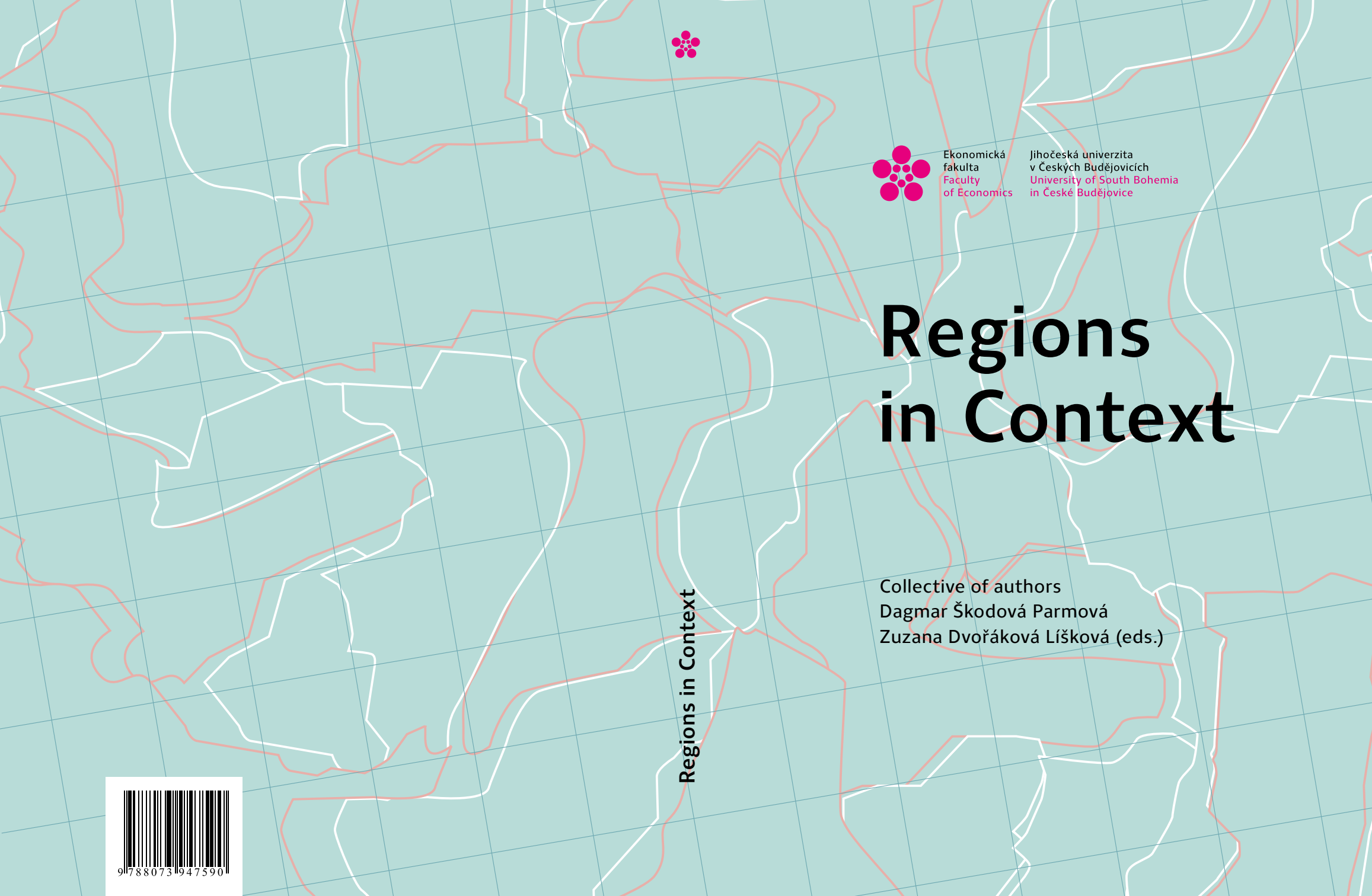

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Regions in Context

Collective of authors
Dagmar Škodová Parmová
Zuzana Dvořáková Líšková (eds.)

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CONTENT

FOREWORD

Regional development is a complex of processes within regions, related to positive economic, social, environmental and other changes in the region. In general, development is described as "a process of positive change, usually an improvement in the quantitative but, in particular, qualitative characteristics of an area."

Regional development, and regional policy, as a public policy, aiming for balanced regional development, takes place in a number of follow-up steps.

Addressing the challenges of regional development of today's world, political, environmental, and financial, puts economic science to be discussed in a wider context.

It means, the economic, social and environmental and ethical context of economic thinking, including its theoretical assumptions and practical consequences.

The aim of the book "Regions in Context" is to describe the above mentioned important conditions and deal with the development in the regions from different perspectives. For that reason, the authors of the book include the regional development professionals, and also economists and professionals in other disciplines.

The book is intended for a wider audience, primarily from academics and students of social sciences. Its aim is to contribute to the necessary debate on regional development.

Dagmar Škodová Parmová
Zuzana Dvořáková Líšková

REGIONAL POLICY AND ITS FINANCIAL INSTRUMENTS

Zuzana Dvořáková Líšková[1]
Dagmar Škodová Parmová[2]
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The main objectives of this chapter are to review the origin and progress of regional policy since its inception, identifying the scope and analysing the distinctive features of the current programming period. It is also intended to discuss the aspects of the Regional policy in the Czech Republic, stressing the need to redirect and reform some aspects in order to improve its overall effectiveness.

AN INTRODUCTION TO REGIONAL POLICY IN EUROPE

The EU's main objective is to step up efficiency and stimulate the economic growth by integrating the markets of goods and production factors (Funck & Pizzati, 2003). In the early stages of European integration, it was commonly believed that the market efficiency was more important

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and could solve any problem since the member states were more or less homogenous. But with the expansion of the EU, both regional and national disparities within the EU become larger and larger. Undoubtedly, the disparities within the EU will curtail the development potential of the periphery member states and, as a consequence, of the whole of the EU. Unbalanced developments and large disparities will make the EU lose its attraction and therefore produce some negative effects on the integration process (Thielemann, 2002). So more and more scholars and politicians started to pay more attention to territorial differences and explore the reasons and solutions to these problems within the EU.

In fact, the debate within economics on whether development policies are really needed to tackle disparities is inconclusive. According to the divergence theory, in the process of the economic integration, the combination of the greater accessibility of production factors and a greater capacity to generate and assimilate innovation in core areas is likely to lead to a greater concentration of economic activities in the core and to an increase of economic disparities in the EU. From this perspective, European economic integration may thus contribute to accelerating the process of the concentration of economic activities. As a consequence, some sort of development policy is necessary in order to counterbalance the economic polarization (Funck & Pizzati 2003). In contrast, the convergence theory claims that the economic integration is likely to contribute to the channelling of investment and innovation from core regions to areas with lower labour costs and to fostering migration from the periphery to the core. The free flow of production factors under the market rules will ultimately result in the economic convergence. Therefore, from this point of view, the economic integration will contribute per se to the reduction of economic disparities across the EU, making the need for a development policy almost redundant. A good argument for the EU regional policy is that there are significant differences among regions within Europe. Although the EU is one of the most developed and prosperous spaces in the world, there have always been some national and regional disparities there. Regions within Europe vary greatly

in their economic capacity, institutional structures and the political, economic and social demands they create (Ezcurra & Pascual, 2007). Large disparities existed even when the Community of Six was created. According to Levi Sandri (Italian politician and European Commissioner), the per capita income of the most favoured region in the Community (Hamburg) was about seven times higher than that of the least favoured Italian region (Calabria). But the 'rich man's club of the 1950s was relatively homogeneous except the southern part of Italy. Both the 1973 enlargement (Denmark, Ireland and the UK) and the accession of Greece (1981), Spain and Portugal (1986) further increased the disparity within the Community (Raphaël, 2008). The eastern enlargement of the EU, when 10 central and eastern European countries joined in 2004, has much increased the differences in wealth levels within the EU. According to Gillingham (2003), the gap between the new and old member states in the second wave of enlargement in the 1980s was about 30 per cent; it was about 60 percent in 2004 enlargement (Nello, 2009). Danuta Hubner (2008), the member of the European Commission responsible for EU regional policy, also emphasized the disparities within today's EU. She stated that 43% of the economic output and 75% of investments in research and innovation are concentrated on just 14% of the European territory, known as the pentagon between London, Hamburg, Munich, Milan and Paris. It is worth mentioning that differences between the dynamic regions and lagging regions 1 are not only manifested in terms of GDP per head, but also in many other economic and social indicators, including the unemployment rate, the productivity rate. Furthermore, economic theories suggest that in the absence of appropriate accompanying policies, market forces unleashed by the EU integration will not be sufficient to eliminate regional divergence, but rather reverse (Armstrong & Taylor, 2007). This is because the elimination of tariff and non-tariff barriers to trade, and of other obstacles to the free inter-regional and cross-border movements of factors of production tends to favour the core regions because their products are more competitive, resulting in the trade creation effects and increasing the overall welfare.

However, the industries in the lagging member states will be hit or even contract because they are required to dismantle all forms of protection against member states and conform to the common external protection (tariffs and quotas). That is to say they have to suffer the trade diversion effect and the overall welfare will be reduced. Therefore, the forces unleashed by the EU's ever-deeper economic integration not only generate efficiency but also a threat to equality. The regional policy at the Community level can also be justified by some benefits of the establishment of an EU regional policy (Neffke et al., 2011). Armstrong & Taylor (2007) summarized these benefits in their book: the EU can ensure that regional policy spending by member states is more closely matched to the severity of the problem faced; the EU can greatly improve the co-ordination of regional policy; EU regional policy offers a means by which any one member state can legitimately become involved in solving the regional problems of other member states; EU regional policy is necessary if further integration is to be sustained.

THE EVOLUTION OF EU REGIONAL POLICY

The above mentioned arguments in favour of the regional policy in the EU show that the decision to set up European development policies to reduce the existing economic disparities within the EU has been not only an economic but also a political problem. In the early days of European integration, the community started to put emphasis on reducing the regional disparity within its territory and created some instruments for promoting the development of lagged regions (Dall'Erba, 2003). European regional policy can date back to the 1950s when the provision for grants to the depressed areas for the industrial conversion and retraining was made by the European Coal and Steel Community. Funds were later provided under the framework of the Common Agricultural Policy. In 1958, the institutions designed to reduce the regional disparities are the European Investment Bank (EIB) which provides low-interest-rate

loans for national governments undertaking infrastructure projects and the European Social Fund (ESF) which provides financial aids to the employment projects and the immigrant workers. In 1962, the Guidance Section of the European Agricultural Guidance and Guarantee Fund (EAGGF-Guidance) was designed to give financial support to the upgrading of the farms and the farming equipment, the improvements of farming methods, and the provision of benefits to farmers. During this time, the regional policy was strictly in the hands of the member states. According to Thielemann (2002), the reasons for this can be attributed to two dimensions: the first involves the institutional structure and the second is related to the dominant sectorial approach to policy that reined in at that time. From the institutional perspective, no provisions were made in the Treaty of Rome for the participation of sub-national levels of governments or groups in civil society in the decision-making process or other activities. The other dimension means that EEC interventions were strictly sectorial in nature and procedures followed in implementing these policies were monopolized by the national governments. In 1969, the Commission proposed a common regional policy, including the creation of a regional development fund, but found little support among the governments of the member states. It was not until 1975 that the European Regional Development Fund (ERDF) was estabilised to redistribute funds in order to to help the lagging regions to adapt to the new situation and accelerate their development, which symbolized the birth of the real regional policy at the Community level. And since the 1980s, the dominating political view in the EU has been that economic integration is likely to enhance territorial disparities and therefore a development policy is needed to achieve greater economic and social cohesion in the EU (Thielemann, 2002). As a result, every recent step towards the economic integration in the EU has been accompanied by the expansion and strengthening of its development policies. In February 1986, the EC member states singed the Single European Act (SEA) with the aim of realizing the free flow of goods, services, labour and capital at the end of 1999. It was feared that the Single Market would unleash

strong centripetal forces of competition and agglomeration which would ultimately lead to a greater concentration of economic activity in the centre at the expense of the periphery (Thielemann, 2002). The Single European Act brought the new attention to the regional policy, introducing a new Title V on Economic and Social Cohesion, and arguing the need to 'clarify and rationalize' the use of the structural funds. The SEA provided the legal basis for a new approach to the regional policy that was structured on the combined resources of the three existing Structural Funds (ERDF, ESF and EAGGF-Guidance section), providing for the coordination of the interventions undertaken by the three Funds, and giving the Commission the power to formulate the rules and regulations for the management of the development programmes (Leonardi, 2005). Further reforms of the regional policy were agreed in 1988 in response to the Single Market initiative. The 1988 reform introduced four basic principles for cohesion policy, agreed on five priority objectives and increased spending percent on structural funds in the EC budget. The 1988 reforms were also aimed at improving the efficiency of regional policy by setting up the Community Support Frameworks under which the Commission, the member states and the regions would work more closely together on agreeing the means to achieve regional development planning goals. More changes to the regional policy came with Maastricht Treaty (1993), under which the Committee of the Regions (CoR) was created to give regional authorities a greater say in European common policy, and the Cohesion Fund was created to assist the least prosperous countries of the Union (Laffan et al., 2000; Leonardi, 2005).As there was the biggest enlargement of the EU ever with ten new Member States joining in May 2004, the disparities in income and employment increased as the average GDP per head in these new member countries was under half of the EU average and only 56% of their population were in active employment, compared to 64% in EU-15. So the 1999 reform and the 2006 reform of the regional policy mainly focused on simplification of Cohesion Policy and its procedures in parallel with preparation for enlargement. The programming period 2007–2013 was the first full membership

period for the EU member states included in the paper (except for Croatia, who joined on 1 July 2013). In the 2014–2020 programming period all regions are benefit from ERDF and ESF funds. The convergence regions are now called the less developed regions. The phasing-out (and gradual exclusion of convergence) and the phasing-in regions (and gradual inclusion in employment and regional competitiveness) belong to the new category of the transition regions. Finally, the regions belonging to the regional competitiveness and employment objective are now the more developed regions.

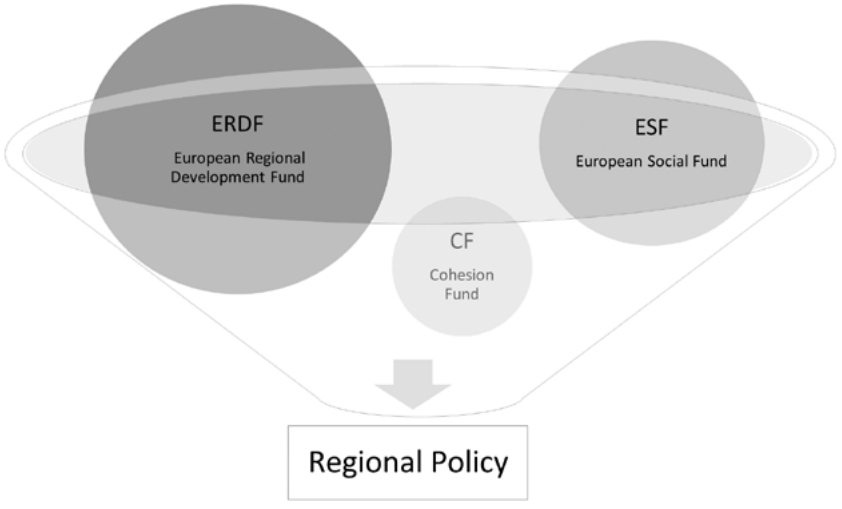
FINANCIAL INSTRUMENTS

Financial instruments represent a resource-efficient way of deploying cohesion policy resources in pursuit of the Europe 2020 Strategy objectives. Targeting projects with potential economic viability, financial instruments provide support for investments through loans, guarantees, equity and other risk-bearing mechanisms, possibly combined with technical support, interest rate subsidies and guarantee fee subsidies within the same operation (Willmott, 2016; Becker et al. 2012).

Financial instruments have been used for delivering investments for Structural Funds since the 1994–1999 programming period. Their relative importance increased during the 2007–2013 programming period (Barone, 2016) and they now (2014–2020) represent around 5% of total European Regional Development Fund (ERDF) resources. In the light of the current economic situation and the increasing scarcity of public resources, financial instruments are expected to play even a stronger role in cohesion policy in the 2014–2020 programming period. Therefore, there is a single set of rules governing financial instruments for all ESI Funds, ensuring consistency with the provisions of the Financial Regulation.

Regional Policy (2014–2020) is delivered through three main funds: the **European Regional Development Fund (ERDF),** the **Cohesion Fund (CF)** and European Social Fund (ESF).

Picture 1: Regional Policy
Source: authors



Together with the European Agricultural Fund for Rural Development (EAFRD) and the European Maritime and Fisheries Fund (EMFF), they make up the **European Structural and Investment Funds** (ESIF)**.**

Regional Policy has a strong impact in many fields. Its investments help to deliver many EU policy objectives and complements EU policies such as those dealing with education, employment, energy, the environment, the single market, research and innovation.

Five main Funds work together (2014–2020) to support economic development across all EU countries, in line with the objectives of the Europe 2020 strategy:

- European Regional Development Fund (ERDF)
- European Social Fund (ESF)
- Cohesion Fund (CF)
- European Agricultural Fund for Rural Development (EAFRD)
- European Maritime and Fisheries Fund (EMFF)

Every EU region may benefit from the ERDF and ESF. However, only the less developed regions may receive support from the Cohesion Fund.

European Union funds represent the key instrument for the implementation of the European cohesion policy. Finances invested through these funds aim to reduce economic and social disparities among the Member States and their regions. Successful applicants may draw finances from these funds through various programmes. Apart from Structural and Investment Funds, there is a whole range of other theme-oriented multinational funds established by the European Union.

Operational programmes in Regional Policy are detailed plans in which the Member States set out how money from the European Structural and Investment Funds (ESIF) will be spent during the programming period. The programmes are prepared by each Member State (Charron & Lapuente, 2013).

CASE STUDY – CZECH REPUBLIC AND REGIONAL POLICY

The Czech Republic is a parliamentary republic with a head of government – the prime minister – and a head of state – the president. The country was formed in 1993, after Czechoslovakia was split into Czechia and Slovakia. The country is now divided into 14 regions, including the capital, Prague. The Czech Republic is one of the EU Member States that receives more from the EU budget than it contributes. In 2012, the Czech Republic received from the EU budget nearly three times more than its contribution was. The EU budget invests heavily in Czech regions with the projects such as modernisation of many city and village infrastructures, construction of new motorways or building of new water sewage plants. The Czech Republic has agreement with the European Commission.

Table1: Comparison of the priorities for programming periods
Source: authors

Programming period	Priorities for programming period	ERDF, ESF and CF allocations per capita (EUR)
2004–2006	• creating conditions for economic growth by strengthening internal factors • enhancing workforce skills, competitiveness and mobility, while limiting negative impact on the disadvantaged groups • achieving greater compliance with European environmental standards • ensuring sustainable development of regions	233
2007–2013	• competitive Czech economy • open, flexible and cohesive society • attractive environment • balanced territorial development	2145
2014–2020	• fostering conditions for business development to favour competitiveness of the Czech Republic in European and world markets, leading to the proliferation of new companies, increasing innovative opportunities for existing companies and attractiveness among domestic and foreign investors • ensuring conditions for an inclusive society in all population groups, employment growth, with particular focus on restricting the number of excluded groups and promoting better quality of life	2122

In 2004–2006, the Czech Republic, received ca. 8% of all ERDF, ESF and CF appropriations over the entire seven-year programming period.

Between 2007 and 2013, the Czech Republic received as much as 5% of Cohesion Policy allocations. With most funds coming from the EuropeanRegional Development Fund and the Cohesion Fund allocated to major environmental and transport investments. Per capita financing grew as much as nine times, from EUR 233 to EUR 2,145.

The new financial perspective opened a new planning opportunity in key areas requiring support.

Partner Agreement (2014–2020) outlines the way in which the financial means of ESI funds will be used to help the Czech Republic to achieve its smart, sustainable and inclusive growth targets. The PA focuses on following financing priorities:

- Promoting efficient and effective employment services that will contribute to increase the employment rate, particularly of vulnerable groups.
- Supporting high-quality education system (lifelong learning) to produce qualified and adaptable labour force.
- Enhancing research & innovation system based on high-quality research, interconnected with the application sphere and targeted at commercialisation of results.
- Supporting actions leading to an increase in private sector research & development investments, helping SMEs to be competitive in a global market and contributing to the shift towards a low-carbon economy.
- Investing in sustainable infrastructure facilitating business competitiveness and adequate territorial serviceability.
- Promoting a transparent and effective public administration with less administrative and regulatory burdens capable of responding to emergencies.
- Fostering social inclusion of vulnerable groups and combating poverty.
- Promoting landscape protection and climate change adaptation policies.

Table 2: The list of programmes available to the Czech Republic 2014–2020

Source: authors

National level	Czech Republic – National Rural Development EARDF	EARDF
	Employment	ESF/YEI
	Enterprise and Innovation for Competitiveness	ERDF
	Environment	ERDF/CF
	Integrated Regional Programme	ERDF
	Maritime and Fisheries – Czech Republic	MM
	Research, Development and Education	ESF/ERDF
	Technical Assistance	CF
	Transport	ERDF/CF
Regional	Prague Growth Pole	ERDF/ESF
Crossborder	Interreg V-A – Austria–Czech Republic	ERDF
	Interreg V-A – Czech Republic–Poland	ERDF
	Interreg V-A – Germany/Bayern–Czech Republic	ERDF
	Interreg V-A – Germany/Sachsen–Czech Republic	ERDF
	Interreg V-A – Slovakia–Czech Republic	ERDF
Transnational	Interreg V-B – Central Europe	ERDF
	Interreg V-B – Danube	ERDF
Interregional	Espon	ERDF
	Interact	ERDF
	Interreg Europe	ERDF
	Urbact	ERDF

Table 3: Comparison of the priorities for programming periods

Source: authors

Programming period	**Priorities for programming period**
2004–2006	• creating conditions for economic growth by strengthening internal factors • enhancing workforce skills, competitiveness and mobility, while limiting negative impact on the disadvantaged groups • achieving greater compliance with European environmental standards • ensuring sustainable development of regions
2007–2013	• competitive Czech economy • open, flexible and cohesive society • attractive environment • balanced territorial development
2014–2020	• fostering conditions for business development to favour competitiveness of the Czech Republic in European and world markets, leading to the proliferation of new companies, increasing innovative opportunities for existing companies and attractiveness among domestic and foreign investors • ensuring conditions for an inclusive society in all population groups, employment growth, with particular focus on restricting the number of excluded groups and promoting a better quality of life

In 2014–2020, EUR 23.9 billion is allocated the Czech Republic for Cohesion Policy (ERDF, ESF, and Cohesion Fund) including EUR 340 million for European Territorial Cooperation and EUR 13 million for the Youth Employment Initiative. This represents an average of 2,270 euro per person from the EU budget over the period 2014–2020. An additional EUR 2 billion is invested in the development of the agricultural sector and rural areas by the EAFRD, and EUR 31 million in the fisheries and aquaculture sectors by EMFF. The investments of the funds need to concentrate

on a limited number of priorities. To that extent, the Czech Republic might invest in the promotion of research and innovation (EUR 2.5 billion), enhancing access to, use and quantity of ICT (EUR 1 billion), reinforcing the competitiveness of enterprises (EUR 1.4 billion) supporting the shift towards a low carbon economy (EUR 2.2 billion). Thematic concentration is therefore above the minimum requirement. The ESF share in Cohesion Policy funding is 22.3% equivalent to EUR 3.4 billion. Significant attention is given to the territorial dimension of interventions in particular in the area of urban development and access to public services. At least 5% of the ERDF is invested in sustainable urban development. More than 22% of the allocation of the ESI Funds is a contribution to climate change objectives, in line with the overall ambition to spend at least 20% of the budget of the European Union to those objectives.

CONCLUSION

A clear focus on least developed countries and regions remains a key feature of the Regional Policy despite some shifts in the political agenda and enlargements of the European Union to include more member states. A range of empirical and macroeconomic studies confirm that EU-funded interventions translate into accelerated social and economic change. Meanwhile, the Cohesion Policy has recently become a major source of funding for the Europe 2020 strategy. Consequently, apart from stimulating convergence, interventions should also contribute to attaining the development objectives across the EU in innovation, employment, social inclusion and transition to low-carbon economy. Throughout the implementation of operational programmes in three financial perspectives, the Czech Republic has reported a dynamic social and economic transition, which largely helped to bridge the development gap between them and the EU average. Available research suggests that the social and economic change in the Czech Republic is also substantially due to the operational programmes funded under the Cohesion Policy.

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PRODUCTIVITY AND COMPETITIVENESS OF REGIONS

Martina Novotná[5]
Tomáš Volek[6]

COMPETITIVENESS AND LABOUR PRODUCTIVITY

Competitiveness can be defined in different ways. This term can be understood on many levels. Competitiveness is often linked to the competitiveness of companies. It is possible to measure the competitiveness of the enterprise to other enterprises or in comparison to the competitiveness of enterprises in other states or regions. From another point of view, it is to monitor the competitiveness of the whole economy as compared to other economies. Bruneckiene and Paltanaviciene (2012) confirm this opinion and say that country competitiveness is necessary understood as a complex of competitiveness at the international level of individuals, enterprises, economic branches and conditions established in the country.

There is practically no sophisticated way of measuring the competitiveness of state or administrative units. There are many approaches that can be divided into traditional and modern. Every approach has its strengths and weaknesses. The traditional measure of strengthening competitiveness is the growth of gross domestic product (comparison of GDP growth rate in the form of volume indices). In addition, modern concepts of competitiveness are based on the thesis of the priority of the quality of the legal environment. The share of creative industries (innovation or scientific progress) on total structure of the national economy is other view on competitiveness. There is an effort to define how economic performance cannot be measured solely by economic growth or declining unemployment, but also by using soft indicators such as the share of creative industries in GDP or the level of education or quality of life (Kislingerová, 2014).

International comparison of the economic status and development can be rated in various ways, using some economic or human development indicators. Enhancement of economic well-being of the EU countries belongs to the main goals of the 28 EU Member States. It is usually done by comparison of the levels and real changes of the gross domestic product (GDP). The improvement of well-being expects the convergence of socio-economic indicators (Carnicky, et al., 2016).

Competition in world markets is more intense due to globalization. There are many ways to increase competitiveness (e.g.: make regular innovations by products and services offered by the company, permanently modernize production technologies, search for new distribution routes and to use ICT resources efficiently, innovate internal business processes in conjunction with a substantial organizational change in internal company environment (Raška, 2007).

Many countries have been engaged in the Fourth Industrial Revolution for several years. Industry 4.0 fundamentally changes the character of industry, energy, trade, logistics, and other parts of the economy. The Czech Republic approved in 2016 the Industry 4.0 initiative whose long-term goal is to maintain and strengthen the competitiveness of the Czech Republic. The digitization of the economy takes place across a wide range of industries, and the goal of Industry 4.0 is to bring complete digital interconnection to all levels of value added – from product development to logistics. This means radical change and investment planning in large and small businesses, productivity change, the importance of IT skills in all areas of business and across a range of jobs, which will significant impact on the labour market and education (Mařík & Marek, 2015).

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The development economies combine the growth of competitiveness with innovation activities (Veber et al., 2016). Innovations and innovation activities are becoming an object of serious concern to government executives, public institutions, enterprises (Mura & Rozsa, 2013). However, the main role is for firm, i.e. innovation in terms of creating new products and practices can be an important part of tackling economic growth. Innovation contributes to business in several ways. Studies have identified for instance a strong link between enterprises performance and new products. New created products help enterprises to maintain market shares and increase profitability in the given markets (Tidd, et al. 2007).

Competitiveness can also be measured by other indicators such as productivity. Deeper analysis of the productivity is needed to discover the competitiveness, standard of living within a country or its regions. Measures of productivity are important indicators for statistical analysis of economic growth of a country. Generally productivity is a ratio of a volume measure output to a measure of input use. The most used indicator of productivity is labour productivity.

The most frequently measured indicator of productivity is labour productivity. Labour productivity is the most common indicator to measure single-factor productivity. Indicator of labour productivity shows the efficiency of utilization factors of production and the production possibility of enterprise or economy. LP is the one of the most important factor that affect overall performance of any company or country. Labour productivity is relationship between growth in the labour force and growth in output per hour worked (Romer, 1990). Labour productivity we can write as GDP per employee (Belorgey et al., 2006), value added per labour (Broersma & Oosterhaven, 2009) or gross value added per employee (Volek & Novotná, 2015) Labour productivity can be measured at the firm, sector and regional or national level.

Identification of factors affecting labour productivity have become a critical issue for a long time. Understanding critical factors affecting labour productivity of both positive and negative can be used to prepare

a strategy to reduce inefficiencies and to improve the effectiveness of enterprises or regions performance as innovations (Mura & Rozsa, 2013) or start-ups (Chmelikova & Redlichova, 2013). Factors affecting labour productivity operate within (internal) but also outside (external) of enterprise or economy structure. There are two sources of labour productivity growth: technical progress and increases in the average capital–labour (K–L) ratio (Guest, 2011).

Labour productivity is influenced by many shocks. There are two types of structural shocks: (1) technological shocks, that are changes in the technological progress which affects labour productivity in the long-run, and (2) non technological shocks, that is all the other shocks that affect labour productivity temporarily through its effects on capital accumulation and aggregate demand (Travagliny, 2012). Among non-technological shocks, we can include the business cycle (Novotná& Volek, 2011). Labour productivity is influenced by business cycle and productivity affects the business cycle.

The regional or countries economy has become increasingly more dynamic and complex. As a result, economic measurement and analysis, particularly relating to productivity, have become more difficult and complicated. The main problem involves properly defining units of measurement, evaluating qualitative changes and obtaining reliable data for both inputs and outputs. This process is further complicated by the need to price – deflate this data in order to evaluate changes in labour productivity in real terms (Attar et al. 2012)

MEASURE OF COMPETITIVENESS – NATIONAL ECONOMICS

The traditional measure of competitiveness of the economies (at NUTS1 level – EU countries) is the growth of gross domestic product (GDP). For better international comparisons, it is advisable to compare GDP growth in purchasing power parity (PPP). This approach is problematic because

countries where GDP is high cannot achieve such growth as states with very low levels of GDP.

The growth of GDP

The growth rate of GDP in the form of volume indices is used to compare GDP growth rates. GDP in volume is calculated by dividing GDP at current prices by a price index that is equal to 100 for a set base period. A volume index (GDP) is a weighted average of the changes between two periods in the quantities of a given set of goods or services. The two periods can be consecutive or non-consecutive. The quantity ratios are independent of the units in which the quantities are measured. Most of the indices can be expressed in the form of weighted averages of these price or quantity ratios. In most OECD countries, the national accounts in volume are calculated at the prices of the previous year and then chained. The chained accounts use as weights the prices of the previous year and are therefore suitable for measuring changes in volume. Their drawback is their non-additivity.

The Laspeyres volume index (Lq) is a weighted average of the quantity ratios:

$$Lq = \frac{\sum_i \frac{q_{i,t}}{q_{i,0}} \cdot v_0}{\sum_i v_{i,0}} = \frac{\sum p_0 q_t}{\sum p_0 q_0}, \quad v_{i,0} = p_{i,0} \cdot q_{i,0} \qquad (1)$$

The main source of data for calculation of competitiveness was Eurostat and OECD (The OECD Economic Outlook). The competitiveness of the five countries was first assessed by means of growth rates in volume of GDP (figure 1) and GDP per capita respectively (Table 1).

Figure 1: Gross domestic product at market prices (Chain linked volumes, percentage change over previous period)

Source: Own calculations based on the data OECD Economic Outlook

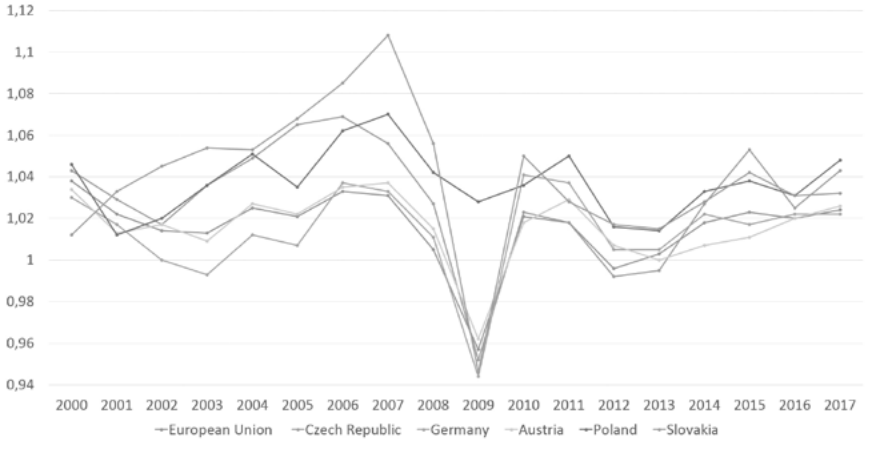


Figure 1 shows a fluctuation in all regions surveyed in the economic crisis (2009) when GDP growth was negative. A further decline in the growth rate of GDP (GDP volume index < 1) is in 2012–2013 in particular for two territorial units (EU (28 countries) and Czech Republic). In the last year under review, GDP growth in the Poland, the Slovakia and the Czech Republic is higher than the EU average (28 countries). If we use for international comparison only the growth rate of GDP, we get a slightly distorted results. This result may be due by the different dynamics of population growth in countries (especially when comparing European and non-European countries).

This means that it is better to compare growth in GDP per capita rather than in GDP itself.

Table 1: Growth in real GDP and in real GDP per capita 2010–2015, average annual growth rate in percentage

Source: Own calculations based on the data OECD Economic Outlook

	Volume index	Per capita, constant prices, constant exchange rates, OECD base year
Czech Republic	1.57	1.53
United States	2.04	1.27
European Union (28 countries)	0.96	0.74

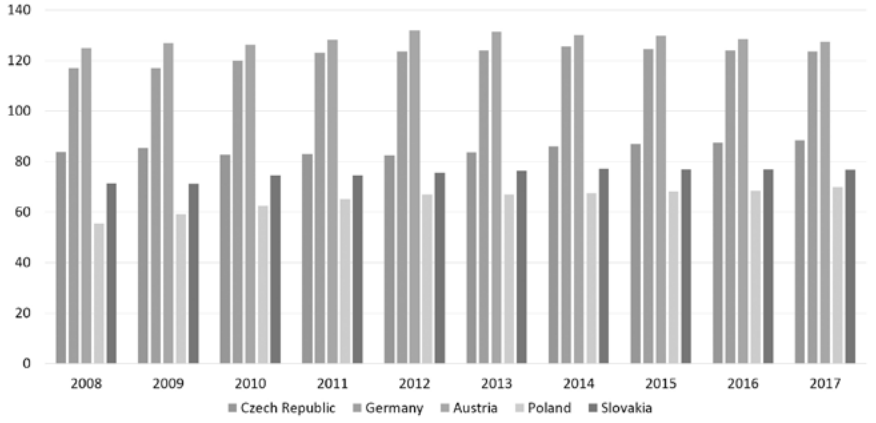
The difference between the growth rates per capita (United States) was only 0.53 points in the case of European Union (instead of 1.08) and 0.26 points for the Czech Republic (instead of 0.47 points). The differences between the three countries surveyed are not so significant if we use the GDP growth per capita to compare.

Another option to compare the development of regions' competitiveness is to use a spatial index where the basis of the comparison is the country or region and not the value of the indicator in another period. For the base in spatial comparisons, the OECD usually uses either the average level of prices for OECD countries or more simply, the level of prices in the United States or the level of prices in EU (using EUROSTAT). Figure 2 shows a comparison of GDP per capita with "purchasing power parities (PPP)".

Figure 2 shows that the Austria and Germany has higher GDP per capita than the EU (28 countries). Czech Republic have level of GDP per capita about 88% of EU (28) and Slovakia even at 77% of the EU average (28). The development of GDP per capita indicator in the all monitored countries is still growing despite of business cycle fluctuations.

Figure 2: GDP per capita in PPP (index, EU28=100%)

Source: Own calculations based on the data Eurostat

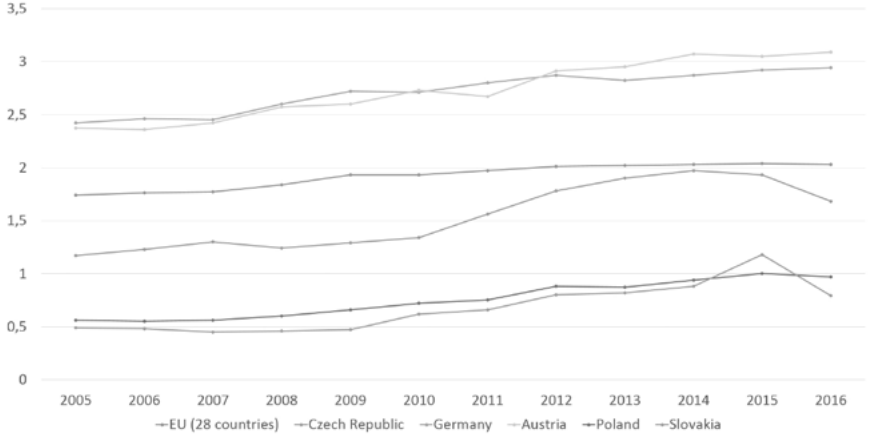


Research and development expenditure (R & D)

Competitiveness can also be assessed by the share Gross domestic spending on R & D (Figure 3). These indicators make it possible to see if there is enough innovation in the economy associated with the implementation of digitization and robotization elements in the context of Industry 4.0.

Figure 3: Gross domestic spending on R&D (% of GDP, 2005–2016)

Source: Own calculations based on the data Eurostat



Share of Gross domestic spending on R & D is the highest (in the all monitored countries) in Germany and Austria with stable growth since 2013 (approximately 3% per year). In the Czech Republic, this share has been closer to the EU (28) average since 2013. The Slovak Republic and Poland had the lowest share of gross domestic spending on R & D (since 2014 about 1% per year).

Labour productivity – competitiveness benchmark

Labour productivity is as another benchmark of the competitiveness of economies. It can be defined in different ways. The most used definition is GDP per hour worked. In this case, it is interesting to compare indicator relative to the EU average (EU 28). Figure 4 shows a comparison of Nominal labour productivity per hour worked.

Figure 4: Nominal labour productivity per hour worked (index, EU28=100%)

Source: Own calculations based on the data Eurostat

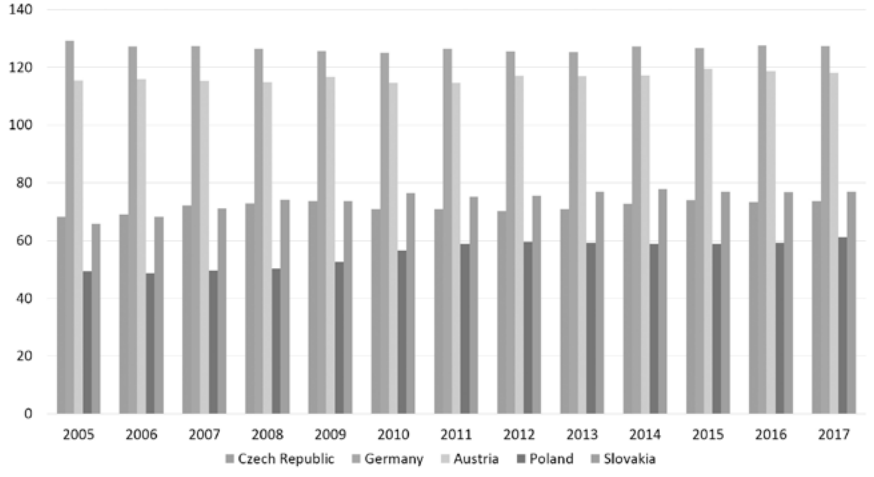


Figure 4 shows that the Germany and the Austria has higher labour productivity than the EU average (28). Czech Republic have level of labour productivity per hour worked about 73% of EU average (28) and Slovakia

even at 77% of the EU average (28). The development of the monitored labour productivity per hour worked indicator in the Czech Republic, Slovakia and Poland is still growing despite of business cycle fluctuations.

Modern concept of competitiveness

Another possibility is using of composite indicators (purpose is to provide a synthesis combining indicators into a single indicator) e.g. human development index (HDI). Nowadays, there are many sets of indicators that are typically used by statistical authorities to address economic, social and environmental phenomena, such as the World Economic Forum (Global Competitiveness Index) or IMD – International Institute for Management Development (World Competitiveness Ranking). This index evaluates how countries direct their resources and competencies to increase prosperity. With the modern concept of competitiveness assessment concepts, which take into account more areas such as innovation, business sophistication, labour market efficiency and technological readiness in one composite indicator is based on the ranking of territorial units (Table 2).

Table 2: Ranking of states in composite indicators

Source: IMD World Competitiveness Centre

	World Competitiveness Ranking (63 countries) in 2018 (2017 rankings are in parentheses)	Global Competitiveness Index World Economic Forum in 2016–2017 (140 countries)
Czech Republic	29 (28)	31
Slovak Republic	55 (51)	67
Germany	15 (13)	4
Austria	18 (25)	23
Poland	34 (38)	41

REGIONAL DISPARITIES OF LABOUR PRODUCTIVITY IN REGION

There is a significant difference between the economic levels of particular member states of the EU. These differences are not caused solely by the number of used production factors, but also by their efficiency – productivity. Regional disparities can be defined as inequalities in the economic or socio-economic growth of the regions (Dusek, 2013). Economic and regional convergence is broadly concerned with whether poor economies catch-up to wealthier economies (Rey & Janikas, 2005). Convergence can serve as a prediction concerning the movements through time of each economy along the path leading to a balanced growth (Ulusoy & lcin, 2011). Some empirical studies have examined labour productivity growth and the convergence hypothesis for various countries, regions (Kumar, Russell 2002, Färe et al. 2006) or sectors (Mulder, De Grooot 2007). The concept of convergence is understood as a convergence of the economic level of different countries (the assessment of labour productivity convergence in the member states of the EU is considered in this case). To investigate in detail if countries with lower labour productivity have a higher growth rate than countries with a higher level of this indicator, the absolute converge (β-convergence) and σ-convergence were applied.

The objective is to examine convergence of labour productivity for EU countries over the period 2000–2017 and in the context of different starting positions of countries. This period of seventeen years was chosen even though some of the countries were not all the time members of the EU. The starting positions of the examined countries were classified according to the level of labour productivity of particular countries (the gross value added (GVA) a total employment domestic concept- L) in the year 2000.

The terminology of convergence was created in connection to the theory of growth models. The basic source is, for example, Barro's, Sala-I-Martin's monograph (1995). The concept of convergence is understood as a convergence of the economic level of different countries (the assess-

ment of labour productivity convergence in the member states of the EU is considered in this case).

If we assess the relationship of the economic, based on any indicators, between two economic entities, it is possible to the express the converge as follows

$$|y_{1,t} - y_{2,t}| > |y_{1,t+1} - y_{2,t+1}|, \quad (2)$$

where $y_{1,t}$ *a* $y_{2,t}$ are relevant economic quantities in time *t*.

It is possible to encounter also a different formal notation which assesses a relative distance of economic levels of countries

$$\frac{y_{1,t}}{y_{2,t}} < \frac{y_{1,t+1}}{y_{2,t+1}}, \quad (3)$$

where $y_{1,t>}y_{2,t}$ and this relationship could be interpret that the relative distance between two economic quantities decreases in time.

β-convergence comes from the neoclassical conception of the economic growth, where the growth of labour productivity is, in this case, negatively dependent on a starting economic level. It means, in the concept of β-convergence, that countries with a lower labour productivity level increase faster in a starting point of observation in comparison with countries with a higher level of this indicator. β-convergence can be defined using the following regressive equation:

$$\frac{1}{T} ln\left(\frac{Y_{it}}{Y_{i0}}\right) = \alpha + \beta * lnY_{i0} + \mu_i \quad (4)$$

Where the left side of the equation expresses the average labour productivity growth in the period from starting point 0 to *t*, which is dependent on the initial labour productivity level ($Y_{i,0}$), *i* denotes an observation number (country), T is the total number of years of the observation period, α is a constant, β is a coefficient and μ_i is a random component. B-convergence

occurs when the slope of line beta is negative. B-convergence is mainly rooted in the methodology of Baumol's (1986) who correlated the absolute level of GDP per work-hour and growth rate of GDP per work-hour.

σ-convergence comes also from the neoclassical conception of the economic growth, where all states converge to the same level of economic development or to the same economic performance. σ-convergence means a decline of the „dispersion" rate of labour productivity (i.e. the relative rate of variability) between countries in time. We can write:

$$\sigma_t > \sigma_{t+1} \tag{5}$$

Ex post we can write

$$\sigma_{t-1} > \sigma_t. \tag{6}$$

As a relative variance rate is used the coefficient of variation c_x, which is a quotient of the standard deviation and the arithmetic mean of the given observed variable

$$c_x = \frac{s_x}{\bar{x}} \text{ , where } s_x = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n}}. \tag{7}$$

σ-convergence takes place if the coefficient of variance of the economic levels of particular countries decreases in time. When defined on absolute differences, for example (Slavík, 2007), the existence of β convergence a necessary condition for σ convergence. However, this relationship need not be true vice versa.

Regional disparities of labour productivity (β convergence) – national economics

To make the analysis more detailed and to find out whether labour productivity of the member states converges in time, β-convergence coming from Baumol's approach was applied. It is derived from the average

growth rate of labour productivity in the observed period (the vertical axis) and this increase is dependent on the starting level of labour productivity (the horizontal axis). This relationship is obvious from Figure 5 and the following regressive model (Table 3).

Figure 5: β convergence of the EU countries
Source: Own calculations based on the data of Eurostat

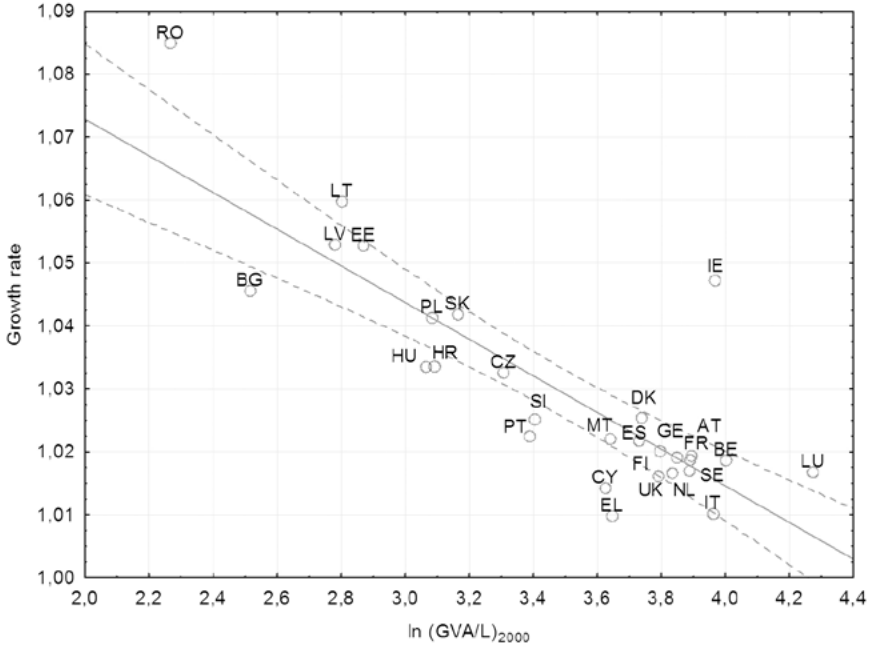


Table 3 presents an estimation of linear selection function and it summarizes basic statistical characteristics of the estimation of the function. It was proven that 0.70% of variance of the observed average yearly rates of labour productivity can be explained using the regressive model. Results of F-test showed that there a statistically significant dependence.

Table 3: The results of regression

Source: Own calculations based on the data of Eurostat

Growth rate; R= .83529776 R2= .69772235 correct R2= .68609629 F(1,26)=60,014						
	b*	Standard error – z b*	b	Standard error – z b	t(26)	P-value.
constant term			1.131085	0.013189	85.76204	0.00000
$ln\ (GVA/L)_{2000}$	-0.835298	0.107824	-0.029129	0.003760	-7.74685	0.00000

The selective regressive coefficient, which is a slope of a line, is at the same time coefficient β. As the coefficient is negative and the determination index () is sufficiently significant, we can claim that the EU states converge mutually.

Regional disparities of labour productivity (σ convergence) – national economics

The convergence process of the labour productivity levels can be examined using σ-convergence, which uses the coefficient of variation. Table 4 illustrates labour productivity values levels of the EU (28) using descriptive statistics in years 2000–2017. The development of the labour productivity values in PPS shows that there is an evident gradual increase of labour productivity. The increase is broken in the year 2009 (the year of the world economic crisis), when there is a significant decrease of the mean value as well as of the median. Standard deviations have increased since 2014 which means greater disparities in labour productivity across EU countries. From the convergence point of view, the development of the coefficient of variation is important. Considering the development in the EU (28) we can assume σ-convergence as the variance values decrease to the year 2013. Since this year, the variation coefficient has been slightly increasing.

Table 4: Development of labour productivity in PPS and coefficient of variation

Source: Own calculations based on the data of Eurostat

	average	median	min.	max.	SD	Var.coef.
2000	35.89	38.16	9.64	71.59	15.37	42.83
2001	36.99	39.94	10.66	68.90	14.92	40.35
2002	38.46	41.02	12.61	70.42	15.00	39.01
2003	39.18	42.89	13.32	70.43	14.69	37.50
2004	41.16	43.80	14.96	73.74	14.98	36.39
2005	42.82	45.00	16.17	77.83	15.12	35.31
2006	44.88	46.42	16.61	85.66	15.85	35.32
2007	47.17	47.71	18.13	89.15	15.99	33.90
2008	47.27	47.74	18.70	85.93	14.92	31.56
2009	45.37	46.43	18.54	79.05	14.04	30.94
2010	47.73	46.53	20.39	83.07	14.62	30.62
2011	49.08	46.53	21.56	87.22	14.95	30.46
2012	50.31	47.21	22.53	86.56	14.89	29.59
2013	50.89	47.16	22.25	88.25	14.96	29.39
2014	52.27	48.38	23.61	93.84	15.70	30.03
2015	55.24	51.24	24.62	113.98	19.08	34.54
2016	54.71	50.86	25.15	111.39	18.32	33.49
2017	55.63	51.37	26.37	115.49	18.50	33.26

In the age of globalization, the issue of territorial unit's competitiveness is of increasingly central importance for economic growth of countries. Competitiveness of territorial units (countries) can be assessed through various indicators such as real GDP growth rates, GDP per capita, labour productivity, and indicators of innovation activity. It was found that the comparison of selected local units by volume index of GDP leads to greater variability than in a comparison to the growth rates GDP per capita. A useful tool for comparing territorial units is a spatial index.

The ranking of the success of territorial units can be create by using multidimensional comparisons. Based on many indicators, some world organizations compile composite indicators that summarize selected indicators into a single benchmark indicator (IMD World Competitiveness Centre). The convergence analysis of labour productivity revealed that the states mutually converge. It means that states with a lower labour productivity level in the starting year of observation catch up the other states with a higher level of this indicator in a higher growth rate. The analysis of the labour productivity proved both β-convergence. The σ-convergence have shown that the level of labour productivity levels have converged in EU countries until 2013. Since 2013, the convergence of labour productivity has changed, which indicates a variation coefficient.

Regional disparities of labour productivity in Czech regions (NUTS 2)

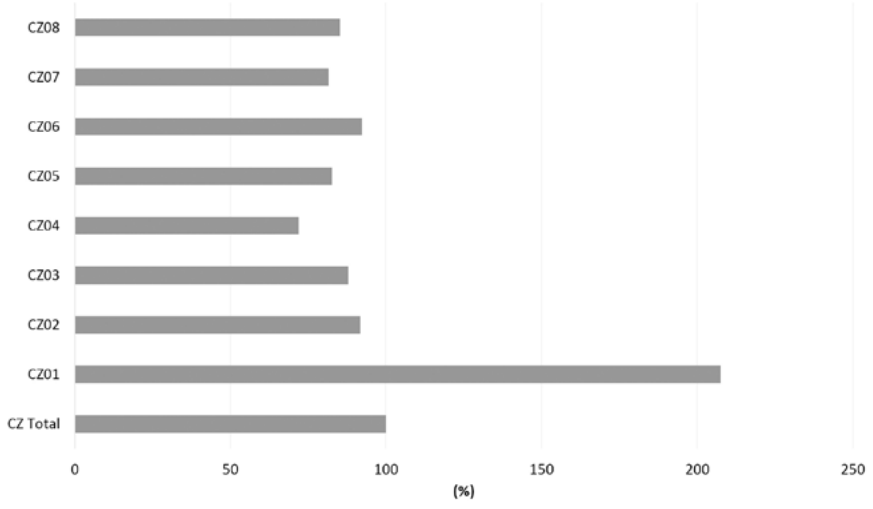
The basis for measuring labour productivity is the economic performance of the regions. The economic performance of the regions is not the same and it is often influenced by external factors (economic cycle, political situation, etc.) or internal factors (structure of firms or sectors (Vrchota, Řehoř, 2017), situation on the labour market, etc.). The economic growth of the regions can be measured by the economic power or the economic level of the regions. The most often used regional indicator for measurement of economic power is indicator per capita.

The economic level of the Czech regions (NUTS2), measured by GDP per capita is very similar except Prague region (Figure 6). Prague has a double economic performance than the average of the Czech Republic (207% CZ average). On the contrary, the best region is the region of northern Bohemia, which reaches only 70% of the Czech Republic average.

Figure 6: The economic level of the Czech regions (NUTS2)

Source: Own calculations based on the data of Eurostat

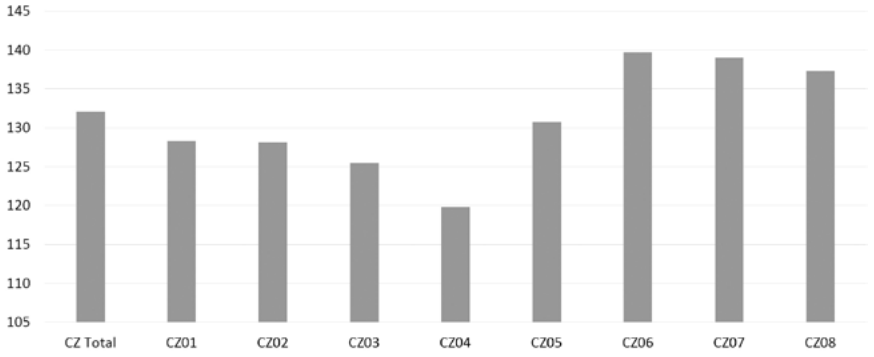
Note: (The Czech Republic CZ Total, Prague CZ01, Central Bohemia CZ02, South West CZ03, North West CZ04, North East CZ05, South East CZ06, Central Moravia CZ07, Moravian-Silesia CZ08)



In the long term it is necessary to assess the development of economic growth. The biggest growth in the region's economic performance was found in the region of South Bohemia and South Moravia from the period 2006 to 2016 (Figure 7). On the contrary, the region's lowest performance growth was found in the North Bohemia region. Significant differences in the change of economic performance in the regions are often due to the sectoral orientation of individual regions.

Figure 7: Index of GVA per capita (2016/2006,%)

Source: Own calculations based on the data of Eurostat



The economic performance of the regions and their disparities are affected by the competitiveness of these regions. From the point of view of the competitiveness of individual regions. It is necessary to monitor the competitiveness of each region as effectively as human resources are used here. The main indicator which shows efficiency of labour force is regional labour productivity. Firstly, the level of regional labour productivity in the Czech Republic for NUTS 2 is assessed in comparison with the year 2006. The table shows the negative trend that labour productivity, measured by the gross value added of the labour cost in most regions decreased except for the South East region Table 5).

Table 5: Labour productivity – regions NUTS 2 in CZK

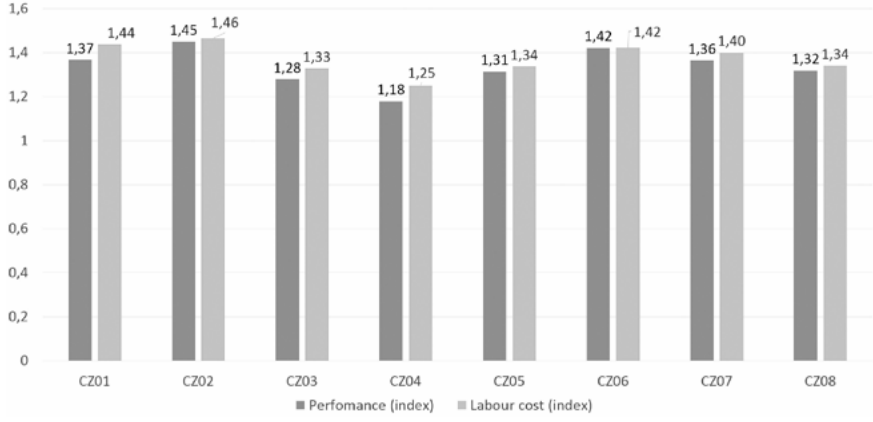
Source: Own calculations based on the data of Eurostat

		2006	2016	Index 2016/2006
The Czech Republic	CZ Total	2.29	2.23	0.97
Prague	CZ01	2.28	2.17	0.95
Central Bohemia	CZ02	2.58	2.56	0.99
South West	CZ03	2.30	2.21	0.96
North West	CZ04	2.35	2.21	0.94
North East	CZ05	2.24	2.20	0.98
South East	CZ06	2.18	2.18	1.00
Central Moravia	CZ07	2.25	2.19	0.98
Moravian-Silesia	CZ08	2.23	2.19	0.98

What is the main reason for the decline in labour productivity? The growth rate of labour costs excesses the growth rate of regions performance for all regions except region South East (Figure 8). This situation can entail a risk for regions to reduce their competitiveness.

Figure 8: Growth of outputs and labour costs – index (2016/2006, %)

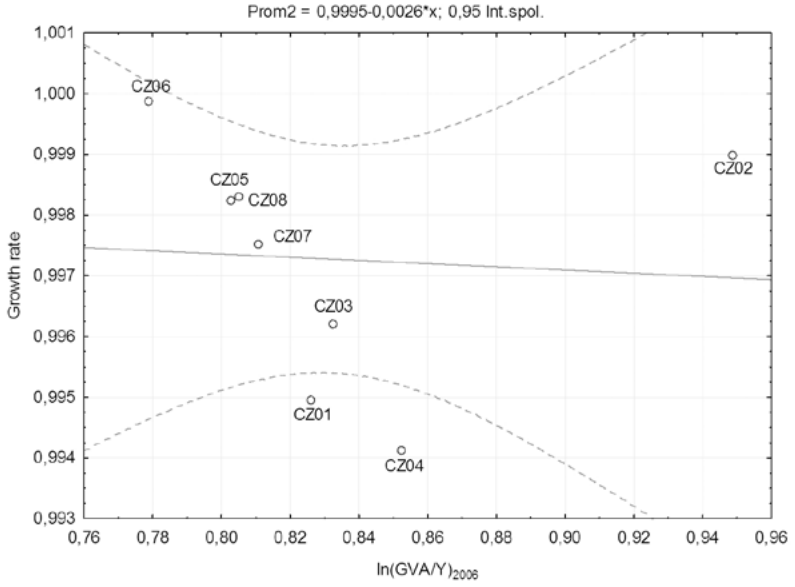
Source: Own calculations based on the data of Eurostat



The following Figure 9 shows the disparities in regional labour productivity in Czech Republic (NUTS 2). The selective regression coefficient (-0.0026) is negative, but the determination index was not significant ($R^2 = 0.1$) (Figure 9). The results show us that the regions are not characterized by significant convergence in labour productivity.

Figure 9: β convergence of the Czech Republic regions

Source: Own calculations based on the data of Eurostat



The process of convergence labour productivity levels can also be assessed by the sigma convergence which using the variation coefficient. Table 6 illustrates labour productivity levers for NUTS 2 regions in period 2006 and 2016. The development of variation coefficients indicates that there is no sigma convergence because the variation coefficient values do not decrease over time. In regions of the Czech Republic therefore does not reduce the gap in labour productivity.

Table 6: Labour productivity – regions NUTS 2 in CZK and coefficient of variation

Source: Own calculations based on the data of Eurostat

	average	median	min.	max.	SD	Var.coef.
2006	2.30	2.27	2.18	2.58	0.12	5.40
2007	2.30	2.24	2.22	2.58	0.12	5.21
2008	2.27	2.20	2.12	2.71	0.19	8.41
2009	2.28	2.26	2.10	2.57	0.14	6.32
2010	2.27	2.26	2.17	2.51	0.11	4.91
2011	2.26	2.24	2.15	2.52	0.12	5.18
2012	2.22	2.18	2.08	2.49	0.12	5.53
2013	2.21	2.20	2.07	2.46	0.12	5.55
2014	2.28	2.26	2.08	2.60	0.15	6.62
2015	2.29	2.25	2.17	2.57	0.13	5.52
2016	2.24	2.20	2.17	2.56	0.13	5.76

The level of labour productivity is one of the critical factors influencing the competitiveness of regions in the Czech Republic. It was found that, labour productivity in most Czech regions (NUTS 2) decreased due to a significant increase in labour costs over the period under review as compared to the growth in the production performance of regions. This situation is caused by situation in the labour market where labour productivity is very influenced by the flexibility in the labour market (Pavelka & Loester, 2013). Next disproportionate wages growth can mean a significant risk of losing competitiveness for Czech regions in the future.

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MUNICIPAL MANAGEMENT AND LOCAL COMPETITIVENESS

Petr Řehoř[7]

INTRODUCTION

The issues related to the questions of regional and local development have recently been discussed by a number of scientist, researchers together with the policies of the Czech Republic and the European Union (further referred to as the EU). The first reason is related to rather significant interregional differences in the European area. Another reason is related to the opportunities of support from the EU Structural Funds. In Czech terms, these issues have become more serious since the Czech Republic joined the EU. One of the main objectives of economic and social cohesion policy is the regional competitiveness.

Together with the accession of the Czech Republic to the EU, a reform of the public administration was launched and its main purpose was to bring management elements into the public administration system, focus on efficiency, professionalism and performance. New tools for managing and improving the management skills of local government managers have become a necessity. The qualities of public sector services and resource efficiency have thus become the primary task of strategic management of the municipalities. One of the other key tasks of elected representatives of local governments is to increase local economic competitiveness.

The strategic management of the municipalities must seek, exploit and develop external opportunities so that the municipalities are able to keep their competitiveness, together with their internal potential (infrastructure, human resources, the environment, development areas), and geographic location being a very important factor. The development potential of most municipalities is decreased by both a lack of funds, and a disadvantageous demographic structure, insufficiently developed civil and technical infrastructure. A citizen is the most important part of each municipality. The local government should do everything for their citizens to ensure their maximum satisfaction. Other important aspects, which the municipal management has to deal with, are certainly community development, its growth and, last but not least, economic stability and economy.

Successful development of municipalities is usually the result of the long-term and hard work of the people (strategic management of the municipality) from the local area and it is based on mastering strategic conceptual management and creation of environment of working together and supporting each other. To guide the development of the municipality, it is necessary to use strategic management tools. Because of the mixed model of public administration and the overall complexity of public administration, it is very difficult for the mayors of municipalities, particularly in the exercise of their functions, in a limited time and personnel space, to grasp the essence of municipal self-government and to get information, necessary for the successful management of a municipality, in an inconvenient way, Each municipality has limited funds and only good management can effectively use these resources to increase local competitiveness. The statistical aspects of competitiveness measurement are very diverse and focus mainly on the comparison and appreciation of the position of the regions. At municipal level, the calculation of local competitiveness, probably due to a limited number of monitored indicators, is almost never done. However, based on its calculation, it is possible to identify differences in the level of economic, social and environmental development of municipalities. These differences are called disparities. Expression of disparities is based both on the identification of key indicators together with the evaluation of their

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development, and on the construction of aggregate indicators. Approaches to generating aggregate indicators are widely discussed. The creation of one dimensionless aggregated indicator is always based to a certain extent on the intuitive approach of a researcher, and it is related to many advantages and disadvantages. The main advantage is seen in the possibility of rapid and clear comparison of the monitored areas. The drawbacks of aggregate expression of local competitiveness on the basis of one indicator result from the great simplification of reality and the lack of differentiation between the underlying elements.

Using more advanced quantitative approaches, including multidimensional statistical methods, appears to be the right way to model an aggregate indicator. These methods are based on the examination of the links and relations between the indicators and their use can either minimize or even eliminate the above mentioned disadvantages. Although the issue of local development management is widely discussed, it is still rather unexploited and complexly unrecognized area of regional economic research. Moreover, this term is not theoretically defined; so different authors approach its definition (definitions, tools, functions) quite differently. Current knowledge of municipal management does not provide exhaustive guidance and procedures on how to plan strategically well, direct the development process at local level or increase the competitiveness of the municipality. They represent a set of findings from the proven use of strategic tools in the practice of public administration, which can serve as a basis for the work of municipal management.

The origin of strategic management is being connected with mid-eighties of the 20th century that are characterized by growing rate of competition, increasing pressure to innovate and rising orientation towards customers. The aim of the management was to find and realize strategy that would represent a competitive advantage. Similarly organizations of non-profit sector started using principles of strategic management to a great extent. There is a series of researches and examinations that are carried out in the EU with the aim to evaluate a level and dynamics especially in regional development. So the concern that arises refers to

evaluating local development and local competitiveness and determining integrated methodology to examine dynamics of development processes and to define current as well as developmental level of municipalities.

The aim of the chapter is:

1. based on the secondary data, to find such variables having a major influence on the competitiveness of municipalities and determine the degree of their impact in the joint action, using statistical methods;
2. to propose a methodical procedure for the compilation and calculation of the local competitiveness index (development potential of municipalities);
3. using local competitiveness index, to compare the municipalities of the region of South Bohemia and determine their position. In addition, to select critical municipalities where strategic management needs to be changed and their development should be taken into account and at the same time to highlight the most competitive municipalities that can be a model for other municipalities in terms of their strategic management and development.

LITERATURE REVIEW

Strategic management is a set of methods and approaches that are applicable to managing the development of regions and municipalities. The basic requirement of this process is to increase their competitiveness (Rolínek and Řehoř, 2006). The objective of strategic management in the conditions of municipalities is to seek the best possible satisfaction of the interests and needs of the citizens in the managed localities, in the form of cooperation of all incorporated self-governing entities. Regarding the other objectives, emphasis is placed on providing financial and other material resources for its needs and for the provision of the highest quality services (Modified by Horčička, 2007).

Issues connected with the questions of regional development are getting at the forefront of many scientific and research branches and also policies of the Czech Republic and European Union (Skokan, 2003). In the Czech Republic the term became more serious when the Czech Republic got closer to and joined the European Union. Regional competitiveness is one of the main aims of economic and social policies of cohesiveness (Stejskal, et al., 2009). Skokan (2004) states that regions in Europe became a significant driving power in the whole company development based on knowledge and based on their existing experience, quality and involvement and they will still play more important role when reaching economic growth and competitiveness. In Anglo-Saxon literature we can often find the term of LED (local economic development), which emphasizes the economic aspect of development implemented in certain locality (municipality) (Greenwod, et al., 2010; Blakely, et al., 2008; Blair, et al., 2008).

Cunningham and Meyer (2005) summarized common characteristics in LED definitions: LED is driven by local government but involvement of private sector and civil community is necessary. Significant social and economic changes occur in all regions. Lower territorial units (municipalities) gain more important role in increasing their competitiveness. They are becoming a motor of economic growth (Turok, 2003). Capello and Nijkamp (2009) state that competitiveness of regions, cities and municipalities form an important part of the theory of regional development.

Municipal management approaches represent ways how to municipalities can properly administer, manage and develop their territories in local and regional development (Rolínek and Řehoř, 2006). Individual cities and towns compete among each other especially in the acquisition of economic subjects, which create and stabilize new jobs, thereby influencing prosperity and the standard of living of their residents (Rolínek and Řehoř, 2008). Author understands the growth of social-economic and environmental potential and competitiveness of regions leading to increasing its inhabitants' living standards and quality of life as regional development (Holátová and Řehoř, 2006).

There is a range of methods and ways how to assess competitiveness and also a range of views of individual factors. Kahoun (2007) defines indicators of regional competitiveness and classifies them into three categories: macro-economic performance, innovative performance and quality of life. Inclusion of the indicator of quality of life is an effort for taking account of social and ecological criteria of regional disparities. Basically the same approach to define competitiveness factors at the regional level is used by Kadeřábková (2007) when assessing regional competitiveness in Annual Competitiveness of the Czech Republic.

Competitiveness index established by Huggins (2003) represents a dynamic tool, by which competitiveness of regions should be measured. The author applied established index of measuring competitiveness on the territory of Great Britain but if specifically modified the index can be used in other states too. Significant economists such as Porter, M.E. (1990), Kotler, P. (2007) or Czech authors Skokan, K. (2004) and Wokoun, R. (2008), deal with the issue of competition and competitiveness, competitive benefits and competitive strategies at micro-economical level.

In the area of municipal management there is, besides legal limitations of selected activities, a relatively extensive area for creative approach towards solving development of municipality when municipality can enterprise, invest various ways, choose above standard services to assure for the citizens, etc. This opens a wide field of activities connected with municipality's dispositions, visions and citizens' needs (Holeček, 2009). One of the key tasks of local management is support for local competitiveness. The localities that can best attract people and capital, and in consequence they can increase quality of life for their citizens, naturally with the highest possible utilization of local sources, can be called competitive (Beneš, 2006).

The main aim and successful result of implementation of these endeavours is creation and increase of municipality's and region's competitiveness by important partial aims, which can, e.g. according to Ježek (2007), be: strengthening competitive position of local and regional associations, support for utilization of insufficiently used sources, improvement of

employment level and long-term carrier opportunities for local inhabitants, improvement of local and regional entrepreneurial environment.

To fulfil individual aims of local economic development various approaches can be used. According to Žárská et al. (2007) in particular these are the following areas of support: creation of investment environment acceptable for local entrepreneurs, support for small and medium companies, and support for new and beginning entrepreneurs, attracting external investments (national or international).

Optimum situation would be to have one general index characterizing local competitiveness. It is important that this index should reflect level of competitiveness of the municipality in appropriate way and at the same time it should enable to make comparisons. There has not been defined until now any common, generalizing indicator, index of competitiveness that would be broadly accepted.

The indicators are measurable ration, which, when properly chosen, allow to convert complex facts into simple informative data. They allow an assessment of the status and development of a particular phenomenon in a given territory and comparison with the recommended values, or the measurement of the efficiency of the expended funds in relation to the stated goals (Novák and Šafářová, 2007) and objective comparison of the individual municipalities (Šilhánková, 2008).

The common term indicators refers to such ration whose regular monitoring and evaluation is useful for the monitoring of social changes. At the same time they help to define the boundaries in which a municipality development is realized. Indicators allow to measure and evaluate the quality of life in a given community, a phenomenon that affects all areas of development. Therefore, the indicators have the potential to give a better view of development management, its planning and evaluation in the municipalities (Hřebík and Třebický, 2007).

Competitiveness of regions, and especially of municipalities, is conditioned by many factors that can be more or less successfully measured and then successfully compared (Řehoř, 2013). To assess local competitiveness we need to come out of the indicators by which we can compare

conditions among the territories. The indicators are harmonized with EU norms and they form the basis for demanding the sources supporting development of municipalities and regions. These are also indicators that are supported by information system in the Czech Republic and so they are fully quantified. The importance of economic analyses of development trends in local territorial units in the Czech Republic becomes essential (Řehoř, 2010).

MATERIALS AND METHODS

In the first place, it was necessary to collect sufficient secondary information and data on municipalities. The most important is the selection and characteristics of the indicators, used for the analysis and the selection and description of the statistical methods used in the analysis. To identify the local differences, a system of descriptors is chosen to characterize the current state and development of municipalities. The purpose of data analysis is to make the data comprehensively available in charts and tables to compile the appropriate statistical characteristics so that their static properties are clearly visible and at the same time their comparison is possible. The software of Statistica version 9 is used to process the acquired data.

The initial source of information for the selection of indicators is the various statistical surveys of the Czech Statistical Office (CZSO) of the Czech Republic. CZSO data bases show social and economic developments in a rather broad complex, both on the basis of their own statistical surveys and on the basis of ongoing use of the information base of other institutions. In addition, the CZSO data bases are consistent with the EU methodology, which makes it possible to perform international comparisons. The MOS (Municipal statistics) database is a useful source of indicators monitored at municipal level. The database includes data on cities, municipalities and their parts with an annual periodicity.

The Ministry of Labour and Social Affairs of the Czech Republic (further referred to as the MLSA) publishes information on unemployment

at municipal level at regular intervals (monthly, quarterly, and annually) on their website dealing with the issues of labour market.

Regarding municipal management, as it is important in planning the development possibilities of a given municipality, the most suitable source of information is the State Accounting and Financial Information (known as the UFIS in the Czech Republic), which is provided by the Ministry of Finance of the Czech Republic. It includes information on accounting and financial statements of individual municipalities, all in annual periodicity in the time series since 2001.

Local competitiveness is explored from many points of view and described by a number of indicators, both quantitative and qualitative. These indicators do not act separately, but in contexts and links. To discover these connections and to define the decisive factors of competitiveness, a whole range of statistical methods and analyses is used. The analyses using multidimensional statistical methods are an important tool. The measurement of local disparities, the level of municipal development and competitiveness is carried out using one-dimensional and multidimensional statistical methods, providing information for the calculation of an aggregate indicator whose creation is part of the aim of this work. When constructing a composite indicator, it is crucial to define the key indicators, involved in the calculation.

The indicators were chosen with regard to the availability of data, in particular with a view to allowing the analyses to be carried out repeatedly over the years and to assess changes in trends. The analyses focused on the following issues:

- assessing the level of individual indicators using basic statistical characteristics (average, variability, extremes, etc.). These methods helped to evaluate the level and variability of individual indicators;
- evaluation of development trends of individual indicators (growth factors);
- reducing a large number of indicators to a smaller number of relevant indicators using selected multidimensional statistical analysis methods (cluster analysis, analysis of major components);

- identifying the factors that affect the most general state of local competitiveness;
- the establishment of an aggregated indicator affecting the individual areas of local competitiveness under examination.

Statistical analyses concentrated on evaluating the level of individual indicators with help of essential statistical characteristics (average, variability), reduction of large quantity of indicators to a smaller number of relevant indicators with the use of correlation and selected methods of multidimensional statistical analysis (cluster analysis, analysis of main components), identification of factors that have most influence upon the overall state of local competitiveness, definition of aggregate indicator affecting individual examined areas of local competitiveness. If we process extensive data file of indicators, when initial number of attributes is significant and confusing for interpretation, we can use to our advantage one of the methods of multidimensional statistical analyses. Partly reduced data file of variables can be then processed in easier way. The methods can show relations among indications or divide units into clear form according to chosen indicators. Using them we can determine the index of local competitiveness. According to Hendl (2006) multidimensional analysis studies the relations between groups of variables and inside groups of variables and differences in behaviour of variables in various subpopulations. An analysis of main components was used for compiling this report. Software program Statistica version 9 will be used for processing the data acquired.

The proposed methods of defining and calculation of the local competitiveness index allow to identify the variables that fundamentally affect the competitiveness of the municipalities and to compare the individual municipalities of the region of South Bohemia according to the calculated value and to find critical and competitive municipalities. Also, development trends in municipalities will be complexly affected, and the most important indicators of local competitiveness for the period 2001–2011

are identified, and municipalities that have developed the most or, on the contrary, there are downturns.

The proposed aggregate indicator might be used to assess competitiveness in the municipalities of South Bohemia in the following areas:

- assessing the status of the municipalities in South Bohemia for 2011 and for the ten-year development and identification of competitive and municipalities with issues;
- as a possible starting point (realizing what the municipality is and might be like) to design strategic development plans of municipalities and their successful implementation through the allocation of resources from both national and EU funds.

RESULTS AND DISCUSSION

Process of index compilation of local competitiveness can be divided into 7 gradual phases.

Choosing the indicators

As shown by the literature review, in the use of different indicator frameworks for assessing the efficiency and condition of municipalities, the creation of an appropriate indicator set in local government conditions is not easy. This reflects the varying conditions of the municipalities (location, structure, size) and, above all, strategic management intentions. The set should contain a limited number of indicators.

The proposed set of indicators for the municipalities of South Bohemia, as mentioned below, uses different variables representing different areas influencing the competitiveness of the municipality to give a certain idea of the position of the municipality and of the development processes that take place in it. The aim of the proposed set of indicators is to present the data on the municipalities clearly and easily.

As part of the quantification of the status of municipalities, a total of 26 indicators for 2011 classified into the following four thematic areas (descriptors) were assessed:

1. social (demographic): total increase, natural increase in thousands of population; balance of migration in thousands of population; population aged 0–14 and over 65 in the total population; share of persons over 14 years of age with completed university education; average age;
2. economic: the registered unemployment rate; the number of registered business units; the proportion of economically active in the primary, and the secondary production; going to work outside the municipality in thousands of population; number of completed dwellings in thousands of population; share of unoccupied dwellings from the total number of dwellings;
3. environmental: the share of population connected to gas and the sewer; the share of agricultural land in the total area; the share of built-up and other areas in the total area,; the coefficient of ecological stability;
4. financial management: tax revenue per capita, financial stability, financial self-sufficiency, self-financing indicator, debt service indicator, current liquidity, debt per capita.

The assessment of the development in 2001–2011 was also based on these indicators, but they were converted to the value of the growth coefficient (i.e., how many percent the value of the indicator increased in 2011 compared to the value for 2001). At the time of this work, more up-to-date data at municipal level were not published. With regard to the possibility of municipality-to-municipality comparisons, most indicators were recalculated on a comparable basis (per thousand inhabitants).

Survey data analysis

The statistical analysis of the data took place in two most important areas:

1. An analysis of the current state of the indicators – defining the indicators of the greatest impact on the current state;

2. The analysis of development trends of different indicators – identification of the indicators of the greatest impact on development.

The defined data file (26 indicators) represents a large, multidimensional set of data that needs to be processed appropriately. The first phase consisted in conducting a survey of data analysis. Descriptive characteristics and, in particular, the variability of the individual indicators for 2011 were calculated. High variability of more than 70% was shown by half of the indicators (all of them financial), therefore these indicators were omitted from further analyses.

Correlation analysis

After reducing the variables, correlation analysis was carried out. For most indicators, the normal distribution was not proven, so the dependence between the indicators was determined on the basis of Spearman's sequence correlation coefficient. When an indicator strongly correlated with another ($|r| > 0.8$), it was removed due to possible unwanted multi-collinearity. In our case, the high correlation was proved for the average age indicator, where $r = 0.88$. It strongly correlated with indicators of the population under 14 and over 65 and therefore they were excluded from the set of indicators.

Based on the calculation of the characteristics (variability, correlation), half of the variables (i.e. 13) were excluded from the set of 26 original variables. The surprise is the exclusion of all financial indicators from the area of management. The input database, as used in the following multidimensional analysis, composed of 13 indicators.

The second part of the analyses was focused on the description and comparison of the development trends of the indicators in the years 2001–2011. From the set of the original 26 variables, five indicators were removed due to a high correlation (three social indicators and two financial indicators).

The development of the indicators (21 in total) was described using growth coefficient. As the magnitude of the coefficient of variation coefficient of growth revealed, the same or different development of individual

indicators in municipalities might be considered. There are nine indicators either high or extremely variable.

Financial indicators are again included, together with the share of flats connected to sewerage and gasification, the number of completed dwellings and the share of unoccupied dwellings. The high variability of the average growth coefficient indicates a different development of these indicators in individual municipalities. Therefore, these indicators are excluded from further analyses. The database of development indicators used in multidimensional statistical analyses has 12 variables.

The use of multidimensional statistical analysis methods

The fourth stage deals with the processing of the data found in the entire complex and its interrelationships. If such a large set of indicators is processed and the default number of characters is large and unclear for interpretation, one of the methods of multidimensional statistical analyses might be used.

In the following phase, the main components were analysed. The selection of variables in each group was based on previous one-dimensional analyses, and with a view to ensuring that multi-collinearity is not among the variables included in the groups. In terms of meeting the objective of reducing indicators and finding key indicators, only those indicators with a correlation coefficient value higher than 0.5 will be further analysed. The narrowed data matrix of the indicators that measure the current status to be used for the calculation of the aggregate indicator includes in the final sum of 9 indicators: the share of unoccupied dwellings, the share of the population over 65, the share of the employed in the primary production, the share of the population under 14, the share of persons with higher education, number of economic subjects, proportion of employed persons in the primary production, share of agricultural land, unemployment rate.

In summarizing the information obtained through the analysis of the main components based on the 2011 data, it is generally possible to state that currently the assessment of the competitiveness of the municipalities has decisive influences on the share of unoccupied dwellings, the share

of the population over 65 years and the share of the employed in the primary. All of these indicators here act as negative factors. The calculated weight was further used to calculate the aggregate indicator.

In order to assess the change in the position of municipalities and their local competitiveness in selected indicators in 2001–2011, the calculation of the growth factor was the basis. In the aggregate index, nine indicators were selected on the basis of the previous statistical analyses: the total population growth, the number of economic subjects, the share of the population at the age of 65, the share of the population under the age of 14, the coefficient of ecological stability, the share of the secondary workers, education and the unemployment rate.

When assessing the development of local competitiveness, the biggest effects of the indicator are the total population growth, commuting to work per thousand of population and number of economic entities per thousand inhabitants.

Choosing an aggregate indicator

In deciding the indicator useful for the task, it is necessary to discuss the following issues:

1. Definition of the indicator.
2. What form should the indicator have?

A comprehensive assessment of the position of municipalities in terms of local competitiveness was carried out on the basis of the calculation of the aggregate indicator, the construction of which was focused on capturing a wide spectrum of indicators and reflecting important development areas of municipalities (demographic, economic, environmental). Emphasis was placed on the comparability of municipalities and the resulting usefulness of the aggregated indicator.

The Local Competitiveness Index characterizes the overall position of a given municipality in the economic, social or environmental spheres. If these areas can be reconciled in the area of governance, it is possible to talk about the sustainable development of the municipality. Local

competitiveness can be expressed as a joint effort to exploit internal and external resources and development opportunities in order to permanently increase the production potential of the municipality.

Selection of the method for the of construction the aggregate indicator

Adjusted values of the variables were used as a base to calculate the index of local competitiveness I_{LC} used to describe the level of competitiveness (development potential) of the municipalities together with a comparison of the municipalities, and to determine their ranking.

A created index: $I_{LC} = \sum_{i=1}^{n} x_i w_i$, where: i – number of variables in the model, x_i – distance value i-variable from anti-optimum in j-municipality, w_i – weight of i-variable calculated on the basis of results of model analysis of main components.

Presented method is flexible, other variables can be added in the model analysis of main components, out of which the structure of coefficient arises, according to what will acquire the greatest emphasis during the monitored period. It is, however, necessary to be aware that the coefficient itself provides only one information, and it is important that it will be complemented by detailed economic evaluation.

Calculation of the aggregate index

Arithmetic mean and standard deviation of selected variables have to be known for further calculations. On top of that, data have to be standardized. Most frequently used form of standardization is normalization of each attribute in its own Z-score. Thus normalized values were calculated from data according to the formula:

$Z_{ki} = \frac{x_{ki} - \bar{x_k}}{s_k}$, where k is municipality and i is indicator.

Values adjusted this way have zero mean and unitary standard deviation, and they are mutually comparable. Moreover distance of standardised

values from anti-optimum was determined. Anti-optimum was set as a minimum value indicator among municipalities ((indicators with positive influence in the given area – direction of influence in the table marked with plus sign) or maximum value among municipalities (indicators with negative direction influence – the more, the worse – holds true). Weights of indicators were set according to accomplished analysis of main components.

The same direction of all indicators was ensured, by calculating distance (difference) of normalized values from antioptimum in absolute value. Final general index of local competitiveness represents sum of multiples of distance from antioptimum and relevant equals for each variable. Final ranking of municipalities in the region is also defined from this calculation. Due to a large amount of data (622 municipalities), only partial, incomplete table 1 was created just for getting an idea about values. It depicts 11 municipalities which have, from a standpoint of given index, the highest and lowest value.

Table 1: The most and the least competitive municipalities of South Bohemia in 2011

Competitive municipalities	Aggregate index value	Noncompetitive municipalities	Aggregate index value
Hlincová Hora	7.26	Bradáčov	2.59
Vidov	7.03	Zadní Střítež	2.72
Srubec	6.85	Drunče	3.09

From overall ranking of individual municipalities for year 2011, Hlincová Hora municipality was evaluated to be a municipality with the highest local competitiveness, quality municipal management and the best rank

and potential for further development. Favourable values of general index were next found in municipalities located also near a regional administrative town. Among the first fifteen most competitive municipalities altogether 13 are located in the county České Budějovice (out of that, first 10 are municipalities only in the county Č. Budějovice). Among them is even a regional administrative town itself. These municipalities can be included in so called satellite municipalities, where most services, facilities as well as public transportation are provided thanks to proximity of a regional administrative town.

On the basis of general index of local competitiveness, the municipalities with worst evaluated ranks were small municipalities located in the county Tábor. All municipalities found at the end of the list can be described as problematic and the least competitive and worse municipal management. These towns are 25 kilometres from town Tábor where basic services and job opportunities are not available.

Description of the strategic management of the most competitive village of Hlincová Hora

The mayor of Hlincová Hora is a man, younger than 55 with university education. His function is a full-time job. As revealed by a questionnaire survey, the village is part of the union of the municipalities of Českobudějovicko-sever, which has its own strategy. The reason for membership in this micro-region is, according to the Mayor, the possibility to participate in joint projects and exchange of information.

The village does not have a strategic plan, however, it is prepared. The strong point is according to the Mayor of the village, local nature and surrounding of the village. The weakness is a lack of funds. The community's threats include the passivity of the population and the state's lack of interest. There is a special employee in the municipal office dealing with the development. The strategic priority of the village development is the improvement of the sports activities in the village. The mayor mentioned bureaucracy and legislation among the major problems of strategic management. The mayor seeks to support local entrepreneurs and involve

the public in everything. They also occasionally monitor their satisfaction with polls. The public actively approached all the local events.

The mayor considers good infrastructure, active societies and quality self-government as the key factors in development. In the last 10 years the infrastructure has improved in many ways in the village (all networks) and transport services (connection to public transport). The cleanliness and appearance of the village remained at an excellent level. On the contrary, it was not possible to improve and increase services, to develop the business sector and to build a second kindergarten. Unemployment has increased here. The Mayor has heard about the new methods of quality of management, knows them, but has not used them yet. They would like to learn more about their deployment options, especially on benchmarking and BSC.

Description of the strategic management of the least competitive village of Bradáčov

The mayor of Bradáčov is a man, older than 65 with secondary education. His position is a part-time job. The village of Bradáčov is part of VENKOV micro-region, but the mayor's does not know its strategy and does not even know the benefits of membership in this union. The village does not have its strategic plan, vision, and goals. Information about the external environment is not collected and analysed. According to the mayor, there is no strength. The weakness is the passivity of the population and the decrease of the population. These two issues are also noticed as the threats. However, the mayor does not know how to eliminate these issues. The development of the village is not dealt with here. Strategic development priorities were not mentioned by the mayor.

The problems that municipalities often deal with include the lack of finance and bureaucracy. The mayor does not engage in or co-operate with entrepreneurs in municipal activities. The public has a passive interest in the community. According to mayor, the key factors are the development of subsidies and nature. In 10 years, infrastructure and culture have improved slightly in the village, while unemployment has worsened. The mayor, unfortunately, does not know how to reduce unemployment. The

worst-rated areas that have failed to improve over the period are services and healthcare. In the village, according to the mayor, they managed to build a water supply, on the contrary, failed to repair the local roads. Population satisfaction is not monitored. Mayor has heard about benchmarking and ISO standards and knows their purpose. Unfortunately, he does not use them and he does not want to learn more about other quality tools.

There are very surprising results in the development of the status of municipalities of South Bohemia between 2001 and 2011. According to the local competitiveness index, there are small municipalities ranking the first places. The best development in time was recorded by the village of Hradec from the district of České Budějovice (14 km from the capital of the region; with 74 inhabitants), followed by Vlkov (22 km from České Budějovice) and the village of Měkynec (20 km distance from the district capital town of Strakonice). The village of Hlincová Hora (winner according to the aggregate indicator for 2011) ranked 19th place.

Very surprising is the ranking achieved by the towns. Here, Trhové Sviny achieved the best result at 274th position. The regional city of České Budějovice ended up at 509th position. In terms of assessed indicators, the situation has not improved in the last ten years in the towns, but either rather stagnates or worsens.

Table 2: The situation of sample best and worst municipalities of South Bohemia for the years 2001 to 2011

Top-developing municipalities	Value of the aggregate indicator	Underdeveloped municipalities	Value of the aggregate indicator
Hradce	5.69	*Újezdec*	2.80
Vlkov	5.46	Bradáčov	2.82
Měkynec	5.30	Zadní Střítež	2.83

Description of the strategic management of the most developing village of Hradce

The mayor of the most developing village of Hradce is a woman, aged 56–60 with primary education. Her position is a part-time job. In spite of that it is a part-time job, the mayor (and the mayors before her) were able to change the village a lot, and to develop the village the most compared to the rest of South Bohemia and to increase its competitiveness (by the variables of our research).

This village is part of the union of villages called Blanský les – Podhůří, which has its strategy. The association's contribution is, according to the mayor, in joint projects and possibilities to raise funds. There is no strategic plan of the municipality, nor is it thought of its creation. As strength, the mayor described the surrounding nature of the village and the presence of a train stop. She sees the weakness in the staffing capacities of the village, insufficiently motivated representatives and insufficient education. The lack of interest of the state was noticed as the greatest threat. The mayor does not engage entrepreneurs into the management, nor does she support them. However, nobody is managing the development of the village. Strategic priorities of the municipality and its future development include housing and infrastructure.

The mayor sees the lack of time to perform this function and inadequate staffing in terms of quality as the most important issues. The municipality would like to cooperate with entrepreneurs, but they do not show interest. Even the public does not engage in community activities. Among the development factors, the mayor included beautiful nature, a good transport connection and a reasonable number of inhabitants. Over the past 10 years, the village has managed to increase employment; new business units have been created. The level of service and appearance of the village has also improved. However, it has failed to complete infrastructure and improve housing construction. The problem here is the scattered area., the mayor has not yet heard about the quality management tools and she does not understood their purpose. Therefore, she does not foresee the possibility of their use in the village.

CONCLUSIONS

The situation is rather different in the towns compared to the villages. Such differences are a reflection of the fact that what is a matter-of-course in cities, such as a strategic plan or methods of quality management (especially the ISO standards), is not used in small municipalities. In the towns, the mayors do the management as their job. In the rural area, the mayors have a different main job. This leads to less time for strategic management of the municipality, the mayor has to perform a function in his spare time and at the weekends. They manage their village mostly within their capabilities.

Each entity, both an enterprise and municipality, should constantly improve and develop. The essence of the development of a municipality is the qualitative change of the inhabitants' lives, as far as possible for the better. It is a constantly ongoing process because the internal and external conditions that affect the municipalities might change. Municipal development often depends most on the management of the municipality and on the willingness of the local population to actively promote changes that often go beyond the immediate responsibilities of the municipality, willing to implement development projects and assume responsibility for them. If there is good infrastructure and good civic amenities in the village, people are be interested in living there, stabilizing the population.

One of the objectives set by the EU in the new programming period (2014–2020) is to support competitive economies. The competitiveness of municipalities, as discussed in a part of this paper, is conditioned by a number of factors that can be more or less successfully measured and then successfully compared. The results of the evaluation of the achieved level of municipal competitiveness are such a good source of information when assessing the socio-economic performance and the potential of the municipality and, last but not least, the quality of life of the population in municipalities.

The aim of evaluating the competitiveness of municipalities is, on the one hand, to know the current state of the municipality, expressed

through various indicators. On the other hand, it is also the comparison and the discovery of the disparities of individual municipalities, which can either be eliminated or at least mitigated by suitable and effective strategic management of municipalities, using appropriate management tools. The chapter proposed a set of indicators at local level designed to measure local competitiveness. This set and the local Competitiveness Index is based on the need to establish a single system of monitoring the development and performance of individual municipalities, interrelated both in individual areas (economic, environmental and social), and hierarchical, from local to regional to state level.

Methodical procedure for creating index of local competitiveness consists of 7 follow-up phases. The most important is selection and statistical data processing (inquiry data analysis, correlation analysis and multidimensional statistic methods) indicators. The results of analysis of main components enabled to identify variables, whose influence is in case of local competitiveness the strongest, and in particular quantify their importance. In 2011 was local competitiveness influenced mostly by these indicators.

From overall ranking of individual municipalities for year 2011, Hlincová Hora municipality was evaluated to be a municipality with the highest local competitiveness, quality management and the best rank and potential for further development. Favourable values of general index were next found in municipalities located also near a regional administrative town. On the basis of general index of local competitiveness, the municipalities with worst evaluated ranks were small municipalities located in the county Tábor.

Final ranking of municipalities in the South Bohemian Region, however, largely depend on selected indicators, their importance and particularly on extreme distance fluctuation of normalized values from antioptimum. Even though the calculated values have the characteristics of general index and should therefore have higher evidence value than individual partial indicators, it is necessary to take a cautious approach.

Resulting index value of local competitiveness largely depends on a range of selected indicators and their evidence value.

The results found after using general index of local competitiveness are suitable for strategic management of municipalities with respect to determination of further direction of municipalities development – in particular to eliminate unfavourable conditions within monitored indicators. Methodology used for calculating index is however rather complex and requires an individual approach, in order to gain result with the least possible inaccuracy, and in order to fulfil required impartiality and representativeness. Index of local competitiveness of municipalities, defined and calculated by an author, can be used for comparisons of municipalities in the whole Czech Republic as well as in other European municipalities and cities.

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TAXATION IN THE CZECH REPUBLIC AND OTHER COUNTRIES OF THE EUROPEAN UNION

Jarmila Rybová[8]

This Chapter describes concisely taxation in the Member States of the European Union. The tax system of the Czech Republic and its modifications in connection with the accession to the Community are described in more detail. Taxation in Member States is specified by using selected indicators – tax quota and tax mix.

TAX HARMONISATION IN THE EUROPEAN UNION

The area of taxation is part of the autonomous fiscal policy of each state. However, Member States of the European Union (hereinafter referred to as "the EU") prefer unanimously to harmonise tax systems. Alignment of Member States' tax systems, particularly indirect taxation, is closely related to the operation of the EU's single internal market. Competition of Member States in the field of taxation is considered harmful.

Harmonization steps are being enforced in the EU in the form of directives to be binding in their entirety for all Member States. The adoption of a directive requires the unanimity of all the members. The principle of implementing directives consists in the fact that only objectives are

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to be set together. Their implementation should be performed in accordance with national legislation.

At present, three main objectives are set for tax harmonisation and coordination in the European Union:

- Stability of the Member States' tax capacity;
- Smooth functioning of the Single Market;
- Support of employment growth.

Income and wealth taxes (direct taxes) are less harmonised than consumption taxes (indirect taxes). The main objective for harmonisation of direct taxes is to introduce a common consolidated corporate tax base for their European activities. Cross-border transfers of losses between the companies connected by their property or otherwise interconnected represent an interesting area from the harmonisation standpoint. The harmonisation of at least these rules seems to be necessary.

The area of indirect taxation is harmonised in the European Union in a much stronger way than direct taxes. It´s a case of VAT, consumption and energy taxes. Import duties may also be included in this tax group. The main reason is the operation of the Single Internal Market. Indirect taxes are included in the price of goods sold (primarily goods and services), and thus distortion of competition and interference with competitiveness of Member States may occur. The trend in the EU is to gradually increase the importance of indirect taxes accompanied by a reduction in direct taxation. Surveys reveal that this factor, however, can be significantly demotivating in terms of affecting employment in the labour market[9]. Moreover, the issue of indirect taxes emphasises the environmental aspects. The tax burden on the consumption of commodities polluting the environment is increasing. Commodities, such as electricity,

9 Support of employment growth is one of the main objectives of tax harmonisation and coordination in the EU. For more details, please see Kubátová, K., Vybíhal, V. & coll.: Tax system optimisation in the Czech Republic. Prague: Eurolex Bohemia, 2004. s. 18-22 ISBN 80-86861-05-8

carbon dioxide, natural gas, heat and fossil fuels are subject to taxation in the European countries.

There is a long-term trend in taxation towards the gradual convergence of the EU Member States. This trend can be demonstrated, for example, by the development of a tax quota indicator. The main cause of convergence is the functioning of the European Union (EU) internal market, cooperation between EU Member States in the area of tax administration and the related harmonisation tax process. Convergence can occur not only through harmonisation, but also spontaneously. The question is whether convergence occurs precisely for taxes being subject to harmonisation.

TAX SYSTEM IN THE CZECH REPUBLIC

The Czech Republic proceeds in accordance with EU regulations and the above trends. With the advent of the market economy in the 1990s, the Czech Republic experienced a tax reform with the objective to approach the Western European countries and join the EU. New taxes were introduced and new rules were set for the existing taxes. The most significant changes concerned mainly consumption taxes. The introduction of the value added tax and consumption taxes constituted a precondition for accession to the EU. Then, there were significant changes in the administration of these taxes and the gradual increase in rates to meet not only the fiscal requirements of the State but also the minimum rates imposed by the directives of the European Commission. Other changes included wealth taxation and the introduction of environmental taxes and gambling taxes. The tax on gambling is not a new tax liability. It replaced lottery levies and levies on other similar games, which basically had the character of a tax. Its introduction primarily focused on creation of a stable tool, which enables the State to implement its gambling policy and prevents their harmful consequences. For that reason, this tax has not only a fiscal but also a protective and regulatory function.

Table 1: Changes in the tax system in the Czech Republic since 1993
Source: Tax legislation. / Taxes bring the major part of the total revenues to the public budgets in the Czech Republic. The most important taxes are consumption taxes including customs duties. Social security contributions also reach a high level. / Tax revenues were on the increase from 1993 to 2017, with tax revenues fluctuating in some years. According to the author's earlier text (Rybová, 2017), in 2009 there was a year-on-year decline in tax revenues compared to 2008, probably in the context of the economic recession. In the following years, a gradual increase in tax revenues can be recorded.

Tax classification	1993	1st May 2004 (accession of the Czech Republic to the EU)	2018
Income taxes	Personal income tax	Personal income tax	Personal income tax
	Corporate tax	Corporate tax	Corporate tax
Wealth taxes	Property tax	Property tax	Immovable property tax (modified since 2014)
	Property transfer tax	Property transfer tax	Immovable property acquisition tax (modified since 2014)
	Inheritance tax	Inheritance tax (until 2013)	–
	Gift tax	Gift tax (until 2013)	–
General consumption tax	Value-added tax	Value-added tax	Value-added tax
Consumption tax	Tax on hydrocarbon fuels and lubricants	Mineral oil tax	Mineral oil tax
	Ethanol tax	Ethanol tax	Ethanol tax
	Beer tax	Beer tax	Beer tax
	Wine tax	Wine and semi-finished products tax	Wine and semi-finished product tax
	Tobacco products tax	Tobacco products tax	Tobacco products tax
			Raw tobacco tax
Environmental taxes (introduced since 2008)	–	–	Electricity tax
	–	–	Solid fuel carbon tax
	–	–	Tax on natural gas and some other gases

Tax classification	1993	1st May 2004 (accession of the Czech Republic to the EU)	2018
Other consumption taxes	–	–	Gambling tax (implemented since 2017)
	Road tax	Road tax	Road tax

Table 2: Tax revenues in the Czech Republic in 2017
Source: Ministry of Finance of the Czech Republic, Czech Social Security Administration (2018)

Tax revenues	Yield – reality (in billion CZK)	Σ	%
Corporate income tax	177.4	370.2	26.1
Personal income tax	192.8		
Tax on immovable property	10.8	23.4	1.6
Inheritance tax, gift tax and property transfer tax	0.1		
Immovable property acquisition tax	12.5		
Value added tax	381.7	571.5	40.3
Consumption tax	157.5		
Energy (environmental) taxes	3.3		
Customs duty, including levy to the EU	8.7		
Levy on electricity from solar radiation	2.0		
Lottery levy	3.2		
Gambling tax	8.9		
Road tax	6.2		
Social security premiums	454.1	454.1	32
Total	1,419.2	1,419.2	100

Tax revenues have a growing trend in the Czech Republic. This trend should also continue in 2018. At the same time, the cigarette tax yield is expected to decrease compared to 2017. On the one hand, this situation can be caused by the ban on smoking in public places and in restaurants and, on the other hand, by the temporary absence of taxation on electronic cigarettes. Electronic cigarettes should be taxed from 2018 onwards.

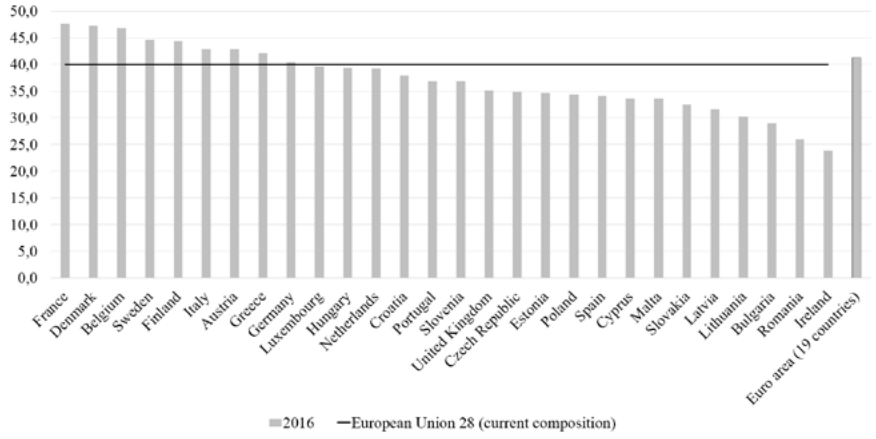
TAX QUOTA IN THE CZECH REPUBLIC AND OTHER MEMBER STATES

Differences in taxation between Member States of the European Union can be demonstrated, for example, by the development of a composite tax quota indicator. It is a macroeconomic indicator that is used for international comparison of the tax burden. In her previous study, the author (Rybová, 2017) states that the tax quota expresses the proportion of the gross domestic product (GDP) which is redistributed through public budgets.

The tax quota is a ratio indicator that includes tax revenues in relation to the nominal GDP over a defined period. Tax quota indicators differ in the structure of absolute values of tax revenues in the numerator (of the fraction). The size of the compound tax quota is determined by the ratio of tax revenues, including social security, to GDP.

Member States´ data can be found in the Eurostat database. Please see the data from 2016 in Figure 1. The most up-to-date data of all EU members is available this year. Member States are classified according to the size of the compound tax quota. The last column features the average of 19 countries within the Eurozone.

Figure 1: Total receipts from taxes and social contributions (including imputed social contributions) after deduction of amounts assessed but unlikely to be collected. There are receipts for general government and the EU institutions in percentage of GDP.
Source: Eurostat database (2018)

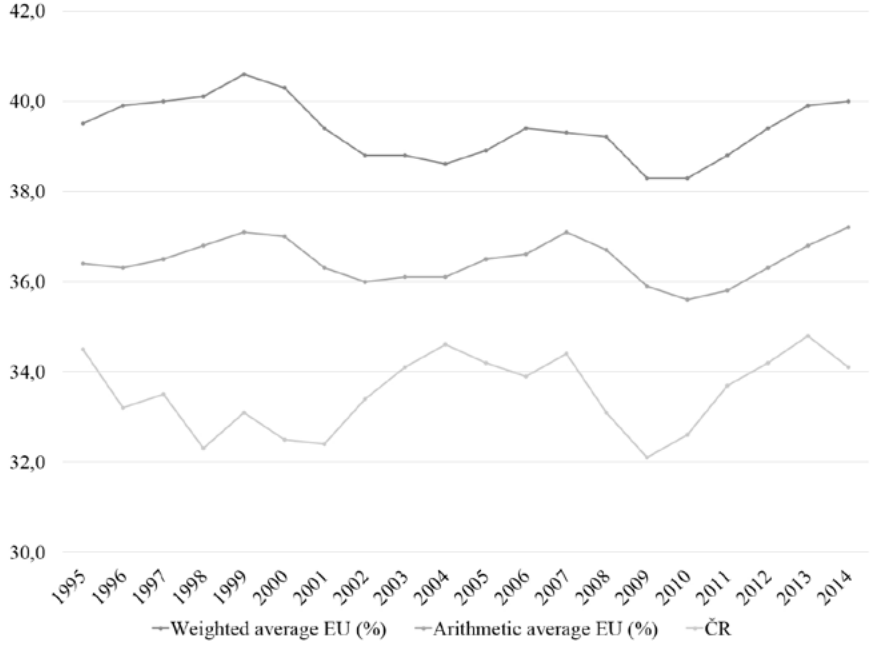


The indicating ability of this indicator is limited for many reasons. Foltysová (2007) quotes the following:

- The tax quota measures the extent to which economic or social assistance is provided through tax expenditures (as opposed to direct government expenditures);
- The method of determining GDP;
- The relationship between the tax base and GDP and the business cycle;
- The approach towards income taxation on social benefits (existence or absence of their taxation);
- The amount of tax evasion and the size of the shadow economy;
- The time lag between the increase in tax liability and its maturity.

The tax quota values in the Czech Republic fluctuate slightly between 32% and 35% over time. They did not exceed the EU averages during the period of available data (see Figure 2).

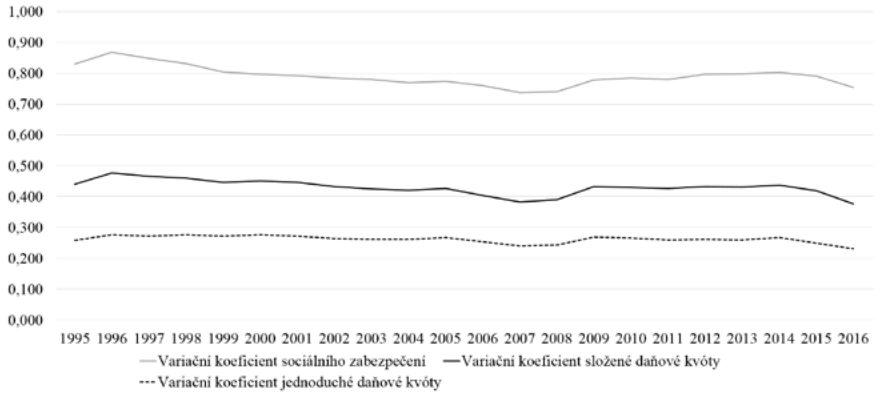
Figure 2: Development of the compound tax quota in the Czech Republic compared to both averages of the European Union
Source: Eurostat database (2018)



In this context, the question is whether the differences between Member States change over time and also whether Member States are approaching each other or receding. Coefficients of variation of Member States' data may lead to an answer to this question. The decline in values of the coefficient of variation brings Member States closer.

Figure 3: Coefficient of variation of the Member States tax quota

Source: Eurostat database (2018)



Rybová & Beránková (2017) quote that European countries are slightly closer to the share of absolute tax revenues in GDP. This is vital information in terms of total tax burden. Having a closer look at the tax subgroups, it is clear that the biggest differences exist between countries in direct taxation, particularly in the capital taxation, where a growing divergence between countries can be observed over a given period. Capital is a mobile tax base defined as a tax competition rather than harmonisation. On the other hand, consumption taxes, with the harmonisation process operating at the level of administration as well as the minimum tax rates, have lower disparities between the surveyed countries in different years. However, there are also divergences in the given period, particularly in terms of consumption taxes.

The trend of very slight decrease coefficients of variation can be observed for all the tax quota curves shown in Figure 4. There is a slight convergence of the monitored indicators between Member States. A temporary change in the trend occurred during the economic recession.

TAX MIX IN THE CZECH REPUBLIC AND OTHER COUNTRIES OF THE EUROPEAN UNION

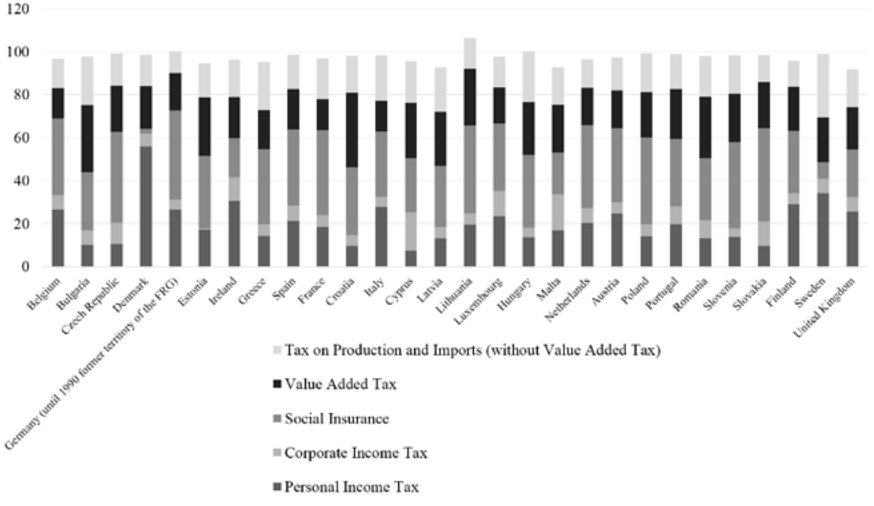
This indicator specifies the share of revenues from individual taxes in the total tax revenue of the state. The individual countries may differ or resemble from this standpoint. The study confirms that the historical development of a country and its tradition have a significant impact on the tax mix composition. This is true both within and outside the European Union.

According to Kubátová (2010) developed countries with good tax payment habits prefer direct taxation. The countries with poor payment morals usually prefer indirect taxation. This rule applies in most countries due to the fact that taxpayers are unwilling to pay taxes if their pensions are low. The collection of indirect taxes is more effective because they are hidden in prices and hence not so much perceived by taxpayers.

Figure 4: Tax mix of Member States in 2016

Source: Eurostat database (2018)

Note: Other direct taxes are not included in the tax mix because of their insignificant values.



The average rates of taxes selected on the total tax revenue of all 28 Member States in 2016 are as follows:

- Social security contributions represent 31%.
- Personal income tax accounts for 20%
- The smallest revenues come from corporate income tax, i.e. 7%.
- Value added tax accounts for 22% of total tax revenue.
- Production and import taxes (excluding VAT) account for a total tax revenue of 17%.
- Other taxes 3%.

A relative similarity of Member States in tax mixes can be determined by a cluster analysis. These countries can be divided into two main groups according to the preference of revenues from selected taxes. The first group consists of the countries where the highest income is derived from social security contributions. The second group consists of the countries with the highest revenues from the personal income tax. In both groups, there are sub-groups of countries that are the most similar to each other according to the results of the data cluster analysis in 2016.

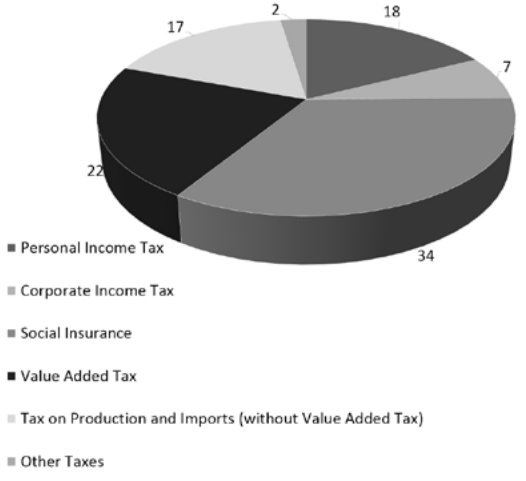
SOCIAL SECURITY-ORIENTED COUNTRIES

Tax mixes of these countries have similar features with the highest share of social security. Indirect taxes play an important role, in particular value added tax. Income taxes are not too significant.

- Belgium, Bulgaria, Czech Republic, Estonia, Finland, France, Croatia, Italy, Cyprus, Lithuania, Latvia, Luxembourg, Hungary, Malta, Germany, Netherlands, Poland, Portugal, Austria, Romania, Greece, Slovakia, Slovenia, Spain,
- This is a large group of countries. The group includes post-communist states and the original West European states of the European Union. See the sub-groups of several similar states:

- Poland, Slovenia, Latvia;
- Czech Republic, Slovakia;
- Belgium, Netherlands, Austria, Spain;
- Cyprus, Malta.

Figure 5: Mix in the social security tax states (arithmetic mean, %)
Source: Eurostat database (2018)



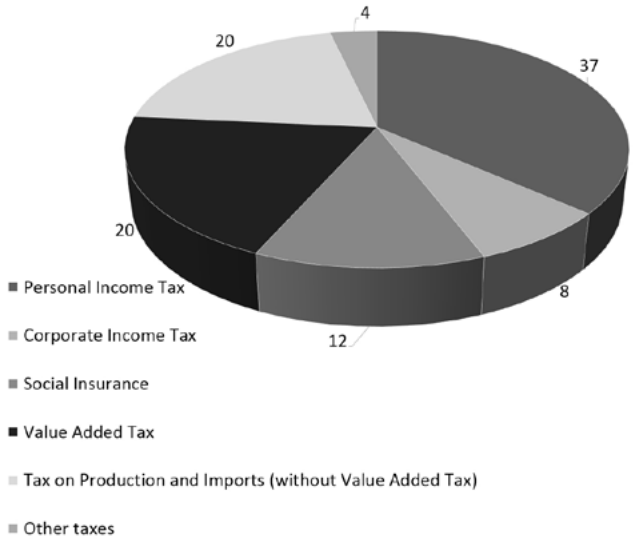
COUNTRIES WITH HIGH PERSONAL INCOME TAXES

Countries forming the northern part of the European Union prefer the highest revenues from the personal income tax. Social security has a weaker position than in the first group of the countries.

- **Denmark, Ireland, United Kingdom, Sweden – they can be characterized** by the highest proportion of personal income tax. The personal income tax proportion is the highest mainly in Denmark, i.e. 56%). The second highest proportion of total revenue consists of indirect taxes (Value Added Tax and Tax on Production and Imports).

Social insurance contributions are, however, very low (especially in Denmark and Sweden).

Figure 6: Tax mix in countries with high personal income taxation
Source: Eurostat database (2018)



Generally speaking, the preferences of selected tax revenues do not change much in individual countries. The tradition, the historical and political customs of a given society are decisive factors in this case.

Like the convergence of the tax quota, it is possible to observe whether Member States' tax mixes were approaching between 1995 and 2016. In fact, the tax mix convergence does not occur between Member States. There are only minor changes in Member States' tax mixes. This factor can be assessed positively from the standpoint of stability of Member States and the European Union. The reasons are similar to the tax quota. The fiscal role of taxes and stability of the political and economic environment is crucial in each country.

Figure 7: Coefficient of variation in the EU members
Source: Eurostat database (2018)

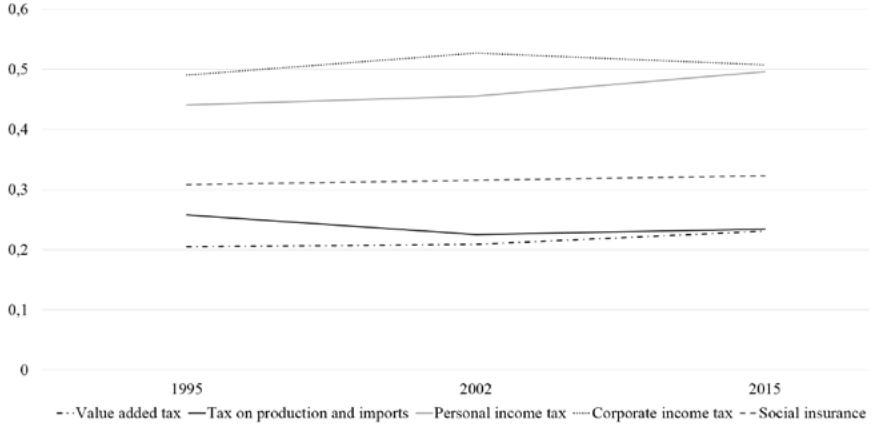


Figure 7 shows that the values of the variation coefficients of indirect taxes (taxes and taxes on production and imports) are lower than those for direct taxes. In other words, indirect taxes are among the States of the European Union more similar than direct taxes. Stringer harmonics is the main reason. Beranová (2018) describes in more detail the convergence of the original and new Member States of the European Union. She concludes that for the top 15 Member States there is only little convergence for most taxes. The new Member States do not mutually adjust by their tax mixes.

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LOCAL PRODUCTION IN CONTEXT OF TRANSFORMATION OF THE CZECH ECONOMY AND THE REGIONAL DEVELOPMENT

Kamil Pícha[10]

INTRODUCTION

Similarly to the whole Czech Republic, every single region went through a transformation in the period after 1989. This transformation meant a transition from centrally planned economy of the Soviet type (Mertlík, 1996) to market economy and also a transition of property – there was only national or co-operative ownership for about 40 years. The economy was highly centralized (Dlouhý, & Mladek, 1994). The whole structure of national economy had to be changed. Particular sectors of economy got gradually different importance compared to the previous period. The significant decrease of importance of agriculture in its contribution to GDP and employment of the Czech Republic affected particular rural areas that had been predominated by agriculture for centuries. Moreover, the collectivization and formation of big agricultural companies in 1950s have been refused in the early 1990s. Transformation of co-operatives (Law No. 42/1992 Coll.), way of restitutions and privatizations caused considerable problems to this industry. The decrease of the importance

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of the so called hard industry as another result of the transformation caused problem in old industrial regions, such Silesia. Ostrava-Karvina basin constituted one of Europe's largest regional problems in 1990s (Gorzelak, 1998).

Other economic subjects in smaller cities, towns and villages were often plants of food manufacturing enterprises. With a few exceptions, all those enterprises were privatized and many of them bought by international or supranational companies that quite often used their acquisition activities to enter the Czech or even Central European marketing and market their own products. The "domestically owned" companies were living transitional problems and the management was not used to market economy rules and to face to a huge number of competitors. Later, the food manufacturing industry underwent a process of concentration when companies have been reducing number of their plants or they merged with other companies or they terminated their operations.

In the meantime, many new – in most cases small and middle enterprises – emerged in production, retail and wholesale and services. Sometimes, we speak about an atomization of the market in 1990 (Szczyrba, 2005; Regnerová & Šálková, 2006. Many small self-standing place of business started their economic activity. A big number of small business places occurred especially in retail.

International and supranational retailers that have been entering the Czech market already since 1990 have brought with them their foreign and international suppliers and were in many cases not very interested in selling Czech food products. They had at their disposal modern technology and they built up their own retail network, logistics, wholesale storehouses, and in some cases, their own manufacturing plants (Regnerová & Šálková, 2006).

Czech retail companies rose from transformed state retail enterprises successively failed. Consumer co-operatives suffered of restitutions as

well as the legal norms on transformation that was rather not in favour of cooperatives. Next to that, they have often withdrawn from the rural areas (where they operated more than 8,000 retail shops in 1989 – Szczyrba, 2005) and tried to develop or rather re-develop – their tradition was rather in towns till 1952 (Szczyrba, 2005) – in towns and cities, where they were to face the competition of emerging retail chains by foreign retailers. Small retailers tried to resist but they faced to their own low business experience (Hes, Samek & Regnerová, 1999), liquidity problems and also to the growing competition of big and well established retailers. The extent of the threat of the retailers depended on location of the respective small retailer.

Czech consumers, hungry for goods – especially foreign products – and for western trends have accepted very quickly and willingly the international retailers and their large-area stores. This fact positively influenced introduction and development of the foreign retailers. They have expanded first in the food retail and from the late 1990 even in the non-food retail. The expansion was followed by stronger concentration of the food retail early after the 2000. The significant concentration process of the non-food retail slowly started from 2003. Czech – and very often smaller and weaker – retailers have mostly not persisted in facing the strengthening market pressures and ceased their operations.

The transformation in 1990s destroyed the long-standing distribution paths. It made the situation difficult for all business when purchasing inputs for their production as well as when selling their products to the market. Next to that, the sector of the small and middle enterprises has been permanently dealing with consequences of the lacking 40-year experience as well as the business centralisation in the previous period. Very liberal government's approach to the markets and its strong belief of the all-solving invisible hand and the insufficient legal framework contributed to the inconveniences and suffering especially of SMEs in the market.

PRODUCERS AS AN ELEMENT OF REGIONAL/LOCAL DEVELOPMENT

Local producers/local companies are an important element of endogenous regional development (Coffey, & Polese, 1984; Aydalot, 1986). Endogenous development patterns are based mainly on locally available resources, making full use of the ecology, labour force and knowledge of an area as well as those patterns which have developed locally to link production and consumption Van der Ploeg, & van Dijk, 1995). The category of localised, disembodied knowledge represents a concept which could encompass the important basis for endogenous regional development, represented by firms relying on localised learning, but building this localised learning on a strategic use of codified, R&D-based knowledge in addition to tacit knowledge (Asheim, 2001). Especially SMEs have a good potential to use local resources based on local biodiversity, culture, traditions, and skills.

LOCAL PRODUCTION/LOCAL PRODUCTS

The definition of the localness of a product and then of the notion local product is not unanimous. "Local" carries the multiple connotations of common interest, of the construction of community through the development of links within everyday life, of the incorporation of a moral economy of interaction between neighbours or allies mutually engaged in production and consumption (Allen et al., 2003). How we determine "local" in this context will have to be contingent on the place: the social, ecological, and political circumstances which circumscribe it (Feagan, 2007). To put it simply, "local" is not the same everywhere. The local food movement is arguably the most dynamic segment of the food system, contributing to the challenge to define it (Thilmany McFadden, 2015). There are even opinions the local scale is socially produced, so it has no particular characteristics (Born, & Purcell, 2006). Local and regional

food represents recently a frequently discussed topic from many point of view (e.g. Hinrichs, 2000; Feenstra, 2002; Kremer and DeLiberty, 2011; McIntyre and Rondeau 2011; Mundler and Rumpus, 2012; Knight, 2013).

According to Thilmany McFadden (2015), local food was first officially defined in 2008 in the USA: by the United States Congress in the Food, Conservation, and Energy Act. The intended outcomes used to support more localized initiatives were primarily to improve the competitiveness of the producers and support local economies.

In public discussion the concept of 'local food' has been defined in many ways. The most commonly used approach defines local food on the basis of the distance that the food travels from production to consumption (Pearson et al., 2011). For example the Department of Agriculture in USAS uses a 400 mile (644 km) boundary to define local products when providing financial support (Clancy and Ruhf, 2010). Within the UK, definitions using this geographic proximity approach range from distances of 30 miles (19 km), within a county, within a sub-region, or even a whole country (Pearson et al., 2011). Much closer to the nowadays understanding in the Czech Republic is the Finnish definition cited by Forsman and Paananen (2003): *local food is food produced and consumed by exploiting the raw material and production inputs within the region, promoting the economic development and employment of this particular area. This particular area may be a municipality, province, or economic area*.

The local products could be, however, viewed differently by the consumer. The localness for them could not be simply defined mathematically by a distance as a circle radius, or administratively (Feenstra, 1997). Discussions are also around two used notions – "local product" and "regional product". Their use is sometimes rather confusing – they are sometimes used as synonyms, but local product could be considered as subgroup of regional products. Štensová (2013) considers a regional product to be a traditional product made in a geographically defined area, while local product is a product made by a producer in or close the place of where the product is consumed.

SUPPORT TO LOCAL PRODUCERS / PODPORA MÍSTNÍM PRODUCENTŮM

The support to the local production generally increases (Pícha & Skořepa, 2017). The existing supports have both the endogenous and exogenous character. As examples from the Czech Republic, we could cite the system of milk vending machines, farm boxes or other elements of the so called community supported agriculture (CSA), national and regional programmes to promote quality local products, farmers' markets or activities of local action groups (e.g. project of „Rural marketplace).

NATIONAL AND REGIONAL PROGRAMMES TO PROMOTE QUALITY LOCAL PRODUCTS

The most common programs are Klasa, Regional food product or programme of Association of regional brands (Asociace regionálních značek – ARZ) that cooperate with respective local action groups. In the South Bohemia, there is a specific programme called "Taste great. South Bohemian". This project has been organized since 2007 by the Regional Agrarian Chamber of the South Bohemian Region. It runs with the support of the South Bohemian Region. The aim of the project is a systemic promotion of quality food from South Bohemian production. One of the instruments is a competition. It is held every year and allows for the extraordinary marketing benefit to the participating South Bohemian food producers for the winning products that gain the right to use the CHJ trademark. During the twelve years (2007–2018), 1658 products were registered in the competition. 330 have obtained the right to use the logo Taste great. South Bohemian. The label has a beneficial effect on private entities involved. Unique products get awards. They are made from the maximum of South Bohemian raw materials and produced in the territory of the South Bohemian Region, so they support also local agricultural production and strengthen social and economic stability in the region. The shortest way of making food from producers to our plates is good for the health of consumers and the South Bohemian landscape.

Entities have already been able to compete with regional competitors simply by joining the project. In the context of a careful commission analysis, their products often receive valuable advice from independent experts and recommend how to improve their quality or marketing.

Awarded products have free advertising and media coverage. Its popularity is strengthened by websites, billboards, agricultural and food exhibitions, as well as in tourism fairs. An important bonus is the possibility of preferential introduction in the assortment of local business networks of the České Budějovice and Kaplice Unity. In order to promote the current year of the project competition, the Regional Agrarian Chamber of the South Bohemian Region issues a special brochure. The winning products are presented in it, through photographs and stories. Throughout the year, all participants have the opportunity to take part in a variety of trainings, such as legal rules or marketing. The South Bohemian Agrarian Chamber is taking care of them and mediates more lucrative sales opportunities in retail chain and networks, small shops and in farmers' markets in the region as well as in foreign countries. Other priorities of the project include better opportunities in school canteens in the South Bohemian Region, e.g. via an interactive Product Map (O projektu, n.d.).

MILK VENDING MACHINES

Vending generally seems to be a dynamically developing sector of economics. A strong competition is present in this market (Hampel, Jůzová and Matulíková, 2012), especially in coffee and other hot drinks, cold drinks and sweets. The idea of selling milk through vending machines faced objections in many countries, but the legislation has moved step by step. For instance, in Italy, the direct sale by farmers of raw milk for human consumption has been allowed since 2004 (Giacometti et al., 2004). The introduction of the milk vending machine itself reflects the drive towards higher profitability through investments in technology (Mincyte and Maximilians, 2009). As for farmers, direct selling can be interpreted as a diversification strategy that can lead to higher profits and better farm

household incomes (Aguglia, De Santis and Salvioni, 2009). The impact of the nearby urban centres seems to play an important role in determining the direct sale of produce. (Meert et al., 2005) Farmers prefer the direct sale of milk to consumers for a number of reasons (Bohra, Singh, Kumar and Singh, 2004):

a) consumers pay more remunerative prices (the willingness to pay is influenced by perceiving the local origin of milk – e.g. Lefèvre, 2014; Tempesta and Vecchiato, 2013; Burchardi, Schröder, and Thiele, 2005);
b) cooperatives or dairies purchase milk on the basis of fat content and therefore milk prices fluctuate on daily basis;
c) co-operatives and dairies do not provide money as and when needed by the producer suppliers, who, sometimes would also provide money in advance;
d) co-operatives often impose other conditions on their members (the milk producers) such as supply of costly feed the cost of which is deducted from the producers' dues.

The sale of milk through these vending machines became the indispensable part of the distribution of the milk from farms (Doležalová, Pícha, Navrátil, & Bezemková, 2014).). This form of sale became profitable for many farms in the Czech Republic (or at least more advantageous) option of selling milk (especially for the small farms with the problematic collection of the milk to the dairies; those vending machines located immediately next to the farm are also highly profitable). A cooperation with government or at least national authorities of supervision over the markets is necessary in such cases. The development of milk vending machines was affected by the statement of the Chief Hygienist of the Czech Republic in February 2010, when he warned against the risk of the transmission of the bacterial and viral infectious agents through the unpasteurized milk (MZCR, 2010).

FARMERS' BOXES

Farmers' boxes emerged in the 1960s in Switzerland and Germany as an alternative way of distribution of local products. Since then, they have

grown throughout world and they have also gained popularity among Czech consumers. Boxes that are filled with fruit, vegetables or other products from local farmers have become part of the lifestyle of many people around the world. It is an unconventional way of shopping, where each box is like a surprise for the consumer. The content of the particular box depends on nature and the season, so it is different each time.

Alternative food networks complete to a lesser extent the missing functions of conventional distribution. Their disadvantage is that product prices are higher, there are seasonal restrictions and also higher organization-demanding and time-consuming. Food sourced from "alternative" food networks is largely considered to have been produced, processed and distributed, and consumed within a given region or locality without the need for elongated, multi-actor food chains. As such, non-conventional food networks allegedly resist and distance themselves from the omnipresent industrialised mode of food production and consumption, by reconnecting producers, consumers and their food (Robinson, 2008). More than a hundred of distributors of farmers' boxes operate now in the Czech market. Part of them distribute exclusive organic food products. This way of distribution could be supported from national funding schemes, such as Programme of support to rural areas for the period 2014–2020.

FARMERS' MARKETS

Farmers' markets could be considered the historical flagship of local food systems (Brown, & Miller, 2008). The primary motivation for producers to sell their produce at FMs is the ability to obtain a full retail price for it, and to remain in full control of their produce until its final point of sale. This not only enables them to maximise its value-added potential, but also to provide a legitimacy for the production methods employed (Kirwan, 2004). Farmers' markets had a very specific tradition in the Czech Republic as it was mostly a way of individuals to sell the surplus of their garden production. The boom of the farmers' markets similar to those of Western countries came only about ten years ago

in bigger towns and cities. Organizers have been even private or public bodies. Some of them started a good tradition, others have faced problems with keeping hygienic and sanitary rules, and also problems with deceptive sellers who offered production originating not directly from farms but from retail chains' stores.

SPECIAL BRANDING

One of the most visible supports in the Czech Republic is branding as a kind of certification of local products or as tool to make the products visible in the shelves. Branding of local products is widely considered to be an appropriate tool to support local economy and/or rural areas (e.g. Trobe, 2001; Morris and Buller, 2003; Martinez et al. 2010). Such brands denote products with an exceptional relation to a region (Mrugank, 1996), its character (Ittersum, Candel and Meulenberg, 2003), tradition (Guerrero et al. 2009; Ohe and Kurihara, 2013), culture (Lim and O'Cass 2001; Tellström, Gustafsson, and Mossberg, 2006) or history. One of the ways of exogenous support is creation of specific brands and brand programmes with clear criteria that a product should meet. Producers in that case present their products to the owner of the brand. The owner verifies if the criteria are met and then grant the producer the right to sell its products labelled with the brand.

Regional brand represents a quality claim for consumers (e.g. Ittersum, Candel and Meulenberg, 2003; Arnoult, Lobb &Tiffin, 2007, Guerrero et al. 2009, Visser, Trienekens & van Beek, 2013).

There are two main groups of regional or local product brands in the Czech Republic. One group is initiated, supported and co-ordinated by the Ministry of Agriculture ("Regionální značka" – Regional Brand). Second group is supported and co-ordinated by the Association of Regional Brands (ARZ), which is a non-governmental organization.

The aim of the first cited project is to support domestic producers of local food (Značka Regionální, n.d.). The ARZ set up its objective as follows: "to support the sustainable development in respective regions by

way of developing the regional brands for products and services" (Asociace regionálních, n.d.).

Next to the above mentioned groups of regional brands, there are a number of individual regional brands managed by various entities, including retailers. A pioneer retailer in that area was Jednota České Budějovice, s.d. – a consumer cooperative. Actually, consumer cooperatives started to promote local products ahead of international retailers in the Czech market.

The number of regional brands swells, hand in hand with the support to their establishments and to the certification process.

The list of brands for local/regional products used in the Czech Republic is really long (next to the national brand Klasa (it indicates the best quality food and agricultural products from the Czech Republic. Label has been awarded by the Ministry of Agriculture Czech Republic from 2003):

- Regional Food: food or agricultural product produced in the region, coming mainly from domestic sources. Regional food logo was introduced at 2010, can be used only on approval of the Ministry of Agriculture. The criteria seem to aim rather national domestic products than products issued from the respective region: The product must be produced in the region and made of traditional raw materials, with the proportion of domestic ingredients being at least 70%. The main component must be 100% of domestic origin.
- Brands of original and regional products by Association of regional brands – by now, there is 27 brands of specific small regions and locations covered by the association (e.g. Krkonoše originální produkt, Šumava originální produkt, Beskydy originální produkt, Moravský kras regionální product, etc.). The associations started to create or provide support to create the specific brands in 2004. The main objective of this regional labelling is to highlight individual regions (both traditional, known for example by their preserved nature, healthy environment, folk traditions, or „new" or forgotten), and to highlight the interesting products that arise here).

- The above mentioned consumer cooperative Jednota provides in their shops and store many local products under their own label "Z našeho regionu" (From our region)
- We can also consider the European quality labels used for local products:
- PDO (Protected Designation of Origin): it covers agricultural products and foodstuff s which are produced, processed and prepared in a given geographical area using recognised know-how;
- PGI (Protected Geographical Indication): it indicates a link of agricultural products and foodstuff s with the geographical area in at least one of the stages of production, processing or preparation;
- TSG (Traditional Speciality Guaranteed): it highlights traditional character of a product, either in the composition or means of production. In order to be "traditional", proven usage on the market during at least 30 years is required;

DEMAND FOR LOCAL PRODUCTS

Consumers interested in products offered by producers operating in their region represent a good market opportunity. After the 1990s, we could feel in the Czech Republic a slight return of consumers to domestic products and traditional Czech products. This interest seemed to increase in the period of considerable economic growth (2004–2008). Quite a short period including a general essay of a non-price competition in 2007 was very unfortunately terminated by the economic recession, followed among others by the decrease of the consumer demand. Consumers became again more sensitive on the price compared to the perceived quality of the products. The demand for local products decreased. Certain relation between stronger interest in domestic and local products and the economic situation of the Czech Republic as well as the perceived living standards (by consumers) was confirmed by the company Nielsen. This company discovered the anew mounting trend of preference for local products in 2012 (Patočková, 2018). The interest in

local food was also reflected in the retail chains. They gradually began to work with local suppliers and to accentuate the supply of such products in their shelves. Next to that, they widely started to accentuate a big share of "Czech products" in their store. Unfortunately, the behaviour of some of the retail chains negatively influenced some consumers – some affairs and scandals occurred with deceptive labelling of products that have not originated in the Czech Republic but were only packaged or otherwise conditioned by Czech companies.

This year (2018), the company Nielsen published date on preference of local products in the Czech Republic in years 2012–2018. Researchers concluded that no more stronger shift of consumers towards local products has happened. They are some increases in particular product categories. A general increase of preference for local product was not found. Czech consumers remain quite sensible on the price of products they purchase (Frýdlová and Vostrá, 2011). Even the period of economic growth in 2004–2008 has not reduced significantly this sensibility (Stávková, Prudilová, Toufarová, & Nagyová, 2007).

The interest of Czech consumers in local products issues often from their beliefs. For example, consumers often consider the local products to be of higher quality than other products. This is a positive information, although this consumer's perception could be related to a certain information confusion as for existing food labelling and certification as the attributes of particular food labels are rather known to the certified producers than to consumers (Pícha, Navrátil & Švec, 2018). Consumers that are more oriented on regional or local products could be also more concerned by environmental friendliness of the production and selling products (Pícha, Skořepa, & Navrátil, 2013).

CONCLUSIONS

The period of transformation of the Czech Republic from centrally planned economy to market economy as well as the following period of adapting

to the contemporary world or at least Western trends brought many challenges to regions and rural areas. Complete business structures were to be established after a long period of dominance of agricultural co-operatives production even in other sectors than agriculture.

After a period of wild transformation and a policy of laissez-faire, politicians realized the importance of regions (especially those of peripheral and rural areas). The importance of small and medium-sized enterprises and local producers has been repeatedly emphasized, based on local resources and local sales supported by national and private initiatives. Regions have still an endogenous potential and they often self-help in creating local systems of supports to producers and distribution to local consumers. Local production destined for consumer markets relies heavily on consumers' preferences and their willingness to buy products although they are sometimes not competitive with other mass production products of transnational processors.

Consumers are still relatively sensitive to the price of products. Still, local products make a significant purchase. However, their demand for local products has not yet grown in recent years. Consumers attribute to local products better parameters of some properties than in case of other products. They are often convinced of the higher quality of these products, or they believe that these products are healthier. They are short-term sensitive to affairs with false labelling of foreign products as Czech or local.

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CSR IN CONTEXT OF REGIONAL DEVELOPMENT

Darja Holátová[11]

INTRODUCTION

The essential characteristic of social responsibility is the willingness of an organization to ta108ke responsibility and be accountable for the impacts its activities and decisions create on society and the environment. This implies both transparent and ethical behaviour that contributes to sustainable development, including health and the welfare of society, takes into account the expectations of stakeholders, is in compliance with applicable law and consistent with international norms of behaviour, and is integrated throughout the organization and practiced in its relationships (ISO 26000, 2011).

Corporate social responsibility involves the conduct of a business so that it is economically profitable, law abiding, ethical and socially supportive. To be socially responsible then means that profitability and obedience to the law are foremost conditions when discussing the firm's ethics and the extent to which it supports the society in which it exists with contributions of money, time and talent (Carroll, Buchholts, 2014). Corporate Social Responsibility – is a concept, which, despite having been the subject of many researchers, has no uniform definition. In an effort to define corporate social responsibility, we can define it as an obligation for companies to protect and improve the environment, the quality of life of people and society in general, now and in the future (Mihalache, 2013).

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Another division according to Kassim (2015) is that CSR can be divided into four dimensions: social, legal, ethical and economic.

Werther and Chandler (2011) highlight five key trends related to the growing importance of corporate social responsibility: growth of prosperity, environmental sustainability, globalization, free flowing information and the growing importance of corporate and brand reputation.

The authors Buchholtz, Carroll (2012) explain total CSR as follows: Economic responsibilities – Social responsibilities – Environmental responsibilities
+ Philanthropic responsibilities = Total CSR

Archie B. Carroll (Carroll, Buchholts, 2014) introduced the so-called CSR Pyramid in his "Pyramid of Corporate Social Responsibility," which described four types of duties that each company has. The core of the pyramid is, of course, an economic duty that is linked to the need to generate profits and therefore support other corporate activities, for example, CSR. The next stage of the pyramid is made up of legal obligations. This means that corporations must make sure that their activities are legal.

Compliance with the regulation helps protect customers who rely on true product information, as well as investors who may lose their capital if the company is fined or is closed down (Anaejion, 2015). According to Dr. Michael Hopkins, this degree cannot manage in countries where there is a high corruption levels and «brotherhoods» (Hopkins, 2011). The third degree of the pyramid is ethical duties. Environmental protection and the creation of conditions for employees are enshrined in the laws, regional or municipality regulations. The ethical duty lies in their voluntary extension. The company can provide a higher than minimum wage, they can create a clean and safe working environment where employees enjoy working. At the top of the pyramid, there is a philanthropic duty which helps a company to become a good corporate inhabitant.

CSR use varies greatly in every sector, but it most distinctly differs between organizations in different stages of maturity and CSR development (Black, 2015.)

Social responsibility strategy has a positive impact on society's welfare, but it has to be designed based on moral principles, public values and a long-term approach (Arman, 2015). The CSR strategy is being implemented by managers who bear the future in mind and want to direct the company towards charitable activities and towards developing and strengthening the community.

Companies should develop CSR strategies whose activities can be divided into three groups. The first group of activities focus on charity, the second on improving operational efficiency and the third group deals with the transformation of business goals to create shared value (Rangan, 2015).

In order to incorporate the CSR strategy correctly, companies have to adjust the existing programmes from each group of activities so they are in line with the purpose and values of the company (Rangan, 2015). They need to find ways of measuring the success of their CSR programmes, co-ordinate programmes across groups and create a team that will manage the CSR strategy.

Effective Corporate Social Responsibility brings many benefits to businesses (Arman, 2015). Companies that are aware of this fact, have actively invested in CSR in order to build a favourable work culture in their business and to be beneficial to society as a whole. An important advantage of corporate engagement in CSR is that it brings much greater benefits to society than a socially responsible individual.

RELATIONSHIP BETWEEN SOCIAL RESPONSIBILITY AND SUSTAINABLE DEVELOPMENT

The World Business Council for Sustainable Development (WBCSD) defines CSR as a commitment of an enterprise to behave ethically, to contribute to economic development while improving the quality of life for

people and families as well as social communities in the world in general (Ikechi, Wagbara 2014).

Sustainable development is a way of developing human society that brings together economic and social progress with full environmental conservation. The main objectives of sustainable development include preserving the environment in the least varied form for future generations. It's built on social, economic and environmental pillars. The Sustainable Development Goals (SDGs) are broad and ambitious.

When an enterprise accepts its responsibility towards municipalities and has an active interest in the well-being of its municipality, it has a long-term advantage in terms of community support, stakeholder loyalty, a good image in the public eye, employee morale and teamwork which is necessary for long-term success. Businesses should actively plan to participate in improving the environment for their benefit, the benefit of their communities and its citizens. (European commission, 2011; Ikechi, Wagbara 2014).

According to the World Business Council for Sustainable Development, the definition of Corporate Social Responsibility is as follows: *"CSR is a commitment on the part of businesses who aim to contribute to economic development while improving the quality of life for its workers and their families. This commitment also applies to the community and also society as a whole" (*WBCSD, 2013).

In September 2015, the United Nations agreed on a program to transform the world into sustainability. 17 Sustainable Development Goals (SDGs) present a development program for the next 15 years (2015–2030) and builds on the successful Millennium Development Goals (MDGs) agenda. All UN member states, representatives of civil society, business communities, academic communities and citizens from all continents participated in the formulation of SDGs. The Sustainable Development Agenda was officially endorsed on September 25th, 2015 by the United Nations Summit in New York in the Agenda 2030 document "Transforming our World: A Sustainable Development Agenda 2030", including the SDGs.

This program is based on specific Sustainable Development Goals. The main purpose of SDGs is to ensure that all people in the world can live a dignified life without poverty, hunger and inequality, and can fully develop their potential. We are the first generation that can eliminate extreme poverty on Earth and at the same time the last generation that can prevent the worst impacts of global warming.

In recent years, limited or non-renewable natural resources, then Earth pollution, global warming, etc., have been the subject of major researches (Mihalache, 2013).

Companies are looking for a way to work so we can maintain the environment with minimal long-term impacts. (Newton, 2014,1) The ethical area not only focuses on fair access to people in less developed countries, but also on decent behaviour towards employees, customers, investors and other stakeholders (Newton, 2014, 2).

Although many people use the terms social responsibility and sustainable development interchangeably, and there is a close relationship between the two, they are actually quite different concepts (ISO 26000, 2011).

GLOBALIZATION AND THE PROCESS OF SUSTAINABLE DEVELOPMENT

Sustainable development is the starting point and possible option of economic and social development in the global world. It is a type of development that meets the needs of the present without threatening the possibilities for future generations to meet their own needs. According to environmental laws, sustainable development is something that retains the possibility of meeting basic life needs for the current society as well as future generations, while not reducing the diversity of nature and preserving the natural functions of ecosystems. It gives importance and respect to the interaction between final resources and consumption, interactions between the burden of the environment and waste products coming from economic activity and seeks to maintain balance and harmony between humanity and the environment.

The condition of globalization and the process of sustainable development is the openness of the system, its complexity and clearly defined and respected rules.

Sustainable development (beyond the economic context, sustainable life) is a way of developing a human society that brings together economic and social progress with full environmental conservation. The main objectives of sustainable development include preserving the environment for future generations in the least varied form of original.

Sustainable development is a concept that was first introduced in the 1987 report "Our Common Future" (USR1), and called "a global agenda for change." Its challenging goals are the elimination of poverty, health for all, and meeting the needs of society while living within the planet's ecological limits. Although numerous international forums have reiterated the importance of these objectives over the years, there is little evidence that we have moved much closer to these goals (ISO 26000: 2010, 2011). Social responsibility has as its focus the organization, not the globe. Social responsibility is, however, closely linked to sustainable development because an overarching goal of an organization's social responsibility should be to contribute to sustainable development. The actions of a socially responsible organization can make a meaningful contribution to sustainable development.

Sustainable development has global, regional and local applications. Proponents of the shift to CR argue that three elements of sustainability required for organizational effectiveness (Benn, Bolton, 2011:

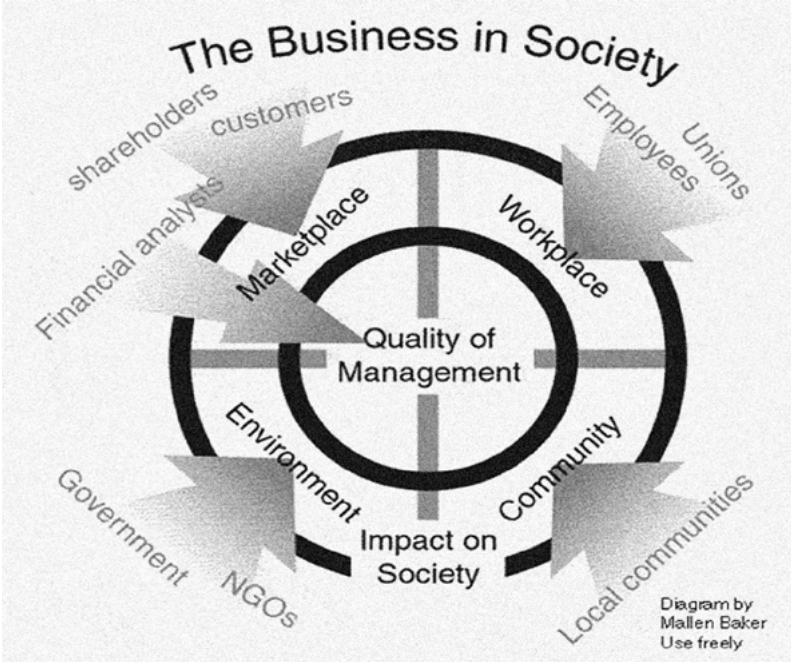
Economic sustainability refers to ensuring that the organization is financially viable and, if a public company that it makes adequate returns to investors.

Social sustainability refers to ensuring that the organization internally creates a supportive and development environment for staff and externally meets legitimate expectations of key stakeholders.

Environmental sustainability refers to ensuring that the organization eliminates any negative impacts on the natural Environment and actively contributes to the health of the biosphere.

Companies need answers to two aspects of their business, the first being the quality of their management in terms of casting as well as processes. The first aspect can be seen in the inner circle. The second aspect is the nature and amount of their impact on society in different areas. The CSR strategy is integrated into the organization's business strategy.

Picture 1: Business society
Source: (Baker, 2013).



External stakeholders are increasingly interested in company activities. Most companies look into the outer circle, seeing what the company has done well or not so well, whether they are products and services, environmental impacts, the local community or how the company behaves and develops its staff. From various stakeholders, it is primarily

financial analysts who, as in the past, focused financial performance on the quality of management as indicators of probable future performance (Baker, 2013).

MATERIALS AND METHODS

OBJECTIVES, RESEARCH METHODOLOGY AND RESEARCH GOALS

The aim of the project is to identify the indicators, factors and tools that can be used to facilitate decision making by managers in the field of Human Resource Management and CSR for small and medium-sized enterprises, which affect the performance of enterprises in their manufacturing and non-manufacturing activities as well in as their economic relations.

BASIC FILE AND RESEARCH SAMPLE

From the basic file (66 514 enterprises) the research sample (1075) was selected by a non-probabilistic method of random selection, due to the difficult conditions of data collection. Each of these companies (1075) received a questionnaire in electronic format. Of the 325 questionnaires returned, 23 were excluded because of incomplete answers. The examined sample, which consists of 302 small and medium-sized enterprises operating in the South Bohemian Region, was generated from the research sample.

Characteristics of the examined sample (302 enterprises) are as follows: micro enterprises with up to 9 employees represent 19%. Small businesses are represented by the greatest number, even though they comprise only 3% of all SMEs in the region, *i.e.* 49%.

The research results presented in this monograph have been achieved in support of the research project of the Grant Agency of the University of South Bohemia "Management of human resources in small and medium-sized enterprises".

RESULTS

A statistical evaluation of the functioning of processes of social responsibility shows that the value of the first quartile (X1st.Qu.) was 49,250; the value of quartile (median) was 70,000; the value of the third quartile (X3rd.Qu.) was 90,000. The simple arithmetic average of evaluation of the level of the functioning of processes was 61,820 (mean) and the standard deviation (sd) for the analysed variable in the file was 36,922.

Table 1: Evaluation of the functioning of processes of social responsibility
Source: Holátová, Doležalová (2015).

Min.	X1st. Qu.	Median	Mean	X3rd. Qu.	Max.	NA.s	sd
0,000	49,250	70,000	61,820	90,000	100,000	15,000	36,922

The research CSR also showed in which areas of social responsibility the surveyed companies are involved. 62.7% of respondents in the companies show engagement in social responsibility primarily in activities of donations, volunteering and sponsorships. Another area in which firms are involved is the area of minimizing the negative impact of business on the environment – 43.32% of respondents. Respondents also reported that 13.2% of companies are committed to superior employee policy and 20.79% state that they are engaged in other unspecified activities. 17.16% reported that they are not engaged in any activities (Holátová, Doležalová, 2015).

In 2015 research in corporate social responsibility took place in Australia and New Zealand (Black, 2015). It's one of the largest social responsibility research assignments in the world. More than 1,000 businesses participated in the research. The research dealt with the role of the manager responsible for corporate social responsibility. A successful CSR manager should be able to effectively communicate (Březinová, Slabá, 2017), influence and motivate both internal and external stakeholders. They should have leadership skills and the ability to develop and implement CSR program (Black, 2015).

Managers influence three core CSR standards – employee care, company ethics and public benefit (Arman, 2015). Companies with a strong social conscience, responsibility and environmental sustainability effort engage a company's policy in its socially responsible goals.

In the last decade, dozens of in-depth interviews have been conducted with managers and directors who are directly or indirectly responsible for CSR's strategy. It has been discovered that well-managed companies are less interested in integrating CSR into their business strategies and goals. CSR projects are often initiated by uncoordinated different internal managers, often without the CEO's active involvement. These companies can't maximize the positive impact on the social and environmental systems in which they operate (Rangan, 2015).

In the research, managers were assigned to the appropriate category – initiator, integrator and innovator. Initiators focus primarily on compliance with environmental regulations, integrators introduce CSR within the enterprise and innovators use CSR as a competitive advantage and address global sustainability issues (Black, 2015). The research shows that innovative CSR practices help companies to reach new markets more than before. Companies are trying to innovate and create new products to reach new customers. For example, the development of a product that can also be bought by groups of people with low socio-economic status.

DISCUSSION

In order to incorporate the CSR strategy correctly, companies have to adjust the existing programs from each group of activities so they are in line with the purpose and values of the company (Rangan, 2015). They need to find ways of measuring the success of their CSR programs, co-ordinate programs across groups and create a team that will manage the CSR strategy.

Effective CSR (Corporate Social Responsibility) brings many benefits to businesses. Companies that are aware of this fact, have actively invested in CSR in order to build a favourable work culture in their business and to be beneficial to society as a whole. An important advantage of corporate engagement in CSR is that it brings much greater benefits to society than a socially responsible individual. (Arman, 2015)

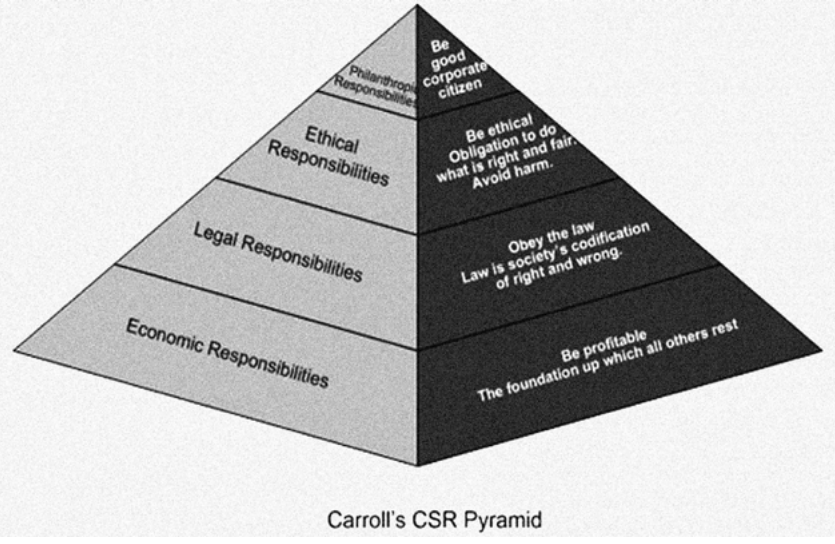
Székely and Knirsch (2005) represent approaches to measuring, monitoring and evaluating the results of company activities within sustainable development and CSR:

- **Researches and surveys conducted by professional and governmental** organisations, international institutions or academic institutions. However, Most of them only examine the respondents' opinions and claims, which can be very subjective.
- **Awards given (financial, education, production, trade and power en**gineering). The number of competitions and awards is very wide and it's very difficult to have an overview of all the award criteria, so the comparison is very difficult.
- Investors criteria,
- Benchmarking,
- Sustainability indices – several stock indexes of sustainability emerged a few years ago.
- Accreditation – standards and codes – business activities are assessed to see if they are in line with widely recognized standards and codes. For example, the most recognized standards are AA1000 Accountability/Assurance, SA 8000 and ISO 14001.
- **Sustainability indicators that produce comparable data on the organ**ization's economic, environmental and social outcomes.
- Non-quantifiable indicators of sustainability and CSR results.

SME´s: Carroll's CSR Pyramid can be applied to small and medium businesses (Dudovskiy, 2012). According to Carroll "corporate social responsibility involves the conduct of a business so that it is economically profitable, law abiding, ethical and socially supportive. To be socially

responsible then means that profitability and obedience to the law are foremost conditions when discussing the firm's ethics and the extent to which it supports the society in which it exists with contributions of money, time and talent" (Dudovskiy, 2012).

Picture 2: The Carroll's pyramid of CSR
Source: (Buchholtz, Carroll, 2012)



- *Legal responsibility in Carroll's CSR Pyramid:* the legal responsibility of corporations demands that businesses abide by the law and play by the rules of the game. Should companies choose to "bend" or even ignore their legal responsibilities the price can be very high for the business.
- *Ethical Responsibility in Carroll's CSR Pyramid:* the main concept of ethical responsibility is that the ethical responsibility consists of what is generally expected by society over and above economic and legal expectations. Ethical responsibilities of companies cover its wide range of responsibilities. Ethical responsibilities are not necessarily imposed by law, but they are expected from ethical companies.

- *Philanthropic responsibility in Carroll's CSR Pyramid*: as it is in the top of the pyramid, it focuses on more luxurious things such as improving the quality of life of employees, local communities and ultimately society in general. Some points of the philanthropic responsibilities of the businesses can be controversial.

And the different layers in the pyramid help managers see the different types of obligations that society expects of businesses (Dudovskiy, 2012).

Any company should be a socially responsible company, whether small, large or operating abroad. Consumers increasingly appreciate socially responsible behaviour and generally prefer companies that actively engage in CSR with their activities.

Among theories concerning firm's social responsibility is "Theory of the firm/strategic leadership theory" which was proposed by Waldman et al (2004). The theory states that some aspects of CEO leadership can have a direct effect on the inclination of firms to engage in CSR and companies which are run by intellectually stimulating CEOs do engage more in strategic CSR than average companies.

Guidelines for Corporate Social Responsibility (2011) provides guidance on how businesses and organisations should work in a socially responsible manner. This means how to act in an ethical and transparent way that contributes to the health and well-being of society.

CONCLUSION

Sustainable development is a fundamentally different concept than the sustainability or ongoing viability of an individual organization. Sustainable development refers to the way in which society's needs are met (ISO 26000, 2011). The sustainability of an individual organization may or may not be compatible with sustainable development, depending on the way the organization is conducted and managed.

Business organizations around the world are aware of the benefits of adopting socially responsible behaviour and are constantly trying to

come-up with new innovations in corporate responsibility. Most businesses have practiced some form of social and environmental responsibility for some time and are therefore trying to contribute to the well-being of communities that they affect and at the same time are dependent on it. It's important for companies to incorporate CSR into their business disciplines and to make sure that individual socially-responsible projects bring them business results. Therefore, the main objective is to reconcile the social and environmental activities of a business with its business values (Rangan, 2015).

It concerns the responsibility of business of producing goods and services needed by society and selling them making a profit. It comes the first responsibility of the business as it is to be a properly functioning economic unit and stay in business. And this is the base of the pyramid, where all the other layers rest on.

Boulouta and Pitelis (2014) deal with the relationship between social responsibility and national competitiveness. It finds answers to the question whether and how corporate social responsibility affects competitiveness on a national level. If it also brings positives from this perspective. According to study's results, there is a positive relationship between social responsibility and national competitiveness, namely by increasing Gross Domestic Product per person. It also turned out that this impact is stronger in countries with a relatively low innovation status. The impact of CSR is stronger in organizations with lower innovation attitudes.

Sustainable development means improving peoples living conditions so that it is not at the expense of future generations. Sustainable development means working together, thinking of others more and respecting the environment. We need to work together for fundamental changes that make relations in society fairer and more equitable. This will not only depend on politicians, but also on companies, organizations and individuals.

In the future, a strong relationship should be built between governments and organizations. Social responsibility should not be understood as an obligation, but as a service to the Earth's social development.

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MANIFESTATIONS OF INSTITUTIONAL ECONOMICS IN THE REGION

Růžena Krninská [12]
Ondřej Skopec [13]

MULTILEVEL GOVERNANCE, ELINOR OSTROM – INSTITUTIONAL ECOLOGICAL ECONOMICS

Multilevel governance is characteristic for a situation where national governments cease to be key actors in the development of environmental policy and its instruments. Competencies move to international and local (regional) levels, while the importance of engaging the public in the development of different planning and other policy documents is being emphasized.

In the Czech Republic, this is related with two processes, which also highlighted the topicality of regional issues. One of them is the creation of modern, liberal democratic decision-making institutions, initiated by the political changes at the turn of the 1980s and 1990s. The second key process is the integration of the Czech Republic into the European Union. The involvement of the Czech Republic in the European integration process has raised a number of issues that are related to economic and social cohesion, balancing regional inequalities and structural and regional policy at all but also with the legitimacy of decision-making and the functioning of democratic mechanisms. While at the beginning of the 1990s the main attention was paid to the creation and stabilization of institutions at the national level (as well as the economic and social transformation of the Czech society), in the late 1990s the decentralization of the decision-making structures and in this context also the reform of the state administration at the regional and local level became the social and political issues. Before 1990, the state was responsible for environmental issues, after 1990, along with liberal approaches, the priority of private ownership was promoted even with natural resources. While **multilevel governance is a model of natural resource management that is** by many of today's academics, based on a series of empirical evidence gathered, **considered more sustainable than previously-enforced state or private solutions.**

One of the academics pushing for new approaches was Professor Elinor Ostrom of Indiana University in the US, who as the first woman became Nobel Prize-winner for Economics with Oliver E. Williamson in 2009. This economic approach testifies that "it depends on institutions – institutions matter". Institutions in this case can be understood as "rules of the game" (or restrictions) that regulate interpersonal interaction. Institutions (from the Latin instituere: establish) are conceived analogously as in sociology: the generally practiced, approved and transmitted way of actions and relationships. It acts as a mechanism for maintaining the social order, but also as a model of behaviour facilitating cooperation. Institution is a way how people do something in a given culture.

Institutions here are not perceived by a familiar Czech way used in common language and connected with the expression of an institution as a social unit or an organization with an internal division of activities. Organization is the way the institutions coordinate their activities. In other sciences, institutions also often mean what is more or less permanent. In sociology, however, both usually differ: for example, banking is an institution, a bank is an organization.

Elinor Ostrom works with the resolution of institutions on laws (from the constitution), social norms and informal institutions: emerging spontaneously and historically – like customs, traditions, conventions, morals,

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ethics and family, language, money, the market. Such perceived institutions affect the behaviour of individuals in everyday life and can, to a large extent, shape their expectations and goals.

At a general economic level, the administration (functioning of institutions in managing) of natural resources can be an example. The neoliberal approaches of private owners of natural wealth, on the one hand consider costs and, on the other hand the benefits of different varieties of their behaviour. They tend to choose those options that have the greatest net benefit (profit) or only immediate maximum profit.

However, an environmental dimension (shared values and behaviour norms) that have the ability to dampen selfish individual interest and increase the weight of socially beneficial phenomena should also be an integral part of this decision on natural wealth.

When applied to environmental protection, we can say that these are mainly badly set institutions (management regimes) that do not give people the incentive to protect natural resources and cause their destruction in space and time.

Elinor Ostrom (1990) has devoted her work to the study of so-called collective goods (in the case of which people compete to consume the goods but where it is difficult to exclude someone from the consumption – for example lakes, pastures, forests, irrigation systems, etc.) which has directed the most part of her research to the field of environmental protection.

Unlike a number of other economists, she has left the premise that individual parts of the environment must as "public" necessarily be administered by the state. At the same time, however, she is not among the representatives of market-oriented economic theories, that advocate the private ownership of natural resources as the only possible solution to current ecological problems.

Elinor Ostrom (1990) argued that it is just the collective goods where it is important to pursue the combination of a certain type of ownership and real (written and customary) usage rules, while it is not possible to predetermine and put above an "ideal" management regime for all situations.

During her scientific work, Elinor Ostrom and her colleagues gathered hundreds of case studies on working community regimes for managing natural resources in different parts of the world. The community management mode is characterized by a group, community of owners or users who have exclusive access to a resource (e.g. a lake or forest). To a large extent, the group itself creates rules for the use of resources, including control and sanction mechanisms, so as to meet the needs of users, while avoiding the degradation of the resource over time. In these examples, Elinor Ostrom demonstrated that individuals are able to pursue objectives that are beneficial to the whole group (i.e. to promote cooperative strategies) under certain conditions and that they achieve better results than government regulations adopted on the central level and implemented into the communities from outside. Thus, she has challenged the existing conclusions of the collective election theory which excluded the effective cooperation of individuals within the group.

However, it should be noted that successful examples fulfilled several stringent conditions formulated by Ostrom (1990) in the form of principles such as:

- user community and resource community are clearly bordered,
- the community is stable,
- the quality of the resource is key to community survival,
- users directly participate in the creation of rules including control system, etc.

Elinor Ostrom (1990) presented the communal regime for the management of natural resources as a real alternative to nationalization and privatization of the environment and warned against the overwhelming interference into historically stable management systems in remote parts of the world.

At the same time, however, on a number of other examples, she illustrated that the mere decentralization of decision-making on natural resources (i.e. the transfer of powers to lower levels of governance, e.g. municipalities) would not ensure sustainable management. In our environment some municipalities in Šumava (of the former Sudetenland, from which

the German population was evicted) can be the examples. The original population there has been linked to the natural environment by its thousand-year tradition. Today's inhabitants, who are living in the area for around sixty years, unfortunately have not fully built the close contact with the natural environment. So, some representatives of municipalities and not only them are interested in how to extract the maximum of wood from the forests and thus bring profit to the municipal treasury. Regardless of whether they are located in the Šumava National Park or in the spring areas. They do not realize the findings of academician Kudrna (1988) that the springs areas must be forested. This is particularly important during the current climate change, when there is a risk of loss of current water resources, not only in our state, but also for the neighbouring countries.

In last works by Elinor Ostrom (1990), there was therefore more strongly promoted the belief that rather than the introduction of fully decentralized or centralized systems, **reforms in the field of natural resource management should focus on creating a multilevel decision-making system – on the distribution of authority between different levels (local – regional – national – transnational)** that are to some extent independent of each other and are therefore better able to balance existing political, economic and environmental interests. For this system, the term "multilevel governance" is used in the current literature, and some of the newer European environmental policy guidelines are promoting it in the EU.

Elinor Ostrom has influenced a number of colleagues and countless students who, while exploring collective asset management regimes, have been involved in collecting empirical material into publicly accessible databases. The method she has created – the method of institutional analysis – diverts the attention of economists in the field of environmental protection from the problematic calculations of effective solutions towards the qualitative processes taking place between human society and ecosystems. Her thoughts have become the basis for **a new thought stream – the so-called institutional ecological economy**.

Its "legacy" can be seen as the result of a lifelong effort to comprehend the functioning of the institutions of the real world. In this light, the theoretical debate about whether the state or the market is better can be seen as largely overcome.

INSTITUTIONAL ASPECTS AS A PREREQUISITE FOR MULTILEVEL GOVERNANCE

Post-communist countries of Central and Eastern Europe have limited experience with multi-level governance schemes, as environmental issues have been solved for a long time through centralized decision-making. Neoliberal market economy approaches have strengthened the segmentation of society to individual units, to the form of extreme individualism that exalts individual freedom beyond the natural laws and ethical values. The capacity of the modern state is in the long term conditioned by the flexibility of political structures, their integration and decision-making capabilities, the stability of social development and the **emergence** of sufficiently **autonomous and structured civil society**. Civil society represents the counterbalance of political parties and power structures, and at the same time serves as a source of value orientations, civic initiative and public discourse that retroactively legitimizes political institutions. It cannot be said that there are new significantly positive institutions in this area so far.

According to Hudečková, Lošťák, Ševčíková (2006), regional institutional arrangement (state administration) through the values and ways of behaviour it supports, and social institutions that form the field for behaviour of individuals and groups, have indirect influence on the economic development of the region. Social institutions are linked to local culture, customs, traditions and other established ways of dealing with people that get its institutionalized form in the form of family and various associations. The way how regional governance works, what cultural standards are incarnated in institutions (e.g., people consider it normal

to work without a job contract), creates space for the institution of illegal employment or the black market, the grey economy, etc. What is the role of the family or what are the positions and activities of non-profit organizations all affect the development of the region. Another indirect influence on the economic development of the region comes from the institutional and political administrative framework of the whole state and from the transnational level (EU). (If the state allows to establish black market institutions, economic development cannot be expected, if "rules of the game" allow, for example, fraud, not even social development can be expected). The efficiency of the institutional structure of a particular region or of the entire state is increasingly seen as an important factor of regional development. This factor has at least the same influence on the development of the region as the traditionally mentioned physical factors like the infrastructure (Hudečková, Lošták, Ševčíková, 2006).

Two municipalities within the South Bohemian Region were selected to assess the institutionalized status of communities (societies) at the local level, the municipalities significantly differed in the state of material security, including infrastructure, contrary to the functionality of cultural traditions associated with institutional aspects. Information on human mobility, communities and, last but not least, the respect of customs and traditions in the village and the relation of the inhabitants to these customs, traditions and the local natural environment, were gathered with the help of the processed results from the questionnaire (with 36 questions) obtained from an adequate number of respondents, corresponding to the population frequency of both municipalities. Following the analysis of the questionnaire and the socio-economic characteristics, a case study was subsequently elaborated. The main objective of the research was the specification and the determination of the importance of cultural and institutional aspects, as well as its influence on the development and stabilization of rural communities at the local level, which is important for multilevel governance.

The first village – smaller – up to 500 inhabitants, with significant cultural traditions, is located 20 km from the regional town, where job opportunities

are found. The village has not enough funds to have a good technical infrastructure due to its smaller size. The village has school with only lower level of basic education which is hard to keep due to the low budget. A detached physician's office at certain times and days of the week is the only medical care in the village.

The second village-bigger – about 1,500 inhabitants, is located 30 km from the border with Germany, lies on the international road connecting the capital of the Czech Republic with a significant border crossing. The village belongs to the historical territory of Prácheň, it was not part of the Sudeten because the German population did not predominate, so the expulsion of Germans after the Second World War was only partial. It does not belong to municipalities close to the borders, which would be significantly inhabited by new settlers from inland after the expulsion of Germans. There is industrial production here. The village is accessible by all the usual means of transport – bus and train. The village has a relatively good technical infrastructure, its size is given by 7 parts, consisting of former adjacent municipalities. This is related with the existence of primary school with lower and higher level of education, as well as of kindergarten. The village provides a permanent general practitioner.

The first factor is a sufficient and diversified job offer (Table 1). The bigger border municipality has very few unemployed people and offers a sufficient number of jobs, thanks to the industrial production in the village. The smaller village due to its size has a small number of people employed locally because there are no job opportunities. It is necessary to commute to the regional town for work opportunities from the local suburban village. This is another element of stability – transport accessibility. The small village has a poorly secured connection with the surrounding area (only the connection to the county town), a small number of bus lines, no rail and no connection with any major nearby towns. On the contrary the transport service in the bigger border village is sufficient thanks to the train and bus connection and road from Prague to border crossing (Table 1). Ensuring sufficient technical infrastructure, this basic development problem again affects only a small municipality,

which is missing a drainage system connected to a sewage treatment plant, pavements, etc. The larger village has sufficient technical infrastructure on the listed and other points (Table 1).

Civic amenity is related to education, which appears to be a significant stabilizing factor for all village residents and not just for young families. The primary school to a certain extent fulfils also the role of the cultural and social centre in the village. Its abolition is seen by many residents as a sign of decline. The small village school has only a lower grade with small classes and faces a lack of pupils, since most parents (particularly newly immigrants) carry their children to the county town. The municipal council is inclined to allow the complete abolition of the school due to the financial difficulty of maintaining a school building. The primary school of the larger border town operates without difficulty according to our findings and the inhabitants are mostly and fully satisfied with it (Table 1). Medical care is another element of civic amenity and one of the basic maintenance factors in the village. The larger village has a secured room for a permanent general practitioner. While a smaller community has to settle for a detached GP practice, only two days a week (Table 1).

Table 1: Summary of factors of socio-economic characteristics of selected municipalities

Selected factors of socio--economic characteristics of municipalities	Factor strength assessment	
	Smaller village	Bigger village
Job offer in the village	unsatisfactory	satisfactory
Traffic service	weak	satisfactory
Technical infrastructure	unsatisfactory	satisfactory
Civic amenities – education	weak	satisfactory
Civic amenities – medical care	unsatisfactory	satisfactory
Satisfaction with interpersonal relations	strong	weak
Alignment with traditions	strong	weak
Alignment with the natural environment	strong	satisfactory

Despite the fact that the smaller village suffers from all the deficiencies of the stabilizing material and technical elements, the inhabitants are much more satisfied with the interpersonal relationships and have a warmer relationship to the natural environment (Table 2).

Table 2: Evaluation of the relation to the natural environment and interpersonal relations in the municipalities

Evaluation	Results in %			
	Smaller village		Bigger village	
	Relationship to the natural environment	Interpersonal relationship	Relationship to the natural environment	Interpersonal relationship
Fully satisfied	64	18	40	0
Rather satisfied	27	65	29	48
Rather unsatisfied	5	7	22	23
Fully unsatisfied	0	0	0	14
I don't care	4	10	9	25

A significant difference between the studied municipalities is in the degree of satisfaction with the interpersonal relationships in the community, which partly reflects in the satisfaction with the surrounding natural environment and landscape. The difference can be attributed to the lively and strong observance of old habits in a smaller village, which are reflected in certain institutional aspects that lead to a uniting community and sense of belonging to the community in the village. In the smaller village, a strong, millenary traditions have the same effect on people today as they had on past generations. The most popular is the Shrovetide, and then erection of a maypole and burning fires at the night from the last of April on May 1. Common experiences in traditional customs, based on old traditional rituals, extending into the far „pagan" past and connecting their communities with natural cycles are essential. These are some roots that, among other things, prevent the inhabitants to leave the community and the place. Institutional aspects of the sense of belonging of the inhabitants of the smaller village to the place, landscape, region, have a stabilizing effect, especially on the younger generation. In the small village, the young generation predominantly remains. Contrary, in the bigger village, the young people leave more often, although they have satisfying technical infrastructure, civic amenities and job opportunities in the village. In the large village, the most popular tradition is the „pilgrimage" (funfair). It is a rural element, but today it only has features of the urban way of life, it is a kind of a „market" connected with adult and children's entertainment (roundabouts and swings). New elements of urban life, individualistically separating and non-creating the communities or a contact with nature, are strongly reflected also in other cultural events. Residents in the larger village are significantly less satisfied with interpersonal relationships, although all material and technical elements of stability contribute to their overall satisfaction.

The conclusion, that the non-material elements are as significant, if not decisive, as materially technical elements, can be achieved by quantitative

research. Whether the non-material aspects, when institutionalized, can be more important than the materially technical elements can be deduced from subsequent qualitative research.

RESULTS OF RESEARCH ON CULTURAL DIMENSIONS AT THE LOCAL LEVEL OF MUNICIPALITIES IN CONNECTION WITH INSTITUTIONALIZED ASPECTS

Links between cultural dimensions and informal institutions have been used for the detection of institutionalized aspects. The cultural dimensions Hofstede (1999) and Color Semantic Differential Test – TBSD according to Ščepichin, Ščepichinová, Kolářová (1992) were used to perform qualitative research. TBSD is among the methods used in the Czech psychological diagnostics. It can be used effectively in all spheres of psychology, especially to capture human relationships, including its individual value system. The hierarchy of the values of the unconscious site not only of individuals but also of communities can be evaluated by TBSD. This means that the TBSD is focused on shared values in the community. Those values testify to the institutional aspects, or the institutions created, as declared by Elinor Ostrom (1990). The identified shared values in the community of surveyed communities are also reflective of the features of their culture. According to Hofstede (2010), the core of every culture (in every society, community, region, etc.) is shared values. Hofstede cultural dimensions (1999) – a large power gap vs. a small power gap; individualism vs. collectivism; masculinity vs. femininity; short-term orientation vs. long-term orientation; security vs. risk, were used to identify shared cultural values in the communities. 60 stimulus words from TBSD symbolizing values were divided into the dimensions according to the dimensions characteristics. The TBSD was presented to the probands to identify shared values within cultural dimensions following a questionnaire survey. Fig. 1 and 2 document the order of shared

values in municipalities. TBSD identifies the shared values by the analysis of the colours and stimulus words that are coupled by a respondent. The stimulus word is always a symbol of a certain value. The VADIM computer software and TBSD Result Appraisal 2.0b were used to process data obtained from TBSD. With their help, the most commonly shared symbols in the community were found, expressing together the shared values – the values institutionalized in the community. These were divided into 4 intervals:

1–15 – community values shared very positively, 15–30 – community values shared rather positively, 30–45 – community values shared rather negatively, 45–60 – values shared very negatively. The order (1 to 60) of the shared values in the smaller community is in Figure 1 and the order of shared values of the larger community is shown in Figure 2. The above-mentioned distribution of cultural dimensions by Hofstede (1999), coupled with corresponding stimulus words (symbols presenting values), concretize the prevailing institutional aspects in the larger and smaller village. Furthermore, it is worth to focus on the most important characteristics of institutions within the framework of cultural dimensions.

A. High power distance vs. low power distance

A high or low power distance expresses the degree in which society members expect power among people to be unequally distributed. The stimulus words selected as symbols of high power distance are, for example: strength, superior, distance, hierarchy, discipline, respect, attack. The stimulus words selected as symbols of low power distance are, for example: trust, spontaneity, ideal me, ideal woman, ideal man. Some symbolical stimulus words representing high power distance are perceived as rather positive in larger village and as rather negative in smaller village. Stimulus word strength has, from the hierarchy of words representing the high power distance, the highest value in the larger village. In the smaller village, trust and spontaneity is shared very positively (Fig. 1 and 2). People in this community mutually feel low power distance

connected with mutual sharing of trust, the low power distance is institutionalized with the institution of cohesiveness.

B. Individualism vs. collectivism

Individualism is indicative of a society in which relationships between individuals are free: everyone is expected to take care of himself and his immediate family. Collectivism is typical for a society in which people are integrated into strong, cohesive groups, communities. Following stimulus words were selected as symbols of individualism: I (self), individual, loneliness, independence, duties. Following stimulus words were selected as symbols of collectivism: society, people, collaboration, friends, cooperation, love, calmness, workplace. Individualism rather than collectivism is institutionalized in the larger village. It is documented by words I (self) and independence which are shared on the second and third place in the hierarchy of values (Fig. 2). On the contrary, the smaller village is oriented collectivistically. Words society, love, friends, collaboration are perceived very positively by this community and are also in the very top of the value hierarchy. The word society is on the first place of all shared values which means it is the most shared symbol of the community (Fig. 1).

C. Masculinity vs. femininity

In a masculine society, the gender roles are clearly different. The man is expected to be assertive, resilient, strict and oriented to performance, material values and success. The woman is expected to be restrained, solidary, to be interested in and to care for the quality of life. In a feminine society, the gender roles overlap and both men and women are expected to be restrained, solidary, interested in and care for the quality of the natural environment and life. Following stimulus words were selected as symbols of masculinity: men, father, performance, success. Following stimulus words were selected as symbols of femininity: mother, relationships, women, understanding, feeling, experience, children.

Figure 1: The order of shared values in the smaller village community

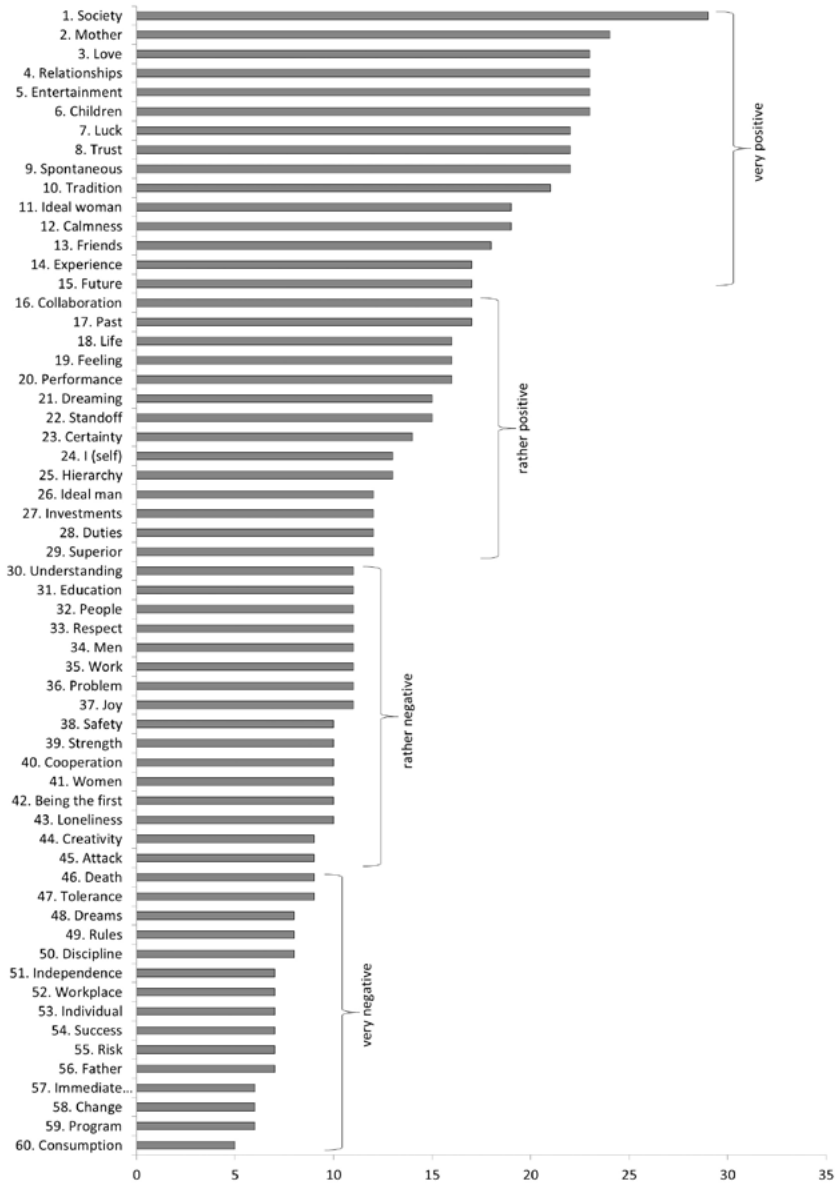
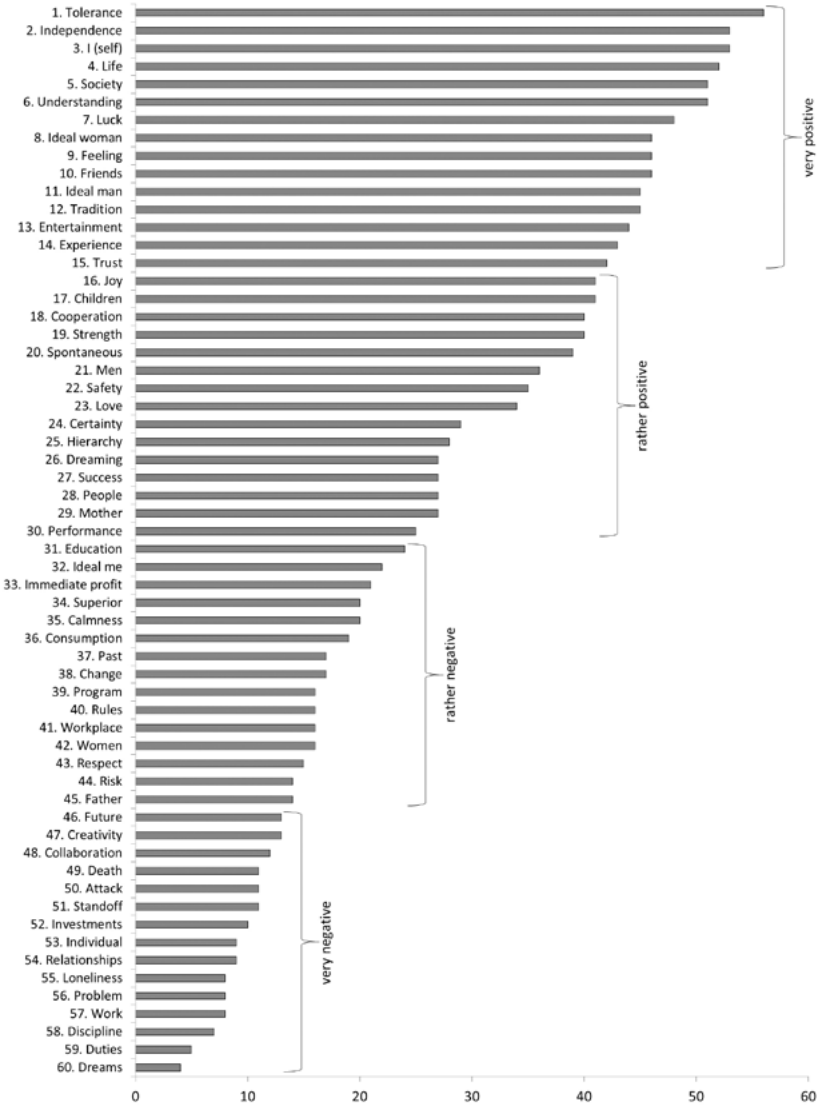


Figure 2: The order of shared values in the larger village community



The larger village could be described as the community manifesting as tolerant and rather masculine, see shared symbols: men and father (Fig. 2). The smaller village holds feminine values more strongly, the very positively shared values are: mother, relationships and love, it also attaches smaller importance to masculine values, success is strongly negatively shared (Fig. 1). In the smaller village, the cultural dimension of femininity is institutionalized. Very surprising is the finding that the village, which was famous for the miraculous image of the Madonna, still has a socially shared and experienced symbol of the mother (the most shared symbol), which is by this institutionalized in this community.

D. Short-term orientation vs long-term orientation

In the short-term oriented society, emphasis is placed on values related to the present and the past. Focus on activities that bring a quick and immediate effect predominate. Long-term orientation is characteristic of the communities where long-term effect-oriented activities in which values focused on future rewards are promoted and supported. Following stimulus words were selected as symbols of short-term orientation: immediate profit, consumption, past, death, dreams, luck, entertainment. Following stimulus words were selected as symbols of long-term orientation: future, tradition, life, joy, education, investments, dreaming. Societies in both villages are rather long-term oriented, the smaller community more significantly. There is a strongly institutionalized focus on the long-term orientation in the small village. The symbol of future is very positively shared in the smaller village (Fig. 1), while it is very negatively shared in the larger village (Fig. 2). The results show surprisingly unambiguous conclusion that a strong link to old traditions implies a long-term perspective with life even in the future. It confirms the reality of this village where its community lives very intensively in an area connected with strong and millenary traditions in connection with the natural order and the natural environment (also confirmed by the results of quantitative research).

E. Security vs. risk

It is a degree of concern about the uncertainty in which members of society feel vulnerable by uncertain, unknown, ambiguous or unclear situations, to what extent they are willing to accept changes connected with risk. Following stimulus words were selected as symbols of security: certainty, rules, safety, calmness, program. Following stimulus words were selected as symbols of risk: risk, change, creativity, problem. The community of a larger village perceives security rather positively, institutionally the dimension of security is more accepted. The risk rejection is the specific of the smaller village. It is coupled with rejection of limiting rules, that would prevent creativity from opening the way towards solution of a problem. It is a proved middle way where it is possible to accept changes and solve problems through creativity and still keep rejecting risk and rigid rules.

THE IMPORTANCE OF LINKING CULTURAL AND INSTITUTIONAL ASPECTS AT THE LEVEL OF MUNICIPALITIES AND REGIONS

The quantitative research suggests conclusion that non-material elements are as important, if not more, as materially technical elements. Qualitative research shows that non-material elements are crucial if they are institutionalized. Institutions can be understood as "rules of the game" that operate on the basis of shared values by community. A generally practiced, approved and transmitted way of behaviour and relationships emerges from the institutions. It acts as a mechanism for maintaining the social order, but also as a model of behaviour facilitating cooperation. Institution is a way people do a certain thing in a given culture. Institutions emerge from traditions and can be formulated on the basis of cultural dimensions, as confirmed by the results of research carried out in two villages.

In summary, the community of the larger village has institutionalized individualism and rather high power distance with an institution of power. The community is at the interface between a rather feminine and rather masculine cultural dimension (masculinity is associated with tolerance and understanding). Furthermore, the dimension of long-termism and the cultural dimension of certainty is institutionalized here. Institutionalization of a rather high power distance dimension and individualism can serve to explain dissatisfaction with interpersonal relationships, which, among other things, lead to the tendency of the inhabitants to leave the village (ascertained by questionnaire survey) although all material values, including good infrastructure, are secured in the village.

On the contrary, in a smaller village where the security of material values and infrastructure is lacking, its inhabitants do not consider moving from the village. The community has an institutionalized low power distance with an institution of trust, collectivism with an institution of community-sharing, and a strongly institutionalized feminine community, with an emphasis on relationships with a strong focus on long-termism with the institution of tradition. Rejecting the cultural dimension of risk and certainty in the form of rules is linked to a strongly perceived creativity as a way to security. Traditions and old folk customs, shared by the fellowship of the community, unite the inhabitants of the village, improve interpersonal relationships, form the community of the village and its connection to the natural environment. Community cohesion overrides the lack of material deficiencies. The inhabitants of the smaller village do not consider abandoning the village, unlike the inhabitants of the larger village (mentioned in the questionnaire above).

The contribution of research is the finding that the interconnection of culture, traditions and the natural environment with interpersonal relationships is significant and has an overall impact on the stabilization of rural settlements. The smaller village suffering from insufficient material technical factors has become more stable, thanks to strong cultural traditions, than the larger village with a sufficient material and technical

base. Old folk customs unite the inhabitants, improve interpersonal relationships, transmit into community sociality, because culture is the accumulated experience of a given social unit and acts as the governing component of any social system. Together with the power of shared cultural traditions in the country, principles of cohesion in the community emerge even in a connection with this space and the natural environment.

If we want to work with the stability of rural space, it will be desirable to attach more intangible elements, such as cultural traditions and their influences on our present day, to materially technical security, to explore the cultural capital of the region. Working with cultural memory and cultural capital therefore means including an open, lively, and „interfering" past, which is thus becoming a significant factor creating the present. The results of the survey show that the importance of lived cultural traditions of rural space clearly stands out in the context of the cohesion of its societies (communities) and as a stabilizer of social and economic development and its sustainability. In conclusion, linking economics (from an institutional point of view) and the social system is done through cultural standards, which can be culturally shared values and are embodied in the institutions – „rules of the game" existing in the community. Direct and indirect influences affecting the economic and social development of the region are linked to the status of the culturally shared values of societies at all levels, starting at the local level – communities of villages and towns. Created institutions associated with symbols (formed by shared values) form the „rules of the game", which, at this local institutional level, subsequently influence the actions of individuals and entire communities.

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THE NETWORK PARADIGM AS A MODELING TOOL IN REGIONAL ECONOMY: THE CASE OF INTERREGIONAL COMMUTING IN GREECE

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INTRODUCTION

Commuting is a multidimensional phenomenon concerning daily mobility for labor purposes outside the place of residence (Polyzos, 2011). The theoretical framework of this phenomenon has social, economic, geographical, and political dimensions, so that the study and the in-depth knowledge of commuting suggests a very complex procedure that can provide useful insights contributing to a more effective policy, especially in the fields of labor and transportation, but also in the sustainable transport planning (Evans et al., 2002; Van Ommeren and Rietveld, 2005). Up today, researchers have studied a wide range of commuting issues, such as transportation (spatial and time) costs (Van Ommeren

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and Fosgerau, 2009; Tsiotas and Polyzos, 2013a), psychology of mobility (Koslowsky et al., 1995), the possibility of a traffic accident (Ozbay et al., 2007), various issues about transportation mode and alternative routes selection (Murphy, 2009; Liu and Nie, 2011), and issues related to the relationship between commuting and forms of productivity (Van Ommeren and Rietveld, 2005).

However, the macroscopic study of commuting has not enjoyed so much attention, both in international and in national level, such as in the case of Greece (Tsiotas and Polyzos, 2013a; Polyzos et al., 2014). One of the modern scientific fields that is capable of providing modeling methods towards this holistic direction is the so-called complex network analysis (Brandes and Erlebach, 2005; Easley and Kleinberg, 2010; Barthelemy, 2011) or the recently renamed discipline of Network Science (Brandes et al., 2013). This approach models communication systems as graphs (Easley and Kleinberg, 2010; Borgatti and Halgin, 2011; Tsiotas and Polyzos, 2013a), namely as pair sets of interconnected units (nodes) and their connections (links or edges). According to this perspective, a commuting system can be modeled as a network, where (on an interregional level) nodes represent places of origin and destination whereas links include distance and flow information.

Within this conceptual framework, this paper models as a complex network the interregional commuting system in Greece, which is developed between capital cities of the Greek prefectures, and it studies the topology and functionality this network, in accordance to its socioeconomic environment. Also, an empirical analysis is applied and constructs a multivariate linear regression model to describe the interregional Greek commuting, based on the semantic components of the network concept, as described by Berners-Lee et al. (2007), Easley and Kleinberg (2010), and Tsiotas and Polyzos (2015c). The further purpose of the study is to detect the structural features of the commuting phenomenon, as these are reflected in the mobility captured by land transport infrastructures.

The remainder of this paper is organized as follows: Section 2 presents the methodological framework and particularly the modeling procedure

and assumptions, the measures used in the network analysis and details of the empirical model constructed. Section 3 presents the results of the analysis and discusses them in the light of complex network analysis and regional economics, emphasizing on the transport sector. Finally, in Section 4 conclusions are given.

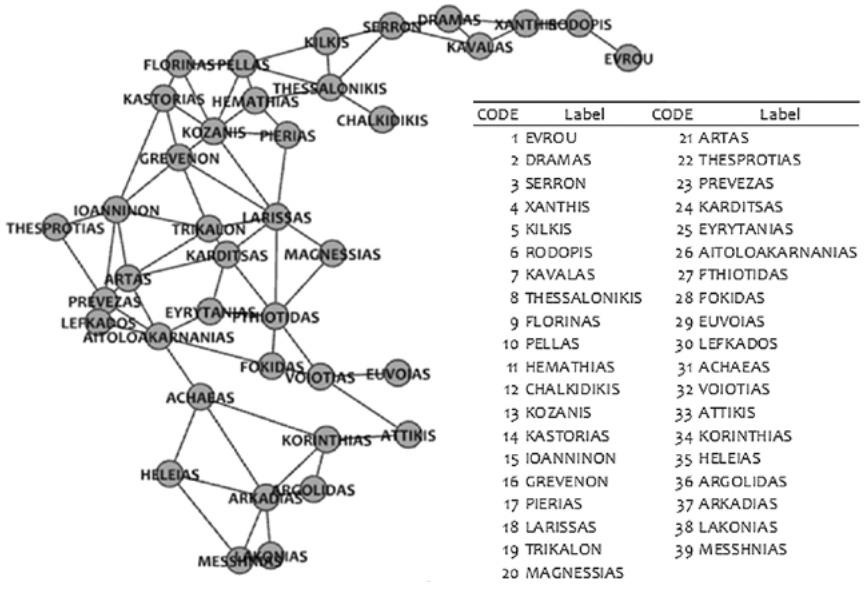
METHODOLOGICAL FRAMEWORK

Network modeling

The Greek Commuting Network (GCN) (Fig. 1) is a network with more an economic and less a physical interpretation. This spatial network represents an aspect of the national road network expressed on an interregional level, in which the routing and the roads geometry is not preserved, but only the geographical scale amongst city distances. Therefore, the GCN essentially represents the functionality of the road connectivity in Greece, in order to study the topology and the economic dynamics shaped by this system of spatial and economic interaction.

In particular, the GCN is represented in the L-space representation (Barthelemy, 2011; Tsiotas and Polyzos, 2015a,b), as a undirected spatial network $G(V,E)$, where the node-set (V) represents the capital cities of the Greek prefectures and the edge-set (E) expresses the potential of developing direct road connections between prefectures of Greece. The nodes' positions of the GCN on the map (Picture 1) correspond to the geographical coordinates of the capital cities considered in the model, whereas the edge lengths are drawn proportionally (on a scale) and represent the road kilometric distances between pairs of nodes. Using capital cities to modeling the GCN is a decision of economic interpretation because capital cities of regions are spatial units with significant population concentration (Polyzos et al., 2013; Tsiotas and Polyzos, 2013a, b) and thus the GCN as a spatial network is a model with a significant economic (gravity) impact.

Picture 1: The Greek interregional commuting network (GCN), modeled in the L-space representation as a non-directed graph, with n=39 nodes and m=71 edges (nodes in the graph represent the capital cities of the prefectures defined by the Kapodestrian act).



CODE	Label	CODE	Label
1	EVROU	21	ARTAS
2	DRAMAS	22	THESPROTIAS
3	SERRON	23	PREVEZAS
4	XANTHIS	24	KARDITSAS
5	KILKIS	25	EYRYTANIAS
6	RODOPIS	26	AITOLOAKARNANIAS
7	KAVALAS	27	FTHIOTIDAS
8	THESSALONIKIS	28	FOKIDAS
9	FLORINAS	29	EUVOIAS
10	PELLAS	30	LEFKADOS
11	HEMATHIAS	31	ACHAEAS
12	CHALKIDIKIS	32	VOIOTIAS
13	KOZANIS	33	ATTIKIS
14	KASTORIAS	34	KORINTHIAS
15	IOANNINON	35	HELEIAS
16	GREVENON	36	ARGOLIDAS
17	PIERIAS	37	ARKADIAS
18	LARISSAS	38	LAKONIAS
19	TRIKALON	39	MESSHNIAS
20	MAGNESSIAS		

The GCN is a connected network (including one component), consisting of n=39 mainland prefectures' capital cities (nodes) and m=71 interregional road links (edges) (Fig. 1). The edge spatial weights $ws_{,ij}=d(e_{ij})$ express the actual kilometric distances of the shortest paths connecting the capital cities of the county. Each edge represent two-way road sections and thus the total network is undirected with a symmetric adjacency matrix. Additional weights in GCN are time distances between the nodes, which express the required time (in minutes) to travel between two network nodes. These values suggest indirect indicators of the inter-regional road network effectiveness, since the average time of a route represents the quality of the network's road infrastructure (Tsiotas et al., 2012; Tsiotas and Polyzos, 2013a,b).

The spatial data (geographic coordinates) used for the construction of the GCN were extracted from Google Digital Mapping Services (Google maps, 2013), while the space-time data from the works of Tsiotas et al. (2012), Tsiotas and Polyzos (2013a,b), and Tsiotas and Polyzos (2015c). Available space-time data correspond to two time snapshots of the Greek interregional road network; the first concern the year 1988 and describe the past status of the national road transport, whereas the concern the year 2010 figures and represent a modern image of this network, resulted after the construction of some major national road infrastructure works, such as the Rio-Antirrio bridge and the Egnatia Motorway.

Finally, the GCN's commuting information was included into the spatial model in the form of node weights (Tsiotas and Polyzos, 2013a,b). That is, the available commuting data does not describe commuting flows on the network edges, but the commuting population mass originating from a certain county capital. This approach was considered as more representative in the regional level than using a model with an edge-weighted commuting flows, because the certain (node-weighted commuting) GCN model has available information for the total number of outgoing commuters capital city (even for those that have destinations other, non-capital, cities), whereas in the edge-weighted commuting model the commuting data will be restricted on just only between capital cities.

Complex network measures

Mixing space and topology measures are used in the GCN analysis and they are summarized in Table 1.

Table 1: Mixing space and topology measures used in the analysis of the GCN

Measure	Description	Math Formula	Reference
Graph density (ρ)	Fraction of the existing connections of the graph to the number of the possible connections. It expresses the probability to meet in the GMN a connected pair of nodes.	$\rho = m \Big/ \binom{n}{2} = \frac{2m}{n \cdot (n-1)}$	(Diestel, 2005)
Node Degree (*k*)	Number of the edges adjacent to a given node, expressing the node's communication potential.	$k_i = k(i) = \sum_{j \in V(G)} \delta_{ij}$, where $\delta_{ij} = \begin{cases} 1, \text{ if } e_{ij} \in E(G) \\ 0, \text{ otherwise} \end{cases}$	(Diestel, 2005)
Node (*spatial*) *strength* (*s*)	The sum of edge distances being adjacent to a given node.	$s_i = s(i) = \sum_{j \in V(G)} \delta_{ij} \cdot d_{ij}$, where $d_{ij} = w(e_{ij})$ in km	(Barthelemy, 2011)
Average Network's Degree $\langle k \rangle$	Mean value of the node degrees $k(i)$, with $i \in V(G)$.	$\langle k \rangle = \frac{1}{n} \cdot \sum_{i=1}^{n} k(i)$	(Diestel, 2005)
Closeness Centrality (*CC(i)*)	Total binary distance $d(i,j)$ computed on the shortest paths originating from a given node $i \in V(G)$ with destinations all the other nodes $i \in V(G)$ in the network. This measure expresses the node's reachability in terms of steps of separation.	$CC(i) = \frac{1}{n-1} \cdot \sum_{j=1, i \neq j}^{n} d_{ij} = \overline{d}_i$	(Koschutzki et al., 2005).
Betweenness Centrality (*CB(k)*)	The proportion of the (σ) shortest paths in the network that pass through a given node *k*.	$CB(k) = \sigma(k)/\sigma$	(Koschutzki et al., 2005)
Local Clustering Coefficient ($C(i)$)	Probability of meeting linked neighbors around a node, which is equivalent to the number of the node's connected neighbors $E(i)$ (i.e. the number of triangles), divided by the number of the total triplets shaped by this node, which equals to $k_i(k_i-1)$.	$C(i) = \frac{E(i)}{k_i \cdot (k_i - 1)}$	(Barthelemy, 2011)
Modularity (*Q*)	Objective function expressing the potential of a network to be subdivided into communities. In its mathematical formula, g_i is the community of node $i \in V(G)$, $[A_{ij} - P_{ij}]$ is the difference of the actual minus the expected number of edges falling between a particular pair of vertices $i,j \in V(G)$, and $\delta(g_i,g_j)$ is an indicator function returning 1 when $g_i=g_j$.	$Q = \frac{\sum_{i,j} [A_{ij} - P_{ij}] \cdot \delta(g_i, g_j)}{2m}$	(Blondel et al., 2008; Fortunato, 2010)
Average Path Length $\langle l \rangle$	Average length $d(i,j)$ of the total of network shortest paths.	$\langle l \rangle = \frac{\sum_{v \in V} d(v_i, v_j)}{n \cdot (n-1)}$	(Barthelemy, 2011)

In addition to these fundamental network measures shown in Table 1, we calculate the omega (ω) index of Telesford et al. (2011), in order to empirically detect whether the GCN has small-world (SW) (Watts and Strogatz, 1998), lattice-like, or random-like characteristics. The SW property is rigorously defined on an available family of graphs, by detecting that the

average path length scales logarithmically as the number of nodes tends to infinity, namely $\langle l \rangle = O(\log n)$, with $n \to \infty$ (Porter, 2012). Due to the unavailability of studying a family of graphs in most of the empirical cases, since it is quite data-demanding to collect many aspects of the same network for different time periods, the small-world attribute detection for the GCN is applied using the approximation ω index of Telesford et al. (2011). This index compares the clustering of the empirical network with that of a $p(k)$ – equivalent (i.e. with the same degree distribution) lattice network ($\langle c \rangle_{latt}$) and the empirical network's path length with that of an $p(k)$ – equivalent random network ($\langle l \rangle_{rand}$), according to the formula:

$$\omega = \left(\langle l \rangle_{rand} / \langle l \rangle \right) - \left(\langle c \rangle / \langle c \rangle_{latt} \right) \quad (1)$$

The null models are computed using a randomization algorithm (Maslov and Sneppen, 2002) and the ''latticization'' algorithm (Rubinov and Sporns, 2010), which both preserve the degree distribution of the original network. Values of ω are restricted to the interval [-1,1], where those close to zero illustrate the SW attribute, positive values indicate *random characteristics*, whereas negative values indicate more *regular* or *lattice-like* characteristics (Tsiotas and Polyzos, 2015b).

Empirical Analysis

In this section we build an empirical model for describing the number of commuters in the GCN, by using network node-variables. Each variable is a collection of values corresponding to the n=39 in number network nodes, measured for a specific feature p. Thus each variable has 39 elements (equal to the number of network nodes) and refers to a single attribute (e.g. degree or population) (Tsiotas and Polyzos, 2013a, 2015c). Given that nodes in the GCN correspond to the Greek prefectures, p=30 in number vector-variables (Y, X_1, ..., X_{29}) are created and entered in the empirical analysis. The selection of the variables is made based on their relevance with the commuting phenomenon in the literature (Glaeser and Kohlhase, 2003, Clark et al., 2003, Ozbay et al., 2007, Van Ommeren and Fosgerau, 2009, Murphy, 2009; Liu and Nie, 2011; Polyzos, 2011; Tsiotas and Polyzos, 2015c), depending on the availability of the data. Furthermore, the variables used in the model are grouped into three thematic categories, a structural (S), a functional or behavioral (B), and an ontological (O), in order to comply with all three components that conceptually describe a network, as proposed by Tsiotas and Polyzos (2015c).

Within this context, all the 30 variables participating in the empirical analysis of GCN are shown in Table 2. The empirical model is constructed to describe the number of outgoing commuters per capital city as a function of the remaining 29 variables. Pearson's bivariate coefficient of correlation and a multivariate linear regression analysis (Norusis, 2004; Devore and Berk, 2012; Tsiotas and Polyzos, 2015c) are used to construct the model.

Table 2: Vector variables participating in the empirical analysis of the GCN

Variable*	**Description**	**Reference/ Source**
(*Structural Class* ($\mathbf{X}_S$)		
(S_1) Road network degree	The number of connections being adjacent to each network node in the GCN.	(Tsiotas and Polyzos, 2015c; Google Maps, 2013)
(S_2) Commuting degree	The number of commuting destinations per node in the GCN.	(Tsiotas and Polyzos, 2015c; ESYE, 2007)
(S_3) Degree difference	The difference $S_3 = S_1 - S_2$	(Tsiotas and Polyzos, 2015c)
(S_4) Closeness centrality	Accessibility variable defined by the measure of closeness centrality shown in Table 1.	(Tsiotas et al., 2013c)
(S_5) Mobility centrality	Centrality measure that is analogue to the kinetic energy formula and captures the potential that a node attribute induces to the network.	(Tsiotas and Polyzos, 2013a, 2015a)
(S_6) Population	Population of each prefecture for the year 2011.	(Tsiotas and Polyzos, 2015a,b,c)

Variable*	Description	Reference/ Source
(S_7) Commuting sign	The sign computed from the statistical difference outgoing-incoming commuters per capital city (+: expelling, 0: neutral, -: attractive)	(Tsiotas and Polyzos, 2015c)
(S_8) Minimum commuting distance	Distance of each city's closest commuting destination.	(Tsiotas and Polyzos, 2015c)
(S_9) Average Neighbour Distance	Average distance of the S_2 variable's destinations.	(Tsiotas and Polyzos, 2015c)
(S_{10}) Bus Route Destinations	Number of available bus trip destinations per capital city.	(Tsiotas and Polyzos, 2015c)
(S_{11}) Train Route Destinations	Number of available train trip destinations per capital city.	(Tsiotas and Polyzos, 2015c)
(*Functional Class* ($\mathbf{X}_B$)		
(Y)** Number of commuters	Number of commuters originating from each capital city.	(ELSTAT, 2011)
(B_1) Direct Commuters	Composite variable defined as B_1=max{incoming, outgoing commuters}$\cdot S_7$.	(Tsiotas and Polyzos, 2015c)
(B_2) Average Bus Route Frequency	Each city's average number of weekly bus routes for all available destinations.	(Tsiotas and Polyzos, 2015c)
(B_3) Bus Flow Index	Is the product: $B_3=B_2 \cdot S_{10}$	(Tsiotas and Polyzos, 2015c)
(B_4) Average Train Route Frequency	Each city's average number of weekly train routes for all available destinations.	(Tsiotas and Polyzos, 2015c)
(B_5) Train Flow Index	Is the product: $B_5=B_4 \cdot S_{11}$.	(Tsiotas and Polyzos, 2015c)
(B_6) Car Number	Number of privet cars at each prefecture.	(Tsiotas and Polyzos, 2015c)
(B_7) Bus Number	Number of buses at each prefecture.	(Tsiotas and Polyzos, 2015c)
(B_8) Taxi Number	Number of taxies at each prefecture.	(Tsiotas and Polyzos, 2015c)
Ontological Class ($\mathbf{X}_O$)		
(O_1) Labor Population Percentage	Population percentage of each prefecture including ages 20<A<65 (extracted from 2011 consensus).	(Tsiotas and Polyzos, 2015c)
(O_2) Educational Index	Composite index of each prefecture's educational level.	(Polyzos, 2011)
(O_3) GDP	Gross Domestic Product of each prefecture.	(Polyzos, 2011; Tsiotas and Polyzos, 2015c)
(O_4) Welfare Index	Composite index showing each prefecture's welfare lever.	(Tsiotas and Polyzos, 2015c)
(O_5) Public Servants	The number of public servants of each prefecture.	(Tsiotas and Polyzos, 2015c)
(O_6) Transportations GDP	Each prefectures's GDP in the transportation sector.	(Tsiotas and Polyzos, 2015c)
(O_7) Accidents	Number of accidents per prefecture.	(Tsiotas and Polyzos, 2015c)
(O_8) Accidents Percentage	Per capita number of accidents for each perfecture ($O_8=O_7/S_6$).	(Tsiotas and Polyzos, 2015c)
(O_9) Productivity Dynamism	Composite index depending from the GDP change, the unemployment percentage, the labor productivity, and the labor percentage.	(Polyzos, 2011)
(O_{10}) Unemployment Inequalities	Inequalities index for unemployment per prefecture.	(Tsiotas and Polyzos, 2013a)

*. Symbols of the variables are given within parentheses.
**. The *Y*-symbol is used because it participates as the response variable in the model

The algorithm of the model's construction consists of three steps. The first involves the grouping of the available variables into the three categories (structural, behavioral or functional and ontological) shown in Table 2. This process leads to the configuration of three sets of variables ($\mathbf{X}_S$, $\mathbf{X}_B$ και $\mathbf{X}_O$), according to the expression (Tsiotas and Polyzos, 2015b):

$$\mathbf{X} \equiv \{X_k, k = 1, ..., p\}$$
$$(\mathbf{X} \equiv \mathbf{X}_S \cup \mathbf{X}_B \cup \mathbf{X}_O) \wedge (\mathbf{X}_i \cap \mathbf{X}_j = \varnothing) \wedge (j \neq i, j = \{S, B, O\}) \quad (2)$$

where the sets $\mathbf{X}_S$, $\mathbf{X}_B$, and $\mathbf{X}_O$ represent the structural, functional, and ontological group, respectively.

In the second step, the algorithm distinguishes the most representative variables from each category, using the bivariate Pearson's coefficient of correlation $r(x,y) \equiv r_{xy}$. The representative variables for each category are those with the largest sum of squares of their correlation coefficients amongst all other variables (only statistically significant correlations are taken into account, $\alpha \leq 10\%$), which are computed (a) within a group $\mathbf{X}_{k=\{S,B,O\}}$ (within-groups calculations and (b) along all the groups for the total of p=30 available variables (global calculations). This process is expressed as follows (Tsiotas and Polyzos, 2015c):

$$X_k \equiv \text{representative}\{\mathbf{X}_k\}_{k=S,B,O} \equiv rep\{\mathbf{X}_k\}_{k=S,B,O} :$$
$$(X_k \in \mathbf{X}_k) \wedge (\forall X_i, X_j \in \mathbf{X}_k) : \quad (3)$$
$$\sum_i r^2(X_k, X_i) = \max\{\sum_i r^2(X_i, X_j) : P[r(X_i, X_j) = 0] \leq 0,10\}$$

n the final step, the representative variables of the groups $\mathbf{X}_S$, $\mathbf{X}_B$, and $\mathbf{X}_O$ are placed as independent variables (X_i) in a multivariate linear regression model, which has dependent variable the number of commuters (Y) and it is described by the following expression (Tsiotas and Polyzos, 2015c):

$$\mathbf{X} \equiv \{X_k, k = 1, ..., p\}$$
$$(\mathbf{X} \equiv \mathbf{X}_S \cup \mathbf{X}_B \cup \mathbf{X}_O) \wedge (\mathbf{X}_i \cap \mathbf{X}_j = \varnothing) \wedge (j \neq i, j = \{S, B, O\})$$
$$GCN(V, E) :$$
$$Y = f(X_S, X_B, X_O) = b_S \cdot X_S + b_B \cdot X_B + b_O \cdot X_O + c \quad (4)$$
$$\text{where } X_k \equiv rep\{\mathbf{X}_k\}_{k=S,B,O} :$$
$$X_k \in \mathbf{X}_k \wedge \forall X_i, X_j \in \mathbf{X}_k :$$
$$\sum_i r^2(X_k, X_i) = \max\{\sum_i r^2(X_i, X_j) : P[r(X_i, X_j) = 0] \leq 0,10\}$$

NETWORK TOPOLOGY ANALYSIS

Network measures

In the first step of the analysis, we calculate the network measures of the GCN, the results of which are shown in Table 3.

Table 3: Network measures of the GCN

Measure/ Metric	Symbol	Unit	Value
Nodes	n	#[(a)]	39
Edges/links	m	#	71
Self-connections	$n(e_{ii} \in E)$	#	0
Isolated nodes	$n_{k=0}$	#	0
Components	α	#	1
Maximum degree	$k_{\max}$	#	7
Minimum degree	$k_{\min}$	#	1
Average degree	$\langle k \rangle$	#	3.641
Spatial strength	$\langle k_w \rangle$	km	322.264
Average nearest neighbor degree	$\langle k_{N(v)} \rangle$	#	3.641
Average nearest neighbor strength	$\langle k_{N(v),w} \rangle$	km	322.26
Average edge length	$\langle d(e_{ij}) \rangle$	km	85.497
Total edge length	$\sum_{ij} d(e_{ij})$	km	3334.4
Average path length	$\langle l \rangle$	#	4.58
Average weighted path length	$d(\langle l \rangle)$	km	389.045
Network diameter (binary)	$d_{bin}(G)$	#	14
Network diameter	$d_w(G)$	km	1,124.4
Graph density (planar)	ρ	net[(d)]	0.640

Measure/ Metric	Symbol	Unit	Value
Graph density (non-planar)	ρ	net	0.097
Clustering coefficient[(c)]	C	net	0.47
Average clustering coefficient[(c)]	$\langle C \rangle$	net	0.422
Modularity	Q	net	0.566

a. number of elements
b. NaN = not a number
c. n/a = not availabled.
dimensionless number

By default, the GCN does not have nodes with self-connections ($n(e_{ii} \in E)$= 0), nor isolated nodes ($n_{k=0}$), nor more than one connected component (α_{GCN}=1). The maximum network degree is $k_{GCN,max}$=7, whereas the minimum is $k_{GCN,min}$=1 (since GCN is a connected component). Further, the network average degree is $\langle k \rangle_{GCN}$ =3.641 and it is close to the mode value in the degree distribution describing the urban road systems, according to the study of Courtat et al. (2010). The average path length generally represents the spatial cost (expressed in number of edges) required to move along a network (Tsiotas and Polyzos, 2015a,b). For the GCN, this cost implies that a path between two random nodes consists of $\langle l \rangle_{GCN}$ =4.58 spatial units (edges or steps of separation).

The GCN's average path length ($\langle l \rangle_{GCN}$) is of order of magnitude $\mathbf{O}(\sqrt{n}) = \sqrt{39}$ ≈6.245 that characterizes the average path length $\langle l \rangle_{latt}$) of a lattice with the same number of nodes with the GCN, implying that the GCN may have lattice-like characteristics. In addition, the spatial (kilometric) version of GCN's average path length is $d(\langle l \rangle)_{GCN}$ = 389.045km and represents the average kilometric distance required to randomly travel between two network nodes.

Next, the magnitude of the binary network diameter expresses that the most distant binary path that can be traversed in the GCN consists of 14 edges, whereas the most distance kilometric path is d(GCN)=1,124.40km (these two diameters are not necessarily the same). The graph density ρ of the GCN, whether it considered as planar graph (i.e. excluding the intersections), equals to $\rho_{1,GCN}$=0.64, whereas for the non-planar case (i.e. including the intersections) equals to $\rho_{2,GCN}$=0.097. Both densities are extremely small compared to the corresponding empirical values of urban road networks (Barthelemy, 2011).

The (global) clustering coefficient of the GCN is C_{GCN}=0.47, indicating a good clustering along the network structure. Additionally, the average clustering coefficient (the average of the local clustering coefficients computed for all the network nodes) is equal to $\langle C \rangle_{GCN}$ =0.422, which is impressively greater than the corresponding value of a random network ER, namely $\langle C \rangle_{ER} \sim 1/n$=1/39=0.026. This implies that the topology of the GCN is far to be described from a random process.

Finally, the modularity of the GCN is Q_{GCN}=0.566, expressing the ability of the network to be divided into communities. This value describes a satisfactory community partitioning capability, which is at least better than the typical road network cases that are of the order Q_{bipart} <0.4.

Topological analysis

The degree of distribution of the GCN is examined at the diagrams (k, $n(k)$) shown in Fig.2. These diagrams show a peaked distribution that better fits to a normal (R^2=0.885) rather than a power-law (R^2=0.025) curve. Also, the peak appearing around the value k=3 implies the presence of strong spatial constraints (Barthelemy, 2011) in the structure of the GCN.

Next the results of the omega (ω) index analysis (Telesford et al., 2011) are shown in Table 4, indicating that the GCN has lattice-like characteristics. This outcome complies with the theory stating that road networks are subjected to intense spatial constraints (Barthelemy, 2011).

Figure 2: Scatter plots (k, n(k)) of the GCN's degree distribution, with a normal and a power-law fitting curve.

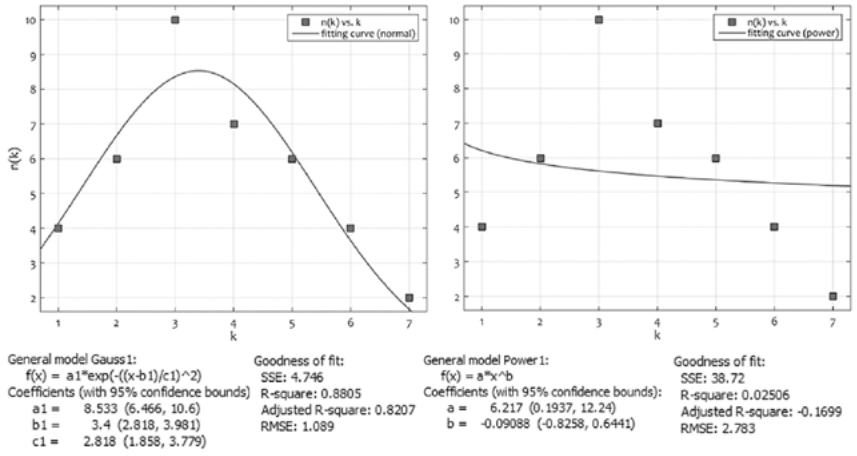


*Table 4: Results of the approximate small-world detection of GCN**

Measure	$\langle c \rangle$	$\langle c \rangle_{latt}$	$\langle l \rangle$	$\langle l \rangle_{rand}$	ω^{*}
GCN	0.422	0.312	4.580	2.889	**-0.7218**
Indication	lattice-like characteristics				

*. According to relation (1)

At the next step, we compute the basic measures of topology and centrality of the GCN (degree, betweenness, closeness, clustering, modularity, and spatial strength), the results of which are shown in the spatial distributions depicted in the topographic maps of Fig.3. First, the spatial distribution of degree (*k*) (Fig.3a) seems to form a distinctive pattern, where a cluster of hubs (highly connected nodes) is located at the center of the GCN, whereas another (single) hub is located south, at the region of the Peloponnese. The cluster at the central Greece is configured by the prefectures of Larissas (18), Fthiotidas (27), Kozanis (13), Aitoloakarnanias (26), and Ioanninon (15), while the hub in Peloponnese is located at the prefecture of Arkadias (37).

At second, a considerable connectivity is shown by the prefectures of Pella (10) and Thessaloniki (8), in the Northern Greece, as well as by the prefectures of Grevenon (16), Trikalon (19), Karditsas (24), and Artas (21), which are configuring a cluster in the Central Greece. Taking into account that magnitude in degree expresses connectivity and thus the ability of nodes to communicate in the network, it seems that the spatial distribution of degree (Fig.3a) points out those nodes in the GCN that have a connectivity advantage over the others. This advantage is due to the geographical arrangement of the Greek prefectures, which favors the development of links in central places rather than in regional areas.

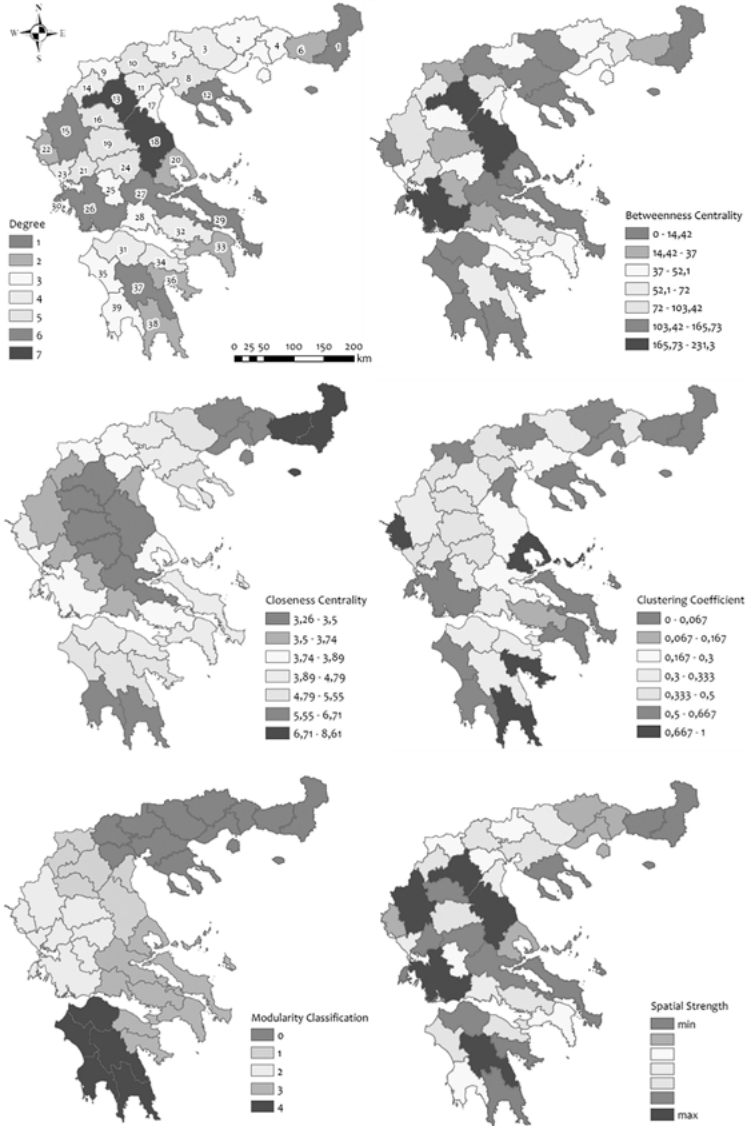
Next, the spatial distribution of the betweenness centrality (Fig.3b) shows a higher intensity at the eastern part of the country, where more upgraded road infrastructure occurs (Tsiotas et al., 2012). On the other hand, the closeness centrality spatial distribution (Fig.3c) shows small values in borderline regions (Eastern Macedonia, Thrace, West Peloponnese), whereas its higher values are also central, verifying the clear advantage that central areas have in spatial networks. In terms of clustering coefficient, the spatial distribution of this measure (Fig.3d) shows higher values to be arranged mainly at the periphery, namely at the prefectures of Heleias (35), Messhnias (39), Lakonias (38) and Argolidas (36), in the Peloponnese, at the prefectures of Thesprotias (22) and Magnessias (20) in the central country, and at the prefectures of Pierias (17), Florinas (9), Kilkis (5), Dramas (2), and Kavalas (7) in the northern Greece. This configuration generally implies that the peripheral regions are more likely to be connected with interconnected neighbors, describing a privilege to receive more coherent information by their network. However, this privilege may also suggest a disadvantage because it implies the dependence of these regions on their neighbors, in terms of interaction. For the GCN, the ability to access high clustering network nodes depends on their neighbors' road infrastructure quality, which may have similar qualitative characteristics, due to the high degree of their interdependence.

At next, the spatial distribution of the modularity classification (Fig.3e) appears to be consistent with the theory (Guimera et al., 2005; Kaluza et al., 2010; Barthelemy, 2011). In particular, this distribution illustrates a distinct partition into geographical areas, which is expected for a lattice network, such as the interregional GCN. Finally, the distribution of the spatial strength (Fig.3f) appears to be more intensive in center places, forming a cluster consisting of the prefectures of Fthiotidas (27), Larissas (18), Kozanis (13), Ioanninon (15), Artas (21), Aitoloakarnanias (26), and Arkadias (37).

In terms of time distances, we examine the differences between two time snapshots of the years 1988 and 2010, for the measures of degree and closeness centrality (Fig.4a,b). This diachronic change may provide insights about the connectivity of the Greek interregional road network and about potential improvements in the road infrastructures occurred in the meanwhile. The comparison of these time snapshots shows an almost identical network structure, except from the prefectures of Aitoloakarnanias (26) and Achaias (31), which increased their degree status. This change is obviously due to the construction of the Rio-Antirion bridge, in the year 2004, which connected the prefectures of Achaias and Aitoloakarnanias and provided direct access to them (Tsiotas et al., 2012).

At next, the spatial distribution of closeness centrality for the years 1988 vs. 2010 is shown in Fig.4b. First, the 1988 map describes the accessibility of the road transport network in that period, which appears generally inaccessible for the borderline prefectures. For the year 1988, the most privileged in connectivity were the prefectures of Kozanis (13), Larissas (18), Ioanninon (15), and of Arkadias (37), obviously due to their central geographical location, while in a secondary position were the prefectures of Central Greece and of Thessaloniki. In particular, the prefecture of Thessaloniki seems to have played a remarkable role in the network's accessibility at that time, since it was a metropolitan core of the country since 1988 (Tsiotas et al., 2012). The comparison between the 1988 and the 2010 maps of the GCN's closeness centrality outlines the qualitative changes occurred in the road network infrastructures of

Figure 3: Spatial distribution of the GCN's node measures
(a) degree (b) betweenness (c) closeness (d) clustering (e) modularity classification, and (f) spatial strength.



Greece in that period (Tsiotas et al., 2012). Obviously, there was an upgrade in the structure of this network that period (1988–2010), which favored the broader region of Central Greece that included prefectures with highest accessibility. A remarkable reduction appears in the accessibility classification of the prefectures of Rodopis (6) and Voiotias (32), each of which is attributed to different reasons. On the one hand, the decrease in the case of Rodopi is apparently due to its geographical location, since the accessibility of its road network has increased in absolute terms. On the other hand, the decrease in the case of Voiotias is probably related to the construction of the Rio-Antirion bridge, which practically "disconnected" Voiotia with the prefectures of the Peloponnese region (31, 35, 39, 38, 37, 36, 34) for those paths leading to the Central Greece (Tsiotas et al., 2012).

Furthermore, the spatial distribution of the straightness centrality (Fig.4c) expresses the deviation from direct access (of a route) and thus the effectiveness of the road network. Thus, this measure may also be used as an indicator of the quality of the GCN's road infrastructures (Tsiotas et al., 2012). Therefore, color gradations in the straightness centrality map illustrate the benefit that regions received from the road infrastructures upgrade during the period 1988–2010. Within this context, the prefectures benefited the most from the road infrastructure projects in Greece were Ioanninon (15), Thesprotias (22), Artas (21), Prevezas (23), and Kastorias (14). Their geographic position indicates that they have benefited from both the Rio-Antirio Bridge construction and from the Egnatia Motorway construction that was conducted during the period 1994–2009 and improved the connectivity of the intermediate prefec-

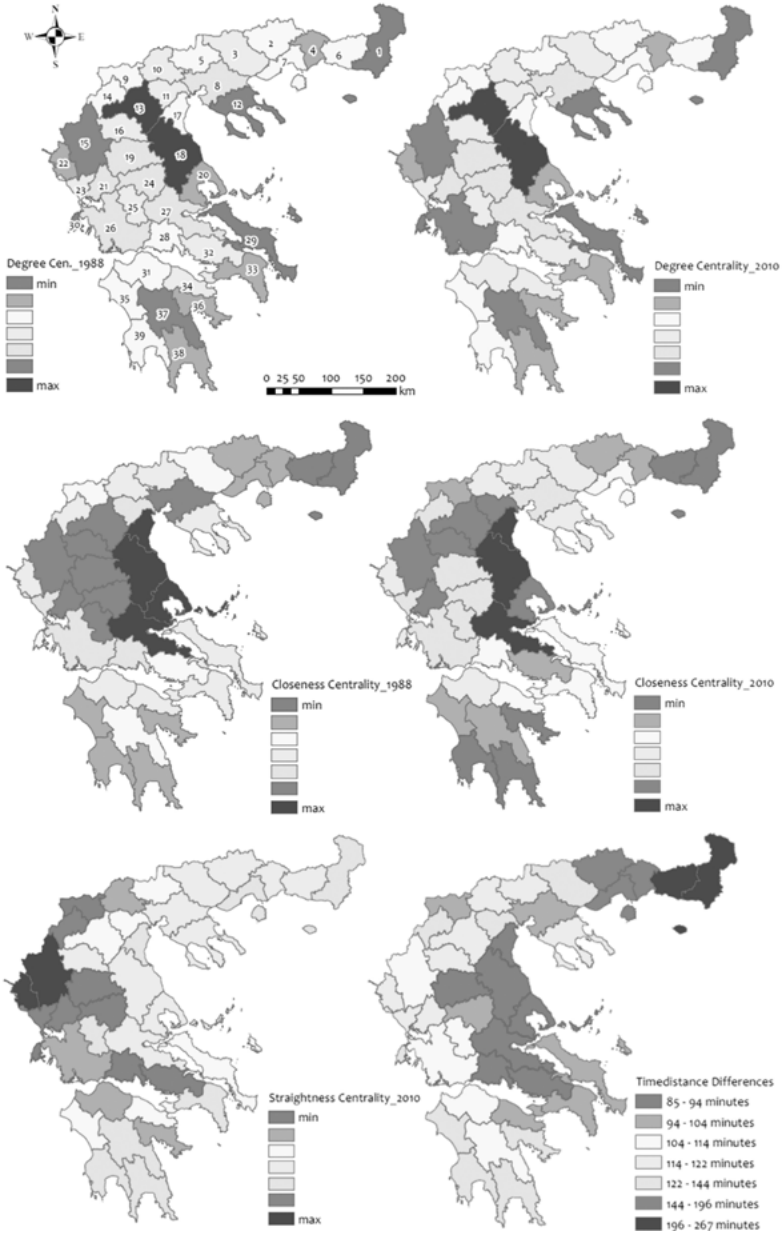


Figure 4: Spatial distribution of the GCN's
(a) degree and (b) closeness centrality, for the years 1988 vs. 2010 (color gradation depicts classification and not absolute centrality values), (c) spatial distribution of the GCN's straightness centrality in 2010, and (d) changes in time distances for the years 1988 vs. 2010 (source: Tsiotas, 2012).

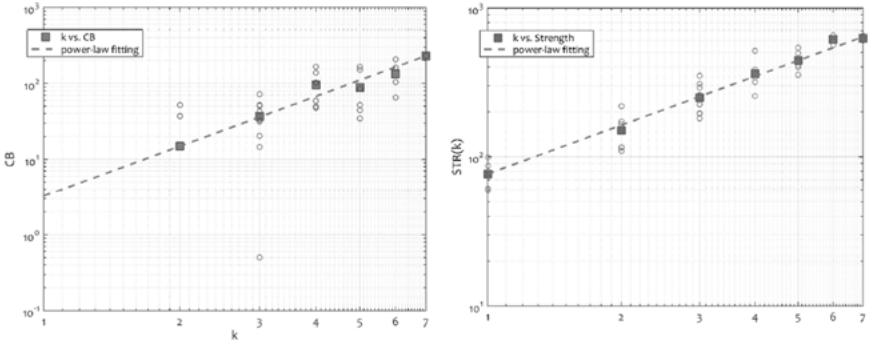
tures between Thesprotias (22) and Evrou (1). At a second level, higher straightness centrality scores are observed for:

- The prefectures-cluster of Kastorias (14), Prevezas (23), and Evrytanias (25), which are adjacent to the previously mentioned most benefited prefectures.
- The prefectures-cluster of Arcadias (37), Laconias (38), and Messhnias (39), in the region of Peloponnese, who apparently benefited more from the Rio-Antirio link,
- The prefecture of Attikis (33), which was obviously favored by the total road upgrading projects, as well as
- The prefectures of Kavalas (7) and Evrou (1), in northern Greece, which appeared to have been favored by the construction of the Egnatia Motorway.

At next, the geographical distribution of the time-distance differences (Fig.6d) illustrates the prefectures that benefited the most from the Greek transport policy in terms of the road infrastructure works conducted at the period 1988–2010 (Tsiotas, 2012). According to the map, the time-distance distribution shows a distinct spatial grouping with highest values in the periphery and the smallest in the center. In particular, the prefectures that benefited the most are the border of Evrou (1) and Rodopis (6) and, secondly, the prefectures of Xanthis (4), Kavalas (7), and Dramas (2). The prefectures following this level, are Serron (3), Hemathias (11), and Florinas (9), in Northern Greece, the prefectures of Prevezas (23) and Lefkados (30), in the West Greece, and the prefectures of Heleias (35), Messinias (39), Lakonias (38), and Argolidas (36) in the Peloponnese.

The last part of the GCN's network analysis shows the correlations between the betweenness centrality $C^b(k)$ and the spatial strength s(k) with respect to the network degree k (Fig.7). According to the fitting curves (k, $\langle C^b|_{k=k_i}\rangle$) and ($k$, $\langle s|_{k=k_i}\rangle$), a remarkable linearity for both cases exists, with coefficients of determination $R^2_{C^b,k}$=0.96 and $R^2_{s,k}$=0.906, respectively.

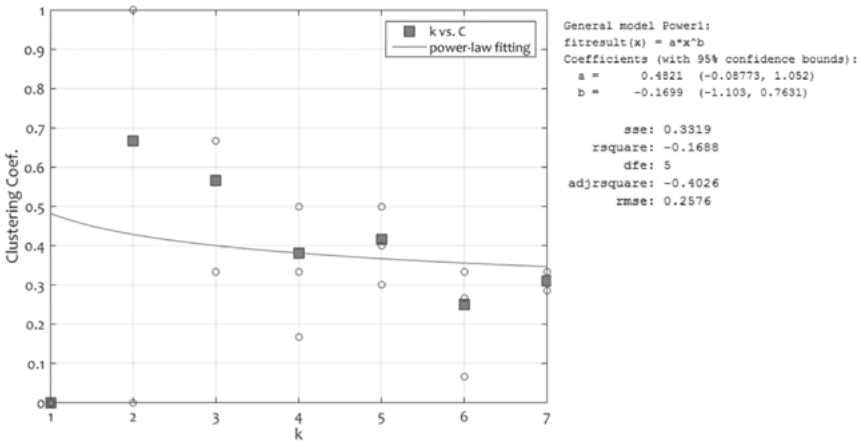
Figure 5. Scatter Plots showing the correlations between (left) the betweenness centrality and network degree (Cb, k) and (right) the spatial power and network degree (s, k), for the GCN (square marks represent the average values per degree class).



The relationship $\langle C^b|_{k=k_i}\rangle = f(k)$, between the degree ($k$) and the mean value of the betweenness centrality per degree $\langle C^b|_{k=k_i}\rangle$, where i=2,3,...,7, has a power-law exponent β_{GCN}=1.94 and expresses that the strong connecting nodes in the network (hubs) undertake the largest load of its traffic. On the other hand, the exponent β_{GCN}=1.156 of the relationship $\langle s|_{k=k_i}\rangle = f(k)$, between the degree k and average spatial strength $\langle s|_{k=k_i}\rangle$, where i=2,3,...,7, is close to the unit (~ 1) and indicates an almost linear relation between the variables, which implies a homogeneity regarding the undertake of distant traffic in the GCN.

Finally, Fig.6 shows the correlation (k,C(k)) between the variables k (node degree) and C (clustering coefficient) of the GCN.

Figure 6. Correlation between the clustering coefficient and network degree (C, k) of the GCN. The shape of the scatter plot indicates a logarithmic decrease as the k values increase.



The relationship $C=f(k)$ (Fig.6) indicates a logarithmic decrease of the GCN's clustering by increasing the degree (k) values, which is consistent with the common research practice (Sen et al., 2003; Barthelemy, 2011). This relationship describes that as the connectivity of a node increases in the network, the possibility of this node to be associated with interconnected neighbors is reduced.

EMPIRICAL ANALYSIS

Table 5 shows the results of the groups' ($\mathbf{X}_S$, $\mathbf{X}_B$, and $\mathbf{X}_O$) representative variables selection, according to the algorithm shown in relation (3). In this table, the ranking (hierarchy) of the variables calculated within the groups is shown in the first column (Position within group), whereas the ranking calculated for the total (Global calculations) of variables are shown in the columns with the indication "Rank".

Table 5: Results of the analysis of choosing the groups representatives

	Structural variables – XS				Functional variables – XB				Ontological variables – XO			
Position within group	Within-groups		Global		Within-groups		Global		Within-groups			Global
	Variable	ΣS(r2) (a)	Rank(b)	Σ(r2)	Variable	ΣB(r2)	Rank	Σ(r2)	Variable	ΣO(r2)	Rank	Σ(r2)
1	S6	2.746	2	12.116	Y(c)	5.285	1	12.181	O2	4.091	9	10.451
2	S5	2.738	3	12.058	B6	5.190	4	11.905	O6	3.990	7	11.703
3	S10	2.493	11	7.877	B7	5.152	6	11.730	O7	3.983	5	11.805
4	S1	2.448	23	2.596	B8	5.048	8	11.428	O4	3.256	13	6.443
5	S2	2.188	22	2.945	B3	3.910	10	9.400	O9	2.612	19	3.859
6	S9	1.777	25	2.137	B5	3.362	12	7.177	O1	2.507	14	5.169
7	S4	1.753	27	1.838	B4	2.622	16	4.883	O3	2.236	21	3.307
8	S11	1.576	17	4.404	B1	1.628	20	3.467	O5	1.935	18	3.898
9	S8	1.570	28	1.790	B2	1.000	30	1.206	O8	1.849	15	5.080
10	S3	1.569	24	2.169				O10	1.368	29	1.458	
11	S7	1.158	26	1.931								

a. Sum of squares of correlation coefficients
b. Relative position of the variable in the total ranking (global calculations)
c. This variable is exempted because is considered as response variable in the model

According to the results of Table 5, the representative variables resulting from the within-group calculations are the structural variable S_6 (population), the functional variable B_6 (number of vehicles), and the ontological variable O_2 (educational index). The corresponding results for the global analysis (in the total of variables) are slightly different, resulting to the variables S_6, B_6, and O_7 (number of car accidents) instead of the O_2, respectively. Taking into account that the position of the O_2 variable for the within-class analysis is three steps lower than its position in the global analysis, for the sake of completeness we use in the analysis three (instead of one) representative groups of variables, namely (S_6, B_6, O_2), (S_6, B_6, O_7), and (S_6, B_6, O_6), which are produced by the global ranking O_7, O_6, and O_2.

An interesting observation resulting from Table 5, is that the dependent variable Y (number of commuters) is placed for both the within-class and global analysis in the first ranking, having the highest correlation coefficients sum of squares. This result is rationale because the independent variables have been chosen on the basis of their theoretical relevance to the commuting phenomenon and thus their direct or indirect correlation with the response variable is somewhere expected. Another interesting observation is that the population variable (S_6) shows the greatest correlation with the other independent variables, illustrating a gravitational pattern of the commuting phenomenon (Tsiotas and Polyzos, 2015b).

In the last step, the variables emerged as representatives of the groups $\mathbf{X}_S$, $\mathbf{X}_B$, and $\mathbf{X}_O$ are entered as independent variables (X_i) into a multivariate linear regression model, with dependent variable the number of commuters (Y). Table 6 shows the results of this analysis, which is applied to the three different sets of representative variables and it produces three distinct linear regression models, namely $\Upsilon_1=f(S_6,B_6,O_2)$, $\Upsilon_2=f(S_6,B_6,O_7)$, and $\Upsilon_3=f(S_6,B_6,O_6)$.

The determination coefficients values (R_2), in Table 6, express that the three models Y_1, Y_2, and Y_3 have almost excellent ability to describe the variability of the response variable (number of commuters). This determination ability is also deduced from the sums of the standardized regression coefficients, which are close to the unit for each case, implying the absence of significant collinearity between the variables (Tsiotas and Polyzos, 2015a). This observation signifies the utility of the proposed multivariate linear regression approach, especially when taking into consideration that it is based on the ~ 10% of the available information (i.e. on 3 of the 29 available variables). The selection of the representative variables assigns a systolic property to the methodological approach applied in this paper, which complies with the conceptual framework of the term "network" as described by Tsiotas and Polyzos (2015c).

Table 6: Results of the multivariate linear regression analysis

Model[a]			Non-standardized coefficients		Standardized coefficients	t[d]	Sig.[e]
Model info		Predictor variables	b[b]	St. Error (S.E.)	b[c]		
(Υ_1) Model: (constant), S_6, B_6, O_2							
R[f]	0.999	(constant)	-881.91	174.10		-5.066	0.000
R^2[g]	0.998	S_6	0.011	0.002	0.600	4.840	0.000
S.E of the estimation	600.75	B_6	0.011	0.004	0.345	3.003	0.005
		O_2	41.422	11.729	0.065	3.532	0.001
(Υ_2) Model: (constant), S_6, B_6, O_7							
R	0.998	(constant)	-674.49	212.47		-3.174	0.003
R^2	0.997	S_6	0.015	0.002	0.816	6.151	0.000
S.E of the estimation	693.20	B_6	0.02	0.005	0.049	0.335	0.740
		O_7	1.198	1.482	0.134	0.809	0.424
(Υ_3) Model: (constant), S_6, B_6, O_6							
R	0.999	(constant)	-532.81	199.46		-2.671	0.011
R^2	0.997	S_6	0.016	0.002	0.834	7.991	0.000
S.E of the estimation	643.41	B_6	0.021	0.007	0.627	2.796	0.008
		O_6	-6.337	2.508	-0.462	-2.527	0.016

a. Enter method (including all variables entered in the model)
b. Non-standardized coefficients beta of the model
c. Standardized coefficients beta of the model
d. t-statistic for the coefficients' significance testing
e. 2-tailed significance
f. Multiple correlation coefficient
g. Coefficient of determination

Overall, the results of Table 6 indicate that the population variable (S_6) is the most important determinant in the commuting phenomenon in Greece. This observation is consistent with the theory (Polyzos, 2011;

Polyzos et al., 2014, 2015), highlighting the gravitational dimension of commuting, since the contribution rate of the S_6 variable (as it is induced from standardized beta coefficients in the models) ranges between 60–83%. Further, the presence of the B_6 variable (number of private cars) in the models implies that the use of private cars by workers plays a crucial role in the interregional commuting. In the interregional scale, the use of alternative modes of transport (bus, train) does not appear to be a determinative factor for commuting, obviously due to the fact that in the interregional level time-distances are already stretched (the maximum possible) and thus there is no option to add more delays by using public transport.

In the Y_1 model, the contribution of variable B_6 (number of vehicles) is about 34.5%, whether the contribution of the variable O_2 (educational level) is limited to 6.5%. In the Y_2 model, both the contribution of the variable B_6 and O_7 (number of car accidents) appears statistically insignificant, implying that these two variables are not related in common with the commuting phenomenon.

Finally, in the Y_3 model, the contribution of variable B_6 is about 62.7%, but together with the population variable (S_6) appear to compete with the O_6 variable (specialization in transportation – transportations GDP), as it is extracted by their positive and negative signs. This model also highlights a gravitational pattern of commuting and it additionally implies that specialized in transportation prefectures tend to maintain a large amount of commuting activity within their urban boundaries and thus to limit interregional transportation and its produced product.

CONCLUSIONS

This article studied the topology of the interregional commuting network in Greece (GCN) by using the network paradigm. The GCN, consisting of 39 non-insular prefectures, was modeled into a complex network and it was studied using measures and methods of complex network analysis and empirical techniques. The purpose of the study was to detect the structural characteristics of the GCN and to interpret how this network is related to the regional development. Towards this direction, the effect of the spatial constraints in the structure GCN was evident, as it was supported by the following observations:

- The degree distributions were peaked deviating from the power-law pattern that describes networks with smooth spatial constraints.
- The estimation of the omega (ω) index, which is used to approximately detect the small-world property and the lattice-like and random-like topology in networks, showed the existence of lattice-like characteristics in the GCN.
- Central in geography places in the GCN showed highest values in terms of degree and betweenness centrality.
- The GCN's communities produced by the modularity optimization showed geographical consistency
- Correlations between degree and betweenness centrality (k,C^b) and degree and spatial strength (k,s) followed *power-law* patterns, whereas this with clustering (k, C) showed a logarithmic decay.
- Large variability was detected in betweenness centrality (C^b), illustrating that this measure has a clear geographic configuration, tending to be identified with the gravitational center of the network.

Despite the detection of spatial constraints on the GCN topology, the form of the relation $s=f(k)$ showed the existence of long-distance connections that are detected when the power-law exponent is greater than one ($\beta>1$). This is obviously due to the construction rule of the GCN, whose edges have conceptual (expressing potential of road connectivity between the Greek prefectures) and not physical interpretation.

Further, the comparison of the centrality measures calculated for two different timeframes (1988 vs. 2010) gave insights about the influence that some major road infrastructure projects have on the GCN. Detected changes uncovered the prefectures that benefited the most from the transport infrastructure policy during the period 1988–2010. Overall, the road transport infrastructure policy of that period in Greece appeared

to follow a planning favoring the borderline and peripheral regions, targeting to eliminate geographical inequalities and to promote regional development.

In the part of the empirical analysis, a multivariate linear regression model was constructed, based on a variables' classification inspired from a conceptual model describing the term "network" in Network Science. The analysis was conducted on 30 vector variables including regional values for each network attribute, which were grouped by their thematic relevance. Three groups of three representative variables were selected from each category, according to their within-group and global sums of correlations, which afterwards were used as independent variables to construct the regression models (Υ_1, Υ_2 and Υ_3). The results of this analysis highlighted the gravitational pattern of commuting, since the population variable S_6 had a contribution, in all models, about 60–83%. The presence of the other (functional and ontological) variables in the models showed the importance that the private transport plays in the commuting (ranging from 5–63% in the three models), whereas the choice of alternative transport modes (bus, train) appeared insignificant. Also, the analysis showed that, in the interregional scale, the commuting has also an ontological aspect where the educational level was the most important component (factor) affecting the phenomenon at a 6.5% level. Finally, the analysis highlighted that specialized in transportation prefectures tend to maintain a large amount of commuting activity within their urban boundaries and thus to limit interregional transportation and its produced product.

Overall, this paper highlighted the effectiveness of complex network analysis in the modeling of systems of regional economy, such as the systems of spatial interaction and the transportation networks, and it supported the use of the network paradigm in regional research.

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SOUTH BOHEMIA AND THE EMERGING INDUSTRIAL REVOLUTION

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INTRODUCTION

The region of South Bohemian has never been one of the industrialized regions of the Czech Republic. It has always been associated with beautiful nature and tourism, attracting thousands of both Czech and foreign visitors every year. This situation has begun to change gradually as our republic opened to the world.

It was particularly beneficial for Austrian and German enterprises to build their branches near their parent companies and to use, above all, a cheap but skilled workforce to help them cut costs. A number of such new companies were established at the borders, in Kaplice, Vimperk and elsewhere. Further development in this cross-border area will also strengthen the completion of the D3 motorway from Prague through České Budějovice to Linz.

Other major businesses also originated in the centres of large towns. In České Budějovice, it is Bosch, with about 4,000 employees and is still expanding. In Písek, branch office of Faurecia was founded, similarly to other towns. The South Bohemian Region is no longer agricultural only. Industry is also important for the region.

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However, such development was only a continuation of the current tendencies and the increase has been quantitative only so far. In connection with the development of new technologies, known as Industry 4.0 (Mařík 2016), one can ask how South Bohemian industry is ready for new qualitative changes, as expected in the coming years. It is obvious that industry is represented by both large, foreign enterprises, and by a large share of small and medium-sized enterprises.

Why is the Fourth Industrial Revolution, Industry 4.0 for short, discussed? This term was introduced by the German government, and it is short and comprehensive to a large extent. Lasi, Kemper, Fettke, Feld & Hoffmann (2014) discuss four fundamental changes of the paradigm, referred to as the industrial revolutions. The first Industrial Revolution refers to the invention and expansion of the steam engine, which allowed the founding of factories outside the proximity of the watercourses that were the source of mechanical power at that time. The second Industrial Revolution is characterized by the production and expansion of electrical energy, related to the invention of the bulb enabling to work in second and third shifts. The third industrial revolution refers to the invention and expansion of computers in the middle of the last century. The fourth industrial revolution then represents the implementation of digitization, robotization and artificial intelligence, and it concerns our current period. Such revolution is described by Miketa (2017) as the Smart Revolution due to a variety of smart technologies (such as smart homes, cities and factories), the Internet of Things, etc. Of course, its course will not be the same in all states, depending on their historical development, industry development and other conditions. The new technologies have changed our lives progressively and significantly, in particular the manufacturing industry. The middle-aged generation still remembers working without the computers, where the paper agenda prevails, using almost exclusively the telephones to communicate, and a lot of "unnecessary" activities that we can hardly imagine doing today.

Most of these changes and a number of others expected are the results of digitization. Digitization means transferring all information

(analogue data) into one of two digits, either 0 or 1 (digital form) further processed by the computers (Parviainen, Tihinen, Kaariainen & Teppola 2017). The digital form transfers written information, libraries, and also sound (digital music recordings), pictures (photographs) and a number of others. Digitization makes it possible to immediately use all the information gathered in the past. Digitization covers all activities and processes in the enterprise, from the takeover of the order to delivery to the customer (Roblek, Mesco & Krapez 2016).

A possible problem could have been related to storage of digital information; however such issue was solved (Siddiqa, Karim &Gani 2017). It is explained by Moore´s Law from 1965: "the number of transistors on a chip doubles every two years while the costs are halved" (Moore, 1965). In the long run, this trend is uncertain, but has been in place for more than fifty years, but the period of doubling computer performance is now only eighteen months. Otherwise, but popularly: if you buy a new computer every two years, it will have approximately the same price but twice the performance. Initially, there was only a small increase in capacities, but the gradual increase was exponential, and at a certain point there was a sharp increase. We are just now at this point of break, which is in fact a period of several years. Industry 4.0 means digitization, together with robotics (Ford, 2015) and artificial intelligence, although digitization is the most important of these factors.

Industrial enterprises need to prepare and adapt quickly to these changes, as any hesitation might mean a loss of competition. It is not possible to do the same as before, when the increase in production was easily ensured by the recruitment of new workers who continued to work using old machines and assembly lines. The current workforce shortage in the labour market should promote the introduction of robots. Their deployment should not be limited, but robotics (Brynjolfsson & McAfee 2014) should cover entire sites and even factories where robots will pass on information about the course of production, the need for repairs and so on. Robotic facilities can work 24 hours a day, significantly increasing performance and productivity (Bahrin, 2016). Pfeiffer (2016) states

that the term "robot" is used today as for software also, so the introduction of robots may not be limited to replacing manual physical work.

METHODOLOGY

In 2018, the authors conducted a survey as a part of the research at the Faculty of Economics of the University of South Bohemia in České Budějovice and obtained data from 90 enterprises in the region of South Bohemia and 74 questionnaires from other regions of the Czech Republic. The information concerned mainly the preparation of the enterprise for new technologies and robotics.

The answers were classified by two possibilities
a) by location of the enterprise (South Bohemia compared to other regions)
b) by the number of employees into small enterprises (up to 25 employees, 62 enterprises in total), middle-sized enterprises (26–250 employees, 50 enterprises in total) and large enterprises (more than 251 employees, 50 enterprises in total).

The percentage shown in the tables is always calculated from the number of enterprises in that row. If there is more than one answer to one question, it exceeds the total of 100%.

A part of our research was also discussed the attitude of the students of a secondary school of economics in South Bohemia (93 students) and the Faculty of Economics of the University of South Bohemia (310 students) to new technologies and whether they are interested in how these changes might affect their future job.
The results obtained from questionnaires were subjected to statistical analysis by individual tests of equal and given proportions without correlation to continuity. In the case of multiple comparisons of relative frequencies, Holm's method of adjusting the level of significance reached was used. The results are interpreted at alpha significance level = 0.05,

resp. with 95% reliability. For reasons of clarity, only significant results, including achieved level of significance (p-value), are given in the text. Statistical evaluation of individual tests was performed using R 3.3.3 programming environment.

IMPLEMENTATION OF NEW TECHNOLOGIES IN INDUSTRY

The results revealed that the region of South Bohemia is similar to other regions regarding Industry 4.0. It is evident (Table 1) that the vast majority of enterprises do not use Industry 4.0. There were no statistically significant differences between enterprises in different regions. Such results were also found for the questions regarding the acquisition of robots, the introduction of new technologies and the need for workers in the future. As the level of industry in the South Bohemian region does not differ significantly from other regions, the results of the questionnaire survey are not further reported by region but by size of enterprise.

Table 1: Level of Industry 4.0. by the regions
**five companies did not answer the question*

Level of Industry 4.0	South Bohemia region	Other regions	South Bohemia region (%)	Other regions (%)
1 – very low	41	30	46.6	42.3
2 – low	17	15	19.3	21.1
3 – average	20	13	22.7	18.3
4 – high	6	9	6.8	12.7
5 – very high	4	4	4.5	5.6

INTRODUCING NEW TECHNOLOGIES

With the growing demands of suppliers, and customers, the enterprises in Industry 4.0, are forced to introduce new technologies. The questionnaire survey identified the main reasons for introducing new

technologies (see Table 2). Different options reached rather balanced rating, with the exception of requirements for increased production flexibility. The main reason for introducing new technologies is cost reduction and shortage of workers in particular. As far as the requirements of key customers are concerned, they most often require a larger supply and better products. The need to increase production stems from the efforts of companies to meet the higher demands of their customers.

Different options were analysed regarding the size. Significant differences (p-value = 0.001) were found for implementing technology due to lack of staff. In this case, there are differences between the small and large enterprise category (p-value = 0.0018). The difference can be explained by the fact that small businesses do not have sufficient financial resources for new technologies and they prefer a different way of replacing missing workers. By contrast, large enterprises are forced to introduce new technologies to replace their work as a result of the shortage of workers. These technologies include the robots as confirmed by the previous section on robot acquisition. However, the reason in small enterprises might also be related to introducing new developments.

Table 2: Reasons for implementing new technology
** significant differences are marked by an asterisk*

Reasons for implementing:	Overall (%)	Classified by size %)		
		small	medium	large
Lack of workers	36.0*	22.6*	32.7	56.0*
Need to reduce costs	38.4	30.6	42.3	44.0
Need to increase production	31.1	29.0	32.7	32.0
Quality requirements for key customers	25.6	22.6	34.6	20.0
Requirements for increased production flexibility	15.2	14.5	13.5	18.0

ACQUISITION OF ROBOTS

Industry 4.0 is closely related to robotization and the introduction of new robots into production. In answering the question of what would be a decisive factor for the enterprises to purchase the robots, the enterprises could choose one of three main reasons (more of them). Almost 70% do not plan to introduce robots due to high prices. Therefore, the companies predominantly rate the price of robots as high (see Table 3).

Comparing the results regarding the size, the differences were found for the possibility that such robots are not available (p-value = 0.0313). The pair test confirmed this difference between the small and large enterprises (p-value = 0.045). It is clear that this is especially preferred by the small enterprises. The market offer seems to be tailored to larger enterprises.

A statistically significant difference (p-value = 0.0013) by enterprise size was also found in the possibility of introducing robots due to a shortage of workers. Also this difference is significant between a group of the large and small enterprises (p-value = 0.0018), with the preference of robots by the large enterprises. This result shows that, in particular, large enterprises introduce the robots because of the lack of workers. Small businesses are likely to face shortage of workers by recruiting and addressing potential job seekers and keeping existing technological procedures.

Table 3: Reasons for the acquisition of the robots
** significant differences are marked by an asterisk*

Reasons for the acquisition:	Overall (%)	Classified by size (%)		
		small	medium	large
No, such robots are not available	33.5*	43.6	34.6	20.0
No due to high price	68.9	62.9	69.2	76.0
Yes, due to lack of workers	33.5*	19.4	32.7	52.0

So far, robotization is relatively positive because it replaces a person where he or she would have to do hard physical work or a tedious job, repeating in short cycles throughout the shift. What will happen in the future? Will robots take over work of people? They will, of course, as they will work cheaper and more accurately. Initially, however, the problem of vacant workers will not be recruited at other workplaces in the plant. Gradually, however, there will be only highly qualified maintenance staff of these automated lines. Work will have to be sought elsewhere, often outside the workforce. This will involve not only manual workers but also undergraduates. It is said that many people do not work at all and will only work temporarily, on some specific projects. The question remains, where they take the money for a dignified life and buy the things the robots have made.

EXPECTATIONS RELATED TO THE NEEDS OF WORKERS

As revealed by the previous results, the introduction of new technologies and the acquisition of robots is related to the need for workers. The results show that more than half of enterprises expect to need more staff, mainly due to increased production.

Table 4: Expectations of the enterprises related to the introduction of new technologies in terms of workers' needs
** significant differences are marked by an asterisk*

Expectations:	Overall (%)	Classified by size (%)		
		small	medium	large
Same number of workers	22.0*	30.6*	23.1	10.0*
Increased number of workers, increased production	52.4	56.5	48.1	52.0
Increased number of agency workers	15.2*	6.5*	13.5	28.0*
Decreased number of workers without dismissal	15.9*	6.5*	17.3	26.0*
Dismissal of workers	1.8	0.0	1.9	4.0

Comparing different options regarding the size of the enterprises, this factor was statistically significant in the expectation of the same number of employees (p-value = 0.0311). A difference between the small and large enterprises was found (p-value = 0.047). Obviously, rather small enterprises expect to have the same number of employees in the future. Differences by enterprise size were further found in expectation of the need for other agency workers (p-value = 0.0063). This difference (p-value = 0.014) is apparent in a small and large enterprise group. The large enterprises expect an increase in the number of agency employees, compared to the small enterprises that are unlikely to count with the possibility at all (6.45%). Similarly, there was a difference (p-value = 0.0179) in the perception of dismissal due to the introduction of new technologies. Large enterprises expect a reduction in the number of employees as a result of this, and possibly recruit new jobs. Small businesses do not consider this issue – probably because of the lesser introduction of new technologies.

APPLICATION OF NEW TECHNOLOGIES IN FUTURE

The fourth industrial revolution infiltrates into our lives. But most people do not realize it is a revolution, because the changes are coming in gradually, there are information on the application of new technologies in various areas of life every month and even a week. However, changes are not only in this information field, they are reflected in the introduction of electronic register of sales for the small enterprises, the protection of personal data on computers, and the introduction of robotization in industrial enterprises.

The older generation does not appear to wish such changes as the change bring something the elderly are not used to. However, how do young people react? Do they understand all these changes and their consequences? Do they choose and accept only what suits them instantly

and not interested in other changes? We have tried to find the answer to this question for students who will start their professional life in a few years and who are currently studying at a secondary school and the university in the region of South Bohemia. First, we found the differences in opinions of the students on global themes with regard to type of their studies, and their overall view.

STUDENTS' VIEWS ON GLOBAL TOPICS BY TYPE OF STUDY

In the society, the students are seen as a progressive part, seeking their own way and trying to break the established order. So that, the authors were interested in the students´ views on new, emerging technologies and some of the global issues that are likely to affect their professional lives. The results (Table 5) show that students at various levels of study (secondary school, bachelors, masters) do not usually show significant differences in the responses. This suggests that the school has little influence on the attitudes of students to these social problems, and students, for most of them, develop their own opinion from information obtained elsewhere.

Table 5: Students' views on global topics by type of study
** significant differences are marked by an asterisk*

Global issue	type of study (%)			p-value
	Sec	UN (Bc.)	UN (Mas)	
Lack of electricity	71.0	85.1	83.6	0.0173*
Construction of deep repositories for nuclear waste	29.0	46.4	42.6	0.0221*
Global warming	72.0	88.1	88.5	0.0019*
Lack of drinking and supply water	92.5	97.0	93.4	0.2201

Progress in healthcare	88.2	88.7	85.2	0.7754
New transport technologies	74.2	86.9	83.6	0.0336*
Possibilities of technology abuse in the war	43.0	57.1	67.2	0.0092*
Job loss due to robotization	65.6	81.5	83.6	0.0056*
Domination of robots / artificial intelligence over humans	44.1	65.5	57.4	0.0036*
New communication technologies	92.5	93.5	90.2	0.7038
Data loss and misuse (Hacking)	72.0	84.5	83.6	0.0409*
Blackout in large areas	46.2	45.2	55.7	0.3563
Migration of people	89.2	89.9	83.6	0.4061
Air pollution	91.4	95.2	93.4	0.4651

The statistically significant differences between the categories arise only from the differences between secondary school and university students (even in one case, differences between a bachelor and master study group were not found by pair tests).

INTEREST OF THE STUDENTS IN GLOBAL TOPICS

Considering all the groups of students, picking up positive answers only (for both active and passive interest), then the global issues are divided into three types: In the first category there are topics that are of great interest to the students. Interest in issues is over 85%, both active and passive. The second category includes 50–85% of active interest topics and the third category is related to the interest of up to 50%.

Table 6: Interest of the students in global topics

Global issue	Interest (%)	Of which (%)		Not interested (%)
		Active	Passive	
Lack of drinking and supply water	95.0	45.0	50.0	5.0
Air pollution	93.8	44.7	49.1	6.2
New communication technologies	92.5	62.1	30.4	7.5
Migration of people	88.5	48.4	40.1	11.5
Progress in healthcare	87.9	38.2	49.7	12.1
Global warming	83.5	36.3	47.2	16.5
New transport technologies	82.6	41.6	41.0	17.4
Lack of electricity	80.7	13.0	67.7	19.3
Data loss and misuse (Hacking)	80.7	42.9	37.9	19.3
Job loss due to robotization	77.3	25.8	51.6	22.7
Domination of robots / artificial intelligence over humans	57.8	17.7	40.1	42.2
Possibilities of exploiting new technologies in the war	55.0	11.2	43.8	45.0
Blackout in large areas	47.5	10.2	37.3	52.5
Construction of deep repositories for nuclear waste	40.7	7.8	32.9	59.3

The students are more aware of areas that are closer to them and which the media are more aware of: new communication technologies, air pollution. They are also rather interested in human migration, global warming and data misuse. We discuss the most reviewed topics briefly.

- **Lack of drinking and supply water**
  The Global warming is manifested through high temperatures, mostly in summer, and in the lack of groundwater, as precipitation decreases and wells dry out. We need to prepare for a number of constraints that regulate water consumption that will influence each of us. An amendment to the Water Act 2018 is prepared in the Czech Republic to provide drinking water for the residents and other strategic needs.
- **Air pollution**
  Since the Industrial Revolution, steam engines have begun releasing thousands of tons of harmful emissions from the combustion of coal and, later, diesel. Carbon dioxide (CO_2) is the most damaging as it is also the most common. Increased concentration of these emissions in the atmosphere causes not all sun rays that hit the Earth's surface are able to return to the cosmos after the reflection but they transmit all their energy to the Earth's surface and warm it more than ever before. The issue of air pollution is therefore closely intertwined with the theme of global warming. Its rating is slightly below 85%. This may indicate that students perceive the problem of global warming, but they are rather interested in the real consequences of this negative phenomenon.
  In 2015, there was a global climate conference held in Paris, attended by almost all countries in the world, and resulting into the measures to prevent global warming. Unfortunately, the conclusions were only declaratory, individual measures should be planned by each state according to their possibilities. The Earth's temperature should not increase by more than 1.50 °C by 2100 compared to the pre-industrial period (around 1750). Of this, 1 °C is already exhausted, so the goals will probably not be reached. Nevertheless, the amount of emissions needs to be reduced and the negative effects of warming are not so harmful. Warming will lead to melting glaciers, rising sea levels and flooding of large seaside areas and consequently the migration of tens of millions of people around the world.
- **New communication technology**
  The new concepts (BPR, CRM, online PR) that affect the form of business-to-business communication ale related to the development of

information technology. There are also new mobile devices, tablets, mobile phones working with an expanded reality (in the future, probably also with holograms and 3D technologies). Classical paper documents are replaced by electronic communications (EDI), in which data are structured and transmitted between information systems. Bill Gates (1999) talks about ten inflection points that might change the way businesses change their activity. It is the internet, social media and electronic data exchange, which change the way of communication. In logistics, barcode technology and radio frequency identification can not be omitted. New ways of communication also change trading, which is increasingly moving to the Internet. The news of non-cash payments include crypto-currencies, which, according to Budíková, & Nevolová (2016), are not dependent on any state and human, and there is no possibility of manipulating, influencing and controlling it.

- **Human migration**
  Migration is one of the global threats and opportunities discussed recently. In essence, it is the movement of people from one area to another in order to settle permanently in a new place. This global movement is not a new phenomenon, people move away from time immemorial. At present, migration is caused mainly by poor economic and natural conditions and war conflicts. On this issue, society is greatly divided due to the negative and positive consequences of migration. Looking at the results of the questionnaire survey, there is a contradiction between master's students who have a rather passive attitude, and the other students with a rather active attitude.
- **Healthcare advances**
  It seems unrealistic, but in the healthcare industry robotizing is as fast as in the industry, but it is at first sight less noticeable. The overall amount of information that can potentially be used by a physician to diagnose a patient and suggest the optimal way to treat it is overwhelming. The aim is to create a system that will recommend the best possible treatment and propose medications with minimal side effects to the patient. This system would work as an expert, and a physician

could use it to make diagnosing easier and more accurate. Another option is to use a system that can even know the beginning of the patient's illness from small changes in X-rays. Similar applications in medicine are increasing.

Roughly in middle of the interest of students (between 50–85%), there are topics related to the introduction of new transport technologies (such as self-governing cars, high-speed rail, alternative fuels, etc.). Their influence will also depend on the development of a „shared economy", i.e. not to own a car, but to order it as a service. This category also includes the issues related to the use of robots in wars (Bloomfield & Vurdubakis 2015), controlling of people by robots and artificial intelligence. Their use will undoubtedly also lead to increased unemployment. With the use of modern technologies, social networks and data sharing, data is being misused recently. For example, the Facebook has admitted to outsourcing data to more than 2 billion people. Data abuse is trying to address the Privacy Policy (GDPR), which brings restrictions on handling sensitive personal data. The problem of electricity shortages has been placed in this category probably because we are not currently dealing with this problem in the Czech Republic.

CONCLUSION

New technologies, known as Industry 4.0 have gradually entered manufacturing enterprises and begun to influence both the social and private lives of humans. A survey of 164 enterprises from 2018 revealed that the region of South Bohemia is not lagging behind the development of industry anymore, compared to other regions. Due to this, it was possible to analyse the whole sample of participants in the survey of the relation of the enterprises to Industry 4.0. The results of the survey revealed the difference in understanding new technology and in particular the difference between small and large enterprises. To a large extent, the small enterprises mostly keep their current traditional methods and they tend to prefer new workforce to new technology.

The survey of the opinions of the students completed the analysis with a future view. Students, as a traditionally progressive component of the society, should have a positive approach to these new tendencies. This assumption is only partially confirmed. Students are familiar with the technologies they come into contact with each day. Strategic issues that will affect their professional position in the future, and some global issues, are not that interested for them. Improvements should be made not only by schools but also by other institutions that can influence the attitudes of young people.

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CONCLUSION

The book Regions in Context is a collective monograhp of sixteen authors who presented the results of their reearch in nine chapters focused on various aspects of regional development and its social and economic context.

The editors believe that this book will raise many interesting questions, possibly also some answers, and that it would be helpful to the rieders for thinking about the different aspects of regional and economic development and about the links between the economy, society and regions. As the book tries to show, the topics are highly interconnected, though often implicitly, and any single academic discipline is hardly able to describe the problems, let alone about suggesting solutions. However, when merged together, the separate problems, disciplines and the case book chapters give a more complete picture which could serve as a good starting point for the readers own thinking about economic, social and regional development.

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