learning phase.

The selection methods of variables in the case of linear regression yield attributes that have strong linear relationships with the dependent variable. These approaches cannot treat the non-linear relationships either in selection phase or in



model execution. Moreover, the variable selected in a linear method context may not be relevant in neural networks environment that may leverage non-linear relationships among the independent features and the dependent variable.

On configuring an appropriate topology for a “good” ANN model, one of the opportunities is to add nodes to the hidden layer/layers in order to raise the capability of the ANN model. The balance should be strike between the hidden processing elements, too few hidden nodes does not provide enough computational resource to build up a good quality model, in the opposite case, too high number of hidden processing units may lead to a so called *overfitting* phenomenon, i.e. irrelevant facets of the empirical data. To acquire a model with good explanatory capacity, the number of hidden nodes and layers should be chosen prudently. The tool that was applied (Ho, 1992) assists in the learning phase. The empirical data is separated into three mutually exclusive subsets, namely training, validation (testing) and holdout or test set. The validation (testing) set is used by the software tool for avoiding the overfitting phenomenon during building-up the model.

The Multilayer Perceptron as the type of neural networks for modeling was selected.

We have created six significantly different models that make use of diverse sets of data as it follows:

(1) Poor countries data 2006–2007, dependent variable: forecast 2008 ( with outliers),(2) Poor countries 2006–2009, dependent variable 2010, (2011), (3) Poor countries 2006–2009, with data Im-Em 2010, dependent variable 2011, (4) Rich countries 2008–2009

(5) Dependent variable 2010, (6) Rich country 2008-2009-Im-Em-2011.

Based on the so called Multi-layer Perceptron (MLP) Artificial Neural Network, we have set the basic parameters and tuned them until the forecasted data was near to a known reference data in an error metric (generally we used sum of squares).

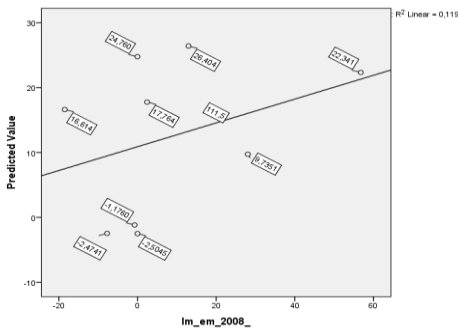
As we have outlined previously, the conventional predictive models are based on linear approaches however indisputably the strongly coupled migration/immigration processes presents non-linear behaviour. The crucial point to build up a good quality linear models is the selection of proper models and data sets fitting to models.

Our proposal is to forecast migration patterns within EU with the assumption that there exist non-linearity and instability in data. For this reason, we have proposed the application of ANN that owns a learning capability and apt to modelling systems whose components and their relationships cannot be reconstructed in details during analysis.

**Table 2. The Characteristics of ANN model**

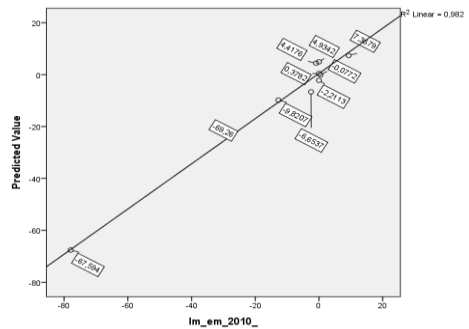
	Number of Units*			24
	Rescaling Method for Covariates		Standardized	
Hidden Layer(s)	Number of Hidden Layers			2
	Number of Units in Hidden Layer 1*			9
	Number of Units in Hidden Layer 2*			7
	Activation Function		Sigmoid	
Output Layer	Dependent Variables	1	Im_em_2010_	
	Number of Units			1
	Rescaling Method for Scale Dependents		Normalized	
	Activation Function		Sigmoid	
	Error Function		Sum of Squares	

\*Excluding the bias unit.  
 Source: Edited by the Authors.



**Figure 2. The Relationship of Empirical and Forecasted Value in Model 1.**

Source: Edited by the Authors.



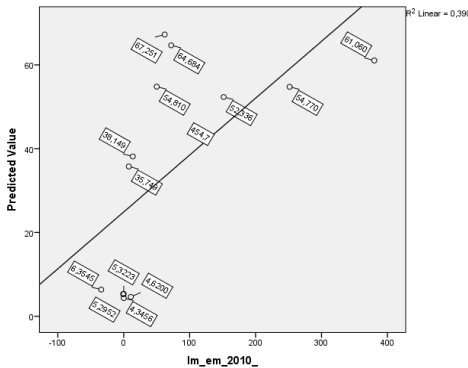
**Figure 3. The Relationship of Empirical and Forecasted Value in Model 2.**

Source: Edited by the Authors.

The MLP neuron model attempts to estimate the output data units using non-linear functions of input units. The MLP (Ratgeber, 2013) determines – during the learning process – the coefficients of non-linear approximation function and the number of units in the hidden layer to calculate the prediction from the input data sets.

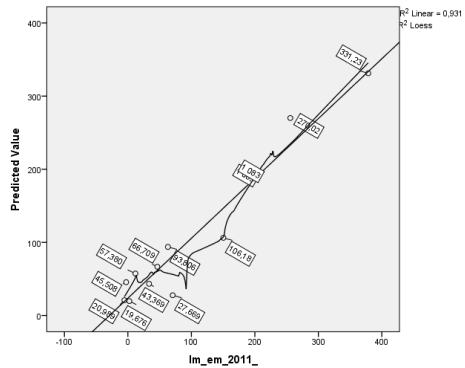
The data source (World Bank) covers a time series from 2005 to 2011 for a total of 675 data items. The countries that were taken into account are all Member States of EU. The reason that we have used this series that the same data were





**Figure 6. The relationship of empirical and forecasted value in Model 5.**

Source: Edited by the Authors



**Figure 7. The relationship of empirical and forecasted value in Model 6.**

Source: Edited by the Authors

**Table 3. Ranking of Normalized Importance in Models per Independent Variables**

	Poor					Rich				
	Model.1	Model. 2	Model.3	SUM	Rank of Position	Model.4	Model.5.	Model.6.	SUM	Rank of Position
GDP per capita	1	3	1	5	1	5	5	5	15	3
Unemployment	2	2	4	8	2	1	2	2	5	1
Im-em	3	1	5	9	3	2	1	1	4	2
Minimum wages	4	5	3	12	5	3	4	4	11	5
Children benefit	5	4	2	11	4	4	3	3	10	4

Source: Edited by the Authors.

The data sets have to be normalized to equalize the importance of variables prior to training of the network. Hence, training and testing data sets were normalized using their minimum and maximum values due to the use of the sigmoid function in the model.

The sensitivity analysis shows that there is a significant difference between poor and rich Member States of EU. In poor countries, the intention and incentive behind social tourism and net migration and immigration patterns is the GDP per capita and unemployment, i.e. poorness. In rich countries, the unemployment and people movement tendencies the outstanding parameters, the GDP per capita is only at the third position.

However, the analysis does not show surprising results, the outcomes are in line with the anticipated data, but the investigation underpins the qualitative evaluation with quantitative methods, except one aspect: gap between social networks would not influence on migration directly.

#### 4. Conclusion

*Both methods*, regression analysis and neuron network showed that the flow of medium-term emigration from Eastern Europe and simultaneously into Western Europe will accelerate in the coming years. Clearly outlined in the donor and recipient country groups, and from among the recently acceded EU 10 countries Romania, and Bulgaria, depletion is accelerating. Three out of ten countries from this group will partly lose their population, and immigration growth in Slovenia, and Poland can hardly compensate. The other group forms from the EU 15, where multiple regression equation forecasts increases in emigration from Ireland, Netherland and Greece (countries which are losing their former appeal), while Germany, United Kingdom and Italy, have also confirmed a unilateral position as hosts. Italy, on the other hand, seems to attract fewer immigrants, as does Great Britain. Special research might reveal the dual impact of financial crises and administrative restriction against illegal immigration in these countries. However, the basic trend, partly due to the crisis, indicates what experts also believe: that newcomer EU member countries will converge to the developed ones, and this will not happen because of labor force mobility. Emigration affected by the difference in economic development indicators, basically micro-level factors influencing decisions, will accelerate. Nevertheless, the model predicting the difference between immigration and emigration for three years has a significant limitation. Both methods proved, that despite our starting theses, focusing on social tourism, and differences between social network, and especially child care allowances, mainly the gap of GDP and unemployment rate should force to move workers from east to West.

Our results could be used as a new, combined – method approach to the problem of migration, with limited prediction ability only for EU.

#### References

- COLLYER, M., DÜVELL, F., HAAS, H. 2012. Critical approaches to transit migration. In: *Population, Space and Place*. Vol. 18, No. 4, pp. 407–414.
- HO, K. L., HSU, Y. Y., YANG, C. C. 1992. Short term load forecasting using a multilayer neural network with an adaptive learning algorithm. In: *Power Systems, IEEE Transactions on*. Vol. 7, No.1. pp. 141–149.

- Worldbank. MIRPAL. 2011. *Harnessing the Diaspora for Development in Europe and Central Asia*. Washington: World Bank Publications.
- OECD 2012. Migration Databases (<http://www.oecd.org/document>) Jennissen, R. 2007. Causality chains in the international migration systems approach. In: *Population Research and Policy Review*. Vol. 26, No. 4, pp. 411–436.
- DEMARIS, A. 2004. *Regression with social data: Modeling continuous and limited response variables*. Indianapolis: John Wiley & Sons.
- LEE, R. D., MILLER, T. 2000. Immigration, social security and broader fiscal impacts Immigration, social security and broader fiscal impacts Immigration, social security and broader fiscal impacts. In: *American Economic Review*. Vol. 90, No. 2, pp. 350–354.
- WITTEN, I. H., FRANK, E. 2005. *Data Mining: Practical machine learning tools and techniques*. 2<sup>nd</sup> Edition”. San Francisco: Morgan Kaufmann.
- RATGEBER, L., MARKOSKI, B., PECEV, P., LACMANOVIĆ, D., IVANKOVIĆ, Z. 2013. Comparative Review of Statistical Parameters for Men's and Women's Basketball Leagues in Serbia. In: *Acta Polytechnica Hungarica*. Vol. 10. No. 6. pp. 151–170.
- IBM Corp. Released 2011. *IBM SPSS Statistics for Windows*, Version 20.0. Armonk. New York. IBM Corp.
- RATHA, D. 2011. *Migration and Remittances*, Factbook, Washington D.C.: World Bank Publications.
- RATHA, D. 2016. *Migration and Remittances*, Factbook, Washington D.C.: World Bank Publications.
- RATHA, D., Shaw, W. 2007. *South-South Migration and Remittances*. Washington D.C.: World Bank (Working Paper, No.102).
- TAYLOR, M. P. 2007. The drivers of immigration in contemporary society: unequal distribution of resources and opportunities. In: *Human ecology*. Vol. 35, No. 6, pp. 775–776.
- ULRICH, R. 1994. *The impact of foreigners on public purse*. In: Spencer S. (ed.), *Immigration as an economic asset*. Staffordshire: Trentham Books.

# Central and Eastern Europe in the 21<sup>st</sup> Century From Geopolitical Buffer Zone to Geo-economic Bridge Region?

ÁGNES BERNEK<sup>1</sup>

**Abstract:** This paper has sought to answer how we can reposition the geopolitical situation of the Central and Eastern European region in this changing 21<sup>st</sup> century world political and world economic environment. Central and Eastern Europe does not exist as an independent region: the region defined by a common socialist past still existed in the 20<sup>th</sup> century, but no longer exists in the 21<sup>st</sup>. Within geopolitical thinking about the region we must abandon the paradigms of the Cold War period, when we asked “are we part of the West or the East?” and “where is the border between Central Europe and Eastern Europe?” and instead we must attach new images to certain geographic areas. The concept of so-called Central Europe “widely understood” used in this paper is part of the new way of thinking, as on one hand it “expands” the borders of Central Europe, while on the other it replaces the traditional North-South-West and East regional division with an economic cooperation approach, one that does not attempt to interpret regions based on geopolitical lines of division. The role of a buffer zone is to separate the spheres of given great powers. Given that the various states in buffer zones are themselves divided along various geographic, civilizational, economic and integration fault lines, the states of buffer zones stand opposed to one another, and there is no actual cooperation among them. The bridge role, on the other hand, entails establishing links between the spheres of the great powers. States in a bridge zone must create close economic cooperation that can oppose the ancient “divide and conquer” policies of the great powers. The “key” to economic cooperation within the bridge zone is that beyond economic cooperation among states the regions within national borders (real territorial economic units) and the companies of the regions must develop tight economic ties amongst one another. A key question for the 21<sup>st</sup> century is whether a new north-south oriented Central and Eastern European “bridge cluster” can be established.

**Key words:** Central and Eastern Europe, buffer zone, bridge region, multi-polar world, new Eurasia, new North-South growth axis

**JEL Classification:** F50, R10

---

<sup>1</sup> ÁGNES BERNEK, Budapest Business School, Hungary, abernek@t-online.hu

## 1. Introduction – Between West and East

When examining the geopolitical roles of Central and Eastern Europe, regularly the main question is, where is this region, in the West or in the East? What is more important, which is more significant: being a border zone of the Atlantic sphere of power or being the western bridgehead of the now-forming Eurasian sphere of power?

The positing of such “West or East” questions is not appropriate for the world of the 21st century but is more a product of the traditional North-South and East-West divisions of the world in the second half of the 20th century. To this day, this West-East division forms the foundation of our thinking on international geopolitical space, despite the fact that since the time of the regime changes of the 1990s the world has become unipolar, with the logic of the international divisions of the Cold War having lost its meaning. This is so much so that in world politics and world economics discourse in the 21st century the term ‘developing country’ is no longer in use. It is important to stress that the basis of this traditional geopolitical interpretation of geographical cardinal directions is that it appears evident to us that the European continent is the central region of the planet. As such, we have always used maps of the world in which Europe is in the centre. As a result, the foundation of the North-South, but especially the West-East geopolitical point of view is that we traditionally study the geopolitical space of the 21st century from an exclusively European stance. At the beginning of the 21st century, can the countries of Central and Eastern Europe change their traditional geopolitical world views? Most importantly, can they move beyond the ingrained stereotype in their thinking, according to which “the West is always looked up to, while the East is always looked down upon”?

In the case of the Central and Eastern European region it is difficult to escape from the “cage” of Cold War-era West-East thinking. Case in point: following the Russian annexation of the Crimean Peninsula in March of 2014, through antagonism between the USA and Russia, the Central and Eastern European region increasingly became a buffer zone; a role it had historically played several times. The multi-polar world taking shape today offers new geopolitical opportunities. We must find a new vision to replace the “fossilized” West-East geopolitical mode of thought, and as such, relatively speaking, the geopolitical situation of the Central and Eastern European region can in the near future be interpreted in an entirely new way.



## 2. Buffer zone/shatterbelt or gateway/bridge region? – Theoretical approach

According to Bernard Cohen’s definition, shatterbelts are “strategically oriented regions that are both deeply divided internally and caught up in the competition between great powers of the geostrategic realms” (Cohen, 2015, 48). Cohen does not offer an unequivocal definition of gateway states and gateway regions. In fact, he emphasizes that although gateway states exist (e.g., Singapore, Hong Kong, Bahrein, Dubai), gateway regions, in his reading, do not. He does, however, view the East European region as a potential gateway region, one that in the future could connect the sea power sphere to the Eurasian continental power sphere. When considering the special characteristics of gateway states Cohen emphasized the following: strategic economic situation, high degree of economic affinity in the population, high level of education in the population, a high degree of openness to the world economy, a high level of service activity, and most importantly, geographic proximity to the world’s key transport and transportation channels.

Based on definitions by Cohen and those generally found in the international literature we can establish that while the shatterbelt is a political term and carries primarily a political/geopolitical role; the gateway is an economic term, the essence of which is provided by a role in the world economy. The diagram below summarizes these theoretical basic features.

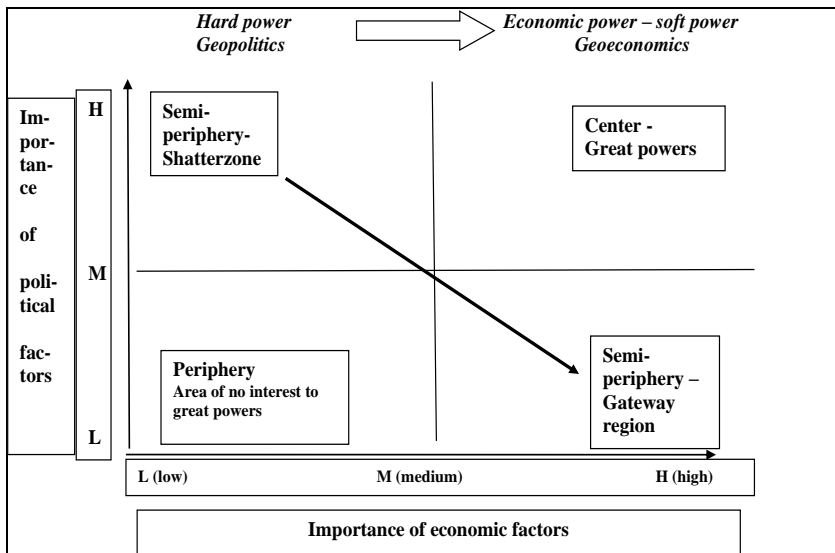


Figure 1. The theoretical basic features of shatterzones and gateways regions

Source: Bernek, 2018, 36.

The diagram analyses the possible situations of a given region through world economy and world politics viewpoints in terms of economic and political factors. The four basic types are the following (*Figure 1*) (Bernek, 2018, 36):

1. Periphery – whereby both economic and political factors are of little importance. Primarily geopolitical strategies are at play.
2. Semi-periphery shatterzone – whereby the importance of political factors is definitive, and the significance of economic factors is low. Again, geopolitics prevails.
3. Semi-periphery gateway region – whereby economic factors are most important, leaving political factors in the background. Geo-economic strategies are of primary importance.
4. A centre region or great power – whereby both political and economic factors are of high importance.

Central and Eastern Europe can only become a gateway region by becoming as strong and sovereign as possible as an economic area, given that this would decrease the political effects of great powers. While the territorial basis of shatterbelts is states, gateway or bridge regions are composed of actual territorial units reaching across state borders and economic centres and regions.

### **3. The multi-polar world of the 21st century – world economic and world political opportunities**

In 2020 it is accepted as a fact that after the era of the uni-polar world based on the hegemonic role of the USA and the Atlantic sphere in world politics and the world economy a new multi-polar world is in formation (Bernek, 2015). The global role of the USA as “first among equals” has now come to an end, and in geopolitical terms this signifies the beginning of the spatial diffusion of power. But what will this multi-polar world be like? Given that the regulatory system of the emerging multi-polar world still remains to be developed, the current period of complete uncertainty can be traced back to so-called system-level geopolitical risks. With China now boasting the world’s second-largest national economy, the Anglo-American global economic regulatory order is being challenged by other political and economic models and economic modes. There is a so-called non-Anglo-American world in formation (alongside the Anglo-American, for the time being). As such, the traditionally understood “Western” dominance is becoming increasingly questionable.

The 21st century’s geopolitical “grand chessboard” (Brzezinski, 1999) is fundamentally changing, and the world’s central region is increasingly that of the Pacific Ocean sphere. The grand strategies of the 21st century will be examined exclusively based on the efforts of three great powers, namely the USA, Russia

and China. The world is turning, and all signs point to a 21st century that is not the European century. And given the above, the Europe-centric world view will change, if only slowly, and interpretation of the divisions in the international order viewed along the traditional North-South and East-West fault lines will transform. Or in cartography terms, the reference point is changing, and the world can be understood not only from the viewpoint of Brussels and Washington, but also from that of Beijing and Moscow, i.e., we must develop a fundamentally new geopolitical spatial orientation.

At this time, however, we are witnessing a renaissance of orthodox (traditional) geopolitical approaches. The unquestionably most-quoted author in current geopolitics is Halford J. Mackinder (1861–1947), a British geographer of Scottish origin. The two most important terms in geopolitics – “Heartland” and “World Island” – have their origins in Mackinder’s writing. Regarding political analysis of Europe and Asia, Mackinder sought to answer the question of what correlations stood behind geographic and historical processes and key events (Mackinder 1904). Mackinder’s “World Island” concept meant Eurasia, which indicates not only Europe and Asia as a single continent in the geographic sense (and hence the planet’s largest continuous land mass), but also stresses that the peoples and states of Europe and Asia form the centre of world power (Mackinder, 1919).

The term Eurasia is one of the most debated concepts of our time. In the western half of Europe, the term’s very existence is denied and is often identified with Russia or the resurgence of the former Soviet Union. Hungary also employs stereotypes characteristic of the Cold War in its thinking, with Europe synonymous with the so-called West and Eurasia identified with the East. The commonly held political notion that Hungary must choose between Europe and Eurasia is fundamentally flawed both geographically and geopolitically.

Despite so many changes, the basic question of geopolitics remains unchanged. Namely, will Mackinder’s “World Island” come to exist at all as a factual territorial unit? Will we, in the near future, study world political relations in terms of the “World Island” vis-à-vis the Americas? Will the USA’s Cold War-era policy of containment continue, and if yes, then what methods will the country employ to obstruct Europe and Asia from forming strong economic and political relations? Will increasing economic cooperation between Russia and China lead to the development of a new Eurasian supercontinent? What kind of new multi-polar world will this bring about, and what will be the position of our region and our countries in the currently forming Eurasian supercontinent?

One of the essential concepts in this paper is the so-called new Eurasia paradigm (Balces, 2016). The most important components of the concept are the following:

- In the 2000s – from the beginning of Putin’s presidency, and from the consolidation and growth period of the Russian economy and political constellation – the Eurasia concept was associated exclusively with Russian geopolitical aspirations (as a post-Soviet term). In the West, the Russian geopolitical strategy was seen as carrying the danger of the “resurgence” of the Soviet Union (this view persists). It is no coincidence that the term was completely rejected in the countries of the Euro-Atlantic sphere, where the idea of the building of a Russian-led alliance and sphere between Europe and Asia was seen as impossible.
- From 2013, with the announcement and launch of the Chinese “New Silk Road” infrastructure and economic development program, the Eurasia concept was granted a new and exclusively economic interpretation. Basically, it moved beyond its post-Soviet empire-building interpretation. For the first time in history there is a realistic economic opportunity for Europe and Asia to form a common economic sphere, given that the west of Europe will in fact be connected with the east of Asia.
- All the above also means that while earlier the term Eurasia was only used in geological discussions (Russian discourse being an exception to this), today the political and economic approach to Eurasia has reappeared. This will fundamentally change our general worldview, with antagonism between West and East being replaced by thinking in terms of a new spatial level and levels.
- But what will characterize the spatial organization of 21st century Eurasia? What new dependence relations will the regions of Eurasia move into to replace the traditional center-periphery relationship? Will earlier buffer zones transform into bridging regions? Does a Central-Eurasia region exist? And in what ways is it different from the traditional term Central Asia?
- What geopolitical role will Central and Eastern Europe assume in the emerging Eurasian continent? In European terms is this region the periphery of the EU, or the eastern half of the European continent? Will this region be granted a new geopolitical role? Will it serve as a bridge between Asia and Europe? Can it escape the “cage” of being trapped between West and East?

For the countries of Central and Eastern Europe, to become the bridging region of the Eurasian continent in formation, the development of an independent economic sphere is a must. But this is only possible if the countries of the region do in fact cooperate economically and replace the almost entrenched West-East division with the construction of a new Central and Eastern European economic sphere based on north-south oriented infrastructural channels. The necessity of the establishment of such a north-south oriented Central and Eastern European

economic (and political) sphere was an element of Polish Marshall Józef Pilsudski's post-First World War settlement plan. Pilsudski coined the term *Intermarium* (i.e., among seas) to indicate stronger cooperation between countries situated between the Baltic and Adriatic and Black Seas in the interest of maintaining their independence.

The currently emerging multi-polar world, despite all its risks, opens up new geopolitical opportunities. It is my view that the Central and Eastern European region, and especially the Visegrad states, will have a world economy and world political role in the 21st century whereby they can serve as the connectors of key economic and political spheres. From an economic point of view, this means that on one hand, transportation and shipping services, and on the other hand, business and financial relay activities can become definitive. Given its geopolitical position, Hungary can become an ideal logistical center for transnational companies from both the West (mainly North America and Western Europe) and the East (mainly Russia and China). The countries of Central and Eastern Europe must by all means strive to become a strategic geographic zone in the multi-polar world of the 21st century. In geopolitical terms they must become a "bridge region". The currently forming Eurasian supercontinent makes this possible. Through increasing economic cooperation between Russia and China a new Eurasian sphere is developing. But the main question concerns the nature of the future political and economic relationship between Europe and Asia: will Europe be a part of the 21st century Eurasian continent? Can the countries of Central and Eastern Europe have an independent foreign economic and foreign trade strategy at all? In a few decades, how will we answer the question: where is the Central and Eastern European region, in the east of Europe or in the center of Eurasia?

#### **4. The spatial organization of the Central and Eastern European economic bridge region**

One of the most important factors for a bridge region is competitiveness in the global world market. As such, the primary spatial organization level is the global world market itself. This, however, means a Pacific Ocean-centered world economy as much as an Atlantic sphere-centered world economy. Given that a key goal of China's world economic efforts is the creation of a new Eurasian sphere, the role of the Central and Eastern European bridge region could be to establish connecting ties between the various regions of the Eurasian sphere. The growth axis of this 21st century Eurasian continent lies along the line connecting Beijing, Astana, Warsaw and Berlin, and as such, we might ask to what degree can the Central and Eastern European bridge region join this growth axis?

Further, it is of utmost importance to stop the demarcation of the Central and Eastern European region based on its socialist past. The 20 countries that are

traditionally thought of as the Central and Eastern European region never formed a consistent sphere in political or economic terms. The region must by all means open to geographically nearby regions and countries, taking into account, among other things, historical relations from the pre-socialist era. In my judgment, we must grant Central Europe a broader interpretation. A so-called “wide interpretation” of Central Europe is presented in the next map. The northern border is the shore of the Baltic Sea. The western border runs along the western borders of Germany, Switzerland and Austria. To the south, the border runs along Italy, Malta, the island of Crete (a part of Greece), and then to the east, it runs along the eastern borders of Turkey and Georgia, then follows the Volga River in Russia. At Kazan, the border turns toward St. Petersburg, where it once again reaches the Baltic Sea (Figure 2).

The interpretation of the Central and Eastern Europe region prevalent during the regime changes of the 1990s has lost its currency, and the twenty countries with a common socialist past can be divided into various macro-regions:

- the Baltic Sea macro-region in the north;
- the Adriatic and Ionian Sea macro-region in the south;
- the Black Sea macro-region in the east, and;
- the landlocked Carpathian Basin/Danube macro-region in the center.



Figure 2. The “wide interpretation” of Central Europe

Source: Bernek, 2018, XV.

Can the macro-regions created largely as EU initiatives or as the result of political will be seen as economic spheres? Clearly, the economically most advanced macro-regions with a long historical past of economic relations, and especially those which do not “spill across” geopolitical fault lines can become real economic spheres.

The following map (Figure 3) illustrates how the twenty former socialist countries of Central and Eastern Europe can be divided into macro-regions. In this interpretation, I did not use EU macro-regional strategies as a starting point, but instead took into consideration the economic development, geographic and geopolitical position and economic relations of the countries of Central and Eastern Europe to divide them into regions, or in my terms, into geopolitical macro-regions.



**Figure 3. The Baltic-Adriatic economic axis and geopolitical macro-regions**  
 Source: Bernek, 2018, XIX.

The central growth zone of the 21<sup>st</sup> century is the Baltic-Adriatic economic axis, which is based on the Visegrad6 (“V6”) geopolitical macro-region. I use “V6” instead of “V4” because I recommend that Slovenia and Croatia be added to the V4 cooperation in the interest of establishing a new geopolitical bridge region. The task of this “V6” geopolitical macro-region could be to construct increasingly intensive economic relations with direct geographic neighbours Germany, Austria and Italy. Three other geopolitical macro-regions are to be connected to the North-South growth axis:

- the North-Baltic macro-region composed of the three Baltic states, which can establish a connection between the “V6” and northern Europe;
- the Eastern macro-region composed of Belarus, Ukraine and Moldova, which can ensure the geographic continuity of the Baltic-Adriatic economic axis with the currently forming Eurasian sphere led by China and Russia, and;
- the Southeast macro-region composed of EU member states Romania and Bulgaria as well as the non-EU former members of Yugoslavia and Albania. This is similar to the southwest-southeast geopolitical axis marked by Ronald Asmus in 2008 (Asmus, 2008). This southeastern macro-region would have an emphasized role, given that it would lay the foundation for the economic and political opening of the “V6” toward Turkey, the South Caucasus, Central Asia and the Middle East.

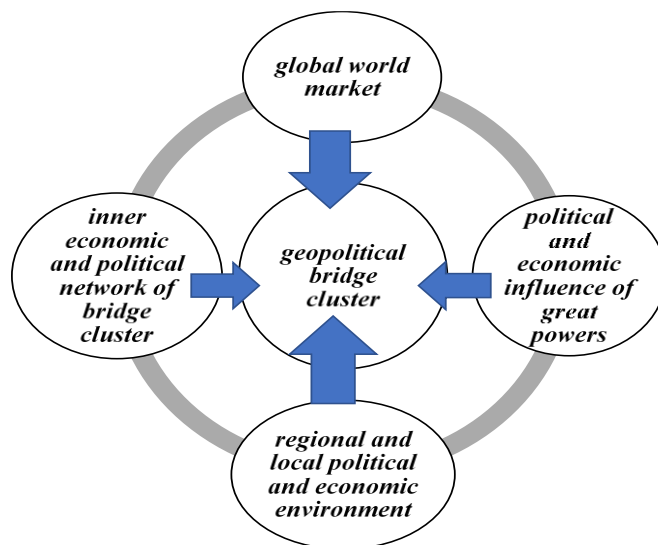
A closer economic cooperation between the “V6” and the previously listed three geopolitical macro-regions can serve as the foundation for redefining the geopolitical role of Central and Eastern Europe in the 21st century, with the region placing itself not exclusively in Europe, but in the currently forming Eurasian continent as well. As such, within a few decades, when asked the old question of where this region is situated, we can respond “in Central Eurasia” instead of “in the eastern part of Central Europe” or “Eastern Europe”.

It is my hope that within a few decades the geopolitical macro-region of the “V6” can transform into a new geopolitical “bridge cluster”, which, based on economic development, economic sovereignty and especially economic cooperation, can become capable of establishing connections between the larger geopolitical spheres.

Currently, in 2020, I can only trace the theoretical framework (*Figure 4*) of this new geopolitical bridge cluster, listing four important influencing factors:

- the global world market: the development of a strategy concerning which geopolitical bridge clusters will become factors of global competitiveness;
- the economic and political influence of great powers: strategic recommendations to states of geopolitical bridge clusters on coordinated geopolitical strategy aimed at given great powers;
- the internal economic and political network of bridge clusters; coordinating strategies on common economic development and joint world political roles, as well as;
- regional/local economic and political environment below the national level: developing micro-economic environments for corporations as well as developing strategies for economic and political cooperation for units within national boundaries.





#### 4. The theoretical model of geopolitical bridge cluster

*Source:* Author, with reference to the theoretical model of regional clusters of Lengyel, Rechnitzer, 2004.

### 5. Conclusion

We live in an age which is at once complicated, unstable, and in a security sense, rather risky. The geopolitical “grand chessboard” of the 21st century will fundamentally change, and through the forming multi-polar world, new “pieces” will appear on the board, which will develop new “rules” of the game. And though everything changes, the fundamental geopolitical question will remain the same: will Halford Mackinder’s World Island – i.e., the Eurasian continent and Africa together – be established at all, and will we, in the near future, be studying world political relations as those between the World Island and the Americas?

This emerging multi-polar world, however, also provides new opportunities, and Central and Eastern Europe, instead of always floating adrift in world political affairs, almost permanently serving as a buffer between great powers, can become a bridge zone between Europe and Asia, or between the Atlantic sphere’s great powers and the emerging states of Asia. There is no doubt that the most important building block for such is strengthening the economic development, economic independence and world market competitiveness of Central and Eastern Europe. The author has written this paper through the lens of this positive view of the future, not forgetting in the meantime that buffer state or buffer zone existence is as much a matter of domestic politics as foreign affairs. The most important

foundation of the bridge state or bridge zone role is social consensus, thinking cooperatively and a willingness to pull together in one direction.

According to Mackinder's writing – these being some of the most-quoted sentences in geopolitical science – the rule of Eastern Europe is the basis of world rule. The 21st century offers Central and Eastern Europe an opportunity to fill a new position on the geopolitical “chessboard”. This is a strategic geopolitical situation which could possibly lead world political and economic leaders in 20-25 years to declare the following about Central and Eastern Europe: “The most important element of success in world politics and world economics in the 21st century is cooperation with the countries of the Central and Eastern Europe region.” (*This 21st century paraphrasing of the Mackinder quote is based on the author's positive view of the future.*)

## References

- ASMUS, R. 2008. Europe's Eastern Promise. Rethinking NATO and EU Enlargement. In: *Foreign Affairs*. January/February.
- BALCES, A. 2016. *A new Eurasian paradigm*. www.eurozine.com/a-new-urasian-paradigm, [Download: 20 September 2017].
- BERNEK, Á. 2015. The “Grand Chessboard” of the 21st Century Geopolitical Strategies of the Multi-polar World. *Nemzetbiztonsági Szemle/National Security Review MMXV. III. évf.* Special Issue/2015 pp. 5–28. <http://nbszemle.uni-nke.hu>
- BERNEK, Á. 2018. *Közép- és Kelet-Európa a 21. század geopolitikai/geoökonómiai stratégiáiban. A 20. század Nyugat és Kelet közötti ütközőzónájától a 21. század eurázsiai hídtertségéig.* , Budapest: Akadémiai Kiadó. (200 p. + 20 colour geopolitical maps).
- BRZEZINSKI, Z. 1999. *A nagy sakktabla. Amerika világhéghatalma és geostratégiai feladatai*. Budapest: Európa Könyvkiadó.
- COHEN, S. B. 2015. *Geopolitics. The Geography of International Relations*. New York, London: Rowman and Littlefield, Lanham, Boulder
- LENGYEL, I., RECHNITZER, J. 2004. *Regionális Gazdaságtan*. Budapest–Pécs: Dialógus Campus Kiadó.
- MACKINDER, H. J. 1904. The Geographical Pivot of History. In: *Geographical Journal*. Vol. 23, No. 4, pp. 421–437.
- MACKINDER, H. J. 1919. *Democratic Ideals and Reality. A Study in the Politics of Reconstruction*. New York: Henry Holt and Company.

## **Chapter 5**

### **Innovation and digital technology**



# The stereotypical link between gender and innovation

VERSAVEL TECLEAB HAILE<sup>1</sup>

**Abstract:** This paper summarizes the arguments within the scientific discussion on the stereotypical association of innovation and gender. Too often, innovation is closely related to science and technology characterized by male over-representation. Such association has resulted in linking innovation with masculine attributes. Women's innovations are less accredited and less acknowledged for achieving technological and scientific advancements. Innovations in male-dominated fields, such as science, technology, engineering, and mathematics are emphasized over innovations of women that involve social and process innovations. Innovations produced in female-dominated fields are discriminated, not regarded as an innovation, are barely studied and have been given less attention in research. The main purpose of this research is to show how the perception of innovation has led to a biased link between gender and innovation. The methodological tool of the research is literature review on gender and innovation from 2000–2016. The paper presents the results of a theoretical analysis demonstrating that a stereotypical association of gender and innovation has resulted in a smaller number of female innovators in male-dominated fields because women are afraid of being criticized for their ideas as their innovations are regarded worthless. The research theoretically proves that gender roles, stereotypes and the way innovation is defined and perceived have contributed to the general notion that men are better innovators.

**Key words:** gender, innovation, masculinity, femininity, perception, stereotype

**JEL Classification:** J16, J71, J78, O39

## 1. Introduction

Which gender pops up in our mind first when we think of innovation? Or what would be our answer if we were asked: “who are the better innovators, men or women?” No wonder we would ignorantly answer “men”. But the real question is “why are we conditioned to think that men are better innovators?” The perception of innovation is influenced by the definition given to innovation. Too often, innovation is associated with technology and sciences where women are underrepresented, thus there is a tendency to believe that men are better innovators.

---

<sup>1</sup> VERSAVEL TECLEAB HAILE, Kaposvár University, Doctoral School of Management and Organizational Science, Hungary, Versicho@gmail.com/Haile; Versavel@ke.hu

Definitions of innovation have been linked to the gendered constructions of innovation. Although the definition of innovation seems gender-neutral, the way it has been measured and practiced is strongly gendered (Pettersson, Lindberg, 2013). Literature indicates that there is a strong male connotation in defining innovation (Marlow, McAdam, 2012). This conception was evidenced by the types of innovation supported by public bodies and governments and the way innovation is measured in national statistics. Due to the gendering of innovation, public support for innovation and R&D is mainly given to male innovators or distributed by males. There is a strong link between masculinity, innovation and science and technology. Shreds of evidence show that this association is interrelated (Dautzenberg, 2012).

Innovation is one of the determinants of success for companies, especially for those that are in the very early stages of their business cycle (introduction and creation stage), and that need to mature (development and growth stages). Innovation contributes to new employment opportunities, competitive advantages, and growth. Feldman (2000) listed different types of innovations such as product/process innovations, competitive/social innovations, and incremental/radical innovations. Studies on innovation largely focus on technological innovation and product innovations of industries and activities that have been mostly dominated by males. Meanwhile, less attention was placed on other types of innovations, such as social innovation where women are better involved (Nählinder, 2010; Blake, Hanson, 2005). So far, a large number of studies conducted in innovation applied methods to measure innovation outcomes in male-dominated industries. Innovations occurring in female-dominated sectors such as the service sector and public sectors are barely studied and have not been regarded as an innovation (Johansson, Malin, 2011). This paper aims to shed a light on the reasons why innovations are mainly associated with masculine attributes and innovations of women are seen less as an innovation. The results of this research can provide a useful insight for policymakers to fix the biased association of innovation with masculinity. Investigation of the stereotypical link between gender and innovation in this paper is carried out in the following logical sequence. First, the definition and concept of innovation are discussed. Second, the way that innovation is perceived is discussed along with the role of gender in innovation. Finally, the benefits of gender diversity in innovation are presented. The objective of the research includes comparing innovations in male-dominated sectors such as science and technology and female-dominated sectors such as public sectors and service sectors.

## **2. Theoretical background – The concepts of innovation**

Recently, scholars have raised questions on who is acknowledged as an innovator and what is acknowledged as an innovation (Agnete et al., 2013). Although innovation is not only about technology, in practice, current abstractions concerning process, service and product innovations in the literature consider it as some form of technological change either in a product or the production of a good or service (Simmie, 2002; Blake, Hanson, 2005). Currently, innovation concepts are covering more areas than just technology and thereby industry includes process innovation and service innovations. Yet the strong masculine connotation of innovation has continued to be reproduced (Agnete et al., 2013).

Innovation is the introduction of new or substantially improved products (goods or services), or processes, new methods for marketing, or new organizational methods in business practice, workplace routines or external relations. Innovation is also defined as “the creation and exploitation of new ideas” (Kanter, 2000, 168). A more economically minded definition is “Innovation is the novel application of economically valuable knowledge” (Feldman, 2000, 373). These definitions of innovation make no explicit mention of technology, however, too often the term innovation is used as a reference to “technological innovation”. The concept of innovation has been constructed to refer to certain kinds of economic activity that involve technology, particularly those economic sectors that are dominated by men in terms of both ownership and employment. These are the ones that fall comfortably within these dominant definitions of innovation (Blake, 2005). Although several innovation studies focus on technological innovations, innovations such as process and organizational innovations are very crucial for any firm. In addition, business innovations play a greater role in value creation than product innovations (Hamel, 2000). Since technological innovations have been regarded as the major innovations associated with masculinity, soft innovations where female participation is the highest, such as process-oriented innovations, have not received much attention so far. Therefore, identifying the actors of innovation may be an important approach to studying gender in innovation (Agnete et al., 2013). This prioritization of technology innovations and masculinity in research and policy in innovation has resulted in the differentiation of “masculinity” and “femininity”; with masculinity considered to be an essential feature of innovation while femininity is not. “A man with an idea on how a high-tech product can affect renewal processes in a traditional industry fits better as innovation than an ethnic minority woman with an idea on how a process may bring about social justice in society” (Susanne et al., 2012).

### 3. Discussion

#### 3.1 How is innovation perceived?

Women and men are neither from a different planet nor are they different creatures. They are human beings born with the same skills and talents. Apart from the biological differences, no significant differences characterize the two sexes in their creativity capacities. However, different studies show that there is a tendency to associate the ability of creativity with stereotypical masculine qualities. Societal attitudes to innovation are constructed by the stereotype that innovation practices that are from men gain priority but innovations that are from women are not regarded as an innovation. For example, according to Proudfoot et al. (2015) men are more likely to be perceived as more creative than women even for the same type of work and productivity. In the same research, it was demonstrated that men's ideas are evaluated as smarter than women's and that female executives are stereotyped as less indigenous and innovative than their male counterparts when evaluated by their supervisors. Moreover, creativity was more strongly associated with stereotypically masculine characteristics such as confident and risk-taking than with stereotypically feminine characteristics such as caring and organized. The stereotype that people tend to perceive men as more creative than women could brainwash people into believing that creative thinking is an ability more common among men than women and also compels women to believe that men's ideas are better. This might, in turn, result in a smaller number of women engaged in innovation and research and development, which might explain why we don't see many female innovators.

How innovation is understood has an impact on innovation policies and implementation. If innovation is conceptualized to refer only to certain kinds of industries dominated by men, the innovations of women in women-dominated sectors will be left out and probably forgotten. This might result in the perception that women are not innovators. I would say that because women were largely not present in the areas of science and technology where most innovation studies are conducted, it doesn't necessarily mean that they are not innovative. According to Nählinder (2010), men and women have different approaches to innovation, for example, women conduct innovations that are largely inspired by local needs to achieve social ends. They are much more interested in soft innovations such as social and organizational innovations. Cooper (2012) discussed in his finding that women are not perceived as innovators (or not as much as men), their ideas are not put forward and therefore not implemented. As the studies of Nählinder (2010) and Johansson and Malin (2011) indicate, social, organizational and environmental innovations are introduced by women. These innovations are more likely to have an effective impact on local economies. Women have the skill to adapt



universal innovations to their local context which is the key to new opportunities, employment, and local economic growth. However, these feminine innovations cannot be adapted to every local environment as they are more related to contextual factors. Most of their innovations remain at the local level; as a result, women's innovations are marginalized and invisible, making them non-effective actors in innovation. These results show that women are not lacking innovation capabilities but stereotypes interfere.

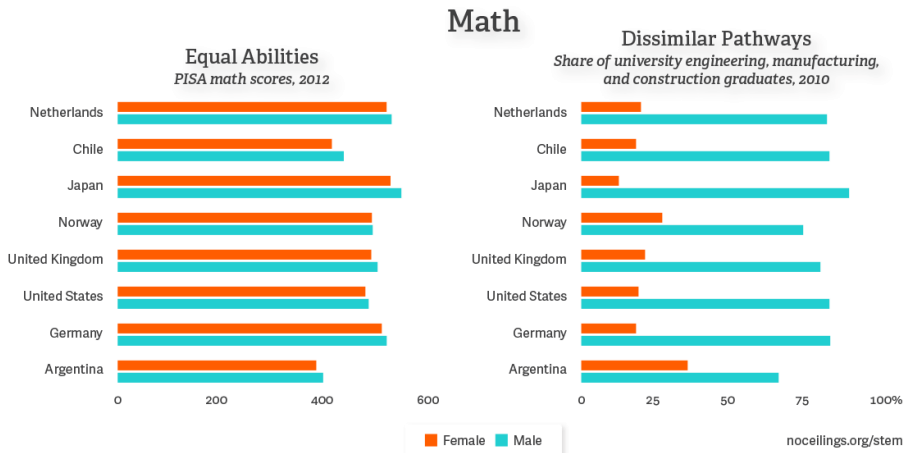
### **3.2 Gender role and innovation**

While men and women are both innovative, the gender role they play within the context of an organization can affect how they are perceived and how they behave when innovating and sharing ideas (Psychology today, n.d). Research by Lynne and Helen (2002) indicates that people perceive innovative solutions to be more likely to come from a male manager, and they perceive adaptive solutions to be more likely to come from a female manager. It was further confirmed that innovative solutions were more likely to be implemented if they were suggested by a male manager. While explaining the barriers women innovators face, the researchers identified the risk attached to consequences of failure or mistake, the risk of criticism, and the risk of not receiving credit for ideas. As we can understand from the findings, women are less likely than men to have their creative thinking recognized which is why they remain absent from creative industries and are most likely to be passed over for leadership positions. This gender bias in creativity judgments clearly affects the economic outcomes of men and women in the workplace and could put women at a professional disadvantage that has the potential to limit opportunities for women in the workplace. This explains why women are not reaching high-level positions and why men are more likely to get a promotion faster than women in a range of professions. Moreover, how women and men are involved in the innovation process as decision-makers and beneficiaries can impact on creativity (e.g. better solution ideas), the efficiency of the process (better problem-solving strategies), and take-up of new technologies (Lee, Pollitzer, 2016).

### **3.3 Why are women underrepresented in science and technology?**

Different factors contribute to the underrepresentation of women in science and technology fields. I believe that the root cause is the difference in the choice of study fields and career between the two sexes which is highly influenced by the mixture of parent's role, childhood fantasies, and norms. Let's discuss each factor. First, parents and educators play a significant role in children's academic interests as much as they do in raising and nurturing children. Research indicates that

parents and teachers are likely to perceive that girls are not good for math-oriented subjects. For instance, a research conducted by Correll (2001) indicated the conception that girls are not qualified for STEM (Science, Technology, Engineering, and Mathematics) and the stereotype that these fields are not as important for girls as they are for boys in the future career, has resulted in differentiation in choices of fields and career interests of children. Children who grow up internalizing STEM as masculine fields will be influenced to shape their choices of field based on this stereotype. This stereotype will, in turn, lead to the construction of gender identity and the classification of fields as either masculine or feminine (Ridgeway, 2011). Therefore, female students may avoid STEM which is a male-dominated field and where the stereotype threat is more likely to be activated. Such stereotype threat will scare away female students from going to a STEM field making them remain a minority in the fields (Alon and Gelbgiser, 2011). Female students are substantially less likely to endeavor to major in STEM in college when compared to male students (Ayalon, 2003). This could also deteriorate their self-concept in science. According to a study, girls are more likely to have a lower self-belief in their science performances and abilities than boys. While boys are more likely to have a higher self-belief of their mathematical ability than females (Eurydice, 2009). As shown in *Figure 1*, PISA (2012) reported that in 65 countries students of both genders among the 15-year-old show that most boys and girls perform similarly in science with a little difference in math, boys performing only 2 percent higher. However, the difference has to do with attitude rather than skill.



**Figure 1. A comparison of boys' and girls' math scores and university graduates**  
Source: PISA, 2012

Second, social norms can be a factor that contributes to gender disparities in the choices of study fields. Socialization channels girls and boys into gender-specific majors in college. Boys, regardless of their actual ability, may face a high social penalty associated with majoring in female-dominated fields (Correll, 2001). As a result, only boys who are less talented or less dedicated than their peers will join the female-dominated fields. Contrarily, only the most talented and ambitious females will choose male-dominated fields, leaving plenty of talented and ambitious women in the female-dominated fields (Correll, 2001; Ayalon, 2003). The perceived conflict between one's gender identities may affect how women value certain career options and their prediction of the probability of succeeding in fields that they choose (Alon, DiPrete, 2015). Therefore, gender differences in education can negatively affect participation in innovation which, in turn, affects economic growth and social inclusion.

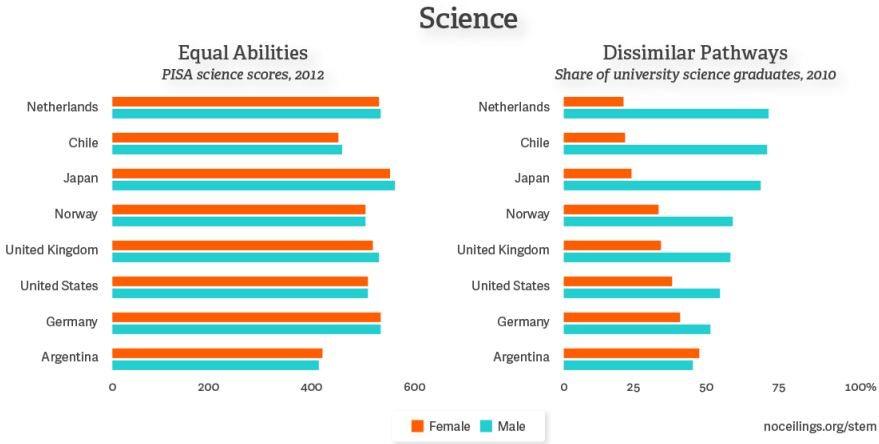
Third, children's fantasies influence their choices of study. The toys children play with shape their future career. Gender-specific toys could influence what children want to become when they grow up. According to Becky (2010), boys are likely to play with toys that involve action, construction, and machinery, while girls play with dolls. The kids' involvement with toys gives implications about what's appropriate for boys and girls to do. For instance, it sends a message that problem-solving is the task of boys while caring and nurturing is for girls. Because of these factors, gender segregation by study majors persists and continues to be an important structural contour of gender inequality in innovation in science. Since women and men are likely to choose different fields of studies and aspire to different paths of careers, they are innovative in a different way and their participation in innovation is different in a discipline.

As seen in *Figure 2*, among university graduates of bachelor's degrees in science, female shares range from 25% in the Netherlands and Japan to 41% in the U.S. In engineering fields, the gender gap is pronounced in high-income countries, including the U.S, Germany, and the U.K., and where less than one in five engineering graduates are women.

### **3.4 Gender diversity in innovation**

Gender diversity is defined as the balance between the two genders (Østergaard et al., 2011). It brings together a variety of knowledge, skills, and experiences of members allowing firms to be more open to new ideas and innovations (Cristina et al., 2013; Singh et al., 2008). The diversity of knowledge and experiences could complement each other, fostering development and innovation (Quintana and Benavides, 2008).

Gender diversity contributes to innovation in a number of different ways. First, research findings show that teams with diverse backgrounds and perspectives are



**Figure 2. A comparison of boys’ and girls’ science scores and university graduates**  
*Source: PISA, 2012.*

more likely to generate new ideas and better outcomes for solving problems. Members’ unique attributes bring different perspectives to the group and lead to better outcomes. Some researchers have identified a positive relationship between gender diversity and innovation capacity (Østergaard et al., 2011; Teruel et al., 2013). The better the gender balance, the higher the team performance and the collective intelligence of the group (Bear, Wolley, 2011). Women and men bring different knowledge, experiences, cognitive styles, values, preferences and behaviors into an organization, which influences the innovation process. The more diversified the knowledge base, the higher the level of innovation is within a firm. The diverse knowledge of females and males can be complementary (Quintana, Benavides, 2008), which enables the combinations of new knowledge and ultimately the creation of new ideas and products (Van der Vegt, Janssen, 2003). Second, gender diversity allows firms to have a stronger connection with the external environment, leverage their access to information, different networks and strengthen their innovative capacities. Customers’ needs and new market trends can be better identified if the firm has a good network pool with the outside environment. And a better understanding of customers’ needs allows the firm to come up with new and innovative product ideas that meet customers’ needs and wants (Teruel et al., 2013).

Third, the cognitive styles, values, preferences, attitudes, experiences, and behaviors of males and females altogether are beneficial for innovations (Cristina et al., 2013). Knowledge alone may not go a long way unless it is followed by a good decision. All the creative ideas and diversified thoughts should be turned

into practical innovation otherwise they will remain nothing but a theory (De Dreu, West, 2001). Therefore, to obtain a tangible innovation, gender diversity is needed as it contributes to better decision-making and problem-solving (Østergaard and colleagues, 2011). A diversified cognitive style, perceptions and broad viewpoints coming from males and females can ameliorate the quality of decision-making, which, in turn, results in improved innovation (Singh et al., 2008). The efficiency and effectiveness of innovative ideas and solutions to problems can be enhanced by including more women in decision-making (idea creation, problem-solving, and exploring market opportunities) on equal terms to men (Woolley et al., 2010).

Fourth, women have stronger interpersonal relationships and more open communication than men (Sandberg, 2003). They are known for their transformational leadership style which is suggested to benefit innovation (Gumusluoglu, Ilsev, 2009). Transformational leadership allows a smooth flow of communication within the organization and stimulates motivation (Eagly, Carli, 2003). Having women in an organization leverages open communication benefits in creating a flexible work environment fostering the exchange of knowledge and ideas. Therefore, a diversified gender composition enables conducive communication which benefits innovation (Østergaard et al., 2011).

#### **4. Conclusion**

Although innovation is gender-neutral, the way it is interpreted and understood has caused gender bias in the field. The concept of innovation has been limited to R&D, technological and scientific advancement where males are overrepresented. This has resulted in a stereotypical link of innovation with masculinity and perception of innovation as more common to man. Less attention has been given to innovations in service, marketing, and processes where women have greater participation. While men and women are both innovative, the gender role affects how they are perceived and how they behave when innovating and sharing ideas. The fact that female-oriented innovations are marginalized should receive due attention from policymakers. It is time to start acknowledging and appreciating innovations in hitherto neglected female-dominated industries. It is necessary to view innovation in a broader scope beyond technological innovations. Equal attention should be given to all forms of innovation regardless of the conception of masculinity or femininity and whether they are technological or non-technological. The gender of actors and the type of sectors shouldn't define innovation. It shouldn't be forgotten that innovation is a multidimensional phenomenon and is gender-neutral. Policymakers need to support all innovators whether male or female and avoid gender discrimination against female innovative ideas and scientific works. Moreover, research organizations should work on improving

the gender balance and integrate gender diversity in research content. This study is a review article, thus further empirical research is needed to have a robust conclusion.

## References

- AGNETE ALSOS, G., LJUNGGREN, E., HYTTI, U. 2013. Gender and innovation: state of the art and a research agenda. In: *International Journal of Gender and Entrepreneurship*. Vol. 5, No.3, pp. 236–256.
- ALON, S., DAFNA, G. 2011. The Female Advantage in College Academic Achievements and Horizontal Sex Segregation. In: *Social Science Research*. Vol. 40, No. 1, pp. 107–119.
- ALON, S., DIPRETE, T. 2015. Gender Differences in the Formation of a Field of Study Choice Set. In: *Sociological Science*. Vol. 2, No. 5, pp. 50–81.
- AYALON, H. 2003. Women and men go to university: mathematical background and gender differences in choice of field in higher education. In: *Sex Roles*. Vol.48, No.5/6, pp. 277–290.
- BEAR, J. B., WOOLLEY, A. W. 2011. The role of gender in team collaboration and performance. In: *Interdisciplinary Science Reviews*. Vol.36, No. 2, pp. 146–153.
- BECKY, F. 2010. Gender, toys and learning. In: *Oxford Review of Education*. Vol. 36, No. 3, pp. 325–344.
- BLAKE, M. K., HANSON, S. 2005. Rethinking Innovation: Context and Gender. In: *Environment and Planning A: Economy and Space*. Vol.37, No.4, pp. 681–701.
- COOPER, R. 2012. The Gender Gap in Union Leadership in Australia: A qualitative study. In: *Journal of Industrial Relations*. Vol.54, No. 2, pp. 131–146.
- CORRELL, SHELLEY J. 2001. Gender and the Career Choice Process: The Role of Biased Self Assessments. In: *American Journal of Sociology*. Vol.106, No. 6, pp. 1691–1730.
- CRISTINA, D.G., ANGELA, G. M, FRANCISCO, J.M. 2013. Gender diversity within R&D teams: Its impact on radicalness of innovation. In: *Innovation*. Vol.15, No. 2, pp. 149–160.
- DAUTZENBERG, K. 2012. Gender differences of business owners in technology-based firms. In: *International Journal of Gender and Entrepreneurship*. Vol. 4, No. 1, pp. 79–98.
- DE DREU, C. K. W., WEST, M. A. 2001. Minority Dissent and Team Innovation: The Importance of Participation in Decision Making. In: *Journal of Applied Psychology*. Vol. 86, No. 6, pp. 1191–1201.
- EAGLY, A.H., CARLI, L.L. 2003. The female leadership advantage: An evaluation of the evidence. In: *Leadership Quarterly* Vol.14, No. 6, pp. 807–834.
- EURYDICE. 2009. Gender Differences in Educational Outcomes, study on the measures taken and the current situation in Europe. Available online at <https://op.europa.eu/en/publication-detail/-/publication/40271e21-ca1b-461e-ba23-88fe4d4b3fd4>
- FELDMAN, M. 2000. Location and Innovation: The New Economic Geography of Innovation, Spillovers, and Agglomeration, in Clark, G., Feldman, M., Gertler, M. (eds), *Oxford Handbook of Economic Geography*, Oxford, Oxford University Press.
- GUMUSLUOGLU, L., ILSEV, A. 2009. Transformational leadership, creativity, and organizational innovation. In: *Journal of Business Research*. Vol.62, No. 4, pp. 461–473.
- HAMEL, G. 2000. The End of Progress. In: *Business Strategy Review*. Vol. 11, No.3, pp. 69–78.
- JOHANSSON, A. W., MALIN, L. 2011. Making a case for gender- inclusive innovation through the concept of creative imitation. In: *Annals of innovation and Entrepreneurship*. Vol. 2, No.2.
- KANTER, R. M. 2000. When a thousand flowers bloom: structural, collective and social conditions for innovation in organization, in *Entrepreneurship* Ed. R Swedberg Oxford University Press, Oxford. pp. 167–210.

- LEE, H., POLLITZER, E. 2016. Gender in science and innovation as component of inclusive socioeconomic growth. Report of the Gender Summit.
- LYNNE J. M., HELEN, F. 2002. Role Expectations as Constraints to Innovation: The Case of Female Managers. In: *Creativity Research Journal*. Vol. 14, No. 1, pp. 93–109.
- NÄHLINDER, J. 2010. Where are all the Female Innovators? Nurses as Innovators in a Public-Sector Innovation Project. In: *Journal of Technology Management and Innovation*. Vol. 5, No. 1, pp. 13–29.
- MARLOW, S., MCADAM, M. 2012. Analyzing the influence of gender upon high-technology venturing within the context of business incubation. In: *Entrepreneurship Theory & Practice*. Vol. 36, No. 4, pp. 655–676.
- JOHANSSON, A. W., LINDBERG, M. 2011. Making a Case for Gender-inclusive Innovation through the Concept of Creative Imitation. In: *Annals of Innovation and Entrepreneurship*. Vol. 2, No. 2, pp. 1–13.
- ØSTERGAARD, C. R., TIMMERMANS, B., KRISTINSSON, K. 2011. Does a different view create something new? The effect of employee diversity on innovation. In: *Research Policy* Vol. 40, No. 3, pp. 500–509.
- PETTERSSON, K., LINDBERG, M. 2013. Paradoxical spaces of feminist resistance – mapping the margin to the masculinist innovation discourse. In: *International Journal of Gender and Entrepreneurship*. Vol. 5 No. 3, pp. 323 –341.
- PROUDFOOT, D., KAY, A. C., KOVAL, C.Z. 2015. A gender bias in the attribution of creativity. In: *Psychological Sciences*. Vol. 26, No.11, pp. 1751–1761.
- PSYCHOLOGY TODAY. The Role of Gender in Innovation Available at <https://www.psychologytoday.com/blog/inside-the-box/201306/the-role-gender-in-innovation>.
- PISA. 2012. There Are Only 3 Countries Where Girls Feel More Comfortable With Math than Boys. Available online at [https://www.oecd-ilibrary.org/education/pisa\\_19963777](https://www.oecd-ilibrary.org/education/pisa_19963777)
- QUINTANA-GARCÍA, C., BENAVIDES-VELASCO, C. A. 2008. Innovative competence, exploration and exploitation: The influence of technological diversification. In: *Research Policy*. Vol. 37, No. 3, pp. 492–507.
- RIDGEWAY, C. L. 2011. *Framed by Gender: How Gender Inequality Persists in the Modern World*. New York: Oxford University Press.
- SANDBERG, K.W. 2003. An exploratory study of women in micro enterprises: gender-related differences. In: *Journal of Small Business and Enterprise Development*. Vol. 10, No. 4, pp. 408–417.
- SINGH, V., TERJESEN, S., VINNICOMBE, S. 2008. Newly appointed directors in the boardroom: How do women and men differ? In: *European Management Journal*. Vol. 26, No. 1, pp. 48–58.
- SIMMIE, J. 2002. Innovation, international trade, and knowledge spillovers in the London metropolitan region. In: *Italian Journal of Regional Science*. Vol.1
- SUSANNE, A., KARIN, B., EWA G., ELISABETH, S. 2012. Promoting Innovation – Policies, practices and procedures .VINNOVA report for Innovation system /Swedish Governmental Agency for Innovation System
- TERUEL, M., PARRA, M.D., SEGARRA, A.. 2013. Gender diversity and innovation in manufacturing and service firms, Universitat Rovira I Virgili, Working Paper.
- TURNER, L. 2009. Gender Diversity and Innovative Performance. In: *International Journal Innovation and Sustainable Development*, Vol. 4, No. 2–3, pp. 123–134.
- VAN DER VEGT, G. S., JANSSEN, O. 2003. Joint Impact of Interdependence and Group Diversity on Innovation. In: *Journal of Management*. Vol. 29, No.5, pp. 729–751.
- WOLLEY, A., CHABRIS, C., PENTLAND, A., HASHMI, N. et al. 2010. Evidence for a collective intelligence factor in the performance of Human Groups. In: *Science*. Vol. 330, No. 6004, pp. 686–688.

# Does Internet Trigger Strict Liability? Stealthy Technologies v. Stealthy Regulations

JÓZSEF KÁRPÁTI<sup>1</sup>, KINGA PÁZMÁNDI<sup>2</sup>  
KINGA PÉTERVÁRI<sup>3</sup>

**Abstract:** Internet connects two parallel but intertwined worlds: the on-line and the off-line world. If software programs are defect on the internet this has physical consequences in the real world. With its connecting nature, internet inserts a third assisting party into all on-line transactions. The role of traditional actors is blurred and extra risks are to be dealt with. The question of competence and liability faces challenges. One uses others' software products or databases via the internet. It necessarily generates global incompetence. Which software, under what legal regime could cause problems? The answer may not be simple for the operation of any robot, since plenty of different algorithms shared by various owners may twist the process of fact finding. The following article suggests that due to this trap of never-ending tracing back to the origins of the problem, the idea of applying strict liability instead of fault-based liability may be promoted.

**Key words:** internet; cloud computing; software liability; data protection; robot

**JEL Classification:** K15, K24

## 1. Introduction

The Venezuelan Supreme Court operates via cloud computing from outside of the country and uses Skype from at least 4 different venues such as the USA, Panama, Colombia and Chile. “Since July 2017, the full tribunal in exile, as well as its executive committee, has been meeting in cyberspace” (Bloomberg Jan, 2019). With the inclusion of the internet, what is new is the speedy way of communications among the interested parties. The judges could follow the rules *simultaneously*, hold hearings, do research and publish their judgement *instantaneously* via the internet. But where does the information come from, most probably even sensitive data in these cases? How to reach the necessary databases from different countries? What if these data were in the clouds, meaning in a server somewhere

---

<sup>1</sup> JÓZSEF KÁRPÁTI, Faculty of Business and Economics, John von Neumann University, Hungary, karpati.jozsef@gtk.uni-neumann.hu

<sup>2</sup> KINGA PÁZMÁNDI, Faculty of Business and Economics, John von Neumann University, Hungary, pazmandi.kinga@gtk.uni-neumann.hu

<sup>3</sup> KINGA PÉTERVÁRI, Institute of Business Economics, ELTE, Hungary, petervari@gti.elte.hu



not really transparent for the data owners or data holders? Under what jurisdiction are these data storable, locatable and accessible?

Is it so that the physical *here and now*, long ago the core elements of legal thinking, are not going to be relevant anymore? And does this mean that the question of competence and the question of the governing law is going to face challenges? Who and where, under what legal regime could act, commit a crime or become liable? Or, in this case, who and where could have authority to award a decision?

The answers may not be simple in many instances, for example, in case of the operation of driverless cars where there are plenty of different types of algorithms shared by various owners over the globe, stored and accessed in the cloud in different legal regimes. These data greedy technologies need the ever more popular cloud computing which guarantees a safe use of statistically measurable data cost-effectively. But would the widespread cloud computing caused borderlessness finally terminate territorialism, sovereignty even, or just the other way round, would it trigger stricter protectionism from the part of the nation states?

Clearly, it is tempting to make people believe that the new technologies bring about a paradigm shift in legal thinking (Zódi, 2018). However, there can be no direct answer to this question (Shapiro, 1999). Undoubtedly, there are many changes in our contemporary, specific world which could generate the feeling of radical difference. But do they touch upon basic legal principles, too? Or would profound changes or many profound changes cause a paradigm shift?

Apparently, there are two camps discernible in this scholarly debate: a) the data exceptionalists and b) the advocates of business-as-usual (Schwartz, 2018). Data exceptionalists perceive new technologies as disruptive to the long-standing notion of territorialism in law. Because one cannot even tell where the data are located or where one has access to them, they claim that the traditional connections have become blurred. On the contrary, the advocates of business-as-usual compare cloud computing with cross border bank wiring or e-transactions and claim that the data in the cloud are nevertheless physical, somewhere locally accessible and even seizable.

No matter what the rule is, however, innovative robotic technologies are going to be overwhelmingly widespread. This is the meaning of stealthy technology. Yet with the emergence of deep learning, the development of technology may become unleashed. Nonetheless, the regulations intertwined with robotics are again stealthy: most of the administrative procedures – or even petty court procedures – provide for self-executive law enforcement via on-line services, like the possible formation of a company through the European e-justice portal in the EU. Still, the evolution of robotic technology may trigger unleashed regulations, like the over-broad data protection regulation in the EU (EU regulation 2016/679, GDPR).

The following paper explores the origins of legal tools applied or suggested to be applied to these special cases generated by the new disruptive technologies. As is shown, all of the legal techniques used or suggested to be used were known in the course of legal history, none of these are new, but perhaps their applicability of scale or their conceptualization is different. And though it seems that the internet has changed our concept of time and place as applied in law, this article hopes to prove that the real change occurs somewhere else.

The internet introduces an extra – virtual – actor in all activities carried out through the web. This insertion of extra, third or fourth, actor prompts further twist in the liability chain in the use of the internet. This twist with the internet then makes the typical relations to result in a several party level-playing field. The software, hardware and human activity connect via the internet which applies a further link in the liability chain thereby also raising new risks in the given legal relations. As more and more databases are going to be used because of the greed for data, for statistically definable data, the liability for others' software products or the liabilities for the contents of the various databases become undistinguishable. Whom – or what? – to make accountable for example if a map register fails to be updated leading to car crashes? Should there be immunities available for those who employ reasonable care or should there be objective liability regardless of the fault of the parties? Should there be limitless damages or should the boundless amount of damages be limited?

## **2. Stealthy Technology and Stealthy Regulation**

Stealthy technology may challenge all these aspects of the law. Internet may diminish the difference between centrum and periphery in the sense that all information is available everywhere, non-exclusionary, at once. People get access via the internet to the same information simultaneously and instantaneously, ideally, at least. Nevertheless, not even the challenges prove to be new ones. The challenges are in fact three-fold: i) the protection of data from illicit intrusion or from unauthorised changes and usage, ii) the safeguarding of those data to be stored undistortedly and correctly, free from misunderstanding, misinformation and hacking and finally iii) the guarantee of proper access to these data. And besides, above all, the exact logging of these activities.

Cloud computing enables service providers to shift data swiftly from one place to another if space or energy efficiency so requires. This includes cross-border transferring of databases, thus creating a possible conflict of laws in case of legal disputes.

Smart cars, not only driverless cars, running on the streets may induce these sort of legal problems very easily. Their greed for data may result in invasion of

privacy, illegal data collection, illicit categorization and usage of data. Some of these include personal data, some infringe competition rules, copyrights or property rights of database-owners. And if these data are in the cloud, as it is going to be more and more the standard, then special patterns of access need to be designed (Bradshaw et al. 2010). So, what data and how should be protected (Currie, Seddon, 2014)?

Due to stealthy technologies, there are two discernible paths for that at the moment, both of them using the good old tools of legal thinking: legal analogies or fiction. These are (i) the classic protection of things, even if they are distinguished between property rights or privacy rights to the information or (ii) the use of special cloud computing models developed fairly recently.

The justification for guaranteeing ownership rights in the data derives from the basic desire of all data-holders to have control and exclusive access to those data. Doubtless, there is no need to demonstrate the eagerness with which one downloads everything one likes, let them be music, book, pictures or anything else. This propertisation of data, however, is fairly contested in the academic debates. The gist of the critical argument is that if data were to be propertised then there should be a market for that. And if there is a market then even data would further the difference between the haves and the have-nots (Pollack, 2019).

The efficiency of these technologies requires further facilities, like cloud computing (Robinson et al. 2011). As the popularity of cloud computing grows, so grows the number of its versions. Recently there are three basic models: *a*) the Data Shard, *b*) the Data Localization, and *c*) the Data Trust cloud computing model (Schwartz, 2018).

The Data Shard model provides for a multinational location to companies. In this case automatism is involved and even a single file can be so broken and stored that the pieces end up in various countries as deemed to be the most efficient. Theoretically this model is the archetype of the cloud computing, in which the cross-border localization of the pieces is not easily definable. This model gives the data exceptionalists the real headache. In contrast to the Data Shard model, however, the Data Localization model guarantees that the data are stored in one place, in an entirely localizable manner, under one jurisdiction. The information is stored in a single country or region. For example, the regional cloud services offered in the EU by Amazon Web Services or Microsoft are not accessible from the US. And finally, in the Data Trust model there are two separate entities: the Data Manager and the Data Trustee. This separation guarantees that the Data Manager can only oversee the network hardware and software whereas the Data Trustee can access the data exclusively. This cloud version enables both extraterritorial location of information and an extraterritorial access to it. An example for this is the Microsoft Cloud Germany with T-Systems Germany (Schwartz, 2018).

As is seen, there are already several even technical solutions to the problem of legal territoriality. Besides these answers to the stealthy technologies, the regulatory answers to the unleashed technologies are rather the strict liability rules as shown below.

### 3. Internet as the Virtual Assisting Actor

The use of the internet may be a clear example for unleashed technology. Because beyond the only seemingly paradigmatic changes brought about by the internet, the most radical ones lie somewhere else. For, in all relations which are administered via the internet there is an *extra actor, an assisting party involved*. Internet connects. One accesses the internet so as to use others' software programs or databases. But this connection inevitably results in the involvement of the internet as an extra actor. And it has three fundamental consequences: (i) the assurance of a global virtual standardization, (ii) the assurance of a global physical standardization and (iii) the problem of widespread incompetence.

#### 3.1 The Assurance of a Global Virtual Standardization

Prior to the industrial revolution there was no general physical standardization at all. The post-industrial revolution times, however, witness a physical type of standardization. In fact, it is far from being total since this standardization has been achieved in the real world. Consequently, the productions exist in the physical world, therefore there is always a "here and now". Yet this fixation in time and space inevitably allows deviations from the standard according to the needs of the specific circumstances. This technologically, economically, legally and culturally pre-determined environment naturally impedes global standardization.

In the current period, however, internet grants the possibility of a total, global standardization, at least theoretically. The difference between the center and the periphery ceases to exist, because ideally, anyone can access the data simultaneously and instantaneously. There are products or services available now on the planet which need not have specific traits to be usable in special circumstances. Word processing or excel spreadsheets do not require specificities. In the recent period of industry 4.0 the unique characteristics of the products or services are no longer necessary. The problem of complexity lies now in compatibility.

This sort of standardization may undoubtedly sound naïve. And it is indeed, for the privatization (Jeet Singh, 2010) of the internet in 1996 naturally led to the protection of national security requirements all over the globe despite not being necessarily equally applicable to all countries (Lehr et al. 2019). Thus, the stealthy, yet soft regulations generate unleashed, sometimes particular regulations.

Notwithstanding these new-born deliberate localizations, the theoretically existing global standardisation triggered by the ubiquitous internet creates further distinctions. The software is connected to the internet and so accessed by the car. Internet connects in order to use others' software programs and databases. If something goes wrong who is going to be responsible or liable then? And so, this insertion of an extra actor renders an extra layer to the liability chain. It is inevitable. Clearly, this model of relationships on the internet disrupts the concept of the privity of the contract, namely, that a mutual agreement could have effect only on the parties to this agreement. Third parties may neither be beneficiaries nor be held liable, unless expressly stipulated so, in the contract or by the governing law.

However, the internet provides for a level playing field for the hardware, software and human action. What is more, human action is not even indispensable anymore: broker algorithms, bank transactions or certain robots, semi-autonomous self-driving cars exclude any type of human interference. The actors are not liable in the traditional sense, due to a lack of intent, the *mens rea*. The liability pattern of this sort of relationship certainly requires new aspects of the use of others' software programs and databases.

And this might (should) have an impact on the relevant regulations. On the one hand, these uses of others' software products or databases need rules, whether contractual or regulative. And on the other hand, these software products and databases need protection as well. The purposefully switchable use of the various databases may demand the re-definition of the ownership and investment interests or the use of robot algorithms (Leistner, 2018).

### **3.2 The Assurance of a Global Physical Standardization**

The current problem with the internet, from this point of view, is that an off-line and an on-line world co-exist. This is not merely a parallel existence but they intertwine. The deficiency of a software product is tangible, has consequences in the physical world. A software driven defect in the braking system of a car may jeopardize life and limb of many on the roads. In all these cases responsibility may be fact-dependent, of course, but not necessarily in legal terms. It is certainly governed by negligent torts based on fault-liability in the common law systems (USA, UK), but not so in the European continent, where strict or objective, non-fault liability prevails.

Under the continental European solution, the decision in this case would not be significantly different, since normally it is not the driver that is liable but the operator/owner of the car. So, no fault of the driver needs to be proven by the injured plaintiff. In order to be exempt from this liability the owner/operator of the car has to be extremely cautious to avoid the accident, for even the defects in

the car would not eliminate their responsibility. The layers in the liability chain would increase, however, and so would blind liability, if the car needs to be linked to the internet due to lack of necessary space for the data.

On the other hand, in the case of negligent tort in the USA one has to act reasonably, with due care, and if it is shown, one is released from liability. Thus, one cannot neglect any default if perceived. If not perceived, that would be unreasonable negligence and if the proximate cause is established, it would draw legal liability with itself. If the user of the product realizes that something goes wrong, s/he has to react to that perception. It is a duty. The car needs to be slowed down or even stopped. Without making sure that the problem is eliminated, the problem needs to be tackled. This is the law of negligence in torts, or non-contractual derelicts. If the driver was not negligent then the product liability of the car producer or the software producer needs to be proven.

Yet, if the internet is involved as a third assisting actor, one may be lacking perception entirely. One has no idea whether there is something wrong going on or not. The software or the driving of a car via cloud computing may not allow human interference, often for safety reasons. Also, for safety reasons, there are special distinct fit-for-purpose computers, also known as robots, or smart cars for example. Owing to the application of the software via the internet, a different question of liability occurs in driving a car. Who is responsible: the hardware, the software or the driver? Or, in legal terms, the product maker, the software producer (SaaS in cloud computing) or the driver (owner or operator)?

### **3.3 The Problem of Widespread Incompetence**

From a legal point of view, the third and perhaps most important consequence of the internet as an extra assisting actor involved in these relations is the problem of widespread incompetence.

An abrupt total automatic switch-off of the electronic devices in the moving car driven by specific software programs may cause damages, harm or immediate death. As seen, this may come, in the near future, as a total surprise, without any human interference or knowledge. Where there is no incompetence from the part of the user, the question is in what ways should he be held liable, since there would be no way the driver/operator/owner could have acted so as to avoid the accident. He could only show diligence and best effort by bringing the car to the service station regularly, for example.

On the other hand, if someone operates a product over which he has no full power, but has nevertheless the interest in doing so, s/he should bear the risk of possible damages. Simply by operating a highly hazardous equipment (an unavoidably unsafe product) triggers stricter, non-subjective, liability. In other

words, in these accidents, for example, the driver/owner/operator can hardly be exempted from liability if damage occurred.

Interestingly enough, it was the time of the industrial revolution when the opposite of objective liability, subjective liability was introduced. As children of the enlightenment and free will, legislators gradually enacted the so-called subjective liability, meaning that individual responsibility is grounded on the intents or the will and deeds of the person. An individual is free and acts in accordance with his free will and intents, therefore any damage caused by him may be righteously borne by him too. Since this notion included total indemnification, this kind of liability proved to be an obstacle to technical/technological development. The loss or injury which could have been caused, for example, by the railway companies could well have exceeded the profits. Objective or strict liability however is a limited liability in the sense that it does not contain all damages, especially not consequential damage, but in exchange for this easement, objective liability applies even if one is at no fault. This sort of legal institution is a mere risk allocation.

The involvement of the internet in these relationships renders special emphasis on data safety. Who should warrant that the data given in the used database are correct or undistortedly stored and applied? Who should account for a due logging so that the identity, time and the place of any possible access or change to the given database be traceable later on (Djemame et al. 2013)? These questions to be answered demand further distinctions and an analysis of the deeds of the various actors involved: the data provider, the internet service provider, the data user and/or ultimately the customer who might not be the data user.

### *3.3.1 Incompetence from the Part of the Data Provider of Others' Software products or Databases*

The data provider or perhaps a database owner need not be an expert as the US case of the mushroom picking laymen shows (Revolidis, Dahi, 2018). In this court case the plaintiffs wanted to pick and eat wild mushrooms so they had bought a mushroom encyclopedia. But after having the meal they got so sick that they needed a liver transplantation (*Winter v. G.P. Putnam's Sons*, 1991). Defendants were the publishing company publishing a book purchased from another book publisher though. The liability question was twofold: the deficiency of the book itself and of the content therein. Since the book was another publishing company's book and it was defective, the defendant was not liable for printing another's book. The reasoning included the problem of liability of publishing houses for reprinting *others' books*. The argument of the court may be rational and acceptable, even if it is hard to digest that an encyclopaedia need not be correct. But what sort of data

become obsolete? And when? And finally, what is more important: to have more information or to have checked information? Checked by whom?

Yet, the emphasis here is on the data or information of others. Internet connects and so generates global incompetence. For, how to trace back the bad signals, misinformation or misunderstanding or even hacking in the interconnections of the various databases and software products used throughout the internet causing defect in the services? Certainly, these software programs and databases have in-built protecting protocols, but so far we must acknowledge that there is no bug-free software. Can a disclaimer be applied in case a map becomes unduly un-updated or a traffic code sign becomes obsolete? And could this be the case in the case of the internet and especially that of driverless cars, for example?

Surely, disclaimers may be applicable among the producers or the suppliers themselves, but their efficiency would be questionable in the consumer protection world. Regulation is going to prevail in this latter case, at least in the European continental legal regime.

### *3.3.2 Incompetence from the part of the Service Provider*

The service providers' liability has been an object of struggle ever since their existence. So far, a service provider is not liable for the illegal content uploaded by the users of the internet platforms or other devices. Because service providers do not owe strict liability, their liability is fault-based, and there is no way to ensure that all uploading be censored in advance. So they have to be informed and are held responsible on a case-by-case basis. In case of justified warning, the upload has to be removed. If they knew or should have known that the upload was illegal, they are liable according to the so-called notice and take-down standard. This policy is still in effect – see Youtube, Facebook, Google, etc. (Tan, 2018), – since at the moment not even the latest EU copyright directive, EU Directive 2019/790, has changed – or rather could change – this approach (Lendvai, 2019). Nonetheless it is not at all bad news, since one should not promote institutional (let it be governmental or private) censorship and especially not at the expense of freedom of expression or the right to be informed.

The “right to be forgotten” policy enforced in the EU by the erroneous decision of the CJEU (C- 131/12, *González*) provides a good example of how burdening this content liability may be. Service providers are literally given the right to constrain free speech<sup>4</sup>. Besides, since the internet is ubiquitous, deleting information in a specific jurisdiction will not necessarily bring about the

---

<sup>4</sup> In this case, a Spanish lawyer was awarded the right to make Google delete certain degrading – but true – information about his managing business. The information in question was put on internet by a third party, a digitized local newspaper.



cancellation of those data completely from the internet, as the case of the fight between Google and France demonstrates (C- 507/17 *Google v. CNIL*)<sup>5</sup>. Nonetheless, such localization of the internet, at least in the Euro-Atlantic world, should fail, according to the Advocate General of the CJEU and other advocates and supporters of Google in this lawsuit.

### *3.3.3 Incompetence from the part of the Data User Other than the Customer*

The problem of competence regarding data users other than the consumer embraces the good old issues of suppliers' product liability. Products must be safe, producers as well as suppliers have strict liability in this matter.

By the assistance of the internet, however, suppliers are often software producers or database owners. The smart, semi-autonomous or driverless cars reach out for data from the various databases located and accessed probably in the clouds. Yet, in contrast to the protection of databases from illegal intrusion, the running of driverless cars on the streets will trigger liability issues through the warranty problems of others' software products too. These may well stand for the use of free software programs and open source software products. But how to tell which data are bugged and who should be liable? With the problem of deep learning this conundrum is going to get ever trickier, finally rendering the user incompetent.

In any event, software liabilities are privileged ones. Liability is strict, but there is always a cap on the amount of compensation.

### *3.3.4 Incompetence from the part of the Data User, ultimately the Customer*

Finally, the customers are, by definition, exempt from the need of being an expert. Notwithstanding the interconnection via the internet, internet adds another layer here, too, to the liability chain while blurring the traditional thresholds of human action. As robots or algorithms take the place of human steering, customers are no longer the actual drivers, not only due to a lack of understanding of the machine as has been the case for some time, but because of the actual substitution of human action by robots.

---

<sup>5</sup> In this case – C-507/17 *Google LLC, successor to Google Inc. v Commission nationale de l'informatique et des libertés (CNIL)* – a French individual wished to have data concerning him be deleted globally. The case is not yet decided, but the Opinion of AG Szpunar was delivered on 10 January 2019 supporting the arguments of the EU Commission and Google Inc, rendering it unacceptable to grant global effect of the EU right to be forgotten.

Due to these concerns, it is intriguing to consider whether or not the application of strict liability is fairly justified. Clearly, in order to preserve the safety of usable databases and the safety of others' software programs, the actual legal solution is a sheer risk allocation rule.

Yet, if this is all only a risk allocation rule, then strict liability draws with itself the necessity of insurance liability. These sort of insurance policies, however, do incorporate limited liability again. Theoretically, software defects in the internet may by chance wipe out map information susceptible to cause tremendous damage. If there had been no limit to these instances, there would have been no innovation in the first place. But weren't there really any (Keren-Paz et al., 2019)?

#### **4. Strict Liability – or the Case of the Software in Driverless Cars**

Strict liability is thus a kind of objective liability. It is basically an application of a fiction. It allows us to use a narrative of a situation which we know is not true. In these cases one interprets the law upon the facts: "as if".

In case of a car crash, the operator or the owner does not drive. In most Member States in the EU this is not a big difference, where strict liability laws apply already in these cases, and, more often than not, the owner/operator of the car is liable, who might not necessarily be the driver. It can be so, since strict liability has no causal condition as in the case of a negligent or intentional tort. Simply by operating a highly hazardous equipment one triggers the stricter, non-subjective, liability. In other words, in these accidents the driver/owner/operator can hardly be exempted from liability if damage occurred.

On the other hand, where negligent tort rules apply, as in most common law cases, the driver himself is liable only if negligent and therefore the proximate cause of the accident has to be cleared and proven by the plaintiff in order to be able to sue. So the injured plaintiff needs to show that the driver was at fault. The defendant driver in these cases can be released if he proves that the car was defective. In the event of an autonomous car, however, the driver is the car itself and so the manufacturer would be liable citing product liability. Product liability is also a kind of strict or objective liability. But should it be the strict liability of the producer of the software or hardware applied directly or should it remain a negligent tort for the driver, for the manufacturer?

In any event, liability issues need to be determined on a case-by-case basis, regarding also the fact that with the driverless cars software problems may override hardware ones. But software failures are often harder to locate and the causal link is even harder to detect with the necessary evidentiary standards. Yet it can happen. As in the case of unintended acceleration software problems in certain Toyota types of 2009, in which the victims of those accidents managed to

prove that the software of the braking system had had bugs. The case remained controversial though, until years later the management of the Toyota Company confessed lying. Notwithstanding, the criticism pointed out that the causal link between the admitted level of bugs in the software and the direct cause of the accident was not proven at the court and the jury was wrong (Cummings, 2017). “It is well known that nearly all non-trivial software has bugs. Furthermore, because there are virtually an infinite number of different ways of solving a non-trivial problem using software, one can often find many opportunities for criticizing software quality, sometimes using criteria that are highly subjective. As a result, the plaintiffs in a software trial can be expected to attack the defendant’s software by looking for bugs and criticizing the software’s quality. If they can find bugs, and show that more likely than not those bugs caused the accident, then they can establish causation. They can also use purported measures of software quality, which may be subjective, to argue that the defendant failed to fulfill his duty to provide software of sufficient quality” (Cummings, 2017, 1).

### **5. Use of Internet and the Liability for the Software in Driverless Cars**

As smart cars travel on the roads, or most importantly, in the cities, the risk and thus the liability questions need to be ascertained on a case-by-case basis and in case of doubts, the damages should be borne by those in whose interest these cars were operated. The present rules on car crashes could well apply in the non-common-law countries, as said, where in such cases strict liability is the rule. Strict liability is therefore a fiction: it means that unless proven otherwise – in a very narrowly interpreted situation – the lack of proximate causation is not going to be an obstacle to finding the producer or the database owner liable; as if...

Safety standards are a starting point in these cases, since consumer protection and product liability derive from the assumption that the product needs to be safe. But how safe? Obviously, a driverless car is regarded to be safer than a car without (or nearly) autonomous driving possibilities. So, under common law jurisdiction the question is, if nevertheless, there is an accident, then is manufacturer liable if the driver is not at fault.

Product liability consists of three elements: defect in the product, defect in the design and lack of warning or lack of instructions. To translate these into the software case, bugs should certainly qualify as defects in the software. In those autonomous vehicles though, in which deep learning is a standard, a bug may not necessarily be programmed from the start but might have been learnt by the machine. In all these cases a state-of-the-art defense may exempt the manufacturer from liability. Since most of the car companies rely on many suppliers, driverless

cars contain various software from different manufacturers, embedded even. This renders the proving of contributory negligence or the percentage of interaction in the operation of the hazardous equipment, the car, in the accident even more difficult.

Notwithstanding, if the rule of negligence applies and thus reasonable care has to be demonstrated, just as in the case of software producers, the internet inserts an extra link of risk into the relations. The data flow needs to be found free from misunderstanding, misinformation and hacking. In case of misunderstanding, the question is whether there is a compatibility problem, or a failure of the different systems. In any event, the link has to be located and the origin of the faulty data determined. Special protecting protocols or designs, such as use ‘stop, if...’, could release liability. There is a duty of care among the actors, therefore, if there is a misinformation, then the sender of the information may be liable for negligence or fraudulent misrepresentation if he knew or should have known that the information was false. Besides, the receiver of the information needs to show reasonable care to rely on the information received and does not react in case of other contradicting information, such as an obvious change in the traffic order. Cybersecurity protocols require special verifications of messages and other protection but hacking remains an evergreen issue, the software has to be able to manage it. In the end, special investigation is needed to establish the liability of the very legal entity, the manufacturer, supplier, seller, repairer, owner or operator. Bugs’ existence needs to be accepted and the software designed in such a way that enables it to react reasonably cautiously.

Despite the Toyota case, software liabilities are generally privileged in the legal system. In case of contractual breach, the damages are limited even above the standards of the foreseeability doctrine and in torts cases the rule of economic loss applies. These all serve the same purpose, namely to ensure that purely economic damages cannot be recovered in tort cases and that the costs of innovation be widespread. Software in cyberspace are extremely intertwined and since robotics are often facilitated by/on the internet, the security of the software is a crucial point. It is because robotics, and especially driverless cars, unlike software on the internet, are designed to be active in real space, thereby more susceptible to cause huge physical da.

The application of strict liability of either the driver, which can certainly be the driverless car in the near future, the producer or the owner, is justified primarily on the basis of the recognition that there is no bug-free software and the very existence of the bug in the software may be discovered only by use. Thus, the real question boils down to the procedure or the protocol to be followed by the design in situations of emergency. It is important since strict liability might provide for exemption in cases where the accident is due to an unavoidable interference of an action outside of the scope of the operation of the hazardous equipment, the car.

## 6. Conclusion

Despite the all-encompassing disruptive nature of the newest technologies, as is clearly shown, there is always a pre-digital analogy for any rule, whether stealthy or unleashed. Recent innovations include stealthy technologies as well as unleashed ones every now and then triggering stealthy and sometimes unleashed regulations. This should not be surprising, however, since these technological changes would not be called innovations if the rules were not to be challenged. For what is the point in those novations which could comply with a rule having been envisioned for some time in the past as fit for the future (Mehra, Trimble 2014).

Internet, however, does have a special new feature. Internet connects. Internet creates two parallel but intertwined worlds: the on-line and the off-line world. And by enabling one to connect and use others' databases and software, the internet generates global incompetence. If software products are defective on the internet, this has physical consequences in the real world. With its connecting nature, internet inserts a third assisting party into all on-line transactions. The role of traditional actors is undistinguishable and extra risks triggered by the internet are to be dealt with. The question of competence and liability faces challenges. One uses others' software or databases via the internet.

This article hopes to have demonstrated that the notion of strict liability towards the consumers for the use of others' software or databases on the internet is a welcome and efficient risk allocation rule. It is so, because otherwise one gets into a trap of never-ending tracing back to the origins of the problems in software bugs. Software products in cyberspace are extremely intertwined and since robotics are often facilitated by/on the internet, the security of the software is a crucial point. The application of strict liability of either the driver, which can certainly be the driverless car, in the near future, or the producer or the owner, is justified primarily on the basis of the recognition that there is no bug-free software and the very existence of the bug in the software may be discovered only by use. Owing to the problem of extended incompetence prompted by the internet and shown above, the application of *strict but limited* liability for software products may be a fair bargain.

## References

- BRADSHAW, S., MILLARD, C., WALDEN, I. 2010. Contracts for Clouds: Comparison and Analysis of the Terms and Conditions of Cloud Computing Services. CCLS Legal Aspects of Cloud Computing Research Project. Queen Mary University of London, School of Law. In: *Legal Studies Research Paper* No. 63/2010. Electronic copy available at: <http://ssrn.com/abstract=1662374>

- CUMMINGS, D. 2017. Was the Jury Wrong about Toyota's Software? How Questionable Testimony on Embedded Software Tipped the Scales IEEE Consumer Electronics Magazine pp 103-107 [DOI: 10.1109/MCE.2017.2684939]
- CURRIE, W., SEDDON, J. 2014. A Cross-Country Study of Cloud Computing / Policy and Regulation in Healthcare. Complete Research. Twenty Second European Conference on Information Systems, Tel Aviv.
- DJEMAME, K., BARNITZKE, B., CORRALES, M., KIRAN, M., JIANG, M., AMSTRONG, D., FORGÓ, N., NWANKWO, I. 2013. Legal issues in clouds: towards a risk inventory. *Philosophical Transactions: Mathematical, Physical and Engineering Sciences*, Vol. 371, No. 1983, e-Science-towards the cloud: infrastructures, applications and research (28 January 2013), pp. 1–17. Published by: Royal Society Stable URL: <https://www.jstor.org/stable/41739965>
- JEET SINGH, P. 2010. From a Public Internet to the Internet Mall. In: *Economic and Political Weekly*, Vol. 45, No. 42. pp. 16–22. URL: <https://www.jstor.org/stable/20787466> [Accessed: 03-07-2019].
- KEREN-PAZ, T., COCKBURN, T., EL HAJ, A. 2019. Regulating innovative treatments: information, risk allocation and redress. In: *Law, Innovation and Technology*. Vol. 11, No. 1, pp. 1–16, DOI: 10.1080/17579961.2019.1572701
- LAKE, E. 2019. The Exiled Court Protecting Venezuelan Democracy. Judges meeting via teleconference bolster the constitution and the legitimacy of Juan Guaido. In: *BLOOMBERG Politics & Policy*. 2019. 01. 28
- LEISTNER, M. 2018. Big Data and the EU Database Directive 96/9/EC: Current Law and Potential for Reform Available at SSRN: <https://ssrn.com/abstract=3245937> or <http://dx.doi.org/10.2139/ssrn.3245937>
- LEHR, W., CLARK, D., BAUER, S., BERGER, A., RICHTER, P. 2019. Whither the Public Internet? In: *Journal of Information Policy*. Vol. 9, pp. 1–42 URL: <https://www.jstor.org/stable/10.5325/jinfopoli.9.2019.0001> [Accessed: 03-07-2019].
- LENDVAI, Z. 2019. Controversies Around the New Copyright Directive. Budapest Business Journal, 21 June. <https://www.bakermckenzie.com/-/media/files/insight/publications/2019/06/controversies-around-the-new-copyright-directive.pdf>
- MEHRA, S., TRIMBLE, M. 2014. Secondary Liability, ISP Immunity, and Incumbent Entrenchment. *The American Journal of Comparative Law*, Vol. 62, supplement, pp. 685–705. Oxford University Press <https://www.jstor.org/stable/10.2307/26425415>
- POLLACK, M. 2019. Taking Data. In: *The University of Chicago Law Review*. Vol. 86, No. 1, pp. 77–142 URL: <https://www.jstor.org/stable/10.2307/26554393>
- REED, C. 2010. Information “Ownership” in the Cloud. CCLS Legal Aspects of Cloud Computing Research Project. Queen Mary University of London, School of Law. Legal Studies Research Paper No. 45/2010. Electronic copy available at: <http://ssrn.com/abstract=1562461>
- ROBINSON, N., VALERI, L., CAVE, J., STARKEY, T., GRAUX, H., CREESE, S., HOPKINS, P. 2011. The Cloud Understanding the Security, Privacy and Trust Challenges. *The European Commission. Directorate General Information Society and Media Europe*. Rand Corporation
- SCHWARTZ, P. 2018. Legal Access to the Global Cloud. In: *Columbia Law Review*. Vol. 118, pp. 1681–1762. Stable URL: <https://www.jstor.org/stable/10.2307/26511248>
- SHAPIRO, A. 1999. The Internet. *Foreign Policy*, No. 115 (Summer, 1999), pp. 14–27, URL: <https://www.jstor.org/stable/1149490> Accessed: 03-07-2019 07:16 UTC
- TAN, C. 2018. Application of the terms of service in: *Regulating Content on Social Media Book*. Subtitle: Copyright, Terms of Service and Technological Features URL: <https://www.jstor.org/stable/j.ctt2250v4k.8>
- ZÓDI, Z. 2018. *Platformok, robotok és a jog* [Platforms, Robots and the Law]. Budapest: Gondolat Kiadó.

# Synchronization of transportation and enterprise resources with the emergence of autonomous road freight

ADRIENN BOLDIZSÁR<sup>1</sup>, FERENC MÉSZÁROS<sup>2</sup>

**Abstract:** With the emergence of autonomous vehicles, a significant transformation of freight transport is expected. In the modern “data age”, companies are more likely to digitize their resources, exploiting the potential of networked smart devices. With cloud-based services, assets are continuously monitored and managed, including delivery vehicles. These disruptive technologies fundamentally transform the demands of freight transport activities. It is a fundamental interest for both transport system operators and companies involved in production and service provision to make the most of the benefits out of technology. Research focuses on exploring, analyzing and evaluating the potential for interacting with technologies, and the benefits they bring, and exploiting the resulting synergies. The expected results of the research will make the process of switching to autonomous vehicles more smooth and efficient.

**Key words:** autonomous mobility, road freight transport, enterprise resources, synchronization

**JEL Classification:** R1

## 1. Introduction

There is a certain type of revolution in the freight transport industry led by autonomous technology development, which has gained enormous interest among industrial entities. Almost all responsible parties view autonomous vehicles in the future as a solution to current problems and difficulties of road freight transport, while others also see the multiplication of challenges of this technology. Undoubtedly, incorporating autonomous vehicles in the road freight sector leads to very complex systems, and operating an autonomous fleet of vehicles in itself is not the solution to the difficulties of road freight transport.

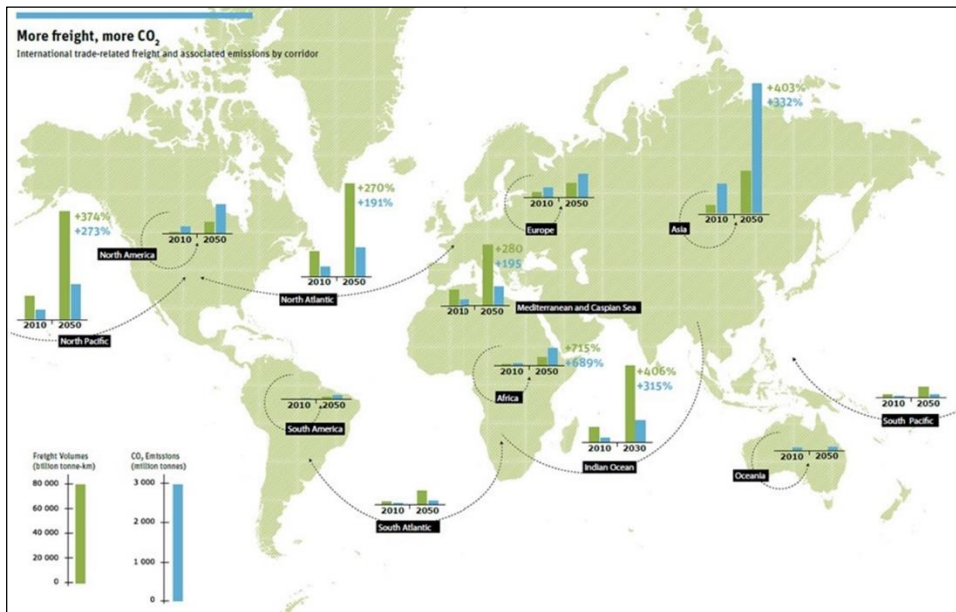
Trade projections up to 2050 assume that GDP will grow at an average rate of around 3% per year. Trade growth is expected to continue to outpace GDP growth, with world trade estimated at around 3.5% per year and global trade projected to

---

<sup>1</sup> ADRIENN BOLDIZSÁR, Budapest University of Technology and Economics, Faculty of Transportation Engineering and Vehicle Engineering, Department of Transport Technology and Economics, Hungary, boldizsar.adrienn@mail.bme.hu

<sup>2</sup> FERENC MÉSZÁROS, Budapest University of Technology and Economics, Faculty of Transportation Engineering and Vehicle Engineering, Department of Transport Technology and Economics, Hungary, fmeszaros@mail.bme.hu

show a 4.1-fold increase between 2010 and 2050, at a constant value. Meanwhile, freight transport will exhibit slower growth than the value of trade, with world shipments growing at a higher rate over the same period, showing a projected 4.3-fold increase (measured in tonne-kilometers). This illustrates the geographical shift in trade patterns, the unequal distribution of income between regions of the world, and changes in consumption patterns and relative productivity (International Transport Forum, 2016) (*Figure 1*).



**Figure 1. Expected CO<sub>2</sub> emissions and growth in international trade volume by 2050**

Source: International Transport Forum, 2016.

The important requirements towards this development – to be sustainable and user friendly in the long run, to be modular and open to other systems – are often neglected or subordinated during the researches. A typical example is the number of compatibility issues that have been caused by the rapid development of IT tools, the bugs caused by updates, which may have caused additional system errors and damages. The potential of these innovative solutions can only be fully exploited if the research, development and innovation processes are coordinated globally, leading to a higher level of innovation as a result of technology coupling (National... 2018).

This paper discusses the opportunities and challenges of autonomous vehicles in the road freight sector.



## 2. Automation levels

There are various levels of development in the autonomous vehicle technology with regard to the degree of automation. The guidelines set by the Society of Automotive Engineers (SAE) distinguish between different degrees of self-driving function. Currently there are five plus one (the “zero”) levels. Zero level means that there is no support for driver automation, first level represents the least advanced level, consequently, the fifth level represents the most advanced level (*Figure 2*).

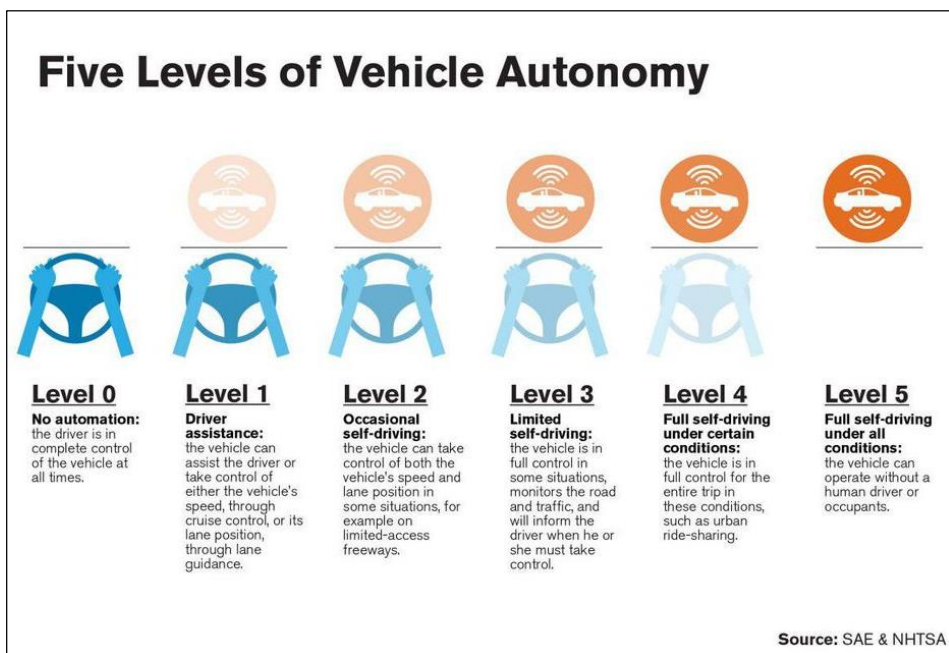


Figure 2. The autonomous driving levels

Source: Jensen, 2017.

## 3. Enterprise information technology and automation developments in the context of autonomous road freight transport

International road freight transport has been characterized by a lack of drivers in the latest years. Many carriers have been forced to take on less orders due to a lack of drivers, or even have to sell their vehicles and reduce their fleet. This problem is of national and international importance. One possible solution to this problem

may be autonomous vehicles. The aim of the authors is to provide an interpretation of this problem from a logistics aspect.

The structure of the information system supporting enterprise logistics processes is closely related to the tasks of logistics management. Accordingly, in addition to operational tasks, corporate planning is a prerequisite for competitive logistics. Planning determines the goals and the operational framework, that are closely correlated to the specific processes. In order to ensure continuous improvement, there is a need for measuring, analyzing and feeding back the actual performance of the operation and for redesigning the system according to the critical points. The transactional system and decision support system supporting operational and planning processes are two essential, closely related parts of the logistics information system. The following table examines the validity of the general freight and logistics system requirements in terms of the capabilities of the autonomous technology listed above, the automated IT system upgrades, and the networking of mobile devices (*Table 1*).

**Table 1. Prerequisites for autonomous road freight transport against the logistics information system of a company**

Requirements	Conventional vehicles	Autonomous vehicles	Gains	Challenges
Quality of information	Based on conventional architectures and softwares, easy to process	Based on communication of high level and automated equipments and on application of innovative softwares	More reliable information, up-to-date data management	Investment and higher level operational knowledge are in need
Extent of information	General extent of data interchange	Higher extent of data interchange	Full monitoring and process control	Improvement of informatics system, need for bigger data storage capacity
Location of information	Far from the origin	Close to the origin	Accurate and updated data management	Improvement of information and communication technology solutions
Lead time	Longer	Shorter	Rapid intervention	Holistic infrastructure development is in need
Data security	Normal level security	High-level security	Secure, protected communication channels	Need for involving high level IT service provider

Human-machine interaction	Human-human and human-machine interactions	Human-machine and machine-machine interactions	Process automation	Current equipments need upgrading or replacement
Integration to partner systems	Low level	High level	Up-to-date information at all involved parties	Need for cooperative and synchronised developments at all involved parties
Level of digitalization	Paper-based and digital information	Mainly digital information	Reducing data process failures	Time-consuming transition
Online accessibility	Only partly online	Mainly online	Cloud-based data management	Emerging risk in abuse of data
Remote monitoring	Low-level, minimal number of applied mobile devices	High-level, high number of applied mobile devices	No spatial or time limit for access	Internet of Things and mobile data interchange system improvement is in need

Source: Edited by the Authors.

During the analysis authors focus on the points where the application of innovative technology has particular importance and clearly leads to identifiable benefits. Additionally, such points have been also highlighted where re-interpretation or modification may be necessary due to the application of autonomous solutions.

Due to all these characteristics, there are numerous gains for freight companies using autonomous vehicles. After examining the general options, authors outline some possible corporate strategies that sketch possible pathways to integrate autonomous vehicles into the freight transport processes (*Table 2*).

**Table 2. Evaluation of autonomous vehicle application strategies**

Application strategy	Level of automation	Market access to technology	Type of road freight activity	Typical corporate gains	Corporate challenges
1. Cooperative adaptive speed control based platooning	Level 1	Available	Long-distance motorway based movements, huge vehicle fleet	Reducing fuel consuming, reducing number of driver failures	Fleet coordination
2. Human-machine platooning	Level 2 and 3	Market introduction in process	Long-distance motorway based full or less than full truckload movements, parcel deliveries	Improved working conditions, reducing labour costs	Driver training programme, cross-docking system deployment and operation

Application strategy	Level of automation	Market access to technology	Type of road freight activity	Typical corporate gains	Corporate challenges
3. Exit-to-exit autonomous vehicle with remote control	Level 3 and 4	Prototype tests	Professional companies with a huge extent of orders	Improved working conditions for drivers, remarkably reducing labour costs, improved operational efficiency	Remote control center deployment, close cooperation with involved parties
4. Autopilot – driver in “sleep mode”	Level 4	Research and development in process	Long-distance door-to-door movements, owned, low number vehicles, special orders	Improved operational efficiency	Worsening working conditions for drivers
5. Exit-to-exit full autonomous vehicle	Level 4	Research and development in process	Long-distance motorway based full or less than full truckload and groupage movements	Reducing labour costs, improved operational efficiency, reducing time of delivery	Cross-docking system deployment and operation
6. Autonomous road freight services between logistics centres	Level 4 and 5	Research and development in process	Motorway based movements between logistics centres and/or ports	Simplified container movements, long-distance delivery without transshipment, improved operational efficiency, reducing time of delivery	Remarkable reduction in number of drivers

Source: Edited by the Authors.

#### 4. Impacts of autonomous road freight transport on corporate expenses

Due to the benefits of using autonomous vehicles, the implementation of autonomous technologies in the road freight market is expected to be faster than in passenger transport. The reason is that purchasing an autonomous truck can be based on a business decision that primarily takes into account the potential opportunity to save the driver's labour costs and to solve the problem of shortage for truck drivers. As expected, such an investment can pay off very quickly. On the other hand, from a technological point of view, freight vehicles are primarily moving on motorways, i.e. in a relatively closed infrastructure environment with few interferences and highly predictable processes, which means easier programming of autonomous systems. By contrast, passenger cars are driven mainly in

densely populated urban areas, on smaller and more busy roads, surrounded by pedestrians, which is a much greater challenge for environmental perception, object recognition and artificial intelligence decision-making of autonomous systems.

As autonomous vehicles with a high level of automation do not exist currently, experience in their operation is still lacking. When quantifying the costs and benefits to be gained, only assumptions and current trends can be relied upon.

Based on this approach, authors analyze both fixed and variable costs based on mileage, and accordingly the data shown represent the specific costs per distance. A 2017 study by the American Transportation Research Institute (ATRI) provides a comprehensive view of the freight transportation market, with companies surveyed in the short, medium, and long term; it also takes into account the data of full truckload, less than full truckload, groupage and special freight sector regarding the mode of transportation. The cost distribution is calculated from the average for the period 2014–2016 (Hooper, Murray, 2018). Currently, most of the expenditure is on driver salary (40%), fuel (27%) and costs of using the vehicle, such as rental (14%) and maintenance (10%). Another self-conducted study among international road hauliers with shipments in Central-Eastern European area shows a similar cost distribution: drivers' salary is the biggest cost category (30%), followed by fuel costs (25%), road tolls (23%) vehicle purchase and general costs (15%), and maintenance and other expenditures (6%). Note: road tolls are not widely applied in the United States of America, but are important cost elements in the European continent. Nevertheless, both studies underline that driver labour costs, fuel expenditures and operational costs are significant elements of the corporate budget, and these items are expected to be significantly altered by remarkable changes triggered by the application of autonomous vehicles.

#### *Driver labour cost changes*

With regard to driver salaries, taking into account the ultimate case where the presence of a driver is no longer required, drivers' wages can be reduced to practically zero.

#### *Fuel cost changes*

The expected change in fuel expenditures is due to the fact that autonomous vehicles are more fuel efficient, meaning that an autonomous vehicle burns less fuel and has a relatively lower consumption than a man-driven truck in the same road segment. The decrease in consumption can be attributed to movement in a convoy, improvement of overall capacity utilisation and the elimination of driver inaccuracies.

*Road toll expenditure changes*

Current expectations do not predict any changes in road tolls when autonomous trucks become widely available in the market, consequently, this category remains unchanged.

*Purchase and general corporate cost changes*

The expected purchase cost of autonomous vehicles can only be predicted as accurate market data is not yet available. According to Roland Berger research, autonomous technology increases the price of a truck by only 20% (Berger, 2016). However, this calculation assumes that the cost of the most expensive vehicle components, such as lidar and similar environmental sensors, will be significantly reduced in the close future. Some experts estimate that an autonomous truck will cost one and a half times more than a conventional one. However, an autonomous vehicle is about twice as efficient as it can be operated virtually without stopping, without the need for having rest and other stops. General corporate costs are expected to remain unchanged as less administration with vehicles and drivers is compensated by managing the necessary high-level technologies. Summing up, the above considerations can be quantified by no change in the vehicle purchase and general corporate cost category, assuming that the individual pros and cons of different effects are balanced.

*Maintenance cost changes*

With regard to the category of maintenance costs, on one hand, these are expected to increase, since autonomous vehicles require more sophisticated and advanced software-based operation, on the other hand, more advanced sensors and vehicle diagnostic equipment reduce these costs. In addition, costs will be reduced due to the neglected failure of mechanical equipment needed for conventional driving, moreover, more efficient and safer driving may also contribute positively to maintenance costs. Taking all these into account, this item can be considered as unchanged (Bokher, 2018).

*Other expenditure changes*

Changes in the case of other expenditures are expected but their impacts are practically insignificant. As a consequence of better road safety conditions, vehicle taxes are expected to be reduced to zero level (Bokher 2018). Tire expenditures remains unchanged, although – due to improved vehicle operation – a minor reduction can be envisaged.

The impacts of fully autonomous road freight operation are summarised in *Table 3*, where the estimated specific costs are based on the results of a self-conducted survey in the Central-Eastern European context.

**Table 3. Comparison of conventional and autonomous road freight costs  
(based on freight expenditures per mileage)**

Cost category	Conventional freight costs [EUR/km]	Autonomous freight costs [EUR/km]
Driver labour cost	0.33	0.00
Fuel cost	0.28	0.25
Road toll expenditure	0.25	0.25
Purchase and general corporate cost	0.17	0.17
Maintenance costs	0.04	0.04
Other costs	0.04	0.02
Total costs	1.11	0.73

*Source:* Edited by the Authors.

Summing up, the expected overall cost reduction through operating an autonomous vehicle fleet can be about 35%. The elimination of driver labour cost has the highest effect on total costs, but other additional effects (e.g. improved operation, reduced delivery time) also contribute to cost reduction, moreover, to a potential raising of revenues. The authors emphasize that the comparison took into account an ideal case where there is a fully autonomous vehicle fleet, instead of more realistic cases where a mixed fleet can exist, consequently, the analysis does not take into account the expected and unexpected effects and impacts of the transition process to autonomous vehicle technology.

## 5. Conclusion

The overall benefits of using autonomous vehicles can make freight transport processes, enterprise tools and infrastructure work safer, more reliable and more efficient. Thanks to the technology, driver errors can be practically reduced to zero, the road network traffic load optimized to reduce congestion, infrastructure maintenance becomes simpler and more modern. We examined the operating costs of the autonomous vehicle fleet in detail, based on a comprehensive survey, and based on the parameters of a company considered to be average in the domestic environment. In the calculations, the specific costs of the autonomous vehicle fleet were analyzed and compared with the operating costs of the conventional vehicle fleet. Based on the obtained results, it can be stated that the use of autonomous vehicles has a great potential for the freight transport segment and can achieve significant cost savings.

---

## References

- BERGER, R. 2016. Automated Trucks; Downloaded: <https://www.rolandberger.com/de/Publications/Automated-Trucks.html> [Last downloaded: 22.07.2019.]
- BOKHER, S. 2018. Autonomous tech can cut trucking operational costs by half; Downloaded: <https://medium.com/@sambokher/autonomous-tech-can-cut-trucking-operational-costs-by-half-be2569017cf1> (Last downloaded:22.07.2019.)
- HOOVER, A., MURRAY, D. 2018. An Analysis of the Operational Costs of Trucking: 2018 Update; Downloaded: <https://atri-online.org/wp-content/uploads/2018/10/ATRI-Operational-Costs-of-Trucking-2018.pdf> [Last downloaded: 05.07.2019].
- INTERNATIONAL TRANSPORT FORUM 2016. The Carbon Footprint of Global Trade, Tackling Emissions from International Freight Transport; Downloaded: <https://www.itf-oecd.org/sites/default/files/docs/cop-pdf-06.pdf> [Last downloaded: 13.04.2020].
- JENSEN, C. 2017. States Must Prepare For Human Drivers Mixing It Up With Autonomous Vehicles, Forbes; Downloaded: <https://www.forbes.com/sites/jensen/2017/02/09/states-must-prepare-for-human-drivers-mixing-it-up-with-autonomous-vehicles/#99571a036f33> (Last downloaded: 30.06.2019.)
- NATIONAL ACADEMIES OF SCIENCES, ENGINEERING, AND MEDICINE 2018. Critical Issues in Transportation 2019. Washington, DC: The National Academies Press. <https://doi.org/10.17226/25314>.



# Implementation of Electronic Monitoring of Accused and Convicted Persons in Central and Eastern Europe: obstacles and perspectives

KAMILA BORSEKOVÁ<sup>1</sup>, JAROSLAV KLÁTIK<sup>2</sup>,  
PETER KRIŠTOFÍK<sup>3</sup>, PETER MIHÓK<sup>4</sup>

**Abstract:** Electronic monitoring, as a relatively new and innovative tool in criminal justice, was designed with the aim to prevent the need for offenders to remain in custody. The present paper aims to analyse the implementation of electronic monitoring of accused and convicted persons in selected countries, and to identify the perspectives of its further utilization and obstacles of its implementation or wider exploitation. It provides a comparative overview of the legal and economic perspectives of EM implementation in this area. The research results on the legal perspectives reveal differences in the length of countries' experience with EM. Prison overcrowding, high daily expenses per inmate and austerity measures support the implementation of electronic monitoring as our research has shown that it is highly efficient from an economic point of view. Besides, implementation of electronic monitoring brings interesting results considering legal aspects such as recidivism, reducing criminality and unemployment due to the possibility of maintaining jobs, prevention but also stigmatic effects of institutional origin or the need to maintain family and community ties. The paper provides an original comprehensive and comparative analysis of electronic monitoring implementation in CEE countries and highlights the most important patterns of electronic monitoring exploitation via original case studies on EM implementation. Furthermore, the present paper identifies pros and cons of EM implementation and outlines the most significant barriers and perspectives of its implementation in CEE countries.

**Key words:** Electronic Monitoring, Central and Eastern Europe, economic efficiency, recidivism.

---

<sup>1</sup> KAMILA BORSEKOVÁ, Matej Bel University in Banská Bystrica, Faculty of Economics (Research and Innovation Centre), Slovakia, kamila.borsekova@umb.sk

<sup>2</sup> JAROSLAV KLÁTIK, Matej Bel University in Banská Bystrica, Faculty of Law, Slovakia. jaroslav.klatik@umb.sk

<sup>3</sup> PETER KRIŠTOFÍK, Matej Bel University in Banská Bystrica, Faculty of Economics, Slovakia. peter.kristofik@umb.sk.

<sup>4</sup> PETER MIHÓK, Matej Bel University in Banská Bystrica, Faculty of Economics (Research and Innovation Centre), Slovakia. peter.mihok@umb.sk

## 1. Introduction

Electronic monitoring (EM) is an alternative form of punishment, used for the detention, restriction and monitoring of the movement of people who are not allowed to enter restricted areas, or are obliged to stay away from certain individuals, and thus whose movement needs to be continuously monitored (Black and Smith 2003). Academic interest in EM originated at Harvard University in the 1960s. In Europe it was first introduced in 1989 in England and Wales, and is now in use in almost every country in the world (Gable, 2011; Nellis, 1991; Renzema, Mayo-Wilson, 2005), including countries of the Danube and the Central Europe region.

Electronic monitoring was designed to remove the need for offenders to remain in custody, thus reducing costs (Ardley, 2005). The most frequently cited aims of EM are to reduce the use of custody without increasing the risk to the public; to avoid the ‘contamination factor’ in imprisonment, when first offenders mix with more experienced offenders and learn the ‘tricks of the trade’; to avoid the stigma of prison and the dislocation of family ties (Whitfield, 1997).

The use of electronic monitoring (EM) of offenders in Europe has been presented in several academic papers, including the results of the Slovak national research project entitled ‘Interdisciplinary approach to EM of accused and convicted persons in the Slovak environment’ (acronymed as IAEMPS)<sup>5</sup> in whose framework this paper has also been prepared.

In this paper, we focus on the implementation of EM in the criminal justice field in the countries of the CEE region. Using mostly desk and empirical research methods, we aim to highlight the most important legal and economic findings concerning EM implementation.

## 2. Concept, data and methodology

Generally, implementation and exploitation of electronic monitoring is connected with probation and/or supervision. There are two basic forms of probation/supervision: before the sentence and after the sentence (Borseková, 2019). Forms of probation/supervision before the sentence include alternatives to pre-trial detention with supervision by probation agencies. EM can also be used as a

---

<sup>5</sup> See for example: Borseková, K., Krištofik, P., Koróny, S., Mihók, P. and Vaňová, A. (2017). Electronic monitoring as an alternative form of punishment: an exploratory study based on European evidence. In: *Oxford conference series: conference proceedings of the 7th international conference on interdisciplinary social science studies & 5th academic international conference on business, marketing and management, ICISSS & AICBMM 2017*, pp. 95–107. Oxford: FLE Learning. ISBN 978 1 911185 42-0.

sanction in its own right. A second type of probation before the sentence is house arrest. The person is required to remain permanently at home. In several countries, house arrest is used exclusively with electronic monitoring. Forms of probation/supervision after the sentence include fully or partly suspended custodial sentences with probation. Both forms may include electronic monitoring and/or house arrest. As before, house arrest may be implemented with EM (Aebi, Chopin, 2016).

The practical aim of this paper was to collect and compare the most relevant official public data on the application of EM in CEE countries and also in Austria and Germany, which we have decided to add to our research due to strong historical, political and cultural links of the relevant CEE countries with these three countries. We used both quantitative and qualitative measures. The former included the length of experience with EM – a legal perspective; and comparisons of average daily expenses per inmate between penal institutions and EM – an economic perspective. For the legal perspective, we based our research on the activities of the Confederation of European Probation (CEP), recorded in questionnaire surveys carried out prior to the CEP EM conferences (Pinto, Nellis, 2011, 1). So, we used the information collected by Beumer and Kylstad Øster (2016), Nellis (2013), Pinto and Nellis (2012) and Albrecht (2005): hereafter referred to as ‘CEP EM questionnaires’ reports.

Where necessary, we used other official sources. With regard to the economic perspective, as both the costs of imprisonment and the costs of EM of house arrests are variables that change over time, our initial assumption was that these variables (or at least the data for the costs of imprisonment), if observed by European countries, would be reported to EUROSTAT. However, we were unable to find any of these data in EUROSTAT’s ‘Crime and criminal justice database’<sup>6</sup>. Therefore, we used data for costs of imprisonment from the Council of Europe Annual Penal Statistics, known as SPACE (Statistiques Pénales Annuelles du Conseil de l’Europe). Specifically, the data for “average amount spent per day for the detention of one person,” and “average amount spent per day for the detention of one person in special facility/section for persons with psychiatric disorders [both in a given calendar year] (Aebi, Tiago and Burkhardt, 2017, 120–121; Aebi, Delgrande, 2014a, 147–148; Aebi, Delgrande, 2014a, 136–137; Krištofik et al. 2017). The average daily cost per EM is contained in the report entitled ‘Survey of Electronic Monitoring (EM) in Europe: Analysis of Questionnaires 2013’ prepared for the Council of Europe by the European Committee on Crime Problems and the Council for Penological Co-operation (Nellis, 2013). This resource only covers 2012. We aimed to use a similar method to Courtright, Berg and Mutchnick (1997, In: McDougall et al., 2008, 16, 28). That is, to calculate the

---

<sup>2</sup> <http://ec.europa.eu/eurostat/web/crime/database>

ratio of the costs of implementing imprisonment to the costs of implementing EM house arrests, for the most up-to-date available data on EM. This was for 2012 (see *Table 2* in section IV).

Qualitative research describes how EM has been implemented in each of the different countries of the CEE region. For the purpose of our paper we opt for case study approach. Case studies describe and explain how the perceptions, implementation and exploitation of EM vary across jurisdictions. The following table shows the implementation and utilization of EM across the countries of the CEE region.

**Table 1. Comparison of indicators related to custody and probation, respectively supervision**

CEE countries	Exploitation of prison capacity, %	Pre-trial detention or forms of probation/supervision before the sentence				Forms of probation/supervision after the sentence			
		Alternatives to pre-trial detention with supervision by probation agencies (total)	Custodial suspension of criminal proceedings	Electronic Monitoring	Home Arrest	Fully suspended custodial sentence with probation	Partially suspended custodial sentence with probation	Electronic Monitoring	Home Arrest
Austria	100.30	203	4078			4587	1279	277	
Bosnia and Hercegovina									235
Bulgaria	100.00							183	
Croatia	93.6	0	15	0	0	274		0	0
Czech Republic	93.20	836	131			11552		0	176
Germany	N/A							26	
Hungary	139.00		3836			6138		NA	
Romania	104.30					30575			
Serbia									284
Slovakia	84.70	278				129		15	9
Slovenia	112.7								3

Source: Edited by the Authors.

The urgency for EM implementation and its wider use in custodial measures depict the exploitation of prison capacity, which is almost in all cases (except Croatia, Czech Republic and Slovakia) higher than 100% and indicate their overcrowding. EM as an alternative custodial measure suggests it could be an effective deterrent to crime and could have enormous social and economic benefits, especially if applied early, saving what might otherwise be habitual offenders from a life of crime (DeLisi, Gatling, 2003). Therefore, the next section describes in the form of case studies the process of EM implementation and utilization in countries of the CEE region.

### **3. Case studies of EM implementation in the CEE region**

#### *EM in Germany*

German criminal justice EM programs have been implemented at both the federal and 'lander' levels. The oldest of the reported programs, carried out by the state of Hesse, began in 2010, and was a pre-trial, front door and back door scheme (Beumer, Øster, 2016). According to Albrecht, Arnold and Schädler (2000) "the state of Hesse introduced electronic monitoring in 2000 on a project basis". The only federal level EM program began in 2011 as a permanent program, and only included a 'back door' scheme (Albrecht, 2005, 2).

According to Dünkel, Thiele and Treig (2016, p. 1), "the model-projects, in which EM was used as an alternative to imprisonment, in two federal states have been evaluated rather sceptically, especially in regard to 'net-widening effects.' With regard to the pilot project in the lander of Hesse, acronymed EPK, the quoted authors state that it was "available only on a pilot basis", and that Hesse was the only one of the 16 federal states of Germany where it was implemented (ibid., p. 5).

The quoted authors further state that "the only form of EM that is accepted in all German federal states is so-called electronic location monitoring (Elektronische Aufenthaltsüberwachung, EAÜ. ... The purpose of EAÜ is to minimise the risk that offenders, who have committed serious sexual or violent offences (dangerous offenders), reoffend after their release from prison or from a forensic institution." (Ibid., p. 1). "EAÜ is primarily used with offenders who are released from prison after having served their full sentence." (Ibid., p. 3).

According to Nellis (2014, p. 495) "Germany never implemented RF EM-curfews/house arrest as a nationally available measure". ... "The Federal German government more readily adopted GPS satellite tracking for high risk sex offenders in 2011, potentially for periods of five years or over, following a European Court of Human Rights (ECHR) decision that ruled against the continued use of "protective" imprisonment beyond the end of their original

sentence.” (Ibid., p. 496). He quotes Eilzer (2012) who stated that “GPS tracking has also been used with paroled sex offenders in the state of Mecklenberg-Western Pomerania since 2011.” (Ibid.).

### *EM in Austria*

All the publicly available relevant sources agree that the first permanent EM programme in Austria began in 2010, but they disagree about whether it included only a ‘front door’ scheme (Pinto, Nellis, 2011). or also had a ‘back door’ scheme (Beumer, Øster, 2016). The most recent country report, prepared within the ‘Probation in Europe’ project, clearly states that both schemes operated from 2010 (Koss, Grafl, 2013). This source also states that electronically monitored home curfew (elektronisch überwachter Hausarrest) was established by law throughout Austria in 2010, after two trial projects in 2006 and 2008. The first pilot project, carried out under a mandate from the Ministry of Justice during the period January 2006 to September 2007, involved persons who were only released conditionally with close monitoring due to special prevention consideration (Koss, 2000). The second EM project for conditionally released offenders started in 2008, in which school social work and other prevention offers were provided nationwide (Koss, Grafl, 2013).

### *EM in the Czech Republic*

The Czech Republic responded to all four ‘CEP EM questionnaires’ in 2011 – 2016, reporting a “nationwide pilot scheme from 1 August 2012 to 30 November 2012” (Nellis, 2013, p. 3), for both the so-called ‘front door’ and ‘back door’ schemes, but not for the pre-trial scheme (Beumer and Øster, 2016, p. 2). There is no national report for the Czech Republic available on the CEP’s webpage that contains the national reports prepared within the ‘Probation in Europe’ project.

“In the Czech Republic the legal system provides the possibility of electronic monitoring via a home arrest as of 2010. However, there was only a pilot testing system running in 2012” (Heiskanen et al. (eds.), 2014, p. 113).

On 20 March 2017, the Israel-based provider of solutions for e-government and public safety, SuperCom, stated in a press release that “its M2M division has been selected by the Czech Republic’s Ministry of Justice to deploy its PureSecurity Electronic Monitoring Suite, a solution aimed at increasing public safety, reducing prison overcrowding and lowering recidivism by tracking and monitoring public offenders. ... The comprehensive nationwide program, set to encompass electronic monitoring of offender programs within the country, is planned to monitor up to 2500 enrollees simultaneously. SuperCom will deploy its PureSecurity electronic monitoring solution which will include home detention, GPS tracking, domestic violence and alcohol monitoring of offenders”

(SuperCom, 2017b). The Office for the Protection of Competition ended the appeal procedure concerning this tender in August 2017.

#### *EM in Slovakia*

Slovakia is not mentioned in any of the ‘CEP EM questionnaires’ reports in 2011–2016. But the 2017 report from the Probation in Europe project notes that “EM was tested and is in use” (Lulei, Cehlár, 2017). This report states that “in 2015, new legislation in relation to EM came into force” (Ibid.) and this can be attributed to the “new Act No. 78/2015 Coll. On Controlling of Execution of Selected Decisions by Technical Means (legislative base of electronic monitoring)” (Ibid.). This new legislation was valid as of the beginning of 2016, and “two weeks after the launch of a fully operational electronic bracelet system for monitoring accused and convicted people, a court decided to put the bracelet on the leg of a first convict” (TASR, 2016).

#### *EM in Hungary*

According to the National factsheet published within the ‘EU Probation Project’ in 2011, Hungary had a Law allowing application of EM as alternative to two coercive measures: home curfew and house arrest (i.e. not as a penal sanction alternative to imprisonment). But in practice EM was not used in 2011 “because the technical means of implementing such measure is missing”.

Nagy (2016, p. 199) stated that “release from prison can occur [in Hungary] in several ways: ... [including] reintegration custody with electronic monitoring (from 1 April 2015)”. According to the most recent Annual Penal Statistics document of the Council of Europe (the so-called SPACE survey), there were 88 persons held under EM in 2015 (Aebi, Tiago and Burkhardt, 2017, 36). The previous report contains the entries ‘No’ and ‘\*\*\*’ for Hungary, in section 8 of Table 1.1, labelled ‘Persons under electronic surveillance/EM’ (Aebi, Tiago and Burkhardt, 2015, 38).

#### *EM in Croatia*

In the most recent ‘CEP EM questionnaire’, “Croatia responded that they do not have EM, but are just starting a new project ‘Support to further development and strengthening of the Probation Service in Croatia’, which will pilot EM” (Beumer and Øster, 2016, p. 1). Croatia is not mentioned in any of the older ‘CEP EM questionnaire’ reports. The Croatia report of the ‘Probation in Europe’ project states that Croatian laws provide for the possibility of technical supervision of home imprisonment with EM, “but this possibility is not yet in practice” (Šimpraga, Maloić and Ricijaš, 2014, 15). There is no additional information on EM in that report.

Nišević, Franić and Rajić (2013, 53) note that according to the definition of probation in ‘Croatia’s Probation Act (NN, 153/09)’, EM is in effect “probation, since it is implemented outside an institution, with intense monitoring, and the behaviour in line with the conditions of electronic monitoring is actually a condition of remaining free of imprisonment”. After outlining all the tasks served by Croatia’s probation service, the quoted authors state that “all of these tasks of probation are also recognized and reflected in the implementation of EM. Even though the reduction in the overcrowding of prisons, and a related decrease in the costs of the prison population to the government, is one of the main reasons for the introduction of EM, these aims may only appear to be achieved” (Ibid.). The newspaper article about the start of the first pilot EM program states that it began in February 2017 as a small regional project, in the Zagreb area, with only 20 stations and bracelets (Pavlic, 2017). This pilot program included EM house arrests, as an alternative to a pre-trial detention, and release from prison on parole. In effect it included a “back door” scheme, without a “front-door” scheme (ibid.).

#### *EM in Bosnia and Herzegovina*

Bosnia and Herzegovina is not mentioned in any of the ‘CEP EM questionnaires’ reports in 2011–2016. According to Muftić, Payne and Maljević (2015, p. 616–617), EM “is applicable only in the Federation of Bosnia and Herzegovina since 2011 and the law defines it as ‘house arrest with electronic monitoring’. Although applicable in cases of conditional release, in practice it is predominantly used as an alternative to prison. Whereas the decision about placing someone under house arrest with EM is made by the courts, its implementation is fully privatized. Lack of systematic data on crime and criminal sentences in BiH makes it almost impossible to estimate the prevalence of the use of house arrest with EM”. They quote Duranović (2013), according to whom there was information available from the courts that a total of 235 individuals had been sent to house arrest since the introduction of the statute in 2011. We assume this means until the end 2012, i.e. within the first two years of EM’s introduction in BiH. (Ibid.).

#### *EM in Serbia*

From the four most recent ‘CEP EM questionnaire’ reports, Serbia is mentioned only in the report from 2013, according to which it implemented a radio frequency EM scheme for the execution of a prison sentence (i.e. for house arrests), with 284 offenders monitored as of 31 December 2012 (Nellis, 2013, 5). Legislation allowing the use of EM house arrests as a specific way of serving a prison sentence, was introduced in Serbia in 2009 (Djoric, Batricevic and Kuzmanovic, 2014, 8). For legislative and practical reasons this form of imprisonment was not implemented until 2011 (Ibid.).



*EM in Slovenia*

Slovenia is not mentioned in any of the ‘CEP EM questionnaires’ reports in 2011 – 2016. Moreover, a national report was not published within the Probation in Europe project. The national factsheet published within the ‘EU Probation Project’ contained information that, as of 2010, there was no intention to introduce EM in Slovenia. The Annual Penal Statistics of the Council of Europe document for 2017 (the so-called SPACE survey) contains the answers “No” and “\*\*\*\*” in section 8 of Table 1.1, entitled “(8) Persons under electronic surveillance/ Electronic Monitoring” (Aebi, Tiago and Burkhardt, 2017, p. 35). Using database or internet search engines, we were unable to find any official document, academic paper or newspaper article mentioning intentions or plans to introduce EM in Slovenia.

*EM in Romania*

The ‘CEP EM questionnaires’ report from 2011 states that “Romania is expanding its use of EM in complex ways, not all of which will entail the involvement of the probation service” (Pinto and Nellis, 2011, p. 1). A more recent CEP report states that “Romania did not complete the survey, but notified that EM can be used only in case of preventive measures, where the responsible body for the enforcement is the police department” (Beumer and Øster, 2016, p. 1). The national report from the Probation in Europe project contained a statement that in 2013 there was no EM in Romania (Durnescu and Schiaucu, 2013, p. 18).

According to the National factsheet published within the ‘EU Probation Project’<sup>7</sup> in 2011, Romania had the intention to introduce EM but, “most probably it is going to be an obligation to be supervised by the Police” and would be used for probation, rather than as an alternative to incarceration.

In a newspaper article, Marica (2018) wrote that “Romania may implement several measures aimed at reducing prison overcrowding in the country, including an EM system..., according to the 2018-2024 calendar of measures to resolve prison overcrowding. ... The document approved by the government shows that the Ministry of Justice considers introducing the EM measure in the criminal law, which would apply only to certain inmates based on a court ruling. ... ‘the [EM] systems can be used in the case of detainees who: participate in lucrative, educational, psychological, social assistance activities outside the place of detention; go out to provide medical assistance to hospitals or medical offices located outside the place of detention; are granted permission to leave the prison, etc.’ Moreover, EM may also be an alternative to serving a prison sentence. The deadline for this possible measure is the second half of 2018”.

---

<sup>7</sup> Available at: [http://www.euprobationproject.eu/national\\_detail.php?c=RO](http://www.euprobationproject.eu/national_detail.php?c=RO) [Accessed 5 February 2018].

*EM in Bulgaria*

Bulgaria is not mentioned in any of the ‘CEP EM questionnaires’ reports from 2011 – 2016. According to the National factsheet published within the ‘EU Probation Project’, EM has been introduced in Bulgaria, but is not considered “as an execution modality to imprisonment, if other than conditional release”. It might have been applied to “suspended sentence, conditional release or alternative sanction”. In other words, EM in Bulgaria had originally been considered a way of applying a probation measure, but is not in itself a probation measure (Ibid.).

Bulgaria adopted the ‘Act for the introduction of electronic monitoring’ in 2009 (Government of Bulgaria, 2015a, p. 8). A press release from the [Sofia News Agency] Novinite on 16 February 2010, announced the launch of an EM pilot project jointly financed by the EU and the British Justice Ministry. The project was to last for six months in the Blagoevgrad Region, and later planned to be extended all over the country. The pilot project focussed on Bulgarians who had been given suspended sentences with some restrictions. The first three cases were to be applied to individuals sentenced to restricted probation. In this pilot project, bracelets that emitted coded signals to a monitoring device were used to monitor violations of restrictions, such as house arrest (Novinite, 2010).

According to Nellis (2014) “Bulgaria had a pilot run free of charge by G4S in which 11 people were tagged across the country. House arrest already existed there as a penalty – but this was not what EM was added to. It was created as one of six probation conditions which prohibited leaving home. The pilot was not pursued.” However, the presentation by G4S (available on the CEP website) about the pilot project co-financed by the EU PHARE funds, and operated from March to October 2010, mentions ten cases. Three of these were early releases from prison (G4S, 2011).

In 2015, the Ministry of Justice and the Embassy of the Kingdom of Norway in Sofia worked “under a joint project for the introduction of electronic monitoring over individual categories of law offenders” (Government of Bulgaria, 2015b, p. 10). One of the ideas was “to apply electronic monitoring also with regard to the accused and the defendants with a measure of remand house arrest. The forecasts and the expectations were that electronic monitoring would reflect in the same positive manner with regard to the number of detainees as probation with regard to the number of persons convicted to imprisonment. The term for the completion of the project and the submission of proposals for amendments in the legislation” was set at the end of 2015 (Ibid.). The project webpage notes that this project was a response to prison overcrowding. The aim was to introduce EM as an alternative to imprisonment. The brochure on the projects co-financed from the so-called Norwegian Financial Mechanism between 2007 and 2017, states that the EM pilot

project covered 183 convicted persons, and in addition 260 others had benefitted from alternatives to imprisonment programs.

#### *EM in Moldova*

Moldova is not mentioned in any of the ‘CEP EM questionnaires’ reports in 2011 – 2016. Moldova started to be interested in applying EM in 2017 (Grubii and Raileanu, 2017), but we were unable to find any information according to which the first pilot or permanent EM project/program would have already started to be implemented.

#### *EM in Ukraine*

Ukraine is not mentioned in any of the ‘CEP EM questionnaires’ reports. But an ongoing reform of the probation system and resocialization has the introduction of EM as one of its priorities for 2019<sup>8</sup>.

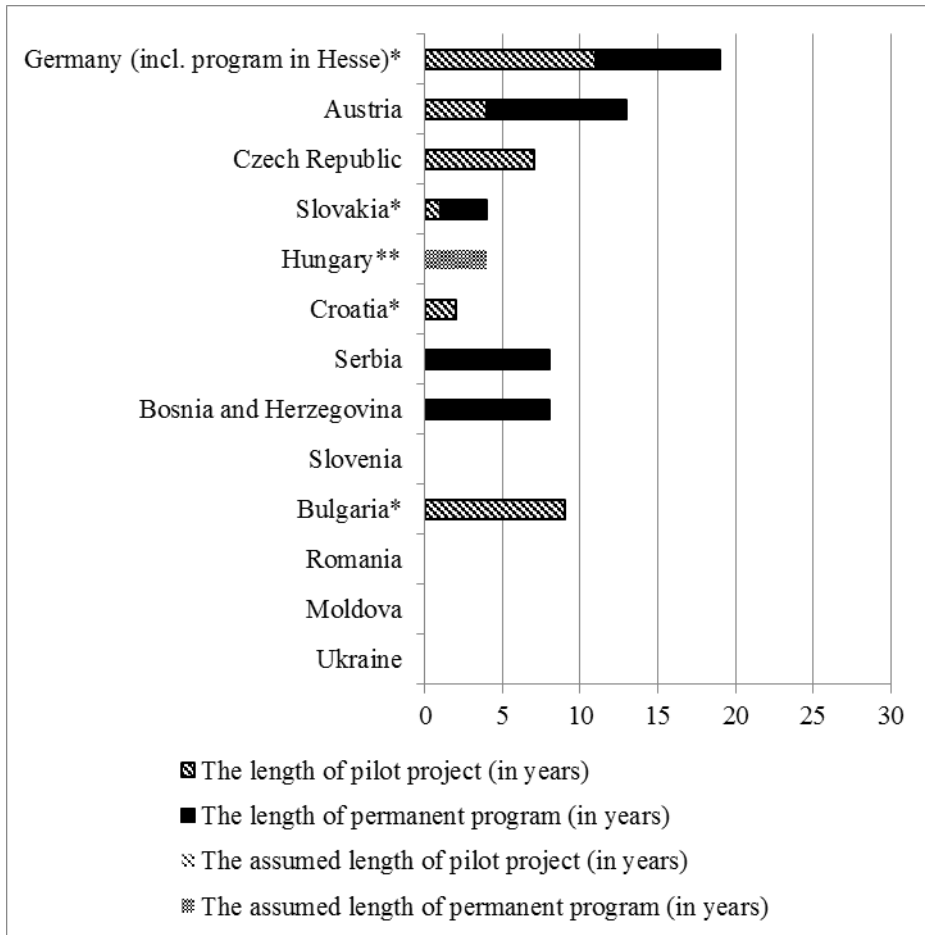
### **4. Overview of the experience with EM in the CEE countries**

Using the data presented above, here we attempt to compare the length of experience of the CEE countries with EM programs. From the results shown in *Figure 1* below, it is apparent that there are significant differences between the individual countries. While Germany had had almost twenty years of experience with EM, and Austria had had more than ten years` experience, for some of the southern states (Slovenia and Romania) we were unable to confirm any use of EM, even within a pilot project. The experience of the three Visegrad countries (Czech Republic, Hungary and Slovakia) and of Croatia, all EU members, seems to be shorter than in Serbia and in Bosnia and Herzegovina.

Research results have also shown that due to prison overcrowding and high daily expenses per inmate in countries of the Danube and Central Europe region, implementation of EM is justified. Nellis et al. (eds., 2013, p. 2) stated “once EM has been adopted, its use in each country tends to increase”. Despite the enormous potential of implementation and utilization of EM it seems that in CEE countries, exploitation of EM is still negligible. Of course it still remains a question whether EM would be primarily perceived as a stand-alone instrument of punishment alternative to incarceration (primarily in order to deal with prison overcrowding, and/or with an aim to save public funds), or whether EM would be perceived primarily as a technical instrument supplementing various other non-technical instruments in national programmes of probation, custody, surveillance of dangerous offenders released from prison, etc. (Borseková et al., 2017).

---

<sup>8</sup> <https://www.kmu.gov.ua/en/reformi/verhovenstvo-prava-ta-borotba-z-korupciyeyu/reformuvannya-sistemi-probaciyi-ta-resocializaciya> [Accessed 2 July 2019].



**Figure 1. The length of experience with the EM programs / projects**

*Note:* The data sources are indicated in the above text.

*Source:* Edited by the Authors.

## 5. Economic aspects of EM in CEE countries

This section is devoted to economic aspects of EM, and to quantifying the difference between EM and custody cost ratios for selected countries. It is also noteworthy that the preparation and launch of national EM programs has recently been co-financed from EU funds: for example, for Bulgaria (Novinite, 2010), Croatia (Pavlic, 2017) and Slovakia (SITA, 2014).

**Table 2. Overview of average daily expenses per inmate and EM and cost ratio in selected CEE countries**

Selected CEE countries	Exploitation of prison capacity	Average daily expenses per inmate	Average daily cost per electronic monitoring	Cost ratio
Austria	100.30%	107,00 €	22,00 €	4.86
Bulgaria	100.00%	13,68 €		
Czech Republic	93.20%	36,40 €	25,00 €	1.46
Germany	N/A	116,37 €	30,03 €	3.88
Hungary	139.00%	26,57 €		
Romania	104.30%	19,79 €		
Serbia				
Slovakia	101.50%	39,39 €		
Slovenia	84.,70%	60,00 €		

Source: Aebi and Delgrande (2014), Křištofik et al. (2017, p. 91), Nellis (2013)

The tentative conclusions of our desk and empirical research suggest that EM programmes can be a cost-efficient alternative to incarceration – if this is judged solely by comparing their costs per inmate per day with a similar cost item for implementation of imprisonment sentences. However, we must be very cautious in using our calculated cost ratios to highlight the conclusion that we have shown the cost-effectiveness of EM programs versus incarceration (Křištofik et al., 2017). The key reason for this has already been addressed in several studies (*inter alia* McDougall et al. 2008; Courtright et al., 1997). Arguably the most important test of EM house arrest programmes is their impact on recidivism, rather than on public expenditure savings. A recent systematic study of European countries' objectives for their EM programmes, discovered a range of opinions on this issue (Hucklesby et al., 2016, 13).

Nevertheless, in an era of austerity, cost cutting in public spending and ensuring value for money assume greater importance. The UK's National Audit Office (2006) study showed that a 90-day curfew period with a tagged offender is around £5,300 cheaper than a custodial sentence of the same length. As our research shows (*see Table 2*), the prisons are full and expensive, and costs per inmate in custody are much higher than those from EM. Hence, there is a strong case to provide this kind of public service more efficiently. EM, including home arrest and home detention, could be very cost effective, and at the same time abort the criminal careers of individuals who would otherwise settle into a pattern of habitual offending. In terms of cost efficiency, EM produces positive externalities that influence the cost efficiency of the whole system of justice (Borseková, 2019; Borseková et al., 2017).

## 6. Concluding remarks on research, obstacles and perspectives of EM in CEE countries and in Europe

This sections aims to conclude with perspectives and bottlenecks of EM implementation, practice and research in CEE countries and in Europe. The following table shows the most important perspectives and obstacles identified in this paper.

**Table 3. Perspectives and obstacles of EM in CEE countries and Europe**

Perspectives	Obstacles
relevant experiences of CEE countries with EM	lack of data and their structure, lack of international comparable data
decreasing costs of incarceration	different approaches to EM across countries make their comparison difficult
decreasing prison overcrowding	low rate of EM utilization in “new” member states compared to “old” EU members
further research on recidivism related to EM	technical parameters of EM devices that might become outdated over time
further research on economic, legal and social aspects of EM	low rate of EM utilization in several CEE countries

*Source:* Edited by the Authors.

The first and the most important obstacle in the research of EM in Europe is a lack of official sources of relevant information and data in English, especially with regards to national level data in a comparable structure that would allow making comparisons between European countries. Our research results suggest that this obstacle concerns the CEE countries to a larger extent than the majority of the so-called “old” EU member states. Access to official/verified national level data on EM seems to be possible only by means of requests under the relevant national Freedom of Information Acts (for which we did not have capacities). As evident from the paper, we had to use the multiple sources of different data concerning mostly other areas than EM, in order to access at least some of the data needed for comparisons intended in our research. We initiated several research activities in the area of EM within the project acronymed IAEMPS. In this paper, we have summarised the most relevant outcomes of this research concerning the CEE countries. Our research revealed significant differences in the length of experience with EM amongst the CEE countries, as illustrated in *Figure 1*. The reason for these differences mainly between developed countries (Austria, Germany) and developing countries might lie in the initial costs of the whole EM system which

were significantly higher in previous decades. Nowadays, the costs of EM implementation decreased, moreover, in EU member countries, EU funds can be used to cover fully or partially the initial costs of EM introduction.

Despite significant differences in the ways of utilization and implementation of EM in the jurisdictions of CEE countries, we can conclude that a significant majority of the CEE countries do have relevant experience with the EM of accused and convicted persons, or are planning to introduce EM in the near future. This is a good perspective for CEE countries as prison overcrowding and high daily expenses per inmate still pose a significant problem in most of the CEE countries.

The issue of EM would, in our opinion, deserve a more solid analysis and empirical research, which is currently impossible due to the above-mentioned lack of comparable data. We highly recommend that national jurisdictions and EU jurisdiction collect the data related to implementation and utilization of EM and its mutual comparison within EU or even outside of EU, as it might help to uncover the potential of EM utilization in individual countries. It will create opportunity for further basic and empirical research with possible implications in national jurisdictions across Europe, not excluding the CEE region. Further research results have the perspective to contribute to the more efficient implementation of EM in countries that so far only plan to involve EM as an alternative to custody in their jurisdictions. Further research might help to improve the utilization of EM in already experienced countries. Besides, solid comparative research on the European level has the perspective to serve as a source of ideas or inspiration for the better implementation and utilization of EM in European countries.

### **Acknowledgements**

This research was funded by the Slovak Research and Development Agency within the project titled 'Interdisciplinary approach to electronic monitoring of accused and convicted persons in the Slovak environment' (acronymed IAEMPS) under contract No. APVV 15-0437.

### **References**

- AEBI, M. F., TIAGO, M. M., BURKHARDT, C. 2017. Council of Europe Annual Penal Statistics. SPACE I. Survey 2015. [Online]. Available from: [http://wp.unil.ch/space/files/2017/04/SPACE\\_I\\_2015\\_FinalReport\\_161215\\_REV170425.pdf](http://wp.unil.ch/space/files/2017/04/SPACE_I_2015_FinalReport_161215_REV170425.pdf) [Accessed 20 May 2019].
- AEBI, M. F., CHOPIN, J. 2016. Council of Europe Annual Penal Statistics SPACE II. Unit of Criminology School of Criminal Justice University of Lausanne, Switzerland.

- AEBI, M. F., DELGRANDE, N. 2014a. Council of Europe Annual Penal Statistics. SPACE I. Survey 2013. [Online]. Available from: <http://wp.unil.ch/space/files/2015/02/SPACE-I-2013-English.pdf> [Accessed 20 May 2019].
- AEBI, M. F., DELGRANDE, N. 2014b. Council of Europe Annual Penal Statistics. SPACE I. Survey 2012. [Online]. Available from: [http://wp.unil.ch/space/files/2014/05/Council-of-Europe\\_SPACE-I-2012-E\\_Final\\_140507.pdf](http://wp.unil.ch/space/files/2014/05/Council-of-Europe_SPACE-I-2012-E_Final_140507.pdf) [Accessed 25 May 2019].
- ARDLEY, J. 2005. The Theory, Development and Application of Electronic Monitoring in Britain, Internet Journal of Criminology. [www.internetjournalofcriminology.com](http://www.internetjournalofcriminology.com) [Accessed 19 March 2018].
- BEUMER, S., ØSTER, M. K. 2016. Survey of Electronic Monitoring in Europe: Analysis of Questionnaires 2016. 10th CEP Electronic Monitoring Conference. Available at (<http://cep-probation.org/wp-content/uploads/2016/04/CEP-EM-Analysisquestionnaire2016.pdf>) [Accessed 25 June 2019].
- BLACK, M., SMITH, R. G. 2003. Electronic monitoring and the criminal justice system. *Trends and Issues in Crime and Criminal Justice*, 254, 1-6.
- BORSEKOVÁ, K., KRIŠTOFÍK, P., KORÓNY, S., MIHÓK, P., VAŇOVÁ, A. 2017. Electronic Monitoring as an Alternative Form of Punishment: An Exploratory Study Based on European Evidence. In: 7th International Conference on Interdisciplinary Social Science Studies, Oxford, United Kingdom. pp. 95–107.
- BORSEKOVÁ, K. 2019. Implementation of Social Responsibility Approach into Electronic Monitoring: Challenge for Public Sector Services. In: *Corporate Social Responsibility in the Manufacturing and Services Sectors*. Berlin, Heidelberg: Springer. pp. 193–221.
- Danish Helsinki Committee for Human Rights (2018). Introduction of probation in Ukraine (Report). Available via: <http://elar.naiu.kiev.ua/handle/123456789/4873> [accessed 9 July 2018].
- DELISI, M., GATLING, J. M. 2003. Who pays for a life of crime? An empirical assessment of the assorted victimization costs posed by career criminals. In: *Criminal Justice Studies*. Vol. 16, No. 4, 283–293.
- DJORIC, J. Z., BATRICEVIC, A., KUZMANOVIC, M. 2014. [Probation in Europe] Serbia. Available from: [https://www.researchgate.net/profile/Jelena\\_Zeleskov\\_Djoric3/publication/27553022\\_Probation\\_in\\_Europe\\_-\\_Serbia/links/553f6afd0cf2574dcf6282af.pdf](https://www.researchgate.net/profile/Jelena_Zeleskov_Djoric3/publication/27553022_Probation_in_Europe_-_Serbia/links/553f6afd0cf2574dcf6282af.pdf) [Accessed 24 June 2019].
- DURNESCU, I., SCHIAUCU, V. 2013. [Probation in Europe] Romania. In: Van Kalmthout, A. M. and Durnescu I (eds.) Probation in Europe. ISBN/EAN: 978-90-820804-0-7. Available via: <http://www.cep-probation.org/knowledgebase/probation-in-europe-update/> [Accessed 16 January 2018].
- G4S 2011. Introduction of Electronic Monitoring in Bulgaria [presentation at the 7th CEP Conference on Electronic Monitoring, Évora, Portugal, 5–7 May 2011]. Available at: [http://www.cep-probation.org/wp-content/uploads/2015/03/EM2011\\_Workshop\\_E\\_Introduction\\_of\\_EM\\_in\\_Bulgaria\\_by\\_Radkovska\\_and\\_Goncharov.pdf](http://www.cep-probation.org/wp-content/uploads/2015/03/EM2011_Workshop_E_Introduction_of_EM_in_Bulgaria_by_Radkovska_and_Goncharov.pdf) [Accessed 16 January 2018].
- GABLE, R. S. 2011. Tagging – ‘an oddity of great potential’. In: *The Psychologist*. Vol. 24, Vol. 11, pp. 866–867.
- GOVERNMENT OF BULGARIA 2015a. Response of the Bulgarian Government to the report of the European Committee for the Prevention of Torture and Inhuman or Degrading Treatment or Punishment (CPT) on its visit to Bulgaria from 13 to 20 February 2015. Available at: <https://rm.coe.int/16806940ec> [Accessed 16 January 2018].
- GOVERNMENT OF BULGARIA 2015b. Response of the Bulgarian Government to the report of the European Committee for the Prevention of Torture and Inhuman or Degrading Treatment or



- Punishment (CPT) on its visit to Bulgaria from 24 March to 3 April 2014. Available at: <https://rm.coe.int/16806940c5> [Accessed 16 January 2018].
- GRUBII, L., RAILEANU, A. 2017. System of electronic monitoring in probation sector presented at Moldovan Justice Ministry [press release, online]. Available at: <https://www.moldpres.md/en/news/2017/10/25/17008346> [Accessed 2 July 2019].
- HUCKLESBY, A., HOLDSWORTH, E. 2016. Electronic monitoring in England and Wales. EMEU Project Report, Leeds: University of Leeds. Available at: <http://emeu.leeds.ac.uk/reports/> [Accessed 22 March 2018].
- KRIŠTOFIK, P., BORSEKOVÁ, K., KORÓNY, S., MIHÓK, P. 2017. Classical and Alternative Methods of Punishment: Economic Comparison Based on European Evidence. In: 7th International Conference on Interdisciplinary Social Science Studies, Oxford, United Kingdom, pp. 85–94.
- LULEI, M., CEHLÁR, V. 2017. [Probation in Europe] Slovakia. In: VAN KALMTHOUT, A. M., DURNESCU, I. (eds.) *Probation in Europe*. ISBN/EAN: 978-90-820804-0-7. Available via: <http://www.cep-probation.org/knowledgebase/probation-in-europe-update/> [Accessed 16 January 2018].
- MARICA, I. 2018. Solutions to prison overcrowding in Romania: Electronic monitoring, more places in prisons. Available at: <https://www.romania-insider.com/solutions-prison-overcrowding-romania/> [Accessed 5 February 2018].
- MUFTIĆ, L. R., PAYNE, B. K., MALJEVIĆ, A. 2015. Bosnian and American students' attitudes toward electronic monitoring: is it about what we know or where we come from? In: *International Journal of Offender Therapy and Comparative Criminology*. Vol. 59. No. 6, pp. 611–630.
- NELLIS, M. 2013. Survey of electronic monitoring (EM) in Europe: Analysis of questionnaires 2013. [Online]. Strasbourg: Council of Europe. Available from: <https://rm.coe.int/16806f9833> [Accessed 20 May 2017].
- NELLIS, M. 1991. The electronic monitoring of offenders in England and Wales. In: *British Journal of Criminology*. Vol. 31, No. 2, pp. 165–185.
- NIŠEVIĆ, A. J., FRANIĆ, N. RAJIĆ, S. 2013. An overview of the research into the effectiveness of electronic monitoring as an alternative sanction. In: *Criminology & Social Integration Journal*. Vol. 23, No. 1, pp. 51–71.
- Novinite [Sofia News Agency] 2010. Bulgaria Begins Using Electronic Monitoring in Probation Cases. Available at: <http://www.novinite.com/articles/113235/Bulgaria+Begins+Using+Electronic+Monitoring+in+Probation+Cases> [Accessed 16 January 2018].
- PAVLIC, V. 2017. Electronic bracelets to replace detention in prison [an English language summary of the article published by the newspaper Večernji List on 5 February 2017]. Available at: <https://www.total-croatia-news.com/politics/16405-electronic-bracelets-to-replace-detention-in-prison> [Accessed 18 January 2018].
- PINTO, S., NELLIS, M. 2011. 7th CEP Electronic Monitoring Conference Survey of Electronic Monitoring in Europe: Analysis of Questionnaires 2011. Available at: [http://www.cep-probation.org/wp-content/uploads/2015/03/EM2011\\_Conference\\_Analysis-of-EM-Questionnaires.pdf](http://www.cep-probation.org/wp-content/uploads/2015/03/EM2011_Conference_Analysis-of-EM-Questionnaires.pdf) [Accessed 10 January 2018].
- RENZEMA, M., MAYO-WILSON, E. 2005. Can electronic monitoring reduce crime for moderate to high-risk offenders? *Journal of Experimental Criminology*, 1, 215–237.
- ŠIMPRAGA, D., MALOIĆ, S., RICIJAŠ, N. 2014. [Probation in Europe] Croatia. In: VAN KALMTHOUT, A. M., DURNESCU, I. (eds.) *Probation in Europe*. ISBN/EAN: 978-90-820804-0-7. Available via: <http://www.cep-probation.org/knowledgebase/probation-in-europe-update/> [Accessed 16 January 2018].

- SuperCom 2017a. SuperCom's PureSecurity Electronic Monitoring Suite to Expand into Another New European Country [Press release]. Available at: <https://finance.yahoo.com/news/supercom-wins-national-electronic-monitoring-140000247.html> [Accessed 16 January 2018].
- SuperCom 2017b. SuperCom Wins \$3.7 Million National Electronic Monitoring Contract in the Czech Republic. [Press release]. Available at: <https://finance.yahoo.com/news/supercom-wins-3-7-million-130000460.html> [Accessed 18 January 2018].
- TASR [newswire] (2016). [quoted in:] First house arrest bracelet in use. Available at: <https://spectator.sme.sk/c/20074993/first-house-arrest-bracelet-in-use.html> [Accessed 5 February 2018].
- WHITFIELD, D. 1997. *Tackling the tag: the electronic monitoring of offenders*. Winchester: Waterside Press.

# Electronic monitoring of convicted and accused persons as a cost-effective way of punishing

KATARÍNA VITÁLIŠOVÁ<sup>1</sup>, PETER MIHOK<sup>2</sup>

**Abstract:** The aim of the paper is threefold: a) to summarise publicly available data and information concerning the expenses of the implementation and operation of the electronic monitoring system of convicted and accused persons in the EU member states, b) to compare these data/information with those relating to incarceration, and c) to summarise the relevant data and information about the electronic monitoring system introduced in Slovakia. Due to a lack of relevant publicly available data, the paper also provides a significant academic literature review. According to our research results, house arrests and other relevant alternative punishments using electronic monitoring are considered as an economically viable alternative to incarceration in the majority of publicly available academic literature; and this has also been confirmed by an analysis of the publicly available data whose results are also presented in this paper. However, no generalisation can be made in this regard, especially concerning Slovakia where imposition of alternative punishments using electronic monitoring has so far been significantly lower than anticipated.

**Key words:** electronic monitoring, public savings

**JEL Classification:** K41, H 40

## 1. Introduction

The electronic monitoring of convicted and accused persons is an institute of scrutiny by technical means (i.e. electronic bracelet) during pre-trial, imposing of a prison sentence or after release from prison. It is an alternative way of punishment of convicted and accused persons, usually used in relation to less serious crimes. In Europe, electronic monitoring of convicts was introduced for the first time in the USA at the turn of the 1980s and 1990s. In 1989, England and Wales were the first European countries where electronic monitoring was introduced firstly in the so-called “front door” model (i.e. alternative to imprisonment), and later in 1999 in the form of a “back door” model (i. e. after release from prison). In 2004, however, it was still a relatively new concept in

---

<sup>1</sup> KATARÍNA VITÁLIŠOVÁ, Faculty of Economics, Matej Bel University in Banská Bystrica, Slovakia, katarina.vitalisova@umb.sk

<sup>2</sup> PETER MIHOK, Faculty of Economics, Matej Bel University in Banská Bystrica, Slovakia, peter.mihok@umb.sk

Europe, which was, at that time, introduced only in six European countries (Belgium, Spain, France, Italy, Sweden and the United Kingdom), and also on a trial basis in the State of Hesse of the Federal Republic of Germany, the Netherlands, Finland and Portugal (Škrovánková, 2016). The electronic monitoring system has also gradually proven itself in the US and Scandinavia as a suitable alternative to short-term imprisonment (Ivor et al., 2006).

In Slovakia, the system of electronic monitoring started to be implemented from 2016. The main reason to implement this alternative way of punishment was a sharp increase in numbers of accused and convicted persons in the last 20 years. Moreover, another associated reason is also the difficulty of reintegrating of accused and convicted persons into everyday life due to the loss of their basic social habits and contacts. There is a large expectation from the Ministry of Justice in the Slovak Republic in the field of public savings in comparison with the incarceration. But there is still relatively short time (just less than 4 years) and low level of utilization of this alternative method of punishment to evaluate the range of public savings. That is why the aim of the paper is to analyze publicly available information on the public expenses of implementation and operation of the electronic monitoring system of convicted and accused persons in comparison with the public expenses of traditional punishment in the form of imprisonment in selected European countries.

The text of the paper is divided into three main chapters. Firstly, literature review is devoted to the definition of basic terms and used tools of economic analysis of electronic monitoring. Secondly, data and methodology of realized research characterize the main sources of data and used methods. The third chapter presents the research results of electronic monitoring expenses in selected European countries and special attention is given to the characterization of electronic monitoring implementation in the Slovak Republic and its specific features. The paper is concluded by a short summary of the main findings and by a proposal of recommendations for further research.

## 2. Literature review

There is an increasing tendency worldwide to utilize electronic monitoring as a way of alternative punishment of convicted and accused persons. Electronic monitoring typically involves offenders serving their sentence in their homes, with their location tracked using an electronic monitoring ankle bracelet. As such, it provides a low-cost means of depriving offenders of their liberty (Williams, Weatherburn, 2019).

There are two most common forms of electronic monitoring: radio-frequency (RF) and global positioning system (GPS) monitoring. “Radio-frequency monitoring measures whether an offender is within a certain distance of the fixed

transmitter; it is almost exclusively used in home curfew sentences and orders. If an offender leaves the home at a prohibited time (often late at night), the RF unit alerts the offender's supervisors that curfew has been violated. GPS monitoring tracks offenders' movements in real time. It is useful for enforcing more complicated supervision orders." (Roman et al., 2012, 4).

According to Padgett et al. (2006), electronic monitoring is startlingly effective at preventing offenders from committing new offenses while they are monitored. Moreover, the authors recommend it as equally suitable for all types of serious offenders. This was confirmed also by previous research of Payne and Gainey (2000). Moreover, they add that electronic monitoring is viewed as sufficiently punitive by citizens who perceive it as a serious yet cost-effective punishment and justice officials are willing to expand the use of alternative sanctions in more crime fields. Belur et al. (2017), Garland (2002), Huckelsby, Holdsworth (2016) confirm as benefits of monitoring systems costs reduction, reduction of reoffending and claim that electronic monitoring is a rehabilitative tool providing structure to offenders' lives and facilitating their integration into social networks.

Among other researchers, Krištofik et al. (2017) summarized reasons to implement electronic monitoring instead of incarceration. Firstly, it solves the problem of overcrowding in prisons causing problems with respecting human rights. It is a more suitable way of punishment for vulnerable groups of persons or for persons committing minor crimes. It is associated with significant lower direct and indirect costs compared to incarceration.

Electronic monitoring produces positive externalities that are embodied in:

- decreasing costs to society arising from rehabilitation counselling and the treatment services required when convicts exit prison;
- lower excess costs to society of the personnel, resources and facilities required to arrest, detain, try, convict, and supervise offenders, beyond the cost of incarcerating convicted offenders for the terms of their sentences;
- reduced costs relating to the intergenerational transfer of crime, due to the fact that children whose parents are career criminals are likely to be at high risk of becoming criminals themselves (Cohen, Piquero, 2009 in Borseková et al., 2018).

Nonetheless, there is a lack of evidence, in the form of reports or data, dealing with the issue of electronic monitoring from the effectiveness or costs point of view in European countries. More attention is paid to this issue in the USA. In many papers (inter alia Schmidt, 2008; Mele, Miller, 2005; Staples, Decker, 2008; Krištofik et al., 2017) we can find reference to the study of drunk drivers published by Courtright, Berg and Mutchnick in 1997. To the main findings belongs the fact that electronically monitored house arrest is a cost-effective alternative to incarceration. Even when the cost of jailing is removed from the calculation, the

jurisdiction still benefited. This gain primarily is due to the fact that offenders paid an electronic monitoring fee as well as a supervision fee when in the community while those in jail did not (Schmidt, 2008).

In academic publications, the effectiveness of the electronic system is usually associated with the application of cost-benefit analysis and estimation of benefits that the electronic system brings with crime reduction for society (e. g. Yeh, 2006; Roman et al., 2012; Belur et al., 2017). Roman et al. (2012, 5) use cost-benefit analysis as a tool that “combines the estimated impact of the electronic monitoring program on participant behavior, costs of operating the program, and the benefits from the program to estimate the net benefits to city agencies, to federal agencies, and to society.” On the other hand, the same author, Roman (2013) claims that although the cost-benefit analysis can help answer important questions about the potential costs and benefits of crime interventions, its application can be tricky. This is due to the difficulty of the precise evaluation of complex human behavior leading to misleading results of the prepared cost-benefit ratios.

The results of cost-benefit analyses presented in publicly available literature mostly confirm the added value of electronic monitoring. For example, the national cost-benefit analysis in the USA estimated that the use of electronic monitoring could yield a social value in the annual reduction in crime worth \$481.1 billion, compared with an estimated cost of \$37.9 billion for the implementation of electronic monitoring required for the above mentioned crime reduction (Yeh, 2006).

However, it is very difficult to find studies on the analysis of economic effectiveness that compare the expenses of electronic monitoring with the expenses of traditional ways of punishment. Partially, this gap was recently covered, for example, by Aebi, Delgrande (2014, 147–148), Aebi, Tiago, Burkhardt (2017, 120) and Krištofik et al. (2017). These authors summarized the results of studies oriented on the identification and comparison of average daily expenses per inmate in penal institutions and average daily cost per electronically monitored in 2012 and added new findings but were oriented mainly on incarceration. However, there is no publicly available updated information on the issue of electronic monitoring.

### **3. Data and methodology**

The authors of the paper focus their attention on electronic monitoring and its effectiveness as an alternative way of punishment. The paper elaborates the secondary data of previous researches as well as the statistical data of Eurostat in a comparative study and an analysis of electronic monitoring in Slovakia. The main sources of data about electronic monitoring in European countries are studies

published by Nellis (2013), Aebi, Delgrande (2014) and Aebi, Tiago, Burkhardt (2017). As mentioned in the previous section, there are no publicly available data on electronic monitoring in European countries for a more recent period. The data from studies are supplemented by the data of the Council of Europe published by Annual Penal Statistics: Prison populations from 2018 and data presented in scientific papers and reports on the issues of electronic monitoring in Europe.

The presentation of Slovak electronic monitoring refers to the Slovak legislative, already published papers and works elaborated as a part of the project's interdisciplinary approach to electronic monitoring of accused and convicted persons in Slovakia (e. g. Krištofik et al. 2017; Borseková et al. 2018) and statistics of Eurostat in crime and law.

#### **4. Comparative analysis of public expenses of incarceration and electronic monitoring in the selected countries**

To compare the public expenses of incarceration and electronic monitoring we use the data already collected and elaborated by Nellis in 2013. According to our knowledge, it is the only official source of data on electronic monitoring in Europe which provides the necessary/relevant financial data needed for the purpose of comparison intended for this paper. It presents research findings of "Survey of Electronic Monitoring in Europe: Analysis of Questionnaires 2013". For our purpose, we selected the data on average daily cost per electronically monitored in 2012, which are compared in *Table 1* with data on average daily expense per inmate in penal institutions in 2012, as well as with the same kind of data from 2017.

Data in *Table 1* confirms the findings on lower average daily costs on electronic monitoring in comparison with incarceration except for Finland RF electronic monitoring. But as Krištofik et al. (2017) pointed out, the data presented by Nellis are not complex. E.g. Finland, Ireland, Lithuania, Sweden excluded the costs of inmate monitoring; there are no available data on average daily expense per inmate in German State/Länder of Hessen; the costs of electronic monitoring in Lithuania cover only rental of electronic monitoring equipment, etc. Even the data have some weaknesses, they are a first step to create a comparable view of electronic monitoring in EU states. To the above presented data, we have also added the average daily expense per inmate in penal institutions in 2017 to compare them with 2012 (the column change), and afterwards, we have calculated also the estimated costs per electronically monitored with the same rate of increase as in average daily expenses per inmate with abstraction to other influences (e.g. inflation, IT progress, etc.) just to illustrate the potential level of costs per electronically monitored.

**Table 1. Comparison of expenses per inmate versus electronically monitored in selected countries**

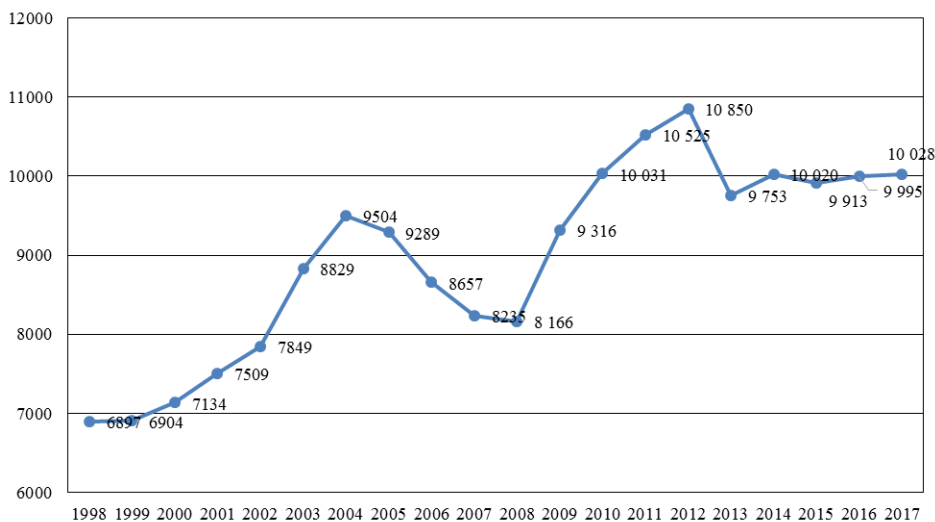
	Average daily expense per inmate in penal institutions in 2012, €	Average daily cost per electronically monitored in 2012, €	Imprisonment costs/electronic monitoring costs ratio in 2012	Average daily expense per inmate in penal institutions in 2017	Change of daily expenses per inmate 2017/2012, €	Estimated costs per electronically monitored with the same change as in daily expenses with abstraction to other influences, €
Austria	107,00	22,00	4,86	129,00	1,206	26,52
Belgium	137,28	29,00	4,73	–	–	–
Czech Republic	36,40	25,00	1,46	46,50	1,277	31,94
Denmark	186,00	56,00	3,32	202,00	1,086	60,82
Finland (RF)	167,00	180,00	0,93	180,20	1,079	194,23
Finland (GPS)	167,00	67,00	2,49			–
Germany	116,37	30,03	3,88	131,80	1,133	34,01
Ireland	179,00	6,45	27,75	188,00	1,050	6,77
Lithuania	12,52	4,00	3,13	23,30	1,861	7,44
Netherland – prison sentence	259,00	45,00	5,76	244,00	0,942	42,39
Netherlands – other alternatives	259,00	75,00	3,45			70,66
Norway	283,00	100,00	2,83	283,50	1,002	100,18
Portugal	40,10	14,20	2,82	41,90	1,045	14,84
Portugal (domestic violence scheme)	40,10	21,12	1,90			22,07
Spain	53,34	5,50	9,70	84,95	1,593	8,76
Sweden	317,00	3,50	90,57	380,00	1,199	4,20
Switzerland/city Basel	312,00	65,00	4,80	–	–	–

Source: Krištofik et al. (2017: 88–89); Nellis (2013), Aebi, Delgrande (2014: 147–148); Aebi, Tiago, Burkhardt (2017: 120), SPACEI (2018: 111).



#### 4.1 Situation in the Slovak Republic

As mentioned in our introduction, the official impetus for the preparation of the pilot project for the introduction of the electronic monitoring system in Slovakia was the Ministry of Finance's statement of a sharp increase in the number of accused and convicted persons in 2009 and 2010. The development of the total number of prisoners is characterized by two waves: the first in 1999–2004 and the second in 2008–2012 (*Figure 1*).



**Figure 1. Total number of prisoners in the Slovak Republic from 1998 to 2017**

*Source:* Eurostat, 5. 8. 2019.

The trend in the total number of prisoners in Slovakia is still increasing, even though the average annual growth is lower. The development in the current EU Member States was more or less similar until 2013. But from 2013–2015, there was a significant annual reduction in the number of prisoners in the EU, in contrast, in Slovakia this number was stabilized.

The introduction of electronic monitoring in Slovakia was made possible thanks to the project supported by the EU Structural Funds under the operational program Informatisation of Society, with a contribution of 26,896,257 € (which composed 98.7% of the project's total costs 27,255,057 €). Similarly, as abroad, the basic technical means of electronic monitoring in Slovakia is the so-called electronic bracelet, i.e. a personal identification device which is attached to the

convict on the body, generally on the ankle. The device has several levels of security against opening of a bracelet or a similar interference, deactivation, cutting etc., and at the same time this device is constantly checking its contact with the body. For each person, “a particular bracelet regime is being set, in accordance with the conditions set by the court's decision, i.e. at what time the convicted person is to remain at home, including when he/she may be away from his /her place of residence; security incident, which results in immediate notification of the acting probation and mediation officer who administers the punishment” (Andrejčíková, 2014). Before the sentence an analysis is usually carried out to verify the appropriate conditions in place of home arresting by probation and mediation officers. Other technical means defined by the Act on Electronic Monitoring are devices for checking presence at the place of enforcement; a device for determining the position of the inspected person; proximity warning device; alcohol consumption control equipment; a voice verification device for the presence of the inspected person and a probation and mediation officer.

The ambitions of using electronic monitoring of convicted and accused persons in Slovakia are often incorrectly claimed to equal the capacity to monitor 2,000 persons at the same time. However, according to our knowledge, the number 2,000 refers to a total number of different technical appliances, from which a vast majority are radiofrequency electronic bracelets, significantly lower amount of GPS monitoring devices, some devices for remote monitoring of alcohol in a breath, etc. That means that only about 1,500 persons can be monitored at the same time, while only radiofrequency monitoring (i.e. checking presence at home or places of work, etc.), can be used in the case of the majority of the monitored; and for less than 500 of persons under such monitoring an additional in-time location monitoring using GPS and/or a remote control of alcohol in a breath can also be carried out by means of intentional actions of the probation service staff (i.e. not automatically).

However, the application of electronic monitoring in Slovakia has been significantly lower than desired (as referred above). In 2016, only 25 alternative punishments using electronic monitoring were imposed (Supreme Audit Office of the Slovak Republic, 2017, Table 5 on p. 10). In 2017, the number of monitored offenders rose to 78, and also 16 victims were monitored under the so-called bilateral scheme that allows warning of victims about the presence of their former perpetrators in their vicinity using GPS monitoring devices (Sliz, 2018). For this reason, a significant amendment of the relevant legislation was made in 2018, targeting an increased use of electronic monitoring for the conditional release of already incarcerated convicted offenders from prison.

According to the SPACE I reports (Aebi and Delgrande, 2014; Aebi and Tiago, 2018), the average daily expenses per inmate in penal institutions in Slovakia were 39,39 € in 2014 and 43,70 € in 2017. The total budget spent by the prison

administration was 150,579,357 € in 2014 and increased to 163 898 082 € (i.e. 8.85% growth) in 2017, i.e. in the period when electronic monitoring started to be implemented in Slovakia.

According to the estimation by the Slovak Ministry of Justice in 2015, the yearly costs of electronic monitoring would total about 6.700 € per one electronically monitored person per year, which means that daily average expenses would total 18,35 € per one monitored person per year (Pravda, 2016). However, this assessment assumed the usage of the above referred full capacity of the Slovak system, i.e. about 1500 monitored persons at the same time. We are unaware of any assessments of real cost expenditures of the Slovak electronic monitoring implementation, and therefore we cannot provide an assessment of costs per one electronically monitored person per year in Slovakia.

## 5. Conclusions

The electronic monitoring of accused and convicted persons is currently a very topical issue in the Slovak Republic. With reference to the above summarised results of our research, this can mostly be related to a sharp contrast between the anticipated and real usage of the capacity of the Slovak electronic monitoring system. In the first year of implementation, 2016, less than 2% of the capacity of the system was used. Despite some increase in the usage of the system for the so-called bilateral schemes which enable also victim protection via warnings using the GPS system, the number of the monitored remained very low, below 5% of the capacity of the system.

The results of our analyses revealed that the average expenses of penal institutions in Slovakia, which in 2017 totalled circa 43,70 € per inmate per day, suggest that economic effectiveness of electronic monitoring in Slovakia (vis-à-vis incarceration) could best be compared with the situation in the Czech Republic and Portugal. However, in the Czech Republic, the implementation of electronic monitoring has been delayed. In Portugal, the average costs of electronic monitoring were reported at circa 15 € per one monitored person per day, respectively at circa 22 € per one monitored person per day for the domestic violence scheme, i.e. the so-called bilateral scheme that involves also monitoring of former victims. This more or less corresponds with the published results of an estimate made by the Slovak Ministry of Justice in 2015, according to which the yearly costs of electronic monitoring would equal 18,35 € per one monitored person per year (Pravda, 2016), should the Slovak electronic monitoring system be used in a full capacity. However, due to the above referred very low use of the Slovak system in its first years of implementation, we consider it to be too early for comparisons to be made and interpreted meaningfully.

## Acknowledgement

This research was funded by the Slovak Research and Development Agency within the project titled ‘Interdisciplinary approach to electronic monitoring of accused and convicted persons in the Slovak environment’ (acronymed IAEMPS) under contract No. APVV 15-0437.

## References

- AEBI, M. F., TIAGO, M. M. 2018. SPACE I – 2018 – Council of Europe Annual Penal Statistics: Prison populations. Strasbourg: Council of Europe.
- AEBI, M. F., TIAGO, M. M., BURKHARDT, C. 2017. *Council of Europe Annual Penal Statistics. SPACE I. Survey 2015*. [Online]. Available from: [http://wp.unil.ch/space/files/2017/04/SPACE\\_I\\_2015\\_FinalReport\\_161215\\_REV170425.pdf](http://wp.unil.ch/space/files/2017/04/SPACE_I_2015_FinalReport_161215_REV170425.pdf) [Accessed 20 October 2017].
- AEBI, M. F., DELGRANDE, N. 2014. *Council of Europe Annual Penal Statistics. SPACE I. Survey 2013*. [Online]. Available from: <http://wp.unil.ch/space/files/2015/02/SPACE-I-2013-English.pdf> [Accessed 20 October 2017].
- ANDREJČIKOVÁ, Z. 2014. Trest domáceho väzenia a elektronické náramky v podmienkach Slovenska. In: *Visegrad Journal on Human Rights*. No. 1, pp. 6–8.
- BELUR, J.; THORNTON, A., TOMPSON, L., MANNING, M., SIDEBOTTOM, A., BOWERS, K. 2017. *A Systematic Review of the Effectiveness of the Electronic Monitoring of Offenders*. What Works Crime Reduction Systematic Review Series. London: University College London.
- BORSEKOVÁ, K., KRÍŠTOFÍK, P., KORÓNY, S., MIHÓK, P., VAŇOVÁ, A. 2018. Electronic monitoring as an alternative form of punishment: an explanatory study based on European evidence. In: *International Journal of Law and Interdisciplinary Legal Studies*. Vol. 4, No. 1, pp. 39–51.
- COURTRIGHT K. E. et al. 1997. The Cost Effectiveness of Using House Arrest With Electronic Monitoring for Drunk Drivers. *Federal Probation*. Vol. 61, No. 3, pp. 19–22.
- GARLAND, D. 2002. *The Culture of Control. Crime and Social Order in Contemporary Society*. Oxford: Oxford University Press.
- Elektronické náramky pre odsúdených sa využívajú málo, monitoruje sa 11 ľudí (2016). Pravda. Dostupné na: <http://spravy.pravda.sk/domace/clanok/399462-elektronicke-naramky-pre-odsudenych-sa-vyuzivaju-malo-monitoruje-sa-11-ludi/>.
- HUCKLESBY, A., HOLDSWORTH, E. 2016. *Electronic monitoring in England and Wales*. EMEU Project Report, Leeds: University of Leeds.
- IVOR, J., POLÁK, P., ZÁHORA, J. 2006. *Trestné právo hmotné I*. Bratislava: IURA EDITION.
- KRÍŠTOFÍK, P., BORSEKOVÁ, K., KORÓNY, S., MIHÓK, P. 2017. *Classical and alternative methods of punishment: Economic comparison based on European evidence*. 7<sup>th</sup> International Conference on Interdisciplinary Social Science Studies, Oxford: United Kingdom. pp. 85–94.
- KRÍŠTOFÍK, P., KLÁTIK, J., MIHÓK, P. 2018. Electronic monitoring of offenders in Slovakia: Influenced by the EU? In: *Review of Socio-Economic Perspectives*, Vol. 3, No. 2, pp. 67–80.
- MELE, C., MILLER, T. A. (eds.) 2005. *Civil Penalties, Social Consequences*. New York: Routledge.
- NELLIS, M. 2013. Survey of electronic monitoring (EM) in Europe: Analysis of questionnaires 2013. [Online]. Strasbourg: Council of Europe. Available from: <https://rm.coe.int/16806f9833> [Accessed 20 October 2017].

- PADGETT, K. G., BALES, W. D., BLOMBERG, T. 2006. Under Surveillance: An empirical test of the effectiveness and consequences of electronic monitoring. In: *Criminology and Public Policy*. Vol. 5, No. 1, pp. 61–91.
- PAYNE, B. K., GAINEY, R. R. 2000. Is good-time appropriate for offenders on electronic monitoring? Attitudes of electronic monitoring directors. In: *Journal of Criminal Justice*. Vol. 28, pp. 497–506.
- ROMAN, J. K., LIBERMAN, A. M., TAXY, S., DOWNEY, P. M. 2012. *The costs and benefits of electronic monitoring for Washington, D. C.* District of Columbia Crime Policy Institute. 15 p.
- ROMAN, J. 2013. Cost-benefit analysis of criminal justice reforms In: *NIJ Journal*. No. 272, pp. 31–38.
- SCHMIDT, A. K. 2008. Electronic Monitoring: What Does the Literature Tell Us? In: *Federal Probation Journal*. Vol. 62, No. 2, pp. 10–19.
- SLIZ, M. 2018. Pavol Rusko je jeden z mála. Elektronické náramky takmer nevyužívame [online]. In: Pravda [daily newspaper], 13 February 2018 Available from: <https://slovensko.hnonline.sk/1693103-naramok-miesto-vazby-u-nas-malokedy> [Accessed: 9 August 2019].
- STAPLES, W. G., DECKER, S. K. 2008. Technologies of the body, technologies of the self: House arrest as neo-liberal governance. In: Deflem, M. (ed.) *Surveillance and Governance: Crime Control and Beyond*. Bengley: Emerald. pp. 131–150.
- ŠKROVÁNKOVÁ, M. 2016. *Zavedenie elektronického monitoringu osôb a jeho dosah na riešenie domáceho násillia. Aktuálne otázky trestného práva v teórii a praxi*. Bratislava: Akadémia policajného zboru SR.
- SUPREME AUDIT OFFICE OF THE SLOVAK REPUBLIC. 2017. *Kontrola implementácie a využívania Elektronického systému monitoringu obvinených a odsúdených osôb. Záverečná správa*. Bratislava: Národný kontrolný úrad, Bratislava, February 2017.
- WILLIAMS, J., WEATHERBURN, D. 2019. *Can electronic monitoring reduce reoffending?* Discussion paper series. IZA Institute of Labor Economics.
- YEH S. 2010. Cost-benefit analysis of reducing crime through electronic monitoring of parolees and probationers. In: *Journal of Criminal Justice*. Vol. 38, pp. 1090–1096.

# Benefits and risks associated with the electronic monitoring of accused and convicted persons implementation from the community life point of view

KATARÍNA VITÁLIŠOVÁ<sup>1</sup>, ANNA VAŇOVÁ<sup>2</sup>,  
KAMILA BORSEKOVÁ<sup>3</sup>

**Abstract:** In the Slovak Republic, from year to year the rate of electronic monitoring of accused and convicted persons' utilization has slowly increased, primarily in criminal law. From this system, the Ministry of Justice of the Slovak Republic expects better inclusion, reduction of recidivism or preservation of basic social habits and contacts of persons on whom such a sentence was imposed. Respecting the relatively short period of implementation of this approach in the Slovak Republic, the aim of the paper is to map the process of electronic monitoring and to define the benefits and risks associated with the implementation of electronic monitoring of accused and convicted persons with an impact on society based on foreign experience and practical implication of electronic monitoring in the Slovak Republic. The paper analyses studies, reports and scientific papers to map the situation in the countries where the system is currently being used and outlines the possible risks and benefits associated with electronic monitoring in the Slovak Republic.

**Key words:** electronic monitoring, risks, benefits, impacts

**JEL Classification:** K41, H 40

## 1. Introduction

Electronic monitoring as an alternative way of punishment has been implemented for 40 years. At the beginning, electronic monitoring was used especially in western countries to monitor adult offenders with curfews and other restrictions. But it went through various changes, particularly linked with the development of new information technologies that bring also new possibilities of utilization in the justice sector as well as increasing the interest of the public in its effectiveness and ethics.

---

<sup>1</sup> KATARÍNA VITÁLIŠOVÁ, Faculty of Economics, Matej Bel University in Banská Bystrica, Slovakia, katarina.vitalisova@umb.sk

<sup>2</sup> ANNA VAŇOVÁ, Faculty of Economics, Matej Bel University in Banská Bystrica, Slovakia, anna.vanova@umb.sk

<sup>3</sup> KAMILA BORSEKOVÁ, Faculty of Economics, Matej Bel University in Banská Bystrica, Slovakia, kamila.borsekova@umb.sk

The paper consists of three main parts. The theoretical part defines the benefits and risks associated with the implementation of electronic monitoring of accused and convicted persons from the point of view of the public. The part Data and methodology characterizes the main sources of data as well as the used methods within the secondary research. The empirical part presents data on experience with electronic monitoring in selected countries, with special attention given to its benefits and risks, especially in the social area. The paper concludes with a summary of potential impacts of implementation of electronic monitoring in the Slovak Republic based on foreign experience and outlines the possibilities of further research.

## **2. Electronic monitoring as a part of community life**

Electronic monitoring is a part of community-based programmes that alter incarceration. It can be used with different people for diverse purposes in youth justice and adult criminal justice systems (Nellis, Beyens and Kampinski, 2013). The researches (Padgett et al., 2006; Payne, Gainey, 2000) show that electronic monitoring is equally recommended for all types of serious offenders. The system of electronic monitoring for offenders provides shelter, structure, and more constant surveillance than traditional probation, and residents have a built-in support system and accountability group (Mays, Thomas, 2014).

There is a wide range of literature (Whitfield, 1997; Garland, 2002; Sthinchcomb, 2005; Huckelsby, Holdsworth, 2016; Krištofik et al., 2017; Belur et al., 2017; Borseková et al., 2018), that summarizes the reasons to implement electronic monitoring. The first group of reasons includes economic benefits – costs reduction stemming from the significantly lower direct and indirect costs compared to incarceration. It reduces the use of custody without increasing risk to the public. It decreases the excess costs to society of the personnel, resources and facilities required to arrest, detain, try, convict, and supervise offenders, beyond the cost of incarcerating convicted offenders for the terms of their sentences.

The second group of reasons concerns the social impact. It is a more suitable way of punishment for vulnerable groups of persons (pregnant women, youth, terminally ill, etc.) or for persons committing minor crimes. This kind of punishment eliminates the negative influence of other prisoners on the offender and supports the normal inclusion of the offender in the family and other social networks. It also eliminates the intergenerational transfer of crime, due to the fact that children whose parents are career criminals are likely to be at high risk of becoming criminals themselves. Moreover, the offender can remain employed and continue any treatment initiated in the community.

However, there are also some obstacles to the implementation of electronic monitoring. For example, “if nonviolent, low-risk offenders become primary targets for house arrest, the net of social control is extended to embrace those who are least likely to have been sentenced to prison, which is in fact what some research has demonstrated. If such intermediate sanctions are not reserved for the truly prison-bound, cost-effectiveness is dramatically reduced. Moreover, the “widened net” in this case can extend beyond the individual offender to his or her family as well, particularly when electronically generated calls come in at any time of the day or night.” (Sthinchcomb, 2005, 86).

Some localities do not only pay attention to the correctional system, but also the involvement of offenders in a collaborative partnership with the community. It is based on negotiation and consensus-building between the offender and circle members. The circles embrace local citizens, support systems, community agencies, the corrections department, and the offender in decision-making and case management related to rehabilitation and re-entry. Circle members meet on a regular basis and offer a powerful forum for citizens to communicate their expectations for successful re-entry. They also help offenders recognize the harm their behaviour has caused and develop a viable plan of action to promote responsible citizenship. The circle helps offenders understand that acceptance back into the community requires the fulfilment of certain obligations and commitments. In this way, the community can exert its capacity to provide informal social control, build supportive relationships with ex-offenders, and promote prosocial lifestyles. At the same time, ex-offenders can obtain opportunities to alter their self-image, earn redemption, repair the harm they have caused, and rebuild community trust through civic engagement (Hart Research associates, 2002).

### **3. Data and methodology**

The aim of the paper is to define the benefits and risks associated with the implementation of electronic monitoring of accused and convicted persons with an impact on society based on foreign experience. The findings of the paper will serve as a guideline for electronic monitoring in Slovakia on how to evaluate the attitudes of the public towards this innovation in the justice system. The paper elaborates secondary data of previous researches in Scotland, Sweden and Florida in the USA. Based on the studies we identify the benefits and risks of electronic monitoring influencing community life. The paper also includes the characterisation of the current state-of-the art in Slovak electronic monitoring implementation and summarizes, on the basis of foreign experiences, the potential risks and benefits it entails. The source of data in this part includes the Statistical



Yearbook of Ministry of Justice, information provided by interviews from the representative of the Ministry of Justice, as well as acts and other relevant legislative norms.

#### **4. Community and electronic monitoring in foreign case studies**

The following section maps already realised researches aimed at the identification of benefits and risks of electronic monitoring and its impact on community life.

##### *Scotland*

The first selected study explores electronic monitoring in Scotland. Electronic monitoring was launched in Scotland in 1998 (Pinto, Nellis, 2012) and became permanently utilized from 2002 (Beumer, Kylvstad Øster, 2016). The report on Electronic Monitoring in Scotland (Working group report) from 2016 published by the Scottish government also analyses the impacts of electronic monitoring on the community. It points out that the most affected persons are co-residents – primarily family members of the monitored person. The families experienced the feeling of punishment as well, with anxiety as a common side effect, moreover their daily routines and social life were affected by electronic monitoring. They often feel guilty about attending social events which fell during curfew hours, which in turn risked increasing a family's own social isolation. They also reported feeling like social workers, compliant in assisting with their family member's monitoring. They felt responsible for ensuring their family members refrain from consuming alcohol, arrive home in due time to meet the conditions of the curfew, and take responsibility for the family's everyday tasks. They evaluate this experience as very difficult from an emotional point of view. Electronic monitoring of relatives brings stress to family relationships, increasing isolation, putting families in a 'policing' role, and leaving them to feel their needs are secondary.

##### *Sweden*

Electronic monitoring in Sweden was launched in 1994 in six probation districts, extended after two years to cover the whole of Sweden, and became a permanent part of the Swedish Penalty Code in 1999 (Wennerberg, 2013, s. 113). Sweden expanded tagging as means of earlier release in 2001; four years later, it made this option permanent. All offenders serving a sentence of at least 1.5 years may apply to serve the last four months under electronic monitoring. In 2005, Swedish authorities also raised the length of the application of electronic monitoring to six months from three. Under this electronic monitoring programme, the offender is under house arrest except for the time allowed by the

probation service for employment, training, health care, or participation in therapeutic programmes. Monitoring is carried out principally by means of an electronic tagging device. In addition, authorities make unannounced visits to the person's home, and the convicted person must visit the probation service at least once a week and take part in the programmes provided. Overall, Sweden has found the experience a positive one. Although those sentenced to electronic monitoring and their family members experienced some of the restrictions imposed by electronic monitoring as stressful and threatening to their personal integrity, they perceived the restrictions of prison as far less attractive. As a corrective measure, electronic monitoring is considerably cheaper than prison. It also yields substantial economic gains for all parties, since the sentenced person can usually continue working at his ordinary place of employment (Swedish National Council for Crime Prevention, 2007).

### *Florida*

The research study on electronic monitoring in Florida was published by the Florida State University's Center for Criminology and Public Policy Research in 2011. The study realised in Florida, in the USA, declares that offenders placed on electronic monitoring found that monitoring significantly reduced the likelihood of failure under community supervision. The decline in the risk of failure is about 31 percent compared with offenders placed on other forms of community supervision. However, many probation officers and offenders believe that monitoring has a negative impact on offenders' relationships with their spouses, children and friends. Some 43 percent of the offenders believed monitoring had a negative impact on their partners because it created an inconvenience. Of the officers interviewed, 89 percent felt that offenders' relationships with their significant others changed because of being monitored. In addition, most offenders said they felt a sense of shame about being under electronic monitoring and felt they were unfairly stigmatized.

Offenders and officers alike were almost unanimous in their belief that the visibility of the monitoring systems makes it much more difficult for offenders to obtain and keep a job. Offenders told stories of job interviews taking on a different tenor as soon as an interviewer noticed the devices. Of the offenders interviewed, 22 percent said they had been fired or asked to leave a job because of electronic monitoring. Of that group, 32 percent assigned the cause to signal loss. Others cited various reasons, such as limits on their flexibility (related to work hours or distance from work). Five percent said they were fired because their bosses did not want customers to see the monitoring devices. There also appear problems with paying the costs of electronic monitoring by offenders. The monthly costs determined by the court were waived for 39 percent of the offenders. Among the remaining 61 percent of offenders who were ordered to pay, 53 percent were not

paying each month. The average monthly cost paid by offenders was \$64 (Bales, William et al., 2010).

## 5. Community and the electronic monitoring in the Slovak Republic

This section is devoted to the study of electronic monitoring implementation in the Slovak Republic and its impact on the community. Electronic monitoring in Slovakia, with the support of relevant acts, started to be implemented from 2015. Despite its numerous benefits, the implementation of electronic monitoring is very slow, so it is relevant to identify the correct reasons to continue implementing it.

The basic technical means of electronic monitoring in Slovakia is an electronic bracelet, a so-called a personal identification device which is attached to the convict on the body, generally on the ankle. The device has several levels of security from opening the bracelet, against interference, deactivation, cutting and checking contact with the body. For each person is “set a particular bracelet regime, in accordance with the conditions set by the court's decision, i.e. at what time the convicted person is to remain at home, including when he/she may be away from his/her place of residence; security incident, which results in immediate notification of the acting probation and mediation officer who administers the punishment.” (Andrejčíková, 2014). Before the sentence an analysis is usually carried out on whether there are appropriate conditions in place of home arresting by probation and mediation officers. Other technical means defined by the Act on Electronic Monitoring are devices for checking presence at the place of enforcement; a device for determining the position of the inspected person; proximity warning device; alcohol consumption control equipment; a voice verification device for the presence of the inspected person and a probation and mediation officer.

Initially, electronic monitoring was used in the Slovak Republic mainly for home arrested persons. The evolution of the number of home arrested offenders during the last 7 years is illustrated in *Table 1*.

But later, the utilization of electronic monitoring became widespread (including the monitoring of victims, offenders on approved leave from the prison, etc.) The capacity of electronic monitoring is around 1.500 devices operating at the same time. As of 15. 8. 2019, 349 monitoring devices are actively used (including the victims and offenders released from prison for holiday). 206 monitoring devices are used by the Ministry of Justice to monitor persons outside prison.

**Table 1. Number of home arrested offenders**

Year	2011	2012	2013	2014	2015	2016	2017
Number of home arrested offenders	28	25	21	17	18	23	14

*Source:* Statistical Yearbooks 2011–2017 published by Ministry of Justice reports.

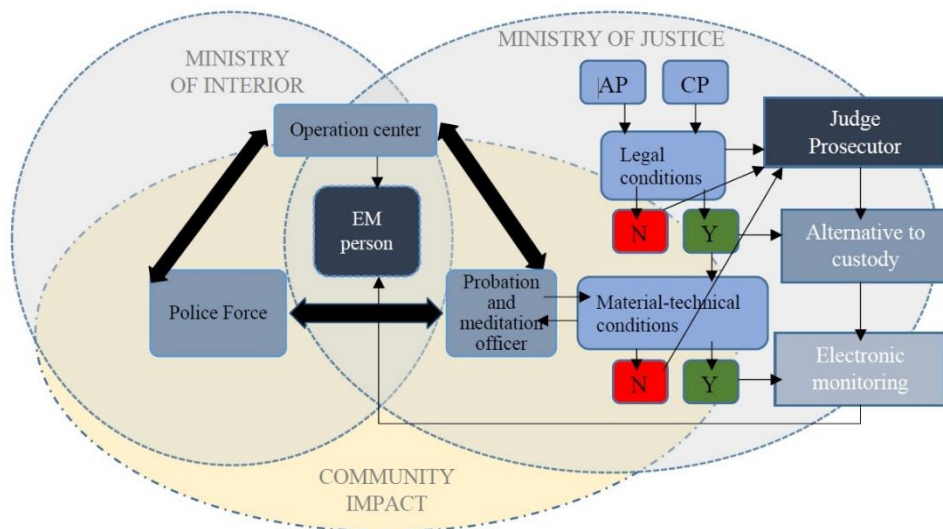
In the following part of this section we aim to describe the overall process of electronic monitoring implementation based on the case of the Slovak Republic. Besides, we opt for the identification of subjects entering this process and their mutual relations, as depicted in *Figure 2*.

At first, the judge or prosecutor enters the whole process by considering an alternative form of punishment – electronic monitoring. They have to consider whether the accused person (AP) or convicted person (CP) is a suitable adept for electronic monitoring implementation according to legal conditions. If not (N), then the case is sent back to the judge or prosecutor. If yes (Y), then the judge or prosecutor might consider an alternative to custody in the form of electronic monitoring. Here enters the community for the first time, if the person to be electronically monitored is living in a household, their member/s should agree with electronic monitoring implementation.

Before the implementation of electronic monitoring it is necessary to fulfil several essential conditions, the so-called material and technical conditions. In case of controlling the ban of alcoholic beverages consumption or punishment under house arrest they are as follows: functional electrical connection, landline data transmission with available signal or mobile network signal, instruction for controlled and protected person, consent of the protected person, instruction of the controlled person and the consent of roommate, if available. In the case of detecting the subject's control of the protected person and the immediate warning of the protected person, it is necessary to assure the functioning of electrical connection, availability of GPS signal and the mobile network signal, the instruction of both the inspected person and the protected person, prior to implementation. Electronic monitoring can be interrupted for the necessary time. The control of material and technical conditions is the responsibility of a probation and mediation officer (PMO) who has to carry out the above mentioned investigation. If conditions are fulfilled, PMO informs back the Court or Prosecution Office and it might start the procedure of electronic monitoring implementation.

In practice, the operation of electronic monitoring is managed by the Operation Centre. The Operation Centre (OC) has continuous operation in the 24/7 regime. OC provides technical support for the probation and mediation officer. It provides continuous supervision of compliance with the imposed obligations, restrictions

or prohibitions by the status of each supervised person in the central monitoring system. It also records operational and security incidents. OC addresses operational incidents with a supervised person (e.g. electricity supply failure). OC reports security incidents to a probationary and mediation officer (e.g., alcohol use detected). In case of danger to life or health or suspicion of committing a criminal offense, the security incidents are reported to the police forces immediately. The probation and mediation officer carries out inspection by technical means, ensures the installation and dismantling of technical equipment, ensures the activation and deactivation of the control regime and solves the incidents. Community, esp. family members are constantly involved in this process indirectly (*Figure 1*).



**Figure 1. Implementation of electronic monitoring in the Slovak Republic**

*Source:* Authors.

The person under electronic monitoring (EM person) is obliged to comply with the specified mode and device operation instructions, contact the probation and mediation officer or the operations centre when dealing with unexpected situations and situations that affect compliance regime. At the same time, this person is obliged to report any change in the control conditions to the probation and mediation officer and to participate in the reimbursement of control costs of € 1.50 per day. This might significantly impact the functioning of the family or community as they have to submit to the regime of electronic monitoring.

When controlling the prohibition of the use of alcoholic beverages, the person is required to have an alcohol control device (alcohol monitoring station) in the dwelling during the entire period of monitoring, and this is able to provide alcoholic breath test upon the call of OC.

Under penalty of house arrest, the person under electronic monitoring is wearing a personal identification device (so-called bracelet) for the whole duration of monitoring. The person under electronic monitoring is required to follow the instructions and stay only in authorized zones (dwelling or if the person is employed place of work and route to work and back). Such restrictions might have an impact on the community or influence the family. For example, if the child is under the care of an electronically monitored person, the child is also indirectly required to stay only in authorized zones, which somehow limits the person from community involvement as well. In the case of detecting the proximity of a person under electronic monitoring to the protected person, the controlled person shall carry the personal identification device (the so-called bracelet) and the device for determining the position of the person monitored (similar to cell phone) throughout the duration of the monitoring. If the protected person (victim) is also involved in the electronic monitoring process, this person carries a proximity alert device (similar to a mobile phone) throughout the duration of monitoring. The protected person is warned about the approaching of the controlled person (controlled person is not informed about the approaching of the protected person) using a warning vicinity (via proximity alert device). In case of emergency, the protected person can immediately contact the OC via alarm devices and if dealing with unexpected situations associated with the regime, the protected person can contact directly the probation and mediation officers (Ministry of Justice) (Borseková, 2019).

Operation of electronic monitoring is based on cooperation and mutual assistance among the operation centre (under the Ministry of Justice), probation and mediation officers (Ministry of Justice), the Police Force (Ministry of Interior) and the controlled person or protected person. It is noteworthy that the efficient setting of individual processes is essential for the proper operation of the process as a whole. As evident, several different subjects with different competences enter the system. Mutual cooperation and proper communication of all subjects involved is inevitable for the successful implementation of electronic monitoring (Borseková, 2019). Besides, there is an evident involvement of the community in the whole process, while cooperation is another inevitable component in the successful implementation of electronic monitoring. Community involvement in the process of electronic monitoring generates important benefits but also brings several risks and might cause vulnerability of relations inside the community. In some cases, for example if a mother of one or several kids is electronically monitored instead of custody, it might be a blessing for the family and her

community ties. In some other cases, for example in case of sexual offenders that are monitored (as in the case of Germany), it could be damaging for his/her family and community involved. Proper and community sensitive measures should be taken into account during the electronic monitoring implementation. The following section concludes with the most important benefits and risks associated with the implementation of the electronic monitoring of accused and convicted persons from the community life point of view.

## 6. Conclusions

As depicted in *Figure 2*, the community is involved in almost the whole process of electronic monitoring, which confirms the risks outlined in the previous section, namely in case studies from Florida and Scotland. Concerning risks connected with involuntary involvement of the community in the electronic monitoring process, the national jurisdictions might consider implementation of sensitive measures considering the vulnerability of the community and its mutual ties into the whole process. The appropriate form of communication on this issue, organization of discussions or supporting groups for community members involved in the process of electronic monitoring might be helpful.

It is also noteworthy that all electronic monitoring programs are aimed at suppressing crime through increased accountability and monitoring. This increases public safety by using more traditional approaches or community supervision, based on the probation supervision, parole and hopes that this approach will reduce the number of repeat offenders in the long term (Renzema, Mayo-Wilson, 2005). This might bring significant benefit for the whole community and society. It eliminates the negative influence of other prisoners on the offender and supports the normal inclusion of the offender in the family and other social networks; eliminates also the intergenerational transfer of crime and helps to keep the prisoners employed. Martinovic (2002) added economic benefits of electronic monitoring programs such as the reduction of the tax burden to the public, by removing the high costs associated with custody. Protection of the offender in terms of stigmatic effects of institutional origin, the possibility to maintain family and community ties belong to the most important benefits with direct relation to the community. Indisputably, electronic monitoring shows the potential to achieve the difficult balance between punishments and therefore meet the public desire for a just punishment, all the while allowing a change in behaviour by encouraging more socially responsible behaviour of monitored persons and ensuring their rehabilitation (Gainey, Payne, 2000; Gainey et al. 2000; White et al. 2000).

To achieve this ambition, it is necessary to perceive community involvement sensitively and consider the potential risks related to electronic monitoring implementation. To the already reported risks we can add the negative effects on family life and the social life of relatives; the danger of social isolation and other negative emotional impacts on the society associated with the monitoring process.

Setting of proper measures to protect the community, better communication or establishment of supporting groups with the attendance of professionals (e.g. mediator, psychologist, etc.) for community members might help to avoid possible risks and support the benefits related to electronic monitoring implementation. Besides, community involvement opens space for further cross-disciplinary empirical research with a potential to generate important empirical results. The topic of electronic monitoring is still vastly underrated in the literature and there is a lack of empirical data. There are still many countries in Europe and beyond that are considering initiation of electronic monitoring into their jurisdiction and thus empirical data, good practices or case studies might be very helpful in the efficient implementation of electronic monitoring and setting the proper measures.

### Acknowledgements

This research was funded by the Slovak Research and Development Agency within the project titled ‘Interdisciplinary approach to electronic monitoring of accused and convicted persons in the Slovak environment’ (acronymed IAEMPS) under contract No. APVV 15-0437.

### References

- ANDREJČÍKOVÁ, Z. 2014. Trest domáceho väzenia a elektronické náramky v podmienkach Slovenska. In: *Visegrad Journal on Human Rights*. No. 1, pp. 6–8.
- BALES, W. D., MANN, K., BLOMBERG, T. G., GAES, G. G., BARRICK, K., DHUNGANA, K., MCMANUS, B. 2010. *A Quantitative and Qualitative Assessment of Electronic Monitoring*. Tallahassee, Fla.: Florida State University, College of Criminology and Criminal Justice, Center for Criminology and Public Policy Research. Available at: <https://www.ncjrs.gov/pdffiles1/nij/grants/230530.pdf>, cit. 15. 8. 2019.
- BELUR, J. et al. 2017. *A Systematic Review of the Effectiveness of the Electronic Monitoring of Offenders*. What Works Crime Reduction Systematic Review Series. London: University College London.
- BEUMER, S, KYLSTAD ØSTER, M. 2016. *Survey of Electronic Monitoring: Analysis of Questionnaires, unpublished*. Confederation of European Probation. Available at: <http://cep-probation.org/wp-content/uploads/2016/04/CEP-EM-Analysis-questionnaire-2016.pdf>
- BORSEKOVÁ, K. 2019. Implementation of Social Responsibility Approach into Electronic Monitoring: Challenge for Public Sector Services. In: GOLINSKA-DAWSON P., SPYCHALA M. (eds): *Corporate Social Responsibility in the Manufacturing and Services Sectors*.



- EcoProduction (Environmental Issues in Logistics and Manufacturing). Springer, Berlin, Heidelberg
- BORSEKOVA, K., KRIŠTOFÍK, P., KORÓNY, S., MIHÓK, P., VAŇOVÁ, A. 2018. Electronic monitoring as an alternative form of punishment: an explanatory study based on European evidence. In: *International Journal of Law and Interdisciplinary Legal Studies*. Vol. 4, No. 1, pp. 39–51.
- Florida State University's Center for Criminology and Public Policy Research. 2011. *Electronic Monitoring Reduces Recidivism*.
- GARLAND, D. 2002. *The culture of control. Crime and social order in contemporary society*. Oxford: Oxford University Press.
- HART RESEARCH ASSOCIATES. 2002. *Changing Public Attitudes toward the Criminal Justice System*. New York: Soros Foundation, February, 2002, available at [http://www.soros.org/initiatives/usprograms/focus/justice/articles\\_publications/publications/hartpoll\\_20020201](http://www.soros.org/initiatives/usprograms/focus/justice/articles_publications/publications/hartpoll_20020201).
- HUCKLESBY, A., HOLDSWORTH, E. 2016. *Electronic monitoring in England and Wales*. EMEU Project Report, Leeds: University of Leeds.
- KRIŠTOFÍK, P. et al. 2017. *Classical and alternative methods of punishment: Economic comparison based on European evidence*. 7<sup>th</sup> International Conference on Interdisciplinary Social Science Studies, Oxford: United Kingdom, pp. 85 – 94.
- MAYS, G. L., WINFREE, L. T. 2014. *Essentials of corrections*. Chichester: Wiley Backwell.
- NELLIS, M., BEYENS, K., KAMPINSKI, D. 2013 Introduction: making sense of electronic monitoring. In Nellis, Beyens K and Kampinski D (eds) *Electronically monitored punishment: international and critical perspectives*. London: Routledge, pp. 1–18.
- PINTO, S., NELLIS, M. 2012. Survey of Electronic Monitoring in Europe: Analysis of Questionnaires 2012.
- SCOTTISH GOVERNMENT. 2016. *Electronic Monitoring in Scotland*. Working Group Report, 2016, ISBN 9781786524812. Available at: <https://www.gov.scot/binaries/content/documents/govscot/publications/independent-report/2016/10/electronic-monitoring-scotland-working-group-report/documents/00506734-pdf/00506734-pdf/govscot%3Adocument/00506734.pdf> (cit. 15. 8. 2019)
- STHINCHCOM, J. B. 2005. *Corrections. Foundations for the future*. London: Routledge.
- SWEDISH NATIONAL COUNCIL FOR CRIME PREVENTION. 2007. *Extended use of electronic tagging in Sweden*. 32 p.
- WENNERBERG, I. 2013. High level of support and high level of control: An efficient Swedish model of electronic monitoring? In: Nellis M, Beyens K and Kaminski D (eds) *Electronically Monitored Punishment – International and Critical Perspectives*. Abingdon: Routledge, pp. 113–127.
- WHITFIELD, D. 1997. *Tackling the tag: The electronic monitoring of offenders*. Winchester: Waterside Press.
- <https://www.crimeandjustice.org.uk/publications/cjm/article/old-and-new-uses-electronic-monitoring-sweden>, cit. 15. 8. 2019.

# Smart manufacturing in the Fourth Industrial Revolution: Trends and economic impacts

COI TRAN<sup>1</sup>

**Abstract:** The global manufacturing industries are currently undergoing a transformation from traditional manufacturing technologies towards smart approaches with a high level of digitalization, automatization/robotization and customization. With the technology advances in the current Fourth Industrial Revolution, new manufacturing generation is enabled by the “Internet of Things” (IoT), “Industrial Internet of Things (IIoT), Cyber-physical systems (CPS), Cloud computing and Big data analytics. Many leading industrial countries have been developing their national initiatives for smart manufacturing in order to stay competitive. For example, the German government initiated Industrie 4.0 as a strategic program. In the US, the Industrial Internet Consortium (IIC) and Smart Manufacturing Leadership Coalition (SMLC) are smart manufacturing initiatives. The topic of smart manufacturing has become important for the researchers, organizations and governments worldwide.

*The objective of this paper is to provide an overview of smart manufacturing and the current trends. Furthermore, the paper discusses opportunities and challenges in terms of economic impacts of smart manufacturing.*

**Key words:** smart manufacturing, industry 4.0, cyber-physical systems

**JEL Classification:** J64, L60, O14, O32, O33

## 1. Introduction

The manufacturing industry is the key driver of the economy in many countries. In the United States, worker productivity increased by 47% over the last 20 years due to technology adoption and innovation, according to the U.S. Bureau of Labor Statistics (2017). In Germany, Japan and South Korea, manufacturing is the main factor of investment in research, development and innovation, contributing to more than 85% of RDI in the private sector as reported by Zimmermann (2015).

Over the past few hundred years, three industrial revolutions have transformed the domain of manufacturing. The first means of water and steam power in the mid-eighteenth century of the first industrial revolution was shifted to mass production in the early twentieth century of the second industrial revolution. From the beginning of the 1970s, the third industrial revolution followed with the new

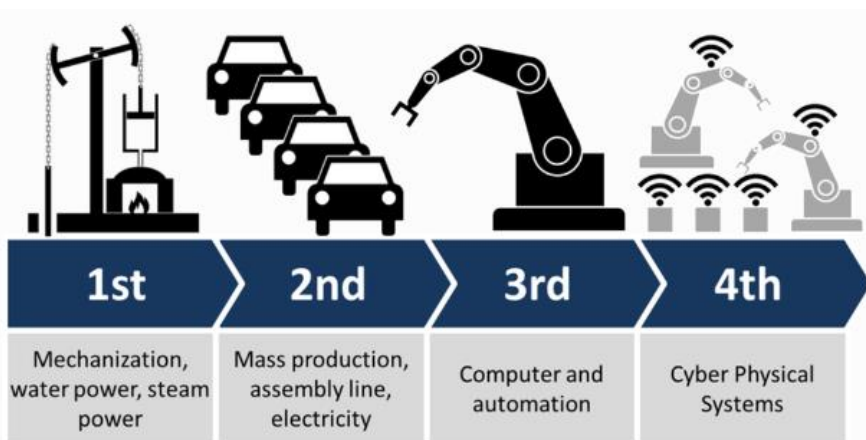
---

<sup>1</sup> COI TRAN, Technical University of Košice, Faculty of Economics, Slovak Republic, coi.tran@fpt.sk

strength of digital computing, automation using the advances of information technology applied in productions.

Recently, innovative technologies have been advancing significantly and shaping a new era of manufacturing in the fourth industrial revolution. The introduction of the “Internet of Things” (IoT) brings connectivity to a whole range of devices from home appliances, smartphones to smart watches and wearables, creating digital connection among smart devices and supporting the automation controls. The advances of IoT in plant floor which is referred to as “Industrial Internet of Things” (IIoT) enable the integration of production systems and enterprise applications together.

With the introduction of cyber-physical system (CPS), physical processes are monitored by a new virtual copy of a physical machine called “digital twin”, making it possible to communicate and interact among smart machines and to help factory supervisors to make decisions through real-time communication.



The 4 Industrial Revolutions (by Christoph Roser at AllAboutLean.com)

**Figure 1. The Four Industrial Revolutions**

Source: <https://www.allaboutlean.com/industry-4-0/>

In addition, combination with some new breakthrough technologies such as Artificial Intelligence (AI), Augmented Reality (AR), Cloud manufacturing, 3D printing, Blockchain, big data analytics is fundamentally transforming manufacturing towards a new era of intelligent manufacturing. *Figure 1* illustrates the four industrial revolutions in an overview landscape.

The objective of this paper is to provide an overview of smart manufacturing and the current trends with selected application examples. Furthermore, the paper discusses opportunities and challenges in terms of economic impacts of smart

manufacturing. The next section (section 2) introduces the literature review and the major concepts. Section 3 discusses the current application trends, while section 4 analyses some economic impacts, and the paper ends with the conclusion in section 5.

## 2. Literature review and major concepts

This section introduces the frameworks of smart manufacturing. Some main concepts and definitions related to smart manufacturing are also presented.

The concept of smart manufacturing, according to MESA (2018), is defined as the intelligent, real-time orchestration and optimization of business, physical and digital processes within factories and across the entire value chain. Therefore, resources and processes are automated, integrated, monitored and continuously evaluated based on all available information for timely operations.

The following part reviews some key technologies which are important components of smart manufacturing.

*The Internet of Things (IoT)/Industrial Internet of Things (IIoT):* According to IEEE (2015), the IoT refers to the network of a range of physical smart devices or objects with embedded sensors, actuators that can be networked and connected for the purpose of gathering and exchanging data, then transforming and processing it for human needs.

The IoT is used in several industries. As consumer IoT, they are healthcare applications such as wearables, smart implantable or injectable devices. As smart home solutions, IoT is used to control for lighting, heating in energy management applications. In industrial IoT (IIoT), they are applications deployed in real-time monitoring and control for production or predictive maintenance.

*Cyber-physical Systems (CPS):* While the IoT deals with unique and inter-connected physical objects, cyber-physical systems are designed for complex systems which require collaboration of different disciplines such as mechanical engineering, electrical engineering, and computer science for their realization, according to NIST (2018) and IEEE (2015).

The examples of CPS applications are smart grids in the utilities industry, medical monitoring systems in healthcare. In manufacturing, CPS models are designed using a coupled model approach. The coupled model is the new concept of a digital twin of the real physical machine. The digital twin is a digital image operating on the cloud infrastructure, communicating and interacting with the physical machine to monitor health conditions and the whole manufacturing process.

*Cloud Computing, Cloud Manufacturing:* Cloud computing refers to the model of delivering the advantages of the on-demand availability of scalable computer

resources such as data storage and computing power over the internet. The introduction of cloud-computing technologies into the manufacturing environment is called cloud manufacturing. In the cloud manufacturing environment, various smart resources in production can be connected into the cloud. Wu et al. (2013) discuss the new trends of providing on-demand use of manufacturing services in the advanced manufacturing model. This makes production lines reconfigurable to enhance efficiency, reduce costs and optimize production resources.

*Big data analytics:* Big data analytics refers to the use of advanced analytic techniques to process large datasets for the purpose of modelling and prediction. With the implementation of smart sensors embedded in IIoT, big data is generated and exchanged in many systems. Open-source software frameworks such as Apache Hadoop is one of the most powerful tools for big data analytics. In smart manufacturing, big data analytics play an important role in predictive activities.

### **3. Application trends of smart manufacturing**

In the 1970s, manufacturing industries were shifted towards a modern era by a wave of a revolution supported by personal computers, numerically controlled machines (NCs), programmable logic controllers (PLCs), and computer-aided manufacturing (CAM). Production improvement processes such as Total Quality Management (TQM), Six Sigma, Just-in-time have brought innovation and efficiency to manufacturing industries.

Today, the convergence of new breakthrough technologies is transforming the industries to a totally new level. It is turning the traditional factories from cost centers to profit centers with the integration of automation, smart machines, IIoT, cloud computing, 3D printing, big data analytics.

However, smart manufacturing is still in the early development stages even though there have been many breakthroughs in the industry. This section highlights some key trends of the future of manufacturing.

#### *Trend #1: Connected factory and production monitoring*

With the support of IIoT and CPS, manufacturing devices powered by internet connectivity ranging from mobile tablets to smart equipment with sensors or smart machines are bringing connectivity to manufacturing operations. Compared with a traditional production system, the smart manufacturing process is automatically monitored, optimized and integrated in a digital platform in real-time. Smart machines are able to exchange data of inventory levels, plant floor situations, and machine functionality status. The process allows factory supervisors to monitor the whole production and supports taking actions when needed.

*Trend #2: Higher level of automation*

Advanced industrial robots and 3D printing are bringing a new level of automation, intelligence and full customization to manufacturing. Advanced robots powered by artificial intelligence are able to complete not only the work originally programmed for them, but also to fulfill more complicated tasks and to learn from experience. Besides robots, 3D printing is considered to be one of the game changers of manufacturing with its potential impact on shifting mass production to a high level of customization. Future manufacturing with the support of advanced robots and 3D printing will be fully automated with limited human involvement.

*Trend #3: Supply chain optimization*

By tracking material consumption in the manufacturing process, IIoT can provide access on a real-time basis to supply chain information. The big difference between smart manufacturing and the traditional one is the introduction of horizontal integration by involving the supply chain in the manufacturing process. According to Eva et al. (2015), this is facilitated by the interoperability mechanisms among CPS systems. Therefore, smart devices and supporting systems enable communication between plants and suppliers, allowing to trace material flows and manufacturing cycles. This helps the visualization of inventory management data from the current estimation of material consumption to the forecast of new coming materials, enabling optimization in the supply chain process.

*Trend #4: Predictive maintenance*

Embedded sensors in equipment at the factory are able to help detect early potential issues and raise alerts. IIoT can be used with Augmented Reality (AR) in predictive maintenance. AR devices such as electronic glasses can help workers to quickly detect problems in specific parts of the machine supported by embedded sensors with the right data. This helps to reduce the involved costs, avoid mistakes, and to speed up the process of maintenance.

Big data analytics plays an important role in the predictive maintenance process. Moyne and Iskandar (2017) analyzed the contribution of big data analytics in Next Generation Fault Detection and Classification (NG-FDC) and Predictive Maintenance (PdM) in the semiconductor manufacturing industry.

In order to support the industry to stay competitive, many leading industrial countries have been developing their national initiatives from a very early time. For example, the German government initiated Industrie 4.0 as a strategic program from 2012. In the US, the Industrial Internet Consortium (IIC), Smart Manufacturing Leadership Coalition (SMLC), and National Network of Manufacturing Institutes (NNMI) are smart manufacturing initiatives to support the industry by creating shared infrastructure called the Smart Manufacturing Platform,

developing and setting future standards for smart manufacturing, and coordinating related activities.

The early adoption of smart manufacturing can be seen worldwide. The survey of the Digital Transformation Institute (2017) shows that the early adopters of smart manufacturing are emerging in some key geographies, especially in the US and Western Europe. Nearly half of all the manufacturers (43%) included in the survey have a smart factory initiative. Even though there have been many difficulties in adopting smart manufacturing, companies remain hopeful about the positive impact of Industry 4.0 on their own company, with nine out of ten expecting their company's competitiveness to either increase or stay the same in the context of Industry 4.0, according to the analysis of McKinsey Digital (2016).

One of the early implementations has been made by Siemens in their first smart factory in Amberg, Germany (Siemens, 2017). As a pioneer in smart manufacturing, Siemens has built up the Electronics Works Amberg factory with more than 75% of automation handled by smart machines and computers, extending from production to material and information flow. The factory in Amberg achieves a high level of flexibility producing 15 million products of Siemens' Simatic product line per year with a high level of quality of 99.9989%.

The trends have been adopted at a regional level in the Central and Eastern Europe (CEE) region. For example, in Slovakia, the automotive industry which contributes about 12% of GDP is one of the fastest-growing industries with the support of automation and robotization. According to Liptáková (2018), the three leading carmakers Volkswagen Slovakia, Kia Motors Slovakia and PSA Groupe and their suppliers have been using thousands of robots in their production lines. At Volkswagen Slovakia in Bratislava, approximately 2,000 robots are installed. In addition, these carmakers are using augmented and virtual reality, big data, online monitoring of production or intelligent gloves with a scanner. The carmakers are moving towards smart and connected factories at the at a regional as well as the global level.

#### **4. Economic impacts of smart manufacturing**

According to the forecast of Digital Transformation Institute (2017), the added output to the economy from smart factories annually would reach a level of \$500 billion in the next five years. In an optimistic scenario, it would add up to \$1,500 billion or 2% of world GDP as it is shown on *Figure 2*.

The initiatives in smart manufacturing aim for many goals. One of the most important targets is to boost the operating profit and margin at the expense of traditional manufacturing. This section highlights some of the positive economic impacts of smart manufacturing and discusses some challenges.

	Factors	Conservative Estimate	Optimistic Estimate
A.	Average expected overall productivity growth in smart factories	27% <sup>a</sup>	28% <sup>b</sup>
B.	Smart factories as a share of all manufacturing plants	21%	60%
C.	Added productivity by manufacturing organizations owing to smart factories (A*B)	5.7%	16.8%
D.	Incremental value added to the global economy, assuming enhanced productivity fully translates into added value (C*\$8.83 trillion)	\$500 billion	\$1483 billion

- a. The average productivity gain estimated across industries
- b. The highest productivity gain estimated by any industry

**Figure 2. Smart factories are expected to boost the global economy**

Source: Digital Transformation Institute (2017).

Firstly, the positive contributions of smart manufacturing can be seen as follows.

*Increase of industrial productivity and efficiency:* Automation, the efficiency of communication among smart machines, better collaboration between people and smart devices are factors that help to increase manufacturing productivity. Furthermore, IIoT devices boost manufacturing efficiency in energy consumption and supply chain optimization.

*Reduced downtime:* Plant maintenance in the era of smart manufacturing is reaching a new level. Features such as predictive maintenance and machine real-time data monitoring help to reduce machine downtime and to eliminate wastes.

*Increase of product quality and product lifecycle management:* Smart manufacturing is designed to avoid product recalls by leveraging features such as fault detection and classification, anomaly detection. Smart machines can detect equipment deviation issues such as temperature parameter, dirty lens indication or any operating parameters.

Additionally, smart manufacturing can also leverage the implementation of blockchain. Blockchain technology helps to simplify the supply chain management, by providing factories, in the case of a recall, tools and data on production processes, helping to detect the origin of errors in product parts.

*New business models and revenue growth:* Horizontal integration takes place at several levels such as the production floor enabled by smart machines, the entire supply chain facilitated by automated collaboration across the upstream supply and logistics chain. Additionally, vertical integration takes place within the organization by connecting the R&D department, production management, quality management, IT, sales and marketing department and so on. Smart manufacturing supporting both horizontal and vertical integration can generate new business models and therefore, can boost revenue growth.



On the other side, smart manufacturing raises many challenges and open issues.

First of all, security, privacy and interoperability and the lack of global digital standards still remain the main challenges of smart manufacturing. When sensitive manufacturing data is exchanged in the company and the supply network, it exposes a number of major threats stemming from access by unauthorized company staff or competitors operating in the same supply network. When there are many enterprises with their smart products entering the market, this makes privacy and security issues become more complicated. In the future, these open issues will require increasing attention from a number of industrial sectors and policymakers alike.

Secondly, smart manufacturing production with AI and robotics becomes cheaper than human production. This leads to the destruction of many routine jobs in the industry. While corporate IT departments in many organizations are becoming redundant and they need to optimize the workforce according to the current fast-changing trends, blue-collar workers face a greater threat of losing their jobs. According to an analysis of the Slovak Spectator (2019), Central and Eastern Europe belongs to the most endangered regions, because unlike Scandinavian countries, the region has many low-qualified jobs. In Slovakia, robotization will change the labour market in the coming years, expected to replace about one-third of current jobs.

This issue highlights the need of upskilling the workforce as a response to the new trends in job creation in areas such as the ICT sector or other high-skill jobs. Additionally, businesses need to make sure that their people are part of the journey towards the future digital transformation and design suitable change management approaches.

Finally, there are still many obstacles such as high investment costs, a lack of digital transformation know-how, governance issues or a lack of skills required from the workforce. Those are among the challenges that organizations need to find suitable solutions to in order to implement their business transformation successfully.

## **5. Conclusion**

In the next decades, the manufacturing industry is predicted to change the way of manufacturing in the entire product value chain to facilitate the delivery of more innovative options and new service models to their customers thanks to the development of both vertical and horizontal integrations. This paper highlights the key trends of future smart manufacturing including connected factory and

monitoring systems, a high level of automation and robotization, horizontal integration towards supply chain optimization, and predictive maintenance.

Smart manufacturing brings positive economic impacts such as increases of efficiency, productivity, quality, and enhanced flexibility. In addition, new business models are expected to generate more revenues to boost business growth.

On the other side, there are many challenges and open issues such as security, privacy and interoperability and the lack of global digital standards; losing jobs to automation and robotization; and some other difficulties of high investment costs or management issues. Those changes and issues will require suitable solutions not only from businesses but also from industry associations and policymakers worldwide.

## References

- Digital Transformation Institute 2017. Smart Factories: How can manufacturers realize the potential of digital industrial revolution, Digital Transformation Institute.
- EVA G., MANFRED, B. 2015. Living in a networked world. Integrated research agenda Cyber-Physical Systems, National Academy of Science and Engineering.
- GALLAHER, M. P., OLIVER, Z. T., RIETH K. T., O'CONNOR, A. C. 2016. Economic Analysis of Technology Infrastructure Needs for Advanced Manufacturing, National Institute of Standards and Technology.
- HERMANN, M., PENTEK, T., OTTO, B. 2015. *Design Principles for Industrie 4.0 Scenarios: A literature Review* Technical University of Dortmund.
- IEEE, 2015. Towards a definition of the Internet of Things (IoT). IEEE Internet Initiative.
- LIPTÁKOVÁ, J. 2018. Car industry in Slovakia gets automated, Slovak Spectator, <<https://spectator.sme.sk/c/20713570/car-industry-in-slovakia-gets-automated.html>>.
- Lu, Y., Morris, K. C., Frechette, S. 2016. Current Standards Landscape for Smart Manufacturing Systems, National Institute of Standards and Technology.
- MANYIKA, J., CHUI, M., BROWN, B., BUGHIN, J., DOBBS R, ROXBURGH C, Byers A.H. (2011) Big data: The next frontier for innovation, competition, and productivity Association, McKinsey Global Institute.
- McKinsey Digital. 2016. Industry 4.0 after the initial hype: Where manufacturers are finding value and how they can best capture it, McKinsey&Company, <[https://www.mckinsey.com/~media/mckinsey/business%20functions/mckinsey%20digital/our%20insights/getting%20the%20most%20out%20of%20industry%204%200/mckinsey\\_industry\\_40\\_2016.ashx](https://www.mckinsey.com/~media/mckinsey/business%20functions/mckinsey%20digital/our%20insights/getting%20the%20most%20out%20of%20industry%204%200/mckinsey_industry_40_2016.ashx)>.
- MESA. 2018. Seeking Common Ground for Smart Manufacturing, Manufacturing Enterprise Solutions Association, MESA International.
- MOYNE, J., ISKANDAR, J. 2017. Big Data Analytics for Smart Manufacturing: Case Studies in Semiconductor Manufacturing, Processes 2017. 5, 39.
- NIST, 2018. Cyber-Physical Systems, National Institute of Standards and Technology, <<https://www.nist.gov/el/cyber-physical-systems>>
- Siemens, 2017. The Digital Enterprise EWA – Electronics Works Amberg, Siemens AG.
- Slovak Spectator. (2019). Robots may replace one-third of jobs, Slovak Spectator, <<https://spectator.sme.sk/c/22115018/robots-may-replace-one-third-of-jobs.html>>.
- U.S. Bureau of Labor Statistics (2017). Manufacturing Sector: Real Output [OUTMS], Federal Reserve Bank of St. Louis, <<https://fred.stlouisfed.org/series/OUTMS>>.

- WISSKIRCHEN, G., BIACABE, B.T., BORMANN, U., MUNTZ, A., NIEHAUS G., SOLER G. J., BRAUCHITSCH B. 2017. Artificial Intelligence and Robotics and Their Impact on the Workplace, IBA Global Employment Institute.
- WU, D., GREER, M. J., ROSEN, D. W., SCHAEFER, D. 2013. Cloud manufacturing: Strategic and state-of-the-art. *Journal of Manufacturing Systems*. Vol. 32, No. 4, pp. 564–579.
- ZIMMERMANN, V. 2015. An international comparison of R&D: Germany benefits from industrial research strength, KfW Research, < <https://www.kfw.de/PDF/Download-Center/Konzernthemen/Research/PDF-Dokumente-Fokus-Volkswirtschaft/Fokus-englische-Dateien/Fokus-Nr.-105-August-2015-FuE-an-international-comparison.pdf>>.

# Enhancement of innovation collaboration via innovation vouchers

VIKTORIE KLÍMOVÁ<sup>1</sup>, VLADIMÍR ŽÍTEK<sup>2</sup>

**Abstract:** The article deals with the implementation of innovation vouchers in the regions of the Czech Republic. The aim of the article is to compare Czech regions with regard to the use of innovation vouchers as a tool to stimulate innovation cooperation. Our paper is focused on national as well as regional innovation vouchers. First, innovation vouchers began to be implemented on the regional level, and for the first time, they were used in the South Moravian Region in 2009. Subsequently, they were extended to almost all Czech regions. In 2015, they began to be funded by the national government, and therefore, most regional governments ended their own support. In the case of regional innovation vouchers, the attention is paid mainly to the regional governments' approach to using and setting up the vouchers. In the case of national innovation vouchers, we mainly deal with spatial aspects of granting support. Our research shows that individual regional governments have different approaches to innovation collaboration support. Although the innovation vouchers have been introduced by regions with strong innovation performance, nowadays, they are rather implemented by regions with weak innovation capacity. The advantage of regional innovation vouchers lies in the fact that policymakers can modify their parameters so that they are tailor-made to the situation of a particular region. Our analysis also showed that a significant part of the support for national innovation vouchers is allocated to the most innovative regions and weaker regions are not able to use the offered resources.

**Key words:** innovation cooperation, innovation policy, innovation voucher, regions, Czech Republic

**JEL Classification:** R12, R58, O38

## 1. Introduction

There is a growing consensus in society and in the professional and scientific literature that innovations are the key driving force for economic growth, living standard, international competitiveness, and regional development (e.g., Acs,

---

<sup>1</sup> VIKTORIE KLÍMOVÁ, Department of Regional Economics and Administration, Faculty of Economics and Administration, Masaryk University, Czech Republic, viktorie.klimova@econ.muni.cz

<sup>2</sup> VLADIMÍR ŽÍTEK, Department of Regional Economics and Administration, Faculty of Economics and Administration, Masaryk University, Czech Republic, vladimir.zitek@econ.muni.cz

Varga, 2002; Halásková, Slovák and Halásková, 2016). There also exists a broad consensus in economic theory and political practice that collaboration between innovation actors has a positive impact on innovation performance (e.g., Stejskal, Hájek, 2019). The importance of innovation and cooperation is accentuated by institutional theories that represent a significant strand of current research into regional issues. These theories emphasize the importance of an institutional set-up and mutual interactions of individual actors. Research and development are perceived as one of the most important sources for innovations (e.g., Kraftová, Kraft, 2018), and therefore, particularly, the R&D collaboration has an essential impact on innovation performance.

It is evident that in order to keep up with the pace of the markets and to remain competitive, companies cannot rely only on in-house innovation (Arvanitis, Bolli, 2012). Public-private cooperation, university-business contacts, business networks, and clusters are essential to generation and dissemination of knowledge and enhancement of the regions' innovation capability (e.g., Grillo, Landabaso, 2011). Cooperation may also take institutionalized forms in the emergence of spin-off companies (Jarábková, Chreneková, 2018). Innovation collaboration speeds up the innovation process and leads to more radical innovations.

Enterprises using different external sources of knowledge (from other companies and knowledge organizations) available on different territorial levels (regional, national, international) are more likely to generate new product innovations that are new to the market (Tödting, Grillitsch, 2015). By working together, businesses can share innovative tasks and achieve goals that they would not achieve on their own (Powell, Grodal, 2005). Collaboration gives businesses access to new sources of knowledge, enabling them to benefit from joint research and share the risks and costs of their innovative projects (Marzucchi, Antonioli and Montresor, 2015).

Innovation policy on regional as well as national level has many options on how to stimulate innovation cooperation among innovations actors. Our article deals with the support of innovation collaboration through innovation vouchers. The aim of the article is to compare Czech regions with regard to the use of innovation vouchers as a tool to stimulate innovation cooperation. The paper is focused on national and as well as regional innovation vouchers. In the case of regional innovation vouchers, the attention is paid mainly to the regional governments' approach to using and setting up the vouchers. In the case of national innovation vouchers, we mainly deal with spatial aspects of granting support. More detailed information about the data and methods used are provided below.

## **2. Innovation vouchers as policy instrument aimed at innovation collaboration**

Innovation policy instruments aimed at collaboration enable the interconnection of the supply and demand side of the innovation system and thus contribute to removing one of its most important barriers. Clusters, technology platforms, competence centres and innovation vouchers are used by innovation policy in this field. Each of these tools has its own specific purpose. Our attention is focused on innovation vouchers.

Innovation vouchers represent a tool designed to initiate collaboration between companies and research organizations, but they also support technology transfer (Hlaváček, 2017). Their purpose is not to promote cooperation for a long period, but rather to give an initial impetus for the beginning of cooperation, which will ideally continue later without public support. Aid granted to a single entity is usually quite low, and is therefore granted as “de minimis” aid in accordance with the legislation of the European Union. It means that this support does not distort economic competition and is not subject to the notification procedure.

The support consists in the provision of an imaginary voucher of particular financial value to a company that has to use it for purchasing R&D services from a research organization. For example, the company can order special research, laboratory measurement, or testing. The aid is intended in particular for SMEs that do not have their own research capacities and facility. Coletti and Landoni (2018) add vouchers allow research organizations to learn about the needs of unfamiliar industries and develop new competencies, which can be an explicit goal of some voucher programmes.

Innovation vouchers are implemented mainly on the regional level, but there are also schemes on the national level. Support providers vary significantly in how they set parameters of the support. The differences are mainly in the target group, the scope of supported activities, sources of financing, co-financing rate and administration system (Rada, 2012). Usage of the voucher is usually territorial bounded, which means that support can be either granted to an enterprise from a certain region or the research services have to be provided by a research organization from a certain region. Vouchers can also be restricted by industry. That allows the tool to be simply adapted to the specific conditions and shortcomings of the regions. Unique mechanisms that would not be applicable to other instruments are also used for project selection. For example, in the Netherlands (Cornet, Vroomen and van der Steeg, 2006), as well as in some Czech regions, it is common to draw lots to decide which companies obtain the voucher.

The emergence of innovation vouchers is associated with the Netherlands, where they were first used in the province of Limburg in 1997 (Cornet, Vroomen and van der Steeg, 2006). It is currently a very popular tool used worldwide.

Besides the Czech Republic, they are used in countries such as Italy (Sala, Landoni and Verganti, 2016), Austria and Switzerland (Good, Tiefenthaler, 2011), the United Kingdom (SQW, 2014) and Canada (Langhorn, 2014). The above list has only an illustrative character because innovation vouchers can be found in almost all European Union countries. For example, a report elaborated for the European Commission (Schade, Grigore, 2009) compares innovation voucher programmes in 12 EU countries.

### **3. Innovation vouchers in the Czech Republic**

Our article deals with the implementation of innovation vouchers in the regions of the Czech Republic. First, innovation vouchers began to be implemented on the regional level, and for the first time, they were used in the South Moravian Region in 2009. Subsequently, they were extended to almost all Czech regions. In 2015, they began to be funded by the national government.

#### **3.1 Innovation vouchers implemented on the regional level**

On the regional level in the Czech Republic, innovation vouchers were first implemented in the South Moravian Region. This new scheme was designed by the South Moravian Innovation Centre, which also ensured its administration. These vouchers were funded by the City of Brno. Gradually, this tool has spread to almost all regions. *Table 1* shows the evolution of the use of this instrument by Czech regions over time. The initial increase in the popularity of innovation vouchers was until approximately 2013 when they were applied in 11 Czech regions. At present, innovation vouchers are implemented in five regions only, and they are newly implemented in the Usti Region. However, the figures in the table are only indicative, as several calls could have taken place in individual regions during the given period. In the framework of these calls, conditions for aid granting could vary slightly. The only region where innovation vouchers were not implemented at all is the Pardubice Region. The table also shows the maximum amount of support per innovation voucher. The provided support is usually in the range of 100 thousand up to 400 thousand CZK (approx. thousands of euros). The aid intensity (ratio between eligible costs and aid) is usually between 70 and 80%. Some regions also define the minimum amount of support or the minimum/maximum value of the contract for the research services.

*Table 2* gives an overview of how innovation vouchers function in individual regions. It contains the type of implementing organization, the criterion of the eligible beneficiary, and the type of research organization that can provide research services. The innovation vouchers schemes are usually implemented by

the regional authority itself, or they are entrusted to some specialized agency (innovation centre, development agency, etc.). The data refer to the current period, but if the vouchers are no longer implemented, the first column indicates the year to which the information relates. Some regions have decided to cooperate with each other in the implementation of innovation vouchers and to launch joint calls. This is the case for the Liberec and Hradec Kralove Regions until 2012 and the Zlin and Olomouc Regions until 2015. However, it should be noted that the conditions may have changed over time. For example, the original schemes in the South Moravian Region allowed the involvement of all companies regardless of their location, but the research organization had to be located in the South Moravian Region. Later, these local eligibility conditions were reversed, and furthermore, foreign research organization can provide their services. Quite unusual is the situation in the Pilsen Region, where vouchers were originally provided by the regional authority to entities throughout the whole territory of this region, but now they are provided by the Statutory City of Pilsen and only enterprises in the Pilsen Metropolitan Area can use this support.

**Table 1. Innovation vouchers in regions – the maximum amount of support (in thous. CZK)**

Region (NUTS3)	2013–2014	2015–2016	2018	2019
Prague	200	200	–	–
Central Bohemian	–	150	150	300
South Bohemian	unlimited	150	150	under preparation
Pilsen	150	100	150	180
Karlovy Vary	170	170	170	170
Usti	–	–	200	200
Liberec	unlimited	–	–	–
Hradec Kralove	150	–	–	–
Pardubice	–	–	–	–
Vysocina	200	200	200	–
South Moravian	100	100	–	–
Olomouc	150	150	–	–
Zlin	150	150	–	–
Moravian-Silesian	400	300	–	–

*Note:* 1 EUR = 25.66 CZK (ECB, 31.7.2019); 100,000 CZK = 3,897 EUR

*Source:* Authors' own elaboration based on websites of the implementing organizations.



**Table 2. Innovation vouchers in regions – institutional conditions**

Region (NUTS3)	Type of implementing organization	Eligible beneficiary (company)	Knowledge provider
Prague (till 2016)	City authority	SME with residence or branch in the region	Czech research organization
Central Bohemian	Specialized agency	SME with residence or branch in the region	Czech research organization
South Bohemian	Specialized agency	Enterprise with residence or branch in the region	Czech research organization
Pilsen	City authority	Enterprise with residence or branch in the Pilsen metropolitan area	Research organization located in the region
Karlovy Vary	Specialized agency	Enterprise with residence or branch in the region	Czech research organization
Usti	Specialized agency	Enterprise with residence or branch in the region	Czech research organization
Liberec (till 2013)	Regional authority	SME with residence or branch in the region	Czech research organization
Hradec Kralove (till 2012)	Specialized agency	SME with residence or branch in the region	13 specified research organizations
Pardubice	–	–	–
Vysocina (till 2018)	Regional authority	Enterprise with residence or branch in the region	Czech research organization
South Moravian (till 2015)	Specialized agency	Enterprise with residence or branch in the region	Czech or foreign research organization
Olomouc (till 2015)	Other public authority	Enterprise with residence or branch in the region	8 specified research organizations
Zlin (till 2015)	Other public authority	Enterprise with residence or branch in the region	8 specified research organizations
Moravian-Silesian (till 2015)	Regional authority	SME with residence or branch in the region	Czech research organization

*Source:* Authors' own elaboration based on websites of the implementing organizations.

The main reason for reducing the interest of regions in this type of instrument is the new scheme carried out under the cohesion policy (operational programmes, see the following section). Due to this fact, regional and national level initiatives would overlap. Instead of innovation vouchers, some regions have started to implement creative vouchers that provide a contribution to fostering cooperation between companies and creatives, usually related to improving the marketing

activities of companies. Examples of such vouchers can be observed in the South Moravian, Central Bohemian, Zlin and Moravian-Silesian Regions.

### 3.2 Innovation vouchers implemented on the national level

Innovation vouchers are supported on the national level since the 2014–2020 programming period. Our analysis focuses on the Innovation vouchers programme, which is a part of the Operational programme Enterprise and innovation for competitiveness 2014–2020. Support is provided in the form of a subsidy to small and medium-sized enterprises for the purchase of consulting, expert and support services from research organizations, and certified testing laboratories. The minimum amount of support is 80,000 CZK per project; the maximum amount according to the programme rules is 500,000 CZK. However, three closed calls and one open call allow companies to ask for a maximum of CZK 300,000 per project. CZK. At the end of the evaluated period, the total allocated support is reaching approximately CZK 195 mil. CZK.

Regions of the Czech Republic are compared on the basis of their activity in gaining resources from the Innovation vouchers programme. The evaluation is carried out for a period of 38 months, from the 1st June 2016, when the first project applications began to be accepted, until the 31st July 2019, the date on which the most up-to-date statistical data are available. The support is analysed according to the real place of project implementation (not the applicant's registered office), and therefore Prague is not included in the comparison. Prague, as a more developed region, is not eligible for funding from this programme. Basic data on supported projects have been obtained from the MS2014 + database of the Ministry of Regional Development (2019) and subsequently, the values for individual regions have been calculated. The comparison focuses on:

- the share of individual regions in the allocated support,
- the amount of aid received, and
- the number of implemented projects.

As shown in *Table 3*, the Innovation vouchers programme supported 878 projects by July 2019. Most of the projects were implemented in the Moravian-Silesian, South Moravian and Central Bohemian Regions. In the latter two cases, these are regions with above-average innovation performance. The lowest number of projects were supported in the Karlovy Vary, Liberec and Usti Regions. Similar results are obtained when regions are compared in terms of their share in the total programme allocation. The three most active regions have spent almost half of the budget for the whole programme.

**Table 3. Support for national innovation vouchers**

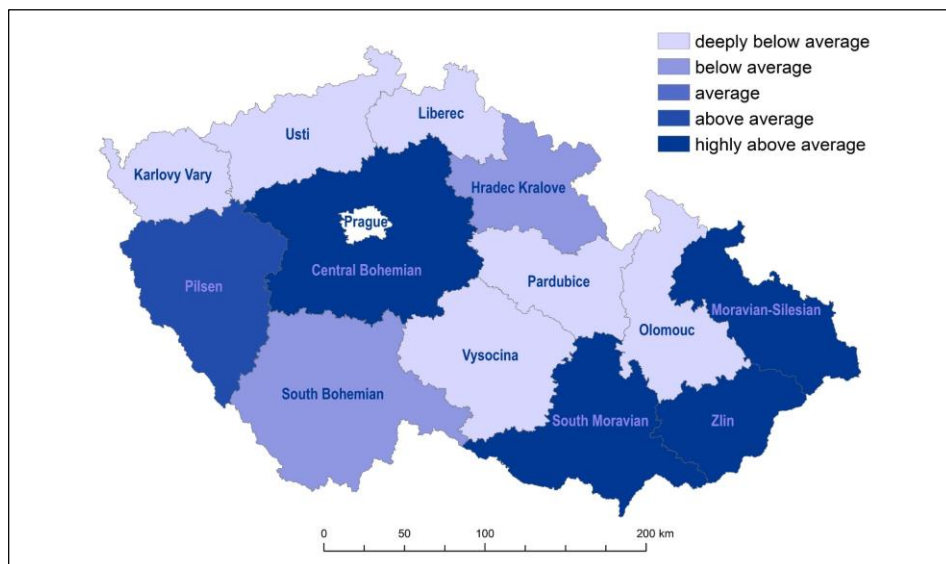
Region (NUTS3)	Number of projects	Share of the region in the total allocation of support (%)
Central Bohemian	112	12.26
South Bohemian	50	6.20
Pilsen	69	8.55
Karlovy Vary	11	1.26
Usti	34	3.53
Liberec	29	3.04
Hradec Kralove	54	5.96
Pardubice	44	4.51
Vysocina	44	5.11
South Moravian	136	15.35
Olomouc	42	4.96
Zlin	101	10.78
Moravian-Silesian	152	18.46
Czech Republic	878	100.00

*Source:* Authors' own calculation based on the Ministry of Regional Development CZ (2019).

The method of cartographic visualization is used for graphical representation of the spatial distribution of support for innovation vouchers. The regions are divided into five groups according to the amount of support they have received. The amount of support for each region is compared to the Czech Republic's average, and the following groups of regions are defined:

- deeply below average (below 70% of average),
- below average (70–90% of average),
- average (90–110% of average),
- above average (110–130% of average),
- highly above average (above 130% of average).

*Figure 1* divides the Czech regions into groups according to the absolute amount of support they were able to receive. No region was included in the group of average regions. On the one hand, there are six deeply below-average regions and, on the other hand, four highly above-average regions. The highest values were reached in the Moravian-Silesian Region (140% of the Czech average) and the South Moravian Region (200%). The Karlovy Vary Region received the



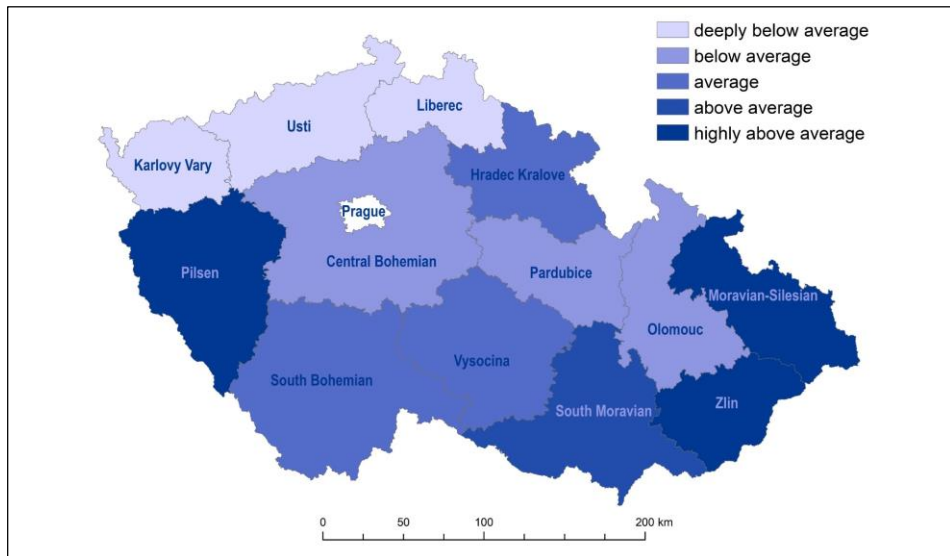
**Figure 1. Distribution of innovation vouchers support in the Czech regions – the total amount of subsidy**

*Source:* Authors' own calculation based on the Ministry of Regional Development (2019).

lowest support (16%). It is thus clear that there are large regional disparities in the allocation of support for innovation collaboration and that the support is concentrated rather in regions with higher innovation capacity.

*Figure 2* assesses the Czech regions according to per capita support received for innovation vouchers. At first glance, disparities between regions are not so high, as the regions are evenly divided into five groups. If the amount of the subsidy was calculated per inhabitant, the highest support was allocated to the Zlin, Moravian-Silesian and Pilsen Regions, which are regions that are not so successful in terms of their innovation performance. The lowest support was gained by the Karlovy Vary and Usti Regions. If the aid is expressed per capita, the values of individual regions range from 40 to 172% of the Czech average.

Finally, it should be noted that innovation vouchers in Prague are also supported by the European cohesion policy. Prague has its own Operational program Prague – the growth pole of the Czech Republic, from which innovation vouchers are financed. The total budget of support for innovation vouchers is about 270 million CZK, and the maximum support for one voucher is 2 million CZK. Due to different conditions, it is not possible to compare support in Prague with the support in the remaining regions of the Czech Republic.



**Figure 2. Distribution of innovation vouchers support in the Czech regions – subsidy per capita**

*Source:* Authors' own calculation based on the Ministry of Regional Development (2019)

## 4. Conclusion

Collaboration provides businesses with access to new sources of knowledge, enables them to benefit from joint research and share the risks and costs of their innovation projects. Enterprises that use different external sources of knowledge are more likely to create new product innovations that are new to the market. Innovation policy has several tools through which it can stimulate innovation collaboration between business and research spheres. Innovation vouchers represent an instrument that is currently very popular in regions of Central and Eastern European countries.

The paper dealt with the implementation of innovation vouchers in the regions of the Czech Republic and was focused on national and as well as regional innovation vouchers. First, innovation vouchers began to be implemented on the regional level, and subsequently, they were extended to almost all Czech regions. In 2015, they began to be implemented by the national government as well, and therefore, most regional governments ended their own support. Nowadays, regional innovation vouchers are implemented in five NUTS3 regions and are rather implemented by regions with weak innovation capacity. We should mention the fact that in some regions of the Czech Republic (particularly the Vysocina and the Karlovy Vary Regions), no public research organizations are located, and

therefore, innovation vouchers can facilitate cooperation between regional companies and more distant research organizations.

The national programme of innovation vouchers is financed in the framework of the European cohesion policy and is a part of Operational programme Enterprise and innovations for competitiveness. Our analysis also showed that a significant part of the support for national innovation vouchers is allocated to the most innovative regions and weaker regions are not able to use the offered resources.

Innovation vouchers are a tool that is well applicable on the regional level and is suitable for initiating new cooperation between business and research spheres. The advantage of regional innovation vouchers lies in the fact that they enable modification of their parameters by identifying their eligible beneficiaries and research organizations so that they are tailor-made to the situation of a particular region (e.g., absence of research organizations within the region). On the other hand, the main advantage of the national innovation vouchers is the higher budget and the possibility to support a higher number of innovation vouchers.

In summary, we identified the following main advantages of innovation vouchers:

- possibility to start a collaboration that will later continue without public support;
- possibility to implement them as the “de minimis” aid scheme that does not disturb economic competition;
- easy tool with low administrative requirements;
- speedy project selection and
- flexible tool that can be modified according to the specific conditions of the region.

On the other hand, policymakers should also consider the potential disadvantages of this instrument. The most considerable risk of innovation vouchers is that they can be abused by companies already cooperating with research organizations. In this case, the vouchers do not lead to new collaborations, but rather replace and crowd out private investments. The disadvantage of vouchers is also the fact that support is used only by enterprises that are already innovating and interested in cooperation and the aid has no or slight impact on non-innovative enterprises.

### **Acknowledgements**

The paper has been supported by the Masaryk University in the framework of the project no. MUNI/A/1051/2018 (Determinants of successful regional innovation systems development).

## References

- ACS, Z., VARGA, A. 2002. Geography, Endogenous Growth, and Innovation. In: *International Regional Science Review*. Vol. 25, No. 1, pp. 132–148.
- ARVANITIS, S., BOLLI, T. 2013. A comparison of national and international innovation cooperation in five European countries. In *Review of Industrial Organization*. Vol. 43, No. 3, pp. 163–191.
- COLETTI, M., LANDONI, P. 2018. Collaborations for innovation: a meta-study of relevant typologies, governance and policies. In: *Economics of Innovation*. Vol. 27, No. 5–6, pp. 493–509.
- CORNET, M., VROOMEN, B., van der STEEG, M. 2006. *Do innovation vouchers help SMEs to cross the bridge towards science?* CPB discussion paper.
- GOOD, B., TIEFENTHALER, B. 2011. Innovation voucher – small is beautiful. In: *Plattform Forschungs- und Technologieevaluierung*. Vienna: Technopolis Group Austria.
- GRILLO, F., LANDABASO, M. 2011. Merits, problems and paradoxes of regional innovation policies. In: *Local economy*. Vol. 26, No. 6–7, pp. 544–561.
- HALÁSKOVÁ, M., SLOVÁK, S., HALÁSKOVÁ, R. 2016. Impact of Selected R&D Indicators on Competitiveness of the European Union Countries. In: *Proceedings of the 3rd International Conference on European Integration 2016*. Ostrava: VŠB – Technical University, pp. 309–318.
- HLAVÁČEK, P. 2017. Use of innovation vouchers for the regional innovation environment development. In: *Economic Annals-XXI*. Vol. 166, No. 7–8, pp. 91–95.
- JARÁBKOVÁ, J., CHRENEKOVÁ, M. 2018. University spin-off enterprises: What's their nature? (Case study of the SUA in Nitra). In: *Geografické informácie*. Vol. 22, part 1, pp. 191–206.
- KRAFTOVÁ, I., KRAFT, J. 2018. The Relationship between Pro-Innovation Factors and the Performance of the European Union Member States and their Regions. In: *Engineering Economics*. Vol. 29, No. 4, pp. 424–433.
- LANGHORN, K. 2014. Encouraging entrepreneurship with innovation vouchers: Recent experience, lessons, and research directions. In: *Canadian Public Administration*. Vol. 57, No. 2, pp. 318–326.
- MARZUCCHI, A., ANTONIOLI, D., MONTRESOR, S. 2015. Industry-research Cooperation within and across Regional Boundaries. What does Innovation Policy Add? In: *Papers in Regional Science*. Vol. 94, No. 3, pp. 499–525.
- Ministry of Regional Development CZ. (2019). *MS2014+ Database*.
- POWELL, W. W., GRODAL, S. 2005. Networks of innovators. In: *The Oxford Handbook of Innovation*. Oxford: Oxford University Press, pp. 56–85.
- RADA, P. 2012. *Inovační vouchery – studie*. Available at: [inovacnipodnikani.cz/wp-content/uploads/IV-Studie\\_final.pdf](http://inovacnipodnikani.cz/wp-content/uploads/IV-Studie_final.pdf).
- SALA, A., LANDONI, P., VERGANTI, R. 2016. Small and Medium Enterprises collaborations with knowledge intensive services: an explorative analysis of the impact of innovation vouchers. In: *R&D Management*. Vol. 46, pp. 291–302.
- SCHADE, S., GRIGORE, C. 2009. *Availability and focus on Innovation Voucher schemes in European regions*. Brussels: European Commission.
- SQW (2014). *An Evaluation of the Invest NI Innovation Vouchers Programme*. Final Report to Invest NI. London: SQW. Available at: [www.sqw.co.uk](http://www.sqw.co.uk).
- STEJSKAL, J., HÁJEK, P. 2019. Modelling collaboration and innovation in creative industries using fuzzy set qualitative comparative analysis. In: *Journal of Technology Transfer*. Vol. 44, No. 3, pp. 981–1006.
- TÖDTLING, F., GRILLITSCH, M. 2015. Does Combinatorial Knowledge Lead to a Better Innovation Performance of Firms? In: *European Planning Studies*. Vol. 23, No. 9, pp. 1741–1758.

# On the Issue of Regional Innovation Networks Case Study of the Creation of Regional Innovation System in the Region of Northern Slovakia

MÁRIA ROSTÁŠOVA<sup>1</sup>, TATIANA ČOREJOVÁ<sup>2</sup>,  
LUCIA FÚROVÁ<sup>3</sup>

**Abstract:** The aim of the paper is determined by the fact that the need for a set of common rules and standards is identified in the regional context, facilitating interaction and mutual understanding in the process of knowledge sharing and achieving the necessary degree of regional cooperation. The introduction introduces the strengths, weaknesses, opportunities and threats related to the creation of the selected subsystem of the regional innovation system and presents the functions that this system should fulfil in the functioning of a particular region. The subject subsystem, which is the object of analysis in this paper, represents the cooperation of academics of the University of Zilina with business subjects in the Zilina region, as one subsystem of the Triple Helix, Quadruple Helix, and Quintuple Helix, respectively. The result section of the study presents an evaluation of this collaboration through an analysis using quantitative research through electronic inquiry. The research problem identified in the absence of a comprehensive identification of academic and business collaboration aspects has been transformed into four research objectives and seven hypotheses that have been validated in the research process. An important part of the paper is the interpretation of the results of the research, which are statistically evaluated. These results have subsequently become the basis for making recommendations and identifying the significance of barriers that hinder or slow down the creation of a regional innovation system. Within the discussion, the tasks of the University of Zilina in the regional innovation system and the way to fulfil the concept of the business university remain unnoticed, in some cases more difficult to achieve.

**Key words:** Triple Helix model, innovation, innovation ecosystem, university, region

**JEL Classification:** R12, R58, O38

## 1. Introduction

The fact that in the regional context the need for a set of common rules, standards and other aspects that facilitate interaction and mutual understanding in the process of sharing knowledge and achieving the necessary degree of regional

---

<sup>1</sup> MÁRIA ROSTÁŠOVA, University of Zilina, Slovakia, maria.rostasova@fpedas.uniza.sk

<sup>2</sup> TATIANA ČOREJOVÁ, University of Zilina, Slovakia, tatiana.corejova@uniza.sk

<sup>3</sup> LUCIA FÚROVÁ, University of Zilina, Slovakia, lucia.furova@fpedas.uniza.sk



cooperation is identified is obvious and well known. The innovation process in a regional innovation system requires not only regional localized resources such as skilled workforce and research results, but is also shaped by institutionalized values and practices at the regional level. The proximity of regional actors is essential for mutual learning, knowledge sharing and stimulating innovation in the region (Doloreux, Parto, 2005; Bucek et al., 2006; Rehak, Sipikal, 2012; Rostasova, Corejova and Rovnanova, 2018).

One of the existing concepts that identify actors and relationships between them in fulfilling the essence of regional cooperation through the creation of regional innovation systems and networks is the Triple Helix concept. It is a triple spiral model identifying three actors in regional innovation systems – university, industry and the state. It was established in the 1990s. The concept interprets the shift from the dominant pair – industry and state in an industrial society, to the growing triple relationship between university, industry and the state in today's knowledge society. The potential of innovation and economic development in the knowledge society lies in the university's stronger role in relation to industry and the state. The aim of this approach is to create a new institutional and social environment for the production, transfer and application of knowledge and technology into practice. The Triple Helix model provides a general framework for exploring complex innovation and communicating national, regional and international innovation and development policymaking. According to Etzkowitz, H. (2008), the evolutionary process in the Triple Helix system involves the transition of model actors from static Triple Helix through Laisser-faire Triple Helix to interactive Triple Helix (Stratford University, 2018; Etzkowitz, 2003).

Yet interactive Triple Helix exists within an institutional perspective, a balanced organization of actors that facilitates the creation of a knowledge-based infrastructure. This arrangement can be defined as a specific transition to a knowledge society where university and other knowledge institutions act in partnership with industry and the state (Madudova, Majercakova, 2017). All three players of the Triple Helix model fulfil their own roles and at the same time take on the role of the other actors in developing a triple interface between universities, industry and the state. A balanced arrangement of the three main players in the Triple Helix model offers the most favourable environment for innovation (Farinha, Ferreira, 2012; Etzkowitz, Leydesdorff, 2000).

The evolutionary perspective defined in the Triple Helix model sees university, industry and the state as co-evolving subsets of social systems. There is interaction between them through networking. These interactions are part of two processes of communication and differentiation: functional (between science and market) and institutional (between the private and public spheres at university, industry and state levels). Internal differentiation within each institutional sphere creates new

types of collaboration between the Triple Helix actors (Unger, Polt, 2017; Stratford University, 2017).

Rostasova et al. (2018) also identified clusters as another stakeholder in the creation of regional and local ecosystems. Clusters (e.g. cluster managers) organize various events and also carry out active marketing to encourage stakeholder networking and market communication. Events are ideal for networking, building relationships and inventing. They provide all stakeholders with the opportunity to meet and exchange relevant information. Cluster managers create relationships with a large number of actors in cities, in the region and at national level, which means that clusters and their members are becoming more visible (Koschatzky, 2003; Isaksen, 2001).

## **2. Selected aspects of creation and functioning of the regional innovation ecosystem of northern Slovakia (Zilina region)**

The beginning of the official and documented creation of the regional innovation system and the subsequent policy can be identified in 2005. Within the framework of the 6FP project (2005–2008), the Zilina Region Framework Policy for Innovation Development was gradually formulated. The policy was designed to help the region to optimize its innovation capacities and expand the regional innovation system. The document was created on the basis of the “Triple-helix” model – a triple spiral as an innovation model, which represents multiple reciprocal relationships in different places in the process of capitalizing knowledge. The implementation of the Triple-helix model was intended to reflect the new relationship of universities, industry and regional government, suitable for supporting regional innovation development of the Zilina Region. The document stated that this is a “relatively free relationship, but already in many ways interdependent, with overlapping and interconnection of objectives and tasks”. It also pointed out that “the regional innovation partnership between science, administration, industry and society as a whole is intended to create an environment supporting the regional innovation potential in the Zilina region. It is also intended to promote cooperation between existing institutions and organizations and to create a strategic development framework that will activate existing businesses to introduce further innovation and create a positive culture for new entrepreneurs (Dado et al., 2006).

In 2014, following the previous document, the Regional Research and Innovation Strategy of the Zilina Region 2014+ (RVIS) was elaborated. RVIS is the basic development document of the Zilina Region for the area of support for entrepreneurship, innovation and research and development for the next period – i.e. for the period 2014–2020 in the context of fulfilling the European Union

agenda “Europe 2020”. The aim of the updated Regional Research and Innovation Strategy of the Zilina Region is to contribute to increasing the competitiveness of the regional economy and creating sustainable jobs through the development of innovative entrepreneurship and excellent research. Based on this document, in cooperation with other stakeholders, the proposed measures are gradually being implemented in the Zilina region in order to increase the smart specialization of regional industry and services, the growth of sustainable jobs driven by innovative business, accelerated by research institutions, clusters and networking in the Zilina region (RVIS, 2015).

Among the positives in the first stages of creating a regional innovation system are:

- Creation of clusters in the field of tourism, connection of important players and readiness of established partnerships to respond flexibly to the possibility of establishing a Regional Tourism Organization and a Regional Tourism Organization;
- ICT cluster formation – Z@ict cluster;
- Implementation of the monitoring of the fulfilment of adopted measures through the functioning of the Support Working Group for Knowledge Economy within the process of monitoring and evaluation of the Program of Economic and Social Development of the Zilina Self-Governing Region in relevant periods;
- Continuation of the implementation of established pilot activities in the form of elaboration of the Regional Research and Innovation Strategy of the Zilina Region 2014+;
- Creation of a stable “core” of partner entities involved in the implementation of the activities in question.

It is possible to mention some negatives, for example:

- Too wide range of proposed measures in the above mentioned strategic documents and uncoordinated implementation of measures to support the establishment and functioning of the regional innovation system;
- Absence of an action plan (short-term action plan) in the first periods of the creation of a regional innovation system as a tool for planning and coordinating research and innovation development activities in the Zilina region;
- Insufficient information among individual “stakeholders / actors” in the regional innovation ecosystem about their projects and their results and still insufficient marketing communication in the area of innovation activities and projects implemented in the Zilina region;
- Unsuccessful efforts to create a Regional Innovation Centre in the conditions of the Zilina region.

It is clear from the brief definition of strengths and weaknesses of the regional innovation system in the Zilina region that innovation arises only from the interaction between the stakeholders. This requires cognitive distance (distance between actors of a regional innovation system) that supports conscious and unconscious cognitive processes between these actors (Lorenzen, Foss, 2003). This cognitive distance is large enough in the Zilina region to engender new connections and new relationships between actors of the innovative ecosystem. But it is not sufficient to ensure mutual understanding between ecosystem participants. In the transfer of knowledge and technology, the problem in the Zilina region lies not only in expressing tacit knowledge, but also in absorbing new knowledge. Innovation is more than research and development. It includes design, marketing, trial production and services (Ciba, Rostasova, 2014, Corejova, Al Kassiri, 2015).

However, it is also possible to define opportunities and threats associated with these processes in the innovative ecosystem in the Zilina region, such as:

- Opportunity to provide ways of professionally assessing the functioning of ecosystems from outside the environment by reputable experts in the field – ecosystem participants must have measures to better control and allocate their resources related to the processes in question;
- The threat of a lack of sufficient knowledge and misunderstanding in the role of actors in the ecosystem – as in other regions, the ecosystem in the Zilina region has different participants with different goals, expectations and attitudes. Therefore, research into this topic and a deeper understanding of stakeholders' implications in implementing innovative ecosystems are needed;
- Opportunity related to the capacity of different research methods (from the environment of international and national professional institutions – to observe whether and how the innovative ecosystem in the Zilina region changes over time, matures and faces new challenges, while the use of multiple research methods can help create more understanding between the subjects of this ecosystem and the forms and ways of fulfilling its tasks;
- A non-professional comparison of the Zilina region ecosystem with ecosystems in other regions and countries can be considered a threat, as the differences between other regions and countries must be taken into account. For example within countries, ecosystems are different because each ecosystem is influenced by the culture, individual political and social systems and institutions of the region and country.

The above-mentioned innovation strategies (or policy and strategy) for the Zilina region in the regional context constitute a set of common rules and standards that strengthen the region's innovative capacity through joint learning in

the region. The existence of such common rules facilitates interaction and mutual understanding in the knowledge sharing process (Hudec, 2007). The region in question has the potential to be considered as one of the best geographical territories for a knowledge-based innovation economy, due to the presence of important specific and regional resources capable of maintaining innovation capacity and competitiveness. In addition, proximity, personal contact and intensity of contacts between actors are essential prerequisites for the exchange of tacit knowledge, which play a key role in innovation processes (Trippel, Sinozic and Smith, 2014).

### 3. Objective of the paper and hypotheses

The entrepreneurial character of the university forms the basis for cooperation with other actors of the regional innovation system. Acceptance of the business mission by the university, resp. academics must be reflected in their behaviour (Graham, 2014; Gunasekara, CH. 2006). The aim of the paper is to examine the degree of cooperation, factors and barriers affecting the cooperation of academics of the University of Zilina (UNIZA) with the business sector. It will also determine whether and to what extent UNIZA academics have accepted the University's business mission.

In the framework of the primary research carried out, based on the performed preliminary analysis, which we processed from available secondary sources, we did not obtain relevant information that would enable us to solve the identified research problem. Our identified research problem, which emerged from the analysis of the current situation, is the absence of a comprehensive identification of aspects of UNIZA academics' cooperation with the business sector. In relation to the research problem we identified four research objectives, on the basis of which we set hypotheses. The research objectives and related hypotheses are set out in *Table 1*.

The primary quantitative research plan, which was aimed at identifying aspects of UNIZA academics' collaboration with the business sector, included a Google Docs electronic questionnaire. The questionnaire contained 16 questions, of which 1 were filtering, 7 were identification and 8 merit questions.

When calculating the sample of respondents, we did not consider it necessary to stratify the sample size in relation to individual faculties and institutes that are at the university. In the stratification of the sample size, we considered the job position of respondents to be an important aspect. When performing the primary research, the required 95% confidence interval was chosen, which corresponds to a table value of 1.96. When calculating the sample, we took into account a maximum error margin of  $\pm 5\%$  and the default value of the character fraction, i.e.

0.5. 212 respondents participated in the quantitative research. The stratification of the respondents is given in *Table 2* (Furova, 2019).

**Table 1. Research objectives and hypotheses**

Research objectives (RO)	Hypotheses (H)
RO1: To find out the degree of cooperation in individual activities of academics with companies	H1: More than 50% of respondents who have worked in the past or are currently working with the business sector stated that they work with the business sector “in R&D” at an “advanced” to “high” level
	H2: More than 40% of respondents who reported having worked in the past or working with the business sector initiate cooperation with businesses, as compared to other stakeholders “usually” or “always”
RO2: Analyse academic partners	H3: More than 50% of respondents currently working with one or two practitioners work together with medium-sized enterprises
	H4: More than 50% of respondents of those who currently cooperate with the business sector cooperate most with enterprises based in the Zilina Region
RO3: Identify the drivers of academic cooperation with businesses	H5: “Existence of mutual trust” is a factor facilitating cooperation with the business sector at an “advanced” to “high” level for more than 60% of respondents from those who have worked in the past or who are currently working with the business sector
	H6: “Opportunity to use in-house research in practice” and “Possibility to improve teaching” through the experience of working with businesses are, at “advanced” to “high” levels, the most motivating factors for more than 50% of respondents who have worked in the past or who are currently working with the business sector business sector
RO4: Identify barriers affecting the scope of academic cooperation with businesses	H7: More than 40% of respondents consider the “lack of state funding for cooperation” to be a barrier to academic cooperation with companies at a “high” level

Source: Furova, 2019.

**Table 2. Stratification of respondents**

Academic structure of UNIZA in 2017	Academic staff	%	Sample
University teachers	593	59	125
Of which: Professors	94	9	19
Associate professors	157	16	34
Assistant professors	341	34	72
Researchers	154	16	34
PhD students	253	25	52
Together	1000	100	211

Source: Furova, 2019.

#### **4. Results of a research process aimed at collaborating UNIZA academics with the business sector**

In a primary survey, we found that out of 212 respondents, 126 respondents have worked in the past or are currently working with the business sector, e.g. 59.4% of respondents. The evaluation of research objectives applies to these 59.4% of respondents involved in cooperation with the business sector.

On hypothesis 1: 54% of respondents who have worked in the past or currently cooperate with the business sector “cooperate in research and development” at an “advanced” to “high” level. At the same time, this type of cooperation aspect is the most developed among respondents. With a 95% confidence, at least 56.7% of UNIZA academics who have worked in the past or are currently working with the business sector are collaborating with “R&D research and development companies” at an “advanced” to “high” level. However, at a significance level of 5%, it cannot be argued that more than 50% of those who have worked in the past or are currently working with the business sector stated that they are working with the business sector ‘R&D’ on an “advanced” to “high” level.

On hypothesis 2 concerning initiating cooperation with businesses: 51% of UNIZA academic respondents who have cooperated in the past or currently cooperate with the business sector are considered to be “usually” or “always” initiating cooperation with the business sector. At a significance level of 5%, it can be argued that more than 40% of academics who reported having worked in the past or currently working with the business sector initiate cooperation with businesses, as compared to other stakeholders, “usually” or “always”. With a confidence of 95%, we can state that at least 43.5% of UNIZA academics who have collaborated in the past or currently cooperate with the business sector initiate collaboration with businesses as compared to other stakeholders, “usually” or “always”.

Hypothesis 3 concerned the question of the number and size of university partners from the business environment. 50% of respondents from those who have worked in the past or are currently working reported that they currently have one or two business partners. At a significance level of 5%, it can be argued that more than 50% of respondents from those who currently work with one or two partners from practice also cooperate with medium-sized enterprises. With a confidence of 95%, we can state that at least 51.8% of UNIZA academics currently work with one or two partners in practice, cooperating with medium-sized enterprises.

Hypothesis 4 focused on the regional aspect of university cooperation. At the significance level of 5%, it can be argued that more than 50% of respondents from those who currently cooperate with the business sector cooperate most with enterprises based in the Zilina region. With a confidence of 95%, it can be argued

that at least 59.9% of UNIZA academics currently working with the business sector cooperate most with companies based in the Zilina region.

The issues of impulses, drivers of cooperation between the university and business entities in hypothesis 5 led to the following finding. At a significance level of 5%, it can be argued that more than 60% of respondents from those who have worked in the past or currently cooperate with the business sector perceive “existence of mutual trust” as a factor facilitating cooperation with the business sector at an “advanced” to “high” level. With a confidence level of 95%, it can be argued that at least 69.1% of UNIZA academics who have worked in the past or are currently working with the business sector perceive “existence of mutual trust” as a factor facilitating cooperation with the business sector from an “advanced” to “high” degree.

In examining hypothesis 6 on the degree of motivation for academics to cooperate with the business sector, 76% of respondents who have worked in the past or are currently working with the business sector perceive as an important factor the “an opportunity to use their own research in practice”. This factor motivates them to cooperate at an “advanced” or “high” level. 71% of respondents who have worked in the past or are currently working with the business sector perceive “the opportunity to improve teaching through the experience of working with businesses” as a factor that motivates them to work at an “advanced” or “high” level. At the same time, this factor is on average considered to be the most motivating. Overall, at a significance level of 5%, it can be argued that for more than 50% of respondents from those who have worked in the past or are currently working with the business sector, the most motivating factors in “advanced” to “high” categories are “opportunity to use their own research” in practice and “opportunity to improve teaching through the experience of working with businesses”. With a 95% confidence, it can be stated that at least 51.5% of UNIZA academics who have worked in the past or are currently working with the business sector consider “an opportunity to use their own research in practice” and “an opportunity to improve teaching through collaborative experience” as factors that motivate them to cooperate at an “advanced” to “high” level.

Hypothesis 7 was devoted to barriers to cooperation and their significance. Barrier “lack of state funding to co-operate” is on average perceived as the most significant barrier among respondents from those who have worked in the past or are currently working with the business sector. At a significance level of 5%, it cannot be argued that more than 40% of respondents from those who have worked in the past or currently cooperate with the business sector, consider the “lack of state funding to co-operate” as a barrier to academics’ cooperation at a “high” rate. With a confidence of 95%, it can be argued that at least 30.2% of UNIZA academics who have worked in the past or currently cooperate with the business



sector consider “lack of state funding to co-operate” as a barrier preventing academics from cooperating of “high” significance (Furova, 2019).

## 5. Discussion and conclusion

Based on the results of primary quantitative research, the university has to intensively communicate its activities, improve marketing communication and stimulate the development and exploitation of innovative ideas of students and academics in practice through a program for mobilizing innovation through a regional research and innovation strategy. Similarly, its components, such as the University Science Park and the Research Centre, have to communicate the intellectual property items developed at UNIZA and present them to relevant businesses that could effectively and beneficially use them to create other innovative solutions.

Based on the findings of the research, academics are the stakeholders that initiate cooperation with the business sector most often. The reasons for this phenomenon stem from UNIZA’s academics’ attitude towards accepting the University’s business mission. Enterprises and graduates initiate cooperation most often after academics. However, a greater involvement of students in the issue of initiating cooperation with the business sector is needed. Entrepreneurship and innovation courses or courses included in the curriculum of selected study programs may also contribute to this. At the same time, academics themselves need to be systematically trained in innovation and entrepreneurship, who, through their acquired knowledge, can further contribute to the development and initiation of cooperation with businesses.

Academic entrepreneurship is the absent aspect of cooperation with the business sector for 68% of those who have worked in the past or are currently working with the business sector. 66% of respondents who have worked in the past or are currently working with the business sector reported cooperation in the student entrepreneurship aspect as an absent or low-developed aspect of cooperation. 56% of respondents who have worked in the past or are currently working with the business sector reported a lack of cooperation in “commercializing R&D results”.

The fact that 59% of respondents working with the business sector currently have a partner based in Zilina seems to be positive. The cognitive distance of actors is one of the facilitating factors for cooperation with the business sector and also one of the primary elements for the emergence of innovation in regional innovation systems. In view of this, it is advisable to address other companies in Zilina with a suitable communication tool and to stimulate them to cooperate with the university, resp. with UNIZA academics to encourage innovation.

In relation to the results of primary research linked to the factors affecting academics' collaboration with the business sector, "the opportunity to improve teaching through the experience of working with businesses" is the most motivating factor. It is recommended that monitoring and assessment of the quality of education achieved through cooperation between academics and business practice be added to the annual academic evaluation. The perceived quality of education can be monitored by assessing entrepreneurship education activities or knowledge acquired by students and the relevance of their use in their further studies, their own business or employment.

The perception of the significance of the barriers to academic cooperation with the business sector has shown that the financial barriers and bureaucracy associated with academic cooperation with the business sector are perceived as the most significant barriers to cooperation by respondents who have worked in the past or are currently working with the business sector. In addition, barriers associated with the "lack of working time defined by the University for academic cooperation with the business sector" are not negligible (57% of those who have worked in the past or are currently working with the business sector perceive this barrier as "advanced" to "high" level and in the case of "lack of awareness among businesses about university research activities", 60% of those who have worked in the past or are currently working with the business sector perceive this barrier as being of "advanced" to "high significance". Solutions to this issue are related to individual UNIZA workplaces, which should provide sufficient time within the working hours of academics working with the business sector to enable them to develop the UNIZA business mission. Another recommendation is to increase the effectiveness of marketing communication through various marketing communication tools in connection with the intensification of companies' awareness of research activities of academics, resp. research teams. A suitable solution seems to be the communication of the information in question on the web pages of the departments, where the information is given for each academic on the university science park as well as the research centre of UNIZA websites. Subsequently, it is possible to communicate this information via social networks (e.g. on the fun pages on Facebook).

In a period of globalization and digital transformation, society is dependent on scientific, technological and social innovations that address the current and future challenges of society. In the region, the university is offered opportunities to actively participate in an innovation system in which it should or could hold a prominent position. The actors of the regional innovation system can benefit from the various activities that the university carries out and provides in the region. Universities and their partners in regional innovation systems are creating new forms of cooperation to address societal challenges and shape their own changing tasks in the process. The regional proximity and common objectives of the actors

of the regional innovation ecosystem ensure that the university proactively promotes innovation creation and integrates innovation in their activities. In order to foster the emergence of regional innovations, the mission of universities includes, in addition to education and scientific research, a business mission that is integrated into university research, curriculum development, education processes and the systematic search for synergies between these tasks.

### Acknowledgment

This contribution was undertaken as a part of the research projects 1/0152/18 VEGA Business and business models and platforms in the digital environment, 1/0087/18 VEGA Enhancing competitiveness of the Zilina region by increasing the influence of the University of Zilina in the region and in Zilina town and IS 2/KS/2019 Measurement of Triple Helix effect in condition the Zilina region. Also the contribution links to projects APVV-14-0512 and APVV-0101-10.

### References

- BUCEK, M. et al. 2006. *Regionálny rozvoj – novšie teoretické koncepcie*. Bratislava: Ekonóm.
- CIBA, J., ROSTASOVA, M. 2014. Creative cities in the context of European post-socialist change. In: Int.Conf. BESKYDY. *Proceedings*. Zilina.
- COREJOVA, T., AL KASSIRI, M. 2015. The Power of Knowledge-Intensive Services. In: 4th International Conference on Social Sciences and Society (ICSSS 2015), Pt 1 Location: Paris, FRANCE Date: MAY 20–21, 2015. Book Series: *Advances in Education Research*. Volume: 70 P. 354–357.
- DADO, M. et al. 2006. Rámcová stratégia Zilinského regiónu pre oblasť inovačného rozvoja, (Framework Strategy of the Zilina Region for Innovation Development). Zilinska univerzita v Ziline, EDIS, Zilina.
- DOLOREUX, D., PARTO, S. 2005. Regional innovation systems: Current discourse and unresolved issues. In: *Technology in society*. Vol. 27, No. 2, pp. 133–153. In: RUAN, X., SAAD, M., KUMAR, V. (2014) The transformational role of University in regional innovation system: The case of Zhengzhou University in China. In: Innovation Systems and the New Role of Universities (COSINUS), Bordj-Bou-Arreidj, Algeria, 23–25 September 2014. Available on : <<https://bit.ly/2L2tP3Q>>.
- ETZKOWITZ, H. 2008. The Triple Helix: University-Industry-Government innovation in action. 2008. New York. ISBN 0-203-92960-8. p. 177.
- ETZKOWITZ, H., LEYDESDORFF, L. 2000. The dynamics of innovation : from National Systems and “Mode 2” to a Triple Helix of university – industry – government relations. 2000. In: *Science and Technology*. pp. 109–123.
- ETZKOWITZ, H. 2003. Innovation in innovation: The triple helix of university-industry-government relations. *Social science information*. Vol. 42, No. 3, pp. 293–337. Available on <<http://eprints.uwe.ac.uk/23973>>.
- FARINHA, L., FERREIRA, J. J. 2012. Triangulation of the Triple Helix: A conceptual framework. 2012. *Triple Helix 10th International Conference 2012*. Available on <<https://bit.ly/2GGIkP>>.

- FUROVA, L. 2019. Úloha univerzít v regionálnych inovačných systémoch (Role of universities in regional innovation systems). Dissertation. Žilinská univerzita v Žiline, FPEDAS, UNIZA, 2019.
- GRAHAM, R. 2014. Extended Executive Summary. Creating university-based entrepreneurial ecosystems evidence from emerging world leaders. 2014. Massachusetts Institute of Technology. p. 154. Available on <<https://bit.ly/1wXe7sA>>.
- GUNASEKARA, CH. 2006. Reframing the Role of Universities in the Development of Regional Innovation Systems. In: *The Journal of technology transfer*. Január 2006. Vol. 31. ISSN 1573-7047.
- HUDEEC, O. 2007. *Regionálne inovačné systémy: strategické plánovanie a prognózovanie*. Košice: Ekonomická fakulta Technickej univerzity v Košiciach. p. 204. ISBN: 978-80-8073-964-5.
- ISAKSEN, A. 2001. Building Regional Innovation Systems: Is Endogenous Industrial Development Possible in the Global Economy? In: *Canadian Journal of Regional Science*, 2001. Canada. p. 101-120. ISSN: 0705-4580. Available on: <<https://bit.ly/2GwMPlv>>.
- KOSCHATZKY, K. 2003. Entrepreneurship stimulation in regional innovation systems – public promotion of university-based start-ups in Germany. In: FORNAHL, D., BRENNER, T. *Cooperation, networks, and institutions in regional innovation systems*. Northampton, MA: E. Elgar, 2003. p. 362. ISBN 1-84064-983-6.
- LORENZEN, M., FOSS, N. J. 2003. Cognitive coordination, institutions and clusters: An exploratory discussion. In: FORNAHL, D., BRENNER, T. *Cooperation, networks, and institutions in regional innovation systems*. Northampton, MA: E. Elgar, 2003. p. 362. ISBN 1-84064-983-6.
- MADUDOVA, E., MAJERCAKOVA, M. 2017. The influence of university-firm cooperation on firm value chain. In: *16th International conference on Information technolog-based higher education and training*. 1. vyd. – Danvers: Institute of Electrical and Electronics Engineers, 2017. ISBN 978-1-5386-3968-9. - p. [1-6]
- REHAK, S., SIPIKAL M. 2012. 52nd Congress European Regional Science Association in Bratislava – The look back and forward. In: *Journal for economic theory, economic policy, social and economic forecasting*, vol. 60, 2012, No. 8, pp. 871–873. ISSN 0013-3035.
- ROSTASOVA, M., COREJOVA, T., ROVNANOVA, A. 2018. Diagnosing of environment for creation of regional and local digital ecosystem in the conditions of the Slovak republic. p. 189–199. In: 9th International Scientific Conference “Company Diagnostics, Controlling and Logistics“. *Proceedings*. University of Zilina. April 12th–13th 2018. 302 p. ISBN 978-80-554-1464-5.
- RVIS 2015. Regionálna výskumná a inovačná stratégia Žilinského kraja 2014+ (Regional research and innovation strategy of Zilina region 2014+), VTP Zilina, Febr. 2015
- STRATFORD UNIVERSITY. *The triple helix concept*. Available on: [https://hstar.stanford.edu/3helix\\_concept](https://hstar.stanford.edu/3helix_concept).
- UNGER, M., POLT, W. 2017. The Knowledge Triangle between Research, Education and Innovation – A Conceptual Discussion. 2017. In: *Foresight and STI Governance*. Vol. 11. No. 2. pp 10-26. E-ISSN 2312-9972. [17-03-2019]. Available on: <<https://bit.ly/2VIUZGT>>.
- TRIPPL, M., SINOZIC, T., SMITH, H. L. 2014. *The role of universities in regional development: conceptual models and policy institutions in the UK, Sweden and Austria*. Sweden: Lund University, 2014. [17-04-2019]. Available on <<https://bit.ly/2PyKcUj>>.

# Possibilities of Using Process Approach to Design Model for Evaluating and Monitoring the Fulfilment of Selected University Tasks in a Regional Innovation System

MÁRIA ROSTÁŠOVA<sup>1</sup>, TATIANA ČOREJOVÁ<sup>2</sup>,  
LUCIA FÚROVÁ<sup>3</sup>

**Abstract:** The aim of the paper is to describe the processes related to the fulfilment of selected university tasks in the regional innovation system. These tasks are decomposed into education, research and development and knowledge and technology transfer. After defining theoretical approaches to solving this issue in the introductory part of the paper, the results section (through the use of the process approach) identifies the processes in question through inputs into processes, outputs from processes and activities carried out within individual processes. Among the results of the solution, it is also possible to include examples of design indicators for measuring the performance of individual processes, or indicators of the degree of perception of factors, that affect certain processes. For their practical application, some indicator cards are presented in the paper. These cards are created not only with the purpose of defining the indicator, but also for the formulation of inputs, the specific way of measuring the indicator, the way the indicator is interpreted, including its orientation. An important part of the indicator card is the source of the data being evaluated. The discussion is mainly focused on the effectiveness of the monitoring of the proposed indicators, their practical applicability, for example in the strategic planning of the university, in order not to increase the administrative burden of monitoring processes beyond tolerable levels.

**Key words:** regional innovation system, monitoring of university performance, performance indicators, perception indicators

**JEL Classification:** R12, R58, O38

## 1. Introduction

A number of important experts in the regional innovation system have defined the basic tasks and activities of the university in the regional innovation system. Rehak and Sipikal (2012) identified two effects of the university on the region, which can be divided into follow-up and return relationships. Forward relationships represent changes in the level of human capital, changes in the

---

<sup>1</sup> MÁRIA ROSTÁŠOVA, University of Zilina, Slovakia, maria.rostasova@fpedas.uniza.sk

<sup>2</sup> TATIANA ČOREJOVÁ, University of Zilina, Slovakia, tatiana.corejova@uniza.sk

<sup>3</sup> LUCIA FÚROVÁ, University of Zilina, Slovakia, lucia.furova@fpedas.uniza.sk

knowledge base and changes in the attractiveness of the site for businesses and individuals. Backward relationships are those related to the expenditure of employees, university and university students as institutions for households, local government and businesses in the form of changes in their incomes and changes in employment (Bucek et al., 2006; OECD, 2010; Rehak, Sipikal, 2012).

Jeck (2010) states that the university's role in the transfer of new technologies and knowledge is as important as the original tasks of education and research. The transfer and diffusion of new scientific technologies and knowledge, which are a factor in economic development, have become an integral part of the activities of universities in developed countries.

Gunasekara (2006) created a specific conceptual framework in which he presented the tasks of the university that it performs in a regional innovation system. He identified two types of tasks – generative and development. They concern the process of delivering targeted performance in specific regional environments. According to Gunasekara (2006), the change in the tasks of the university in the field of regional innovation may be measurable in terms of the following aspects:

- University's focus on regional engagement is defined as the nature of senior management's commitment to regional engagement and the mechanisms by which this process is implemented;
- History of relations between universities and regions is determined by the nature of the historical ties between the university and regional actors;
- Complementarity of areas is determined as a degree of reconciling university research strength and regional knowledge needs;
- The existence of advocates; the presence and influence of university and regional advocates greatly affects relations between universities and regions;
- The nature of the regional industrial platform, i. e. the types of industries and businesses in the region determine the demand for university knowledge;
- Impact of political and economic conditions – represent the impact of specific government policies and practices on the region and university (Gunasekara, 2006).

There are a number of institutional and economic factors that shape the role of universities in developing a regional innovation system. These factors vary from region to region (Ruan, Saad and Kumar, 2014).

Universities also play an important role in the state development process itself and in addressing various societal challenges, whether in terms of population health, sustainability or economic growth. The national innovation system encompasses all economic, political and other social institutions influencing innovation

(national banking system, private sector, education system, labour market, culture, state and institutional regulatory policy, etc.) and universities play a fundamental role in it. The higher education sector produces a skilled workforce and is actively involved in innovative activities – from creating new resources and services to interacting with businesses and communities, as well as activities to attract investment. The active symbiosis of innovation capacity and the higher education sector is important for the country's productivity growth as well as the relevance of higher education (Corejova, Al Kassiri, 2015). The national innovation system is not an isolated entity; it is part of a global network of national innovation systems. University partnerships cross regional and national borders. Funds earmarked for research and development at the University may also be made up of funds from abroad, student and labour mobility between countries, or university and business access to new markets. The university provides a strong stabilization framework for the nation within the global innovation ecosystem (Adkinson, 2014).

The concept of a business university is created on the basis of the institutional business skills of the university, which create synergies, and these are a prerequisite for fulfilling the third task of the university. Foss and Gibson (2017) identify two main types of business university activities:

- Entrepreneurship education, which is understood to support the entrepreneurial potential of students and graduates and forms part of the university's academic programs (e.g. offering specific courses, laboratories and platforms for collaborating with the business environment and implementing cross-sectoral exchange programs);
- Business activities, including the creation of spin-offs and start-ups; creating intellectual property and engaging in contract research. Academic business involves the development of support structures for commercialization, such as technology transfer offices or industry collaboration offices.

The business university concept is the basis for cooperation between the state, business and academic sectors, the most important of which is the university. The university is therefore transforming university management and organizational structures and mechanisms. This leads universities to become strategic actors in the innovation system. The institutional transformation encompasses three main pillars. The regulatory pillar is the creation of a legal framework, management mechanisms and a monitoring system. The normative pillar involves the implementation of university functions in accordance with their expectations, dominated by social values, the environment in which the university is located and social principles. The cultural-cognitive pillar is the acceptance of the university's business role by academics, which is reflected in their behaviour (Foss, Gibson, 2015).

The university is also active in the regional innovation system, along with other actors involved in creating an innovative ecosystem. It cooperates with companies in the field of education, research and technology transfer, and also with the city or region in which it is located and with the external environment. Innovative activities at the university are initiated by students, staff and other parts of the university (Tripl, Sinozic and Smith, 2017; Corejova, 2018).

In strengthening the role of the university in the region, it should be borne in mind that the lack of business sector information on academic research can have an impact on the region's innovation process. It is important that the university is surrounded by an appropriate infrastructure in the form of companies that create a demand for research. Consequently, such research constitutes a public benefit. At the same time, the university must respond to industry demands and make use of commercial experience (Graham, 2014).

In relation to the assessment of the fulfilment of the university's tasks in the regional innovation system, the question is to measure the university's performance in connection with the fulfilment of its objectives and mission (Isaksen, 2001; Hudec, 2007). Based on a suitably chosen approach or method for measuring university performance, the university chooses the relevant key performance indicators. One example of developing approaches to measuring the performance of universities is the work of Lynch and Cross (1991) and their pyramid model of performance measurement. This model was adapted by Wang (2010) to measure the performance of higher education institutions. Wang's (2010) pyramid of university performance measurement can serve universities as a basis for identifying relevant performance indicators (Lynch, Cross, 1991; Wang, 2010).

## 2. Theoretical background

In general, measuring university performance is a rather difficult process. Abroad, the approaches and methods in question have been elaborated quite accurately. There are four approaches, or methods relevant to monitoring overall performance in higher education institutions. These include the *Balanced Scorecard method*, the *EFQM model*, and the *method of aggregates and data dashboards*. However, these approaches and methods suitable for evaluating and monitoring the fulfilment of universities' tasks do not provide universities with a standard solution suitable for measuring their performance. They only provide universities with a framework for designing key performance indicators, where universities can reflect on their own set of relevant performance indicators and, where appropriate, the relationships between them (Koschatzky, 2003; Madudova, Majercakova, 2017).



Wang (2010) states that university performance can be measured in managerial terms according to the extent to which each of the university functions is performed in accordance with its objectives. The university's overall performance is a combined set of existing primary dimensions derived from its academic and management functions. Both functions are interconnected. These two main dimensions can be further subdivided into sub-dimensions (Wang, 2010). The primary principle of the functioning of the pyramid model for measuring the performance of an organization is based on progressive measures aimed at meeting the goals of the organization. The pyramid consists of several layers. The corporate vision is placed on top of the pyramid along with two important market and financial dimensions. Below the market and financial dimensions are placed dimensions of productivity achieved by the organization, flexibility of the organization, customer satisfaction, and environmental aspects and so on.

The activities of the university at different levels have different orientations, which can be monitored using performance indicators in the identified dimensions. The dimensions support each other, linking organizational goals and strategies to current activities. The pyramid is the result of the systemic integration of dimensions and performance indicators into the overall framework of university performance measurement. The university vision as a whole is at the top of the pyramid, with two main performance dimensions (academic and managerial) that are closely linked to university goals. The two main dimensions are divided into four sub-dimensions (research, education, finance, human resources). These dimensions deliver a more strategic and balanced performance measurement of the university's top management with key performance indicators. At the middle and lower levels of the pyramid, additional indicators in the four sub-dimensions create an operational view of university performance measurement. Information from indicators within each sub-dimension is an important source for the university's top management to develop a model for measuring the academic and management performance of the university, based on a summary and review. Key performance indicators defined in relation to the key dimensions and sub-dimensions are sets of measures that are relevant to the present and future success of the university. Based on these, universities can build competitive advantages over competitors in the relevant market. The performance indicators of the university's top management provide:

- information that may be relevant to strategic decision making;
- set of competitive advantages leading to results that may be comparable to results at other universities (Wang, 2010; Durst, Poutanen, 2013).

The framework principles and procedures mentioned above can also be used to establish university performance indicators in a regional innovation system (Furova, 2019).

### **3. Objective of the paper**

The aim of this paper is to present the following examples of University of Zilina (further UNIZA):

- Proposal of a generally applicable procedure for evaluation and monitoring of the fulfilment of the tasks of universities in the regional innovation system;
- Design of performance indicators and perception indicators suitable for evaluation and monitoring of the fulfilment of tasks of Slovak universities in regional innovation systems.

UNIZA is an important regional player in the Triple Helix model, connecting major stakeholders of the regional innovation system with industry in the region and regional governments. It belongs to the academic sphere, where other research institutes and institutions cooperate with it in the region. As already mentioned, the university operates by performing three main tasks: it educates and generates knowledge capital for the region in accordance with the region's requirements; carries out research and development activities, with a view to ensuring that the results of its research and development activities are applied as widely as possible; implements innovations in its education and research. At present, it is possible to record at UNIZA the absence of measurement of its performance in a regional innovation system, which should assess the inputs, outputs and level of activities of the university processes in quantitative and qualitative terms. It should be based on performance measures to improve the achievement of the university's objectives and tasks, to improve processes and to foster innovation (Rostasova, Corejova and Rovnanova, 2018).

### **4. Material and methodology**

In the processing of this paper were used mainly analytical methods (for examining the theoretical background), methods of abstraction (in narrowing the scope of the theoretical problem from a large number of authors' opinions on the issue) and synthesis (for evaluating the role of of the university in the regional innovation system).

### **5. Results**

In relation to the dimensions of the university's tasks in the regional innovation system, performance indicators and perception indicators have been proposed, which are suitable for evaluating and monitoring the fulfilment of the tasks of universities in the regional innovation system in selected university-business

interconnection (Etzkowitz, 2008; Unger and Polt, 2017; EU 2016). The proposed indicators represent a set of key indicators that reflect the importance of linking university and business in the regional innovation system. The indicators are proposed in relation to selected processes related to the dimensions of the university's tasks resulting from the cooperation of the Triple Helix model actors in the fields of education, research and development, as well as knowledge and technology transfer (Farinha, Ferreira, 2012; Etzkowitz, 2003).

For a deeper analysis of the researched issue, it would be appropriate (in further research activities) to examine the dimension of the university's tasks arising from the cooperation of the university with the regional, resp. local government. It would be an analysis and evaluation of processes related to the creation of regional innovation strategy, processes of monitoring fulfilment of regional strategy tasks, processes connected with updating of the most important strategic documents for the functioning of the regional innovation ecosystem, etc. An analysis of these processes could lead to the identification of other perception and performance indicators that would be appropriate to monitor the fulfilment of the tasks of universities in the regional innovation system (Gasperova and Rostasova, 2018; EU, 2016, OECD, 2010).

As already mentioned, the design of the model for evaluating and monitoring the fulfilment of the university's tasks in the regional innovation system is based on a process approach where relevant processes were identified for individual task dimensions corresponding to the university tasks resulting from participation in cooperation with regional innovation system actors. Process inputs, process outputs and process activities were specified for the identified processes. Based on this approach, it is then possible to design appropriate performance indicators (calculated) and perception indicators (based on a survey of relevant respondent segments) (Furova, 2019).

#### *Dimension processes I. Education*

In the field of education, five processes (hereinafter referred to as P\_1V to P\_5V) have been identified that are linked to the education process and through which the university participates in the regional innovation system:

- The process of ensuring systematic education of academics in the field of innovation and entrepreneurship (P\_1V) monitored by the indicators:
  - Number of training courses aimed at developing entrepreneurial and innovative skills of academics
  - The share of expenditure on entrepreneurial education of academics in the total expenditure of the Faculty
- The process of ensuring the education of students in the field of innovation and entrepreneurship (P\_2V) monitored by the indicators:

- I-1 The number of courses on innovation included in the educational process at the university
- I-2 Students' interest in completing innovative courses
- The process of assessing the success of student learning and involving students in innovation and entrepreneurship activities (P\_3V) monitored by the indicator:
  - I-3 Perception of usability of students' acquired knowledge of innovative subjects needed for effective use in practice
- The process of ensuring business sector education in innovation and entrepreneurship (P\_4V) monitored by the indicators:
  - I-4 Number of training courses aimed at developing entrepreneurship and innovation skills for enterprises
  - I-5 Satisfaction of company employees with the training course provided by the university and using the knowledge gained in employment
- The process of involving the business sector in the education of students in the field of innovation and entrepreneurship (P\_5V) monitored by the indicators:
  - I-6 Number of lectures on entrepreneurship and innovation organized
  - I-7 The share of final theses solved in cooperation with companies from the total number of theses completed at the faculty

In a further solution, each process has been analysed and decomposed into the inputs, activities, and outputs that create this process.

Example of decomposition selected process – the process of ensuring the education of students in the field of innovation and entrepreneurship (P\_2V):

The purpose of this process is to ensure that entrepreneurial and innovative knowledge and skills are communicated to students through entrepreneurship and innovation education activities with a view to their application in the labour market. The aim of the process is to contribute to the development of entrepreneurial and inventive thinking of students, which they can subsequently use in their further studies, employment or their own business. The inputs, activities and outputs of the process are contained in *Table 1*.

Examples of proposed indicators characteristic for monitoring process P\_2V are identified in *Table 2*.

### *Dimension processes II. Research and Development*

The second dimension of the university's role in promoting regional innovation is to co-create relevant knowledge and skills that are the output of science and research. To achieve the excellence of the university in research and development, this knowledge must correspond to the fields of interest of the university's science and research as well as those of the actors of the regional innovation system. The success of the university as a source of relevant knowledge for the creation of

**Table 1. The process of providing education for students in the field of innovation and entrepreneurship P\_2V**

P_2V The process of providing education for students in the field of innovation and entrepreneurship		
Inputs	Activities	Outputs
<ul style="list-style-type: none"> <li>– requirements for students as future graduates by their future employers</li> <li>– the requirements of the accreditation agency for the content and scope of the student's knowledge acquired in the education process</li> </ul>	<ul style="list-style-type: none"> <li>– Formulation of innovative and entrepreneurial subjects in the curricula of selected study programs</li> <li>– setting student assessment criteria</li> <li>– inclusion of entrepreneurial and innovative subjects or courses in the curricula of selected study programs</li> </ul>	<ul style="list-style-type: none"> <li>– A trained student in entrepreneurship and innovation for a future employer</li> <li>– study results for the P_3V process</li> <li>– Innovated educational activities and subject content in the field of innovation and entrepreneurship creation</li> </ul>

Source: Furova, 2019.

**Table 2. Process performance indicators P\_2V**

Process performance indicators P_2V	Data source
I_3 Number of courses on entrepreneurship and innovation included in the curriculum of the given study program	Faculty/ICT Centre at UNIZA
I_4 Students' interest in completing innovative courses	Faculty

Source: Furova, 2019.

innovation depends on the processes carried out in the field of research and development. Three processes (hereinafter referred to as P\_1VaV to P\_3VaV) have been identified in research and development that should be monitored using established performance and perception indicators:

- Process of support and realization of cooperation with practice in scientific research activities (P\_1VaV) monitored by the indicators:
  - I-8 Perception of academic motivation to cooperate with companies in science and research
  - I-9 Coefficient of increase in the number of cooperating academics with the business sector
  - I-10 The share of contractual research of the university in the total volume of contractual research of all universities
- The process of creating outputs from science and research (P\_2VaV) by the indicators:
  - I-11 Number of innovated study programs based on the use of science and research outputs

- I-12 Number of patents created in cooperation with practice
- The process of evaluating the fulfilment of tasks of scientific research activity (P\_3VaV) by the indicator:
  - I-13 Success rate of science and research

Example of process decomposition – Process of support and realization of cooperation with practice in scientific research activity (P\_1VaV):

The purpose of the process is to carry out academic cooperation with the business sector in joint scientific research activities that lead to the creation of new solutions and innovation. Cooperation with the business sector aims to improve the competitiveness and growth of regional sectors. The inputs, activities and outputs of the process are contained in *Table 3*.

Proposed indicators that seem to be suitable for monitoring and improving the P\_1VaV process are listed in *Table 4*.

**Table 3. Process of support and realization of cooperation with practice in scientific research activities P\_1VaV**

P_1VaV Process of support and realization of cooperation with practice in scientific research activities		
Inputs	Activities	Outputs
<ul style="list-style-type: none"> <li>– science and research fields in which the university participates</li> <li>– requirements coming from an external environment</li> </ul>	<ul style="list-style-type: none"> <li>– Creating the preconditions for successful cooperation with actors of the regional innovation system in science and research through institutional incentives</li> <li>– Ensuring funding for cooperation in scientific research</li> </ul>	<ul style="list-style-type: none"> <li>– University and business participation in joint science and research projects</li> <li>– excellence in the results of cooperation in science and research</li> <li>– contract research conducted for the business sector</li> <li>– formation of clusters</li> </ul>

*Source:* Furova, 2019.

**Table 4. Process performance indicators P\_1VaV**

Process performance indicators P_1VaV	Data source
I_10 Perception of academic motivation to cooperate with companies in science and research	Survey
I_11 Coefficient of increase in the number of cooperating academics with the business sector	Faculty
I_12 The share of contractual research in the university budget in the total volume of contractual research of all Slovak universities	Ministry of Education, Science, Research and Sport of the SR

*Source:* Furova, 2019

*Dimension processes III. Knowledge and technology transfer*

Within the knowledge and technology transfer, three processes (hereinafter referred to as P\_1TT to P\_3TT) have been identified that are associated with ensuring the transfer of knowledge and technology into practice, through which the university fulfils its further role in the regional innovation system. By completing the following processes, the university carries out business activities through which it supports the economic development of the region and increases its competitiveness. These processes are interconnected:

- The process of protection and commercialization of intellectual property (P\_1TT) monitored by the indicators:
  - I-14 The degree of patents and utility models created at the university and applied in practice
  - I-15 Financial feedback on applied intellectual property subjects at the university
- The process of supporting the start-up and spin-off of companies with innovative potential (P\_2TT) monitored by the indicators:
  - I-16 Number of spin-off firms
  - I-17 Survival rate of spin-off companies
- The process of supporting the creation of prototypes with innovative potential (P\_3TT) monitored by the indicators:
  - I-18 Academics' interest in harnessing the challenges of the university supporting the development of academic innovation potential
  - I-19 Number of process support tools

Example of process decomposition – Process of protection and commercialization of intellectual property (P\_1TT):

The purpose of this process is to protect intellectual property and to find their application in economic and social practice. Promoting the creation, protection and commercialization of intellectual property brings prestige to the university. The inputs, activities and outputs of the process are contained in *Table 5*.

Proposed indicators suitable for monitoring and improving the P\_1TT process are identified in *Table 6*.

19 indicators were proposed as a result of solving the system of evaluation of the fulfilment of the university's tasks in the regional innovation system. As already mentioned, for their practical application were processed so-called indicator cards. These cards are created not only to create the definition of the indicator, but also to formulate the inputs, the specific method of measuring (calculation) of the indicator, the periodicity of measurement, the way of interpreting the indicator, including its orientation. An important part of the indicator card is the source of the evaluated data. An example of the processing of the indicator card is in *Table 7*, where the Indicator Card I-21 is shown.

**Table 5. The process of protection and commercialization of intellectual property P\_1TT**

P_1TT The process of protection and commercialization of intellectual property		
Inputs	Activities	Outputs
<ul style="list-style-type: none"> <li>– External requirements</li> <li>– Outputs from scientific research activities</li> <li>– Specialized workplaces of the university ensuring the transfer of knowledge and technology into practice (Centre of Technology Transfer)</li> <li>– Directive on the management of intellectual property under UNIZA conditions</li> </ul>	<ul style="list-style-type: none"> <li>– Recommendation of the Rector's Evaluation Committee on the exercise of intellectual property rights in relation to their novelty and estimation of commercial potential</li> <li>– Filing a patent, preparing a patent application or utility model application, and the like for the registration and self-registration of an intellectual property object</li> <li>– Counselling for intellectual property originators</li> <li>– Providing feedback from the academic and business environment regarding the assessment of the applied intellectual property</li> </ul>	<ul style="list-style-type: none"> <li>– Intellectual property (patent, utility model, design, software, database, methodology, directive, test report)</li> <li>– Commercialization of intellectual property (license, transfer of rights, start-ups, spin-offs)</li> <li>– Remuneration for the originator of the intellectual property</li> </ul>

Source: Furova, 2019

**Table 6. Process performance indicators P\_1TT**

Process performance indicators P_1TT	Data source
I_14 Degree of applicability of patents and utility models created at the university	CTT
I_15 Financial feedback on applied intellectual property subjects at the university	University and workplace of intellectual property originators

Source: Furova, 2019

**Table 7. Indicator card I\_14**

Indicator card I_14	
Indicator title	The degree of applicability of patents and utility models created at the university in practice
Indicator definition	Performance indicator. The indicator shows the proportion of patents and utility models created at the university that have been commercialized into practice. The indicator is monitored by a specialized department at the university (CTT).



Inputs for indicator measuring	
$P_R$ $P_U$	Total number of registered patents and utility models for the reference period Number of patents and utility models applied in practice for the reference period
Measuring the indicator	
	Application rate of patents and utility models in practice $\frac{P_U}{P_R}$ * 100 [%]
Interpretation of the indicator	
	The calculated percentage represents the proportion of applied patents and utility models created at the university in practice in the total number of registered patents and utility models at the university.
Indicator orientation	
	The periodicity of regular reporting of the indicator is three years. Non-decreasing or the increasing trend of the indicator is considered favourable.
Additional indicators to the indicator	
Number of patents and utility models applied in practice $P_U$	The role of the indicator is to carry out an overview of the application of patents in practice every three years. The aim of the survey is to find out, by contacting the originator of the intellectual property, the reason for the origin of the object of intellectual property, where to find out where the object of intellectual property was applied and how to put the object of intellectual property into practice. It is necessary to choose a suitable method of recording and reporting of an additional indicator.
Data source: <i>CTT UNIZA</i>	

Source: Furova. 2019.

## 6. Discussion and conclusion

The first and most important question is the question of effectiveness or purpose of monitoring the proposed indicators and their practical applicability. The usability of indicators is not only for short-term operation and fulfilment of the Deming cycle (as a method of gradual improvement), but also in the strategic planning of the university, demonstrating the impact of the university on the region, etc. However, the objective of implementing these measurements must be, as a priority, not to increase the administrative burden of the monitoring processes. However, the number of proposed 19 indicators directly supports the issue linked to the administrative burden of this process. However, there are several possible solutions to this problem.

First of all, the proposed monitoring system must be discussed with all stakeholders concerned by the defined processes. It is assumed that the outcome of this reassessment may be the exclusion of certain indicators, or adding other – more appropriate indicators that will require their practical use.

However, in a technologically rich environment, which is undoubtedly created at the university, the implementation of a truly effective way of the monitoring can be significantly supported by the completion of the currently used database system with other necessary data on the basis of which indicators can be monitored at a higher frequency, but also in real time.

Another solution is not a “one-off”, but a gradual introduction of monitoring, starting with those indicators already contained in the university information system. In this context, it was found that at least 5 of the proposed indicators can be calculated from readily available data that are already present and monitored in the university information system already and thus do not cause an increase in administrative burden. Contributing to this is also building a database, which is very effective in practice, in the Technology Transfer Centre (CTT) at UNIZA University Science Park.

The proposed model of a generally applicable procedure for evaluating and monitoring the fulfilment of university tasks in a regional innovation system and the design of performance and perception indicators suitable for evaluating and monitoring the fulfilment of university tasks in a regional innovation system should contribute to raising awareness of university performance and success and processes directly related to the university's tasks in the regional innovation system. The aim of the proposal is to ensure that existing processes are monitored by means of relevant indicators to improve the processes in question. The question remains whether the proposed indicators should not be more closely linked to trends from abroad, or to information that is more relevant for the university's key partners.

By evaluating and monitoring the proposed performance and perception indicators, the university can build its competitive advantage. The proposal is intended for the internal needs of the university. The systematic application of the proposed model will allow the university to focus on those areas where the indicators reach favourable values and focus on strengthening them. Similarly, it is appropriate to identify the indicators which show up as “weaknesses”, where the potential for improvement is possible. At the same time, it will allow the entire academic community and stakeholders in the regional innovation system to be informed about the results of monitoring the fulfilment of the university's tasks in the regional innovation system.

## Acknowledgment

This contribution was undertaken as a part of the research projects 1/0152/18 VEGA Business models and platforms in the digital environment, 1/0087/18 VEGA Enhancing the competitiveness of the Zilina region by increasing the influence of the University of Zilina in the region and in Zilina town and IS 2/KS/2019 Measurement of the Triple Helix effect in relation to the Zilina region. Also the contribution links to projects APVV-14-0512 and APVV-0101-10.

## References

- ADKINSON, D. R. 2014. Understanding the U.S. National Innovation System. Washington. June 2014. s.27. Available on <<https://bit.ly/1rPldcv>>.
- BUCEK, M. et al. 2006. *Regionálny rozvoj – novšie teoretické koncepcie*. Bratislava: Ekonóm, 2006, ISBN 80-225-2151-5
- COREJOVA, A. 2018. *Transfer poznania a ochrana duševného vlastníctva v podmienkach IKT sektora*. Dissertation. Žilina. Žilinská univerzita v Žiline, 2018. 144s.
- COREJOVA, T., AL KASSIRI, M. 2015. The Power of Knowledge-Intensive Services. In: 4th International Conference on Social Sciences and Society (ICSSS 2015), Pt 1 Location: Paris, FRANCE Date: MAY 20–21, 2015, Book Series: *Advances in Education Research*. Vol. 70, pp. 354–357.
- DURST, S., POUTANEN, P. 2013. *Success factors of innovation ecosystems*. University of Helsinki. Available on <<https://bit.ly/2J17Rvc>>.
- ETZKOWITZ, H. 2008. The Triple Helix: University-Industry-Government innovation in action. 2008. New York. ISBN 0-203-92960-8. p. 177.
- ETZKOWITZ, H. 2003. Innovation in innovation: The triple helix of university-industry-government relations. 2003. *Social science information* 42(3): 293-337. Available on <<http://eprints.uwe.ac.uk/23973>>.
- EUROPEAN UNION. 2016. Regional Innovation Ecosystems: Learning from the EU's Cities and Regions. Brussels. s. 272. ISBN: 978-92-895-0877-3.
- FARINHA, L., FERREIRA, J. J. 2012. Triangulation of the Triple Helix: A conceptual framework. 2012. In: *Triple Helix 10th International Conference 2012*. Available on <<https://bit.ly/2GGIkpP>>.
- FOSS, L., GIBSON, D. 2017. *The Entrepreneurial University: Context and Institutional Change*. Editor: RIOT. S. 286. ISBN 9781138743540
- FUROVA, L. 2019. Úloha univerzít v regionálnych inovačných systémoch (Role of universities in regional innovation systems). Dissertation. Žilinská univerzita v Žiline, FPEDAS, UNIZA, 2019.
- GASPEROVA, L., ROSTASOVA, M. 2018. The economic impact of the University of Žilina's Employees Expenditures on the host city. In: *International Journal of Scientific & Engineering research*, Volume 9, Issue 9, September-2018. ISSN 2229-5518.
- GRAHAM, R. 2014. Extended Executive Summary. Creating university-based entrepreneurial ecosystems evidence from emerging world leaders. 2014. Massachusetts Institute of Technology. p. 154. Available on <<https://bit.ly/1wXe7sA>>.
- GUNASEKARA, CH. 2006. Reframing the Role of Universities in the Development of Regional Innovation Systems. In: *The Journal of technology transfer*. January 2006. Vol. 31. ISSN 1573-7047.

- HUDEEC, O. 2007. *Regionálne inovačné systémy: strategické plánovanie a prognózovanie*. Košice: Ekonomická fakulta Technickej univerzity v Košiciach. p. 204. ISBN: 978-80-8073-964-5.
- ISAKSEN, A. 2001. Building Regional Innovation Systems: Is Endogenous Industrial Development Possible in the Global Economy? In: *Canadian Journal of Regional Science*, 2001. Canada. p. 101-120. ISSN: 0705-4580. Available on: <<https://bit.ly/2GwMPlv>>.
- JECK, T. 2010. *Transfer a difúzia znalostí ako faktor modernizácie slovenskej ekonomiky*. Dissertation. Bratislava: Ekonomický ústav SAV, 2010. Evidenčné číslo: 5e4331dc-bc85-445e-bb85-632f98a4f.
- KOSCHATZKY, K. 2003. Entrepreneurship stimulation in regional innovation systems – public promotion of university-based start-ups in Germany. In: FORNAHL, D., BRENNER, T. *Cooperation, networks, and institutions in regional innovation systems*. Northampton, MA: E. Elgar, 2003. p. 362. ISBN 1-84064-983-6.
- LORENZEN, M., FOSS, N. J. 2003. Cognitive coordination, institutions and clusters: An exploratory discussion. In: FORNAHL, D., BRENNER, T. (eds.) *Cooperation, networks, and institutions in regional innovation systems*. Northampton, MA: E. Elgar, 2003. p. 362. ISBN 1-84064-983-6.
- LYNCH R. L., CROSS, K. F. 1991. *Measure up!: Yardsticks for Continuous Improvement* (1st ed., 1991), Blackwell (USA). In: JOHNSONS, SHANE. 2005. The pyramids and pitfalls of performance measurement. Available on <<https://bit.ly/2UX319w>>.
- MADUDOVA, E., MAJERCAKOVA, M. 2017. The influence of university-firm cooperation on firm value chain. In: *16th International conference on Information technology based higher education and training*. 1. vyd. – Danvers: Institute of Electrical and Electronics Engineers, 2017. ISBN 978-1-5386-3968-9. - p. [1-6]
- OECD. 2010. OECD Innovation Policy Platform: Regional innovation strategies. January 2010. Available on <<https://bit.ly/2J2NQ7V>>.
- REHAK, S., SIPIKAL, M. 2012. 52nd Congress European Regional Science Association in Bratislava – The look back and forward. In: *Journal for economic theory, economic policy, social and economic forecasting*. Vol. 60, N. 8, pp. 871–873. ISSN 0013-3035.
- ROSTASOVA, M., COREJOVA, T., ROVNANOVA, A. 2018. Diagnosing of environment for creation of regional and local digital ecosystem in the conditions of the Slovak republic. p. 189–199. In: 9th International Scientific Conference “Company Diagnostics, Controlling and Logistics“. *Proceedings*. University of Zilina. April 12th–13th 2018. 302 p. ISBN 978-80-554-1464-5.
- RUAN, X., SAAD, M., KUMAR, V. 2014. The transformational role of University in regional innovation system: The case of Zhengzhou University in China. In: *Innovation Systems and the New Role of Universities* (COSINUS), Bordj-Bou-Arredj, Algeria, 23-25 September 2014. Available on <<http://eprints.uwe.ac.uk/23973>>.
- UNGER, M., POLT, W. 2017. The Knowledge Triangle between Research, Education and Innovation – A Conceptual Discussion. 2017. In: *Foresight and STI Governance*. Vol. 11, No. 2. pp 10–26. E-ISSN 2312-9972. 17-03-2019]. Available on: <<https://bit.ly/2VIUZGT>>.
- TRIPPL, M., SINOZIC, T., SMITH, H. L. 2014. The role of universities in regional development: conceptual models and policy institutions in the UK, Sweden and Austria. Sweden: Lund University, 2014. Available on <<https://bit.ly/2PyKcUj>>.
- WANG, X. 2010. *Performance measurement in universities: Managerial perspective*. University of Twente. s.88. Available on <<https://bit.ly/2HqQLK>>.

# Digitalisation in Europe: How did Hungary perform on a European scale in the most recent years?

BENDEGÚZ RICHÁRD NYIKOS<sup>1</sup>

**Abstract:** Technological and digital development had a huge impact on the world. With the widespread of the Internet, industries, economies and cultures has changed all over the planet. Based on the most recent statistics of Internet Live Stats, on a global scale, Europe has one of the highest internet penetration rates with a growth of 570% between 2000 and 2018.

In the most recent years, Internet usage has become even more common all over Europe – Hungary is no exception. Growth in the user base between 2014 and 2017 in Hungary was more rapid than the European average, however, in 2018 this development declined and the Internet penetration of the country slightly decreased.

With the introduction of Facebook to the world, the social media phenomenon evolved into a new and modern version. The user base started to grow rapidly and it has become the most popular networking alternative both on a global and on a European scale. According to the report of the company, its daily active users base tripled between 2011 and 2018 – exceeding 1.4 billion –, and is still augmenting.

Even though the positive tendency of the change in Internet penetration came to a halt in 2018 and declined by 1% from 2017, in terms of social media usage, the statistics prove that the development of digitalisation is still ongoing in Hungary, where the social media penetration managed to exceed the global and European averages in the most recent years.

Based on the different reports, statistics and data, a very complex analysis and comparison was concluded, demonstrating that Hungary is one of the most dynamically developing countries in terms of Internet and social media usage on a European scale.

**Key words:** digitalisation, social media, Europe, European Union, Hungary, technological development

**JEL Classification:** O33, M15, M31, F63

## 1. Introduction

Digitization transcends our everyday lives and also our work. It radically changes the way value is created, revolutionizes the economy and all the companies. We create, combine and share more data with each other, creating new services,

---

<sup>1</sup> BENDEGÚZ RICHÁRD NYIKOS, University of Sopron, Hungary, nyikos.bendeguz@uni-sopro.hu

products, and business models. “Industry 4.0” enables the complete reorganization of whole value chains and means significant developments for business models.

Transition to the digital future has a huge impact on every single industry and company, regardless of region or country. It is crucial to develop the right strategies and also the right skillsets in order to adapt to the new circumstances and, additionally, to “exploit” the potential of the digital world. All these developments bring significant changes and opportunities to all organisations, processes and cultures.

In order to understand and to create a summary of the development and current situation of digitalization in Hungary, Internet and social media usage must be analysed and compared with other regions and countries.

## 2. Methodology

The study presents data and analysis of various indices concerning digitalisation, including internet penetration and Facebook usage statistics, relative to both the total population of the specific region and its population connected to the Internet.

Internet World Stats presents up-to-date world data based on various factors such as Internet usage and social media statistics, for most of international regions and countries. Complemented by the individual, yearly reports of We Are Digital, this research provides an accurate and complex representation of the current digital state of different regions and countries. The main sources are the individual reports of these two organisations, which are also supported by other studies and data.

The research is entirely based on secondary data, presenting, comparing, and summarizing the results of various literatures, data and statistics, which are used to provide a more complex picture of the current digital state of Europe, the European Union and its various member states.

These are not only used to present the individual results of the regions and countries, but also allow us to compare and rank them based on particular criteria. Even though the paper is solely based on secondary research, the analysed data has never been used for such purpose, which renders this complex summary highly valuable when it comes to the exploration of the current digital state of various EU member countries, including Hungary.

### 3. Literature Review

#### 3.1 Internet Usage

In the rapidly changing 21st century it is almost impossible to keep track of technological advancement. Our whole world has become entirely digital since the middle of the 1990s, when the Internet started spreading from Western societies throughout the rest of the planet. The user base of the Internet grew rapidly between 1995 and 2005 to reach 1 billion. Recently, according to Internet World Stats, this number has exceeded the 4 billion mark which means a growth in worldwide penetration from 0.4% (1995) to 55.1%. Throughout the last two decades the Internet presented an exponential growth in its user base – especially between 2008 and 2018 – and by mid-2018 finally it had exceeded the 4 billion mark. It accounted for more than 55% of the worldwide population (<https://www.internetworldstats.com/stats.htm>).

Internet managed to spread from western societies to the rest of the world and has become available on all the continents, with various rates of penetration – compared to the total population.

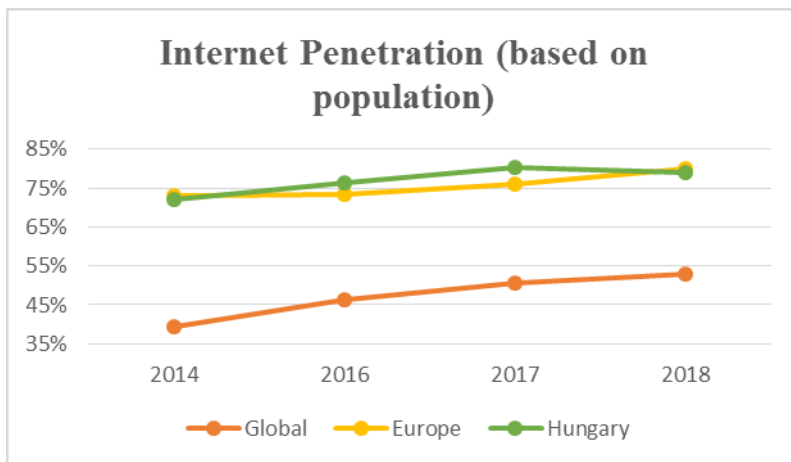
Even though Africa presented the most rapid growth in the user base between 2000 and 2018, Internet usage penetration only accounted for 36.1%. Based on this factor, it is clearly seen that North-America and Europe achieved the highest rates in June 2018 (*Table 1*).

Based on these figures, it is clearly seen that in terms of Internet penetration, Europe means a promising option for advertisers who aim to communicate with their current and potential customers online.

**Table 1. Internet Usage in the Different Regions (Internet Live Stats, 2018)**

	Population	Internet users (June, 2018)	Penetration (%)	Growth (2000–2018) (%)
Africa	1,287,914,329	464,923,169	36.1	10,199
Asia	4,207,588,157	2,062,197,366	49.0	1,704
Europe	827,650,849	705,064,923	85.2	570
Latin-America/Carribean	652,047,996	438,248,446	67.2	2,325
Middle East	254,438,981	164,037,259	64.5	4,894
North America	363,844,662	345,660,847	95.0	219
Oceania/Australia	41,273,454	28,439,277	68.9	273
World Total	7,634,758,428	4,208,571,287	55.1	1,066

Over the last couple of years, on both the global and the European scale, Internet penetration still managed to grow, albeit only with a slight tendency. Hungary not only managed to keep up with the growing potential of Europe, but to exceed it as well, based on this factor. Despite a lack of reliable data for 2015, the evolution of the performance of these three regions is still visible. However, in 2018, Hungary showed a slight underperformance of 1% (*Figure 1*).



**Figure 1. Internet Usage between 2014 – 2018 on a global, European and Hungarian scale**

*Source:* Own edition, based on yearly reports of We Are Digital.

### 3.2 Digital Economy and Society Index

Digital Economy and Society Index aggregates the results of more than 30 indicators and measures digital performance to rank member states according to a weighting system while providing data for the development of a relevant strategy. DESI provides a clear report on performance including quantitative indicators for further analysis and comparisons. The quantitative indicators are provided to the European Commission by the statistical offices of the Member States and the telecommunications authorities. It basically consists of five dimensions, each dimension is made up of sub-dimensions that contain unique metrics (Csótó, 2019):

- Connectivity
- Human Capital
- Use of Internet Services
- Integration of digital technology
- Digital public services



Special weight is given to each metric and dimension by the European Commission in order to rank the member countries. The dimensions are weighted as follows:

- Network Connectivity: 25%
- Human Capital: 25%
- Use of Internet Services: 15%
- Integration of Digital Technologies: 20%
- Digital Public Services: 15%

In the overall ranking, including all dimensions, Hungary ranked 23<sup>rd</sup> among the 28 member countries. Despite having managed to increase its score, Hungary was unable to improve its position. In the Central-European region Poland and Romania achieved lower scores, however, Slovakia, the Czech Republic and Croatia received better rankings. Hungary shows the best performance in the Network Connectivity category and constantly achieves scores above the EU average. It should also be noted that high speed and super-fast broadband coverage are both exceptional, and while 4G coverage in Hungary extends to 96% of the population, when it comes to the usage of broadband connection, Hungarians are at the bottom of the chart. This might be attributed to the higher expenses of mobile carriers (DESI, 2019).

Even though in terms of Internet penetration Hungary ranked 20<sup>th</sup> among EU countries, it was clearly visible that Hungarian people, on average, are characterized by higher online consumption in categories such as News, Music video and games, as well as Social networks. However, when it comes to banking or shopping, Hungarian citizens are less likely to use online platforms (*Table 2*).

**Table 2. Network Connectivity DESI indices for Hungary and EU**

	Hungary				EU
	DESI 2017	DESI 2018	DESI 2019		DESI 2019
	value	value	value	rank	value
Internet users (% individuals)	78%	76%	75%	21	83%
News (% internet users)	88%	85%	85%	10	72%
Music video and games (% internet users)	81%	81%	82%	14	81%
Social networks (% internet users)	83%	84%	86%	2	65%
Banking (% internet users)	44%	49%	54%	20	64%
Shopping (% internet users)	48%	49%	52%	21	69%

Source: European Commission, 2019.

Electronic public administration has been available in Hungary since 2004–2005. The European Union selected 12 types of administrative and public service cases that are most commonly used by citizens. In addition, 8 types of cases that are most often handled by businesses have also been added to the previously chosen topics. These 20 types of cases constitute CLBPS, which is basically the list of the most common, basic public services. As the EU proposed the new methodology, the list had to be introduced in the member states on a mandatory basis. With the introduction of electronic administration of all 20 case types, the era of e-governments have begun (Tózsza, 2011) (*Table 3*).

**Table 3. Digital Public Services DESI indices for Hungary and EU**

	Hungary				EU
	DESI 2017	DESI 2018	DESI 2019		DESI 2019
	value	value	value	rank	value
e-Government users (% internet users needing to submit forms)	38%	45%	53%	20	64%
Pre-filled forms (Score 0–100)	23	28	31	23	58
Online service completion (Score 0–100)	63	75	82	22	87
Digital public services for businesses (score 0–100, including domestic and cross-border)	68	73	77	24	85
Open data (% of maximum score)	NA	NA	NA		64%
e-Health services (% individuals)	NA	7%	7%	26	18%
Medical data exchange (% of general practitioners)	NA	NA	28%	15	43%
e-Prescription (% of general practitioners)	NA	NA	69%	14	50%

*Source:* European Commission, 2019.

The implementation of the National Info-communication Strategy in Hungary began in 2014 and the adoption of the Digital Success Programme (Digitális Jólét Program) was adopted at the end of 2015 and was followed by the DJP 2.0 in 2016. In 2018 the Hungarian government prepared the Digital Agricultural Strategy and the Digital Sports Strategy to further improve its overall digitalisation. Since 2019, 5G has also been available in the country and its further development in various industries is already planned. In addition, a wide range of large-scale projects have been implemented, including the Superfast Internet Program (Szupergyors Internet Program), the Program of Modern Enterprises

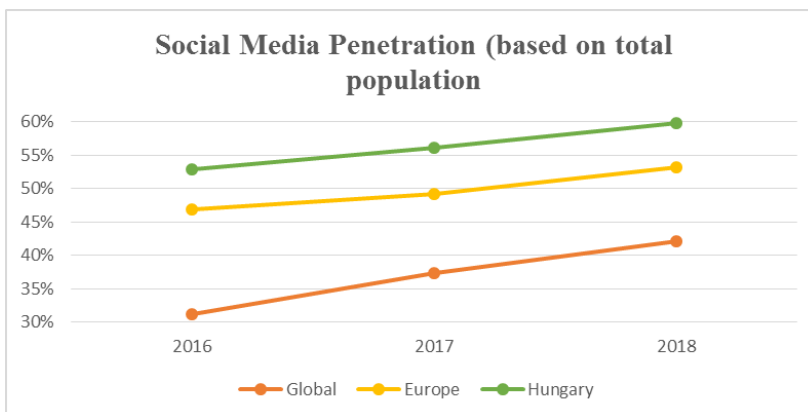
(Modern Vállalkozások Programja), the Support Program for Business Digital Development (Digitális Vállalkozásfejlesztés Támogatása Program) and further developments in both e-government and e-health (Tózsza, 2011).

Even though Hungary has implemented a wide range of development strategies to increase efficiency in these areas, Digital Public Services still remains the area that faces the most significant challenges.

### 3.3 The Development of Social Media

The 2010s brought huge developments in the World Wide Web to users, one of the most popular examples of which are the social media platforms. Social Media can be basically described as “a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of User Generated Content” (Kaplan, Haenlein, 2010, 61).

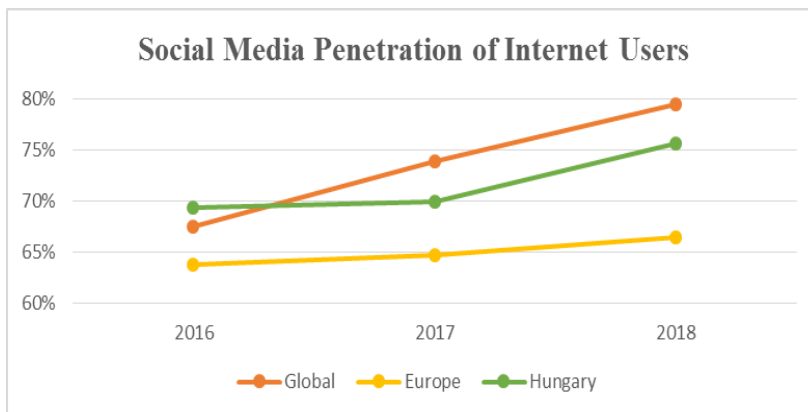
These web 2.0 technologies have significantly increased the personal communication between users from any parts of the world and also enable companies to revolutionize their engagement towards customers. Social media is basically one of the most advanced results of the Internet technologies and today, it represents the most effective online communication for both end users and corporations. In just three years, all of the three previously analysed regions managed to achieve a notable increase in social media penetration. Despite lagging behind European countries in 2018 in terms of internet penetration, in the area of social media usage, Hungary achieved higher percentages between 2016 and 2018 (*Figure 2*).



**Figure 2 Social Media Usage between 2016–2018 on a global, European and a Hungarian scale**

*Source:* Own edition, based on yearly reports of We Are Digital.

Even though these statistics clearly illustrate the huge impact of social media on today's societies, comparing the number of members with the internet user base could provide a better insight into the power of these networks (*Figure 3*).



**Figure 3. Social Media Usage of Internet Users between 2016–2018 on a global, European and a Hungarian scale**

*Source:* Own edition, based on yearly reports of We Are Digital.

Throughout the years, the basic functions of cell phones have been expanded and later also replaced by other features these devices offer to users. Texting, connection to the Internet, downloading and using data and also a large number of different applications, shopping and ordering are the features every single user would require today. Even though the number of applications is infinite and the preferences of users may also vary in terms of country, culture, age and other factors, softwares that allow social networking, media streaming, purchasing or simply messaging have become the most important services users are currently looking for. Smartphones still have their basic texting function – also known as SMS -, however, today's users are constantly looking for alternatives. Connection to people via social media offers a wide range of applications with different purposes. Ever since Facebook was established, countless users have joined the online social network on a daily basis. It can be easily accessed from various devices such as desktop computers, laptops, tablets and, obviously, from smartphones, which has a high impact on social media penetration on a global scale. Users are only required to have Internet connection, they can register for free and there are no hidden premium features. In the world of social media, Facebook is still the leader. According to the report of the company, its daily active users tripled between 2011 and 2018 – exceeding 1.4 billion –, and still expanding (Investor.fb.com, 2019).

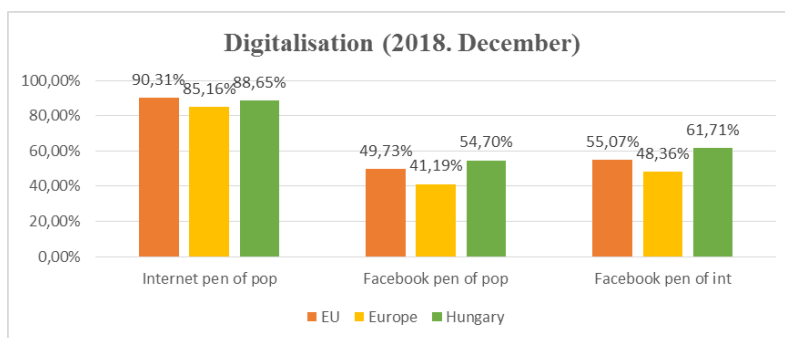
Despite a steady increase of the number of social media networks in the previous years, to day, Facebook remains the leader of all these platforms. That is why when it comes to the analysis of the usage of these networks in any particular region, social media penetration and Facebook penetration are more or less the same. The most recent statistics concerning Facebook usage shows us how popular Facebook is in the different regions.

## 4. Results and statistics – concerning various digital indices

### 4.1 Digitalisation at the end of 2018

Digitalisation has also been present in Hungary and the user base of such technological advancements has rapidly increased throughout the recent years. Besides computers, handheld devices – alongside with the internet and one of its most advanced features, the social media networks – have become increasingly popular in the nation and they are commonly used by all the different age and social groups. On average, almost every 2<sup>nd</sup> person in the European Union is a member of the network. On a more “global”, European scale, this number is slightly smaller. However, if these indices are compared with the level of penetration in Hungary, it can be seen how the small country managed to achieve higher results in this category too.

Based on the number of Internet users, on a global scale, social media penetration achieved a more rapid increase over time. Additionally, it must be mentioned that Hungary managed to exceed the European average in this area and at the end of 2018, the difference between the two regions exceeded 10%. By comparing the number and different factors on a global, European and Hungarian scale, it is clearly seen how well the small country performed (*Figure 4*).



**Figure 4. Comparison of Digitalisation Indices**

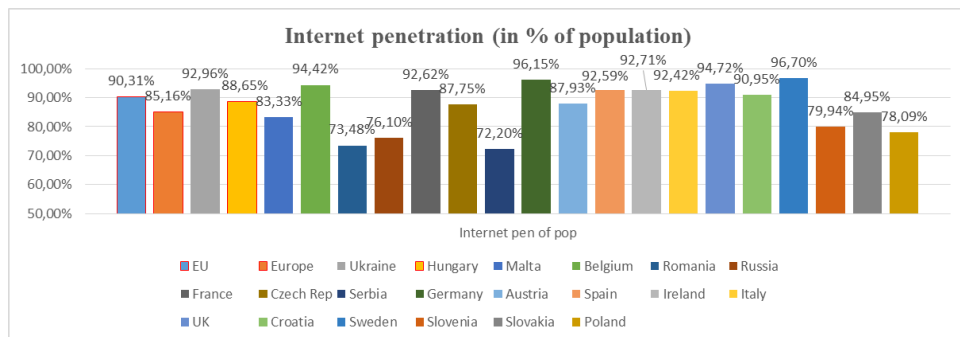
*Source:* Own edition, yearly reports of We Are Digital and Internet World Stats.

The rapid technological advancement has brought the smart phones to the world, which have become the basic mean of telecommunications. In 2016, 3.6 billion people were connected to the Internet and 3.8 billion phone users were registered – out of whom 2.1 billion people used smart phone. Although it is possible that some of the 2.1 billion some only used these devices offline, there is a clear connection between the growth of the user base of the Internet and the increasing sales of these smart communicational devices (Internet World Stats, June 30, 2016)

## 4.2 Hungary's digital performance relative to other countries

Based on the European level and relative to the European Union, it is clearly seen how well Hungary performed in terms of digitalisation (Internet and Facebook usage) at the end of 2018. However, it might be interesting to compare these numbers not only with the regional averages, but also with the performance of other countries. In the next analyses, the EU and European averages, as well as the statistics of 20 additional countries – including Hungary – will be included. The analysis is based on the following indices:

- Internet user base relative to population
- Facebook user base relative to total population
- Facebook user base relative to internet user base.

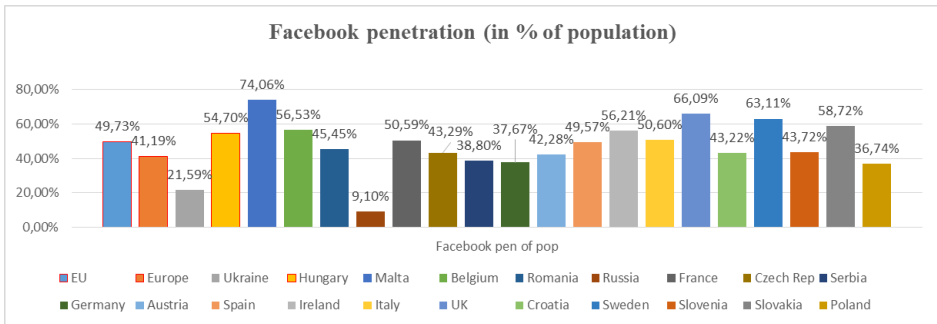


**Figure 5. Comparison of Internet Penetration of European Countries**

*Source:* Own edition, yearly reports of Internet World Stats.

In terms of internet penetration based on the total population, Sweden (96.70%) and Germany (96.15%) managed to achieve the highest scores. Even though Hungary managed to achieve a slightly lower penetration of 88.65% and is below the average penetration in the European Union, compared to the “global” European average and other countries in the region, this number is still considered

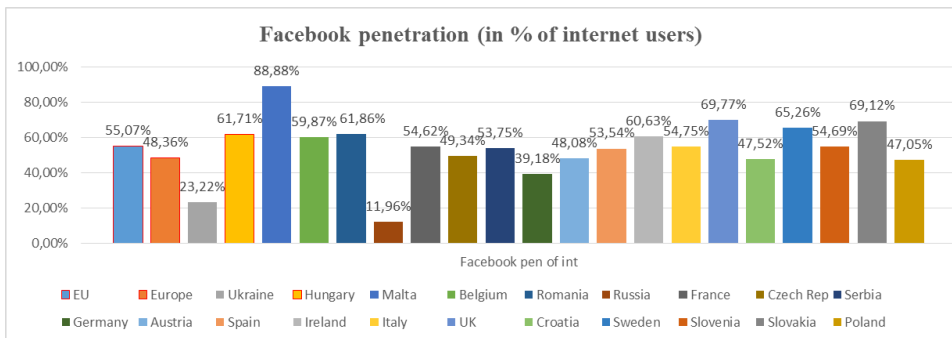
fairly high and reaches rank 11 (*Figure 5*). The internet penetration index might offer an insightful statistic, however, in this case, the point is to analyse the social media usage, more precisely, the Facebook penetration of these regions and countries (*Figure 6*).



**Figure 6. Comparison of Facebook Penetration of European Countries**

Source: Own edition, yearly reports of Internet World Stats

Facebook, as the main social media network, has a strong presence in the previously mentioned regions and countries. While in the European Union almost every 2<sup>nd</sup> person is member of the platform, the gross European average falls below this number by more than 8% and only accounts for 41.19. In the case of Facebook penetration based on total population, Malta managed to achieve rank 1. Hungary is still above both the EU (49.73%) and European averages (41.19%) with its 54.7%. In this case, only 6 countries managed to achieve higher results (*Figure 7*).



**Figure 7. Comparison of Facebook Penetration of Internet Users in European Countries**

Source: Own edition, yearly reports of Internet World Stats.

In terms of digitalisation and Internet usage, the last index is the Facebook usage of the internet users. Malta once again managed to achieve the highest rank with 88.88%. Compared to the results of the previous analysis, both the EU and European averages are higher in this case: 55.07% and 48.36%. After being the 11<sup>th</sup> and 6<sup>th</sup> best performing country in our analyses, in this case Hungary managed to achieve the highest ranking by far with its 61.71% – which could be surpassed by only 5 countries in this category: Malta, the UK, Slovakia, Sweden and Romania.

## 5. Summary and Future Outlook

Technological and digital development have had a huge impact on the world. With the widespread of the Internet, industries, economies and cultures have changed all over the planet. Based on the most recent statistics, on a global scale, Europe has one of the highest internet penetration rates with a growth of 570% between 2000 and 2018.

Based on the statistics, digitalisation has grown fairly rapidly in Europe through the recent years. The Internet and social media penetration are both considerably high, which means that companies should take these indices into consideration when it comes to planning their strategies to reach out to their current and potential customers.

In the most recent years, Internet usage has become even more common all over Europe – Hungary is no exception. The growth in the user base between 2014 and 2017 in Hungary was more rapid than the European average, however in 2018 this development declined and the Internet penetration of the country slightly decreased.

Even though Hungary has implemented a wide range of development strategies to increase the efficiency in the areas of public administration and e-Government, Digital Public Services still remains the area which faces the most significant challenges and will definitely require further intervention, especially in the e-Health sector.

With the introduction of Facebook to the world, the social media phenomenon evolved into a new and modern version. The user base started to grow rapidly and it has become the most popular networking alternative both on a global and on a European scale. Even though the positive tendency of the change in Internet penetration came to a halt in 2018, in terms of social media usage, the statistics prove that the development of digitalisation is still ongoing in Hungary, where social media penetration managed to exceed the global and European averages in the most recent years.

These data confirm that Hungary is one of the most dynamically developing country in terms of Internet and social media usage on a European scale. It might



be interesting to perform similar researches in the upcoming years to see how this tendency in Europe and Hungary changes. In addition, the Internet and social media penetration, along with further statistical data concerning digitalization could be compared to the digital marketing expenditure of the region and countries to see how well companies adapt to the various markets.

## References

- CSÓTÓ, M. 2019. Mértéki annyi, mint tudni? Az elektronikus közigazgatás közösségi mérőszámairól. In: *Vezetéstudomány/Budapest Management Review*. Vol. 50, No. 2, pp. 14–31.
- DESI 2019. Digital Economy and Society Index. Retrieved March 25, 2020, from Digital Single Market: [https://ec.europa.eu/newsroom/dae/document.cfm?doc\\_id=59898](https://ec.europa.eu/newsroom/dae/document.cfm?doc_id=59898)
- DESI 2019. Connectivity – Broadband market developments in the EU.” Retrieved March 25, 2020, from Digital Economy and Society Index: <https://ec.europa.eu/digital-single-market/en/desi>
- GOEL, N., BADALAMENTI, J. 2016. Lighting the Way Toward Seamless Pickups with Uber Beacon. <https://www.uber.com/newsroom/beacon/> [Accessed September 25, 2019].
- <https://www.internetworldstats.com/stats.htm>
- <http://www.internetworldstats.com/emarketing.htm>
- KAPLAN, A. M., HAENLEIN, M. 2010. Social media: back to the roots and back to the future; Emerald Insights. <http://www.michaelhaenlein.eu/Publications/Kaplan,%20Andreas%20-%20Back%20to%20the%20roots%20and%20back%20to%20the%20future.pdf> [Accessed September 25, 2019].
- PARK, M. 2019. Facebook to Announce Second Quarter 2019 Results. Calif., July 1, 2019 /PRNewswire/ Accessed September 25, 2019 <https://investor.fb.com/investor-news/press-release-details/2019/Facebook-to-Announce-Second-Quarter-2019-Results/default.aspx>
- RICHTER, F. 2016. The Most Popular Apps in the World. *Statista*. <https://www.statista.com/chart/5055/top-10-apps-in-the-world/> [Accessed September 25, 2019].
- TÓZSA, I. 2011. E-közigazgatás Európában? Jelen és jövő. In: *Vezetéstudomány*. Vol. 42, No. 3. pp. 10–18.
- WE ARE SOCIAL 2014. Social, Digital & Mobile in Europe. <https://www.slideshare.net/wearesocialsg/social-digital-mobile-in-europe> [Accessed September 25, 2019].
- WE ARE SOCIAL 2016. 2016 Digital Yearbook. <https://www.slideshare.net/wearesocialsg/2016-digital-yearbook> [Accessed September 25, 2019].
- WE ARE SOCIAL 2017. Digital in 2017. <https://digitalreport.wearesocial.com/> [Accessed September 25, 2019].
- WE ARE SOCIAL 2018. Digital in 2018. <https://digitalreport.wearesocial.com/> [Accessed September 25, 2019].