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SOCIOECONOMIC AND ENVIRONMENTAL RANKING OF MICRO-REGIONS IN CZECHIA

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Abstract

New method of socioeconomic ranking of Czechia is performed and tested on microregional-level. The microregions are ranked in year 2011. Set of indicators for socioeconomic ranking aggregates three domains: sociodemographic, sociopathological, and economical. The main objective is to analyse the causes of spatial differences and measure the socioeconomic quality of the environment using objective indicators. Another aim is to assess mutual relationships between the microregional-level indicators. Finally, the results are discussed in the context of regional and national policy. The socioeconomic ranking in Czechia confirms that persistent major differences exist, which result from different focuses within individual areas beginning before the Velvet Revolution in 1989. In general, according to the definition of regions with focused government support, national policy corresponds to regions having the lowest socioeconomic ranking. But, on the other hand just there are the big problems with European funding.

Key words: *socioeconomic ranking, development axis and cores, impaired regions*

1. Introduction

The terms quality of life, well-being and standard of living are considered synonymous according to Veenhoven (2000). Scientific studies measuring the quality of life are appearing with increasing frequency because gross domestic income per capita, though often used, does not entirely explain quality of life or well-being. GDP growth is not necessarily connected with well-being and happiness (Kenny 1999). A socioeconomic ranking measures the primary material conditions of living – both economic and social. Some studies have focused on national-level objective indicators and on cross-country differences in the non-economic quality of life (McGillivray 2005). Other studies have used a different method with subjective indicators (Diener 2006).

Objective indicators may include good social conditions, healthcare availability, education availability, housing quality, work and career opportunities and transportation access. Subjective evaluations of the quality of the socioeconomic environment are the primary focus of sociological studies (Mareš a Rabušic 1997). Using various methodologies, residents' (or visitors') views and evaluation of the area are measured. Geert Hofstede, one of the most well-known empirical researchers, believes that these systems are primarily designated by the culture (Hofstede a Hofstede 2004). Hofstede claims that social reality cannot be understood from the confines of a single discipline and single ranking level. This conclusion is also important for socioeconomic rankings. The macroregional (or meso-regional) and microregional levels are interconnected. At individual hierarchical levels, the applicability of the conclusions to other levels is important (Heřmanová 2013). Generally, a shift towards a broader spatial level implies a better application of objective socioeconomic quality criteria. In smaller regions, mutual differences are naturally erased. The final value averages these differences.

For an objective evaluation, internationally comparable indicators are used. A good indicator of macroregional-level socioeconomic quality is "the quality of life model", which was created at the University of Toronto (http://www.utoronto.ca/qol/qol_model.htm). Moreover, a model of four qualities of life was created by Veenhoven (2000). One of the four dimensions is also a good indicator of socioeconomic quality. Veenhoven calls this dimension "liveability of environment".

For the meso-regional and microregional levels (including regional, district and city administrative units), objective and subjective evaluation approaches are used [such as value preferences (Kostelecký 1995) and regional identities (Chromý a Janů 2003)].

Our aim is to provide an objective socioeconomic ranking for Czechia. The main objective is to determine the causes of spatial differences. The following questions were posted. What makes regions with low socioeconomic quality similar? What are the similarities between regions with high quality? What are the causes of the similarities and differences? Which indicators best testify to socioeconomic quality? Another objective is to assess the mutual relationships between the microregional-level indicators.

There are many international rankings for environmental quality or well-being, such as those from the World Bank, UN Environmental Programme (UNEP), and OECD (e.g., OECD 1995; Pieri et al. 1995). Moreover, there are many rankings that evaluate the quality of the region "from the other side" by measuring negative impacts in the area. In the construction of the Countryside Quality Index, Morse et al. (2011) cites the much older Townsend Index of Deprivation TID (Townsend et al. 1988). The TID includes unemployment as a percentage of economically active persons aged 16 and over with no car ownership, no home ownership and household overcrowding. A revision of the TID Index of Deprivation (ID 2007) contains 38 indicators. Attempts have also been made to define environmental quality "from the other side" in Czechia. The environmental stress indicator has been formulated and applied in local case studies (Balej et al. 2008, Balej a Anděl 2011).

Špes et al. (2001) evaluates environmental quality according to UNESCO recommendations and based on physical (ecological) and social factors. Two groups are defined for the social factors. The first includes demographic and socioeconomic indicators. The second group includes the quality of housing or the built-up environment. Liao (2009) defines the quality of life using domains of indicators, i.e., medical service, domestic finances, work, education, leisure, public safety and environmental (natural) quality, comparing all of the counties in Taiwan using factor analysis and deducing the local typology in terms of the quality of life. Another approach to the quality of life is represented by the Physical Quality of Life Index (Morris 1979). Sirgy et al. (2006) combine several approaches. Rossouw and Naudé (2008) measure the non-economic quality of life. Similar to Johansson (2002) and Erickson (1993), Rossouw and Naudé (2008) divide the indicators into two groups: demographic domain (i.e., population growth, aging, households, urbanisation, economic activity, level of education, and unemployment) and geographic domain (i.e., built-up areas, forest, wetlands, water bodies, erosion, rainfall, and temperature). An interesting conclusion of this study is the proven correlation between the demographic index and per capita income. They also find that urban areas tend to dominate the top ten places in terms of the demographic index and not the geography index.

Perz (2000) presents a special approach in evaluating environmental quality. A case study from the Brazilian Amazon requires a specific set of indicators. The indicators for environmental hazard production include, e.g., the urban population size, migration, industrial activity, and sewage. Indicators for environmental hazard exposure comprise housing construction, water quality and child exposure. The other groups of indicators indicate specific threats that the Brazilian Amazon urban environment faces. Cases from the opposite corner of the world, i.e., Australia, are similarly interesting. In connection with the concept of sustainability, a socioeconomic set of sustainability indicators has been composed by the federal Land and Water Resources Research and Development Corporation (1995). These indicators include, e.g., the level of education, mobility, population age structure, service facilities, and housing demand.

2. Methods

By definition, socioeconomic index ranking aggregates partial indicators that should cover the entire socioeconomic theme. Partial indicators must be representative and available at the monitored spatial level for all territorial units. The data must be statistically investigated with regard to mutual correlations. In addition to statistical methods, a group of experts to determine weightings produces good results (Saltelli et al. 2005).

Data availability is another crucial aspect in determining the final ranking. It is important to consider the predictive power of the indicator at the selected spatial level. At a lower rank, there are indicators with minimal macroregional-level predictive power (such as commuting to work or school and transportation accessibility). At the interregional level (such as the Czech regions), Potůček (2002) was among the first to focus on methods for mapping the quality of life in Czechia. He selected 36 indicators in eight living condition areas. Some living condition areas can also be used to evaluate the socioeconomic quality of the environment.

We apply our methodological process on Czechia for all "small" districts [municipal authorities with broadened competencies, administrative units between Local Administrative Unit (LAU) 1 and LAU 2]. These authorities and administrative wards (catchment areas) were established on 1 January 2003, pursuant to Act No. 314/2002 Coll., on the appointment of municipalities with a delegated municipal office and extended competence. There are 205 units. Due to the large differences, Praha is omitted as an administrative unit.

Socioeconomic ranking indicators were tested and examined by a group of experts to better reflect the socioeconomic quality of Czechia. Indicators in the sociodemographic domains include the age index, net migration rate and percentage of the population with university degrees. An inverse age index value, positive net migration rate and high percentage of residents with university degrees represent an area with positive socioeconomic development potential. The percentage of the population with university degrees is the most important indicator, which describes a knowledgeable, creative society; population growth due to in-migration indicates positive population dynamics. The sociopathological indicators include the divorce rate, children born out of wedlock and abortion rate. These indicators signal existing or emerging problems in the region. Due to the lack of many micro-level economic indicators, the experts selected the following indicators: unemployment rate, new home construction and home prices. While new home construction and low unemployment represent a strong potential for further development, home prices are not as clear. Home prices indicate attractiveness in the initial development phases. However, home prices may later become an obstacle for further development. We expected strong connections (correlations) among these indicators.

Table 1 Set of indicators for socioeconomic ranking (in 2011)

Domain	Indicator	Description	Unit	Source
Sociodemo-graphic	Age index	Age-dependency ratio	-	Czech Statistical
	Net migration rate	Population growth due to in-migration (per mil)	‰	
	University graduates	% university graduates	%	
Sociopatho-logical	Divorce rate	Divorces per 100 marriages	%	
	Births out of wedlock	Births out of wedlock	%	
	Abortion rate	Abortion ratio (per 100 live births)	%	
Economics	Unemployment	General unemployment rate	%	
	New home construction	New home construction per 1,000 residents	-	
	Home prices	Home price index	-	

The data were standardised and weighted based on mutual correlations. The correlation with other indicators is inversely related to the indicator weights. The indicators were subsequently aggregated and an overall ranking of the microregions was compiled.

One intermediate result included a verification of the determined hypotheses on mutual correlations between indicators (Pearson coefficient). First, a group of experts / geographers (20 in total) were contacted. These individuals assigned points to estimate the connections between indicators based on their knowledge and skills: ++ close positive connection, + weak positive connection, -- close negative connection, - weak negative connection and 0 no connection (Table 2).

Table 2 Expert hypotheses of correlations between indicators

Indicator	Age index	Divorce rate	Births out of wedlock	Abortion rate	Net migration rate	Unem-ployment	University graduates	New home construction	Home prices
Age index		-	-	-	0	+	-	--	-
Divorce rate			++	+	+	0	0	0	0
Births out of wedlock				+	0	+	+	0	+
Abortion rate					0	+	0	0	0
Net migration rate						+	+	+	-
Unemploy-ment							--	--	--
University graduates								++	+
New home construction									+
Home prices									

3. Results

The expert group predicts positive connections primarily in the sociopathological domain, i.e., divorce rate, children born out of wedlock, and partially the abortion rate. The experts also predict strong negative connections in the economic domain, i.e., between new home construction and unemployment and between home prices and unemployment. Lastly, the experts expect pronounced connections regarding the age structure, i.e., age index and new home construction. Connections to population growth through migration are weak; the experts often could not reach a consensus.

Table 3 Correlations between indicators

Indicator	Age index	Divorce rate	Births out of wedlock	Abortion rate	Net migration rate	Unemploy-ment	University graduates	New home construction	Home prices
Age index		-0.19	-0.35	-0.26	-0.16	-0.22	0.09	-0.17	0.14
Divorce rate			0.32	0.28	-0.15	0.01	-0.23	-0.09	-0.13
Births out of wedlock				0.63	-0.34	0.47	-0.46	-0.43	-0.46
Abortion rate					-0.19	0.17	-0.26	-0.28	-0.3
Net migration rate						-0.38	0.5	0.71	0.43
Unemploy-ment							-0.42	-0.42	-0.44
University graduates								0.61	0.5
New home construction									0.56
Home prices									

Correlation indices are often different from expert hypotheses (Table 2 and Table 3). In the sociopathological domain, no pronounced connection is surprisingly found between the divorce rate and births out of wedlock. In contrast, there is a strong connection between the abortion rate and births out of wedlock. Connections in the economic domain are largely confirmed. Moreover, new home construction is positively correlated with home prices and negatively correlated with the unemploy-

ment rate. There are also strong correlations between new home construction and the net migration rate or the percentage of university graduates. Correlations analogous to those for new home construction are also present for home prices (see Table 3).

Large differences compared to the hypotheses are found for the age index, which does not significantly correspond with indicator (except the expected negative connection with out-of-wedlock births). Connections between age and new home construction or the divorce rate are also not confirmed.

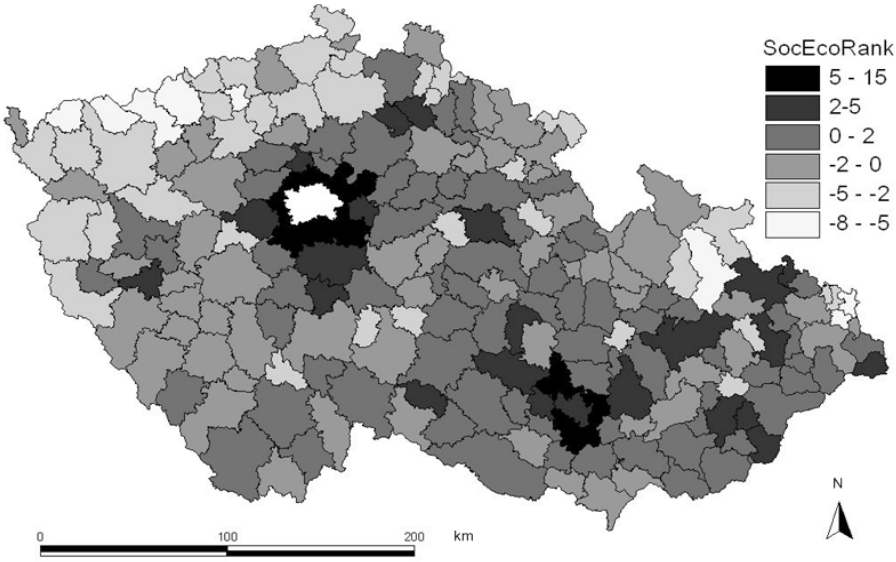

Figure 1 Socioeconomic ranking (SocEcoRank) of Czechia

The socioeconomic ranking ranges from 14.72 (Říčany) to -7.39 (Bílina). Suburban areas around Praha and Brno dominate the microregions with the highest rankings. The only large city among the 14 microregions with a high socioeconomic ranking is Olomouc (3.93). Microregions with a high socioeconomic ranking are represented by a complete range of common characteristics: predominantly young population, low abortion rate, high immigration, high percentage of university graduates and especially intense home construction. Unemployment is typically relatively low. Population densities and average life expectancies are high (see Table 4). Among the Czech microregions, Brandýs nad Labem-Stará Boleslav has the highest immigration and largest number of completed housing units. There is an evident connection with good transportation access to Praha and newly built industrial zones, including good associated services.

Table 4 Maximum and minimum socioeconomic ranking values

Rank	Microregion	SocEcoRank	Population	Area	Population density	Life expectancy (man)	Life expectancy (woman)
1	Říčany	14,72	56296	37717	149,3	74	80,4
2	Černošice	14,53	112211	58064	193,3	75	80,3
3	Brandýs nad Labem--Stará Boleslav	14,01	83386	37785	220,7	74,7	79,4
4	Šlapanice	8,76	61383	34310	178,9	75,2	81
5	Kuřim	7,83	52098	37713	138,1	76,4	80,9
6	Lysá nad Labem	7,72	20843	12110	172,1	73,4	77,7
7	Židlochovice	5,51	29958	19426	154,2	73,1	80,7
8	Tišnov	5,1	29066	34249	84,9	74	80,1
9	Velké Meziříčí	4,65	35762	47331	75,6	74,2	80,8
10	Vizovice	4,61	16669	14612	114,1	72,8	80,5
11	Český Brod	4,24	18141	18434	98,4	72,8	79,3

Rank	Microregion	SocEcoRank	Population	Area	Population density	Life expectancy (man)	Life expectancy (woman)
12	Valašské Klobouky	4,24	23761	25882	91,8	72,1	79,9
13	Olomouc	3,93	161802	85862	188,4	74,6	80,6
14	Kralupy nad Vltavou	3,91	28476	13122	217	73,5	80,1
192	Sokolov - I	-4,26	78788	48919	161,1	71,9	78,3
193	Cheb	-4,31	52765	49688	106,2	73	79,5
194	Bohumín - I	-4,34	29750	4805	619,1	71,2	77,7
195	Teplice - I	-4,4	109088	34531	315,9	71,2	77,1
196	Pacov	-4,57	9914	23456	42,3	74,1	83,1
197	Broumov	-4,69	16988	25938	65,5	72,9	78,6
198	Bruntál - II	-5,02	38667	62940	61,4	71,4	77,9
199	Ostrov - III	-5,02	29330	31843	92,1	71,8	78,1
200	Havířov - I	-5,19	96839	8820	1097,9	72,7	79,7
201	Karviná - I	-5,45	71692	10562	678,8	70,6	78,5
202	Kadaň - I	-5,63	44265	44919	98,5	69,9	77,8
203	Chomutov - I	-5,86	82953	48613	170,6	71,4	81
204	Kraslice - I	-5,88	14046	26462	53,1	71,4	78,6
205	Bílina - I	-7,39	20844	12358	168,7	69,3	76,3

Notes: *I – structurally impaired microregion*
II – economically weak region
III – region with far above average unemployment

Microregions primarily located in northwestern Bohemia are located on the other end of the ranking. Eastern and northern Ostrava district (Karviná, Havířov and Bohumín) and three peripheral microregions (Bruntál, Broumov and Pacov) are also included on this end of the ranking. Teplice, Chomutov and Havířov are the mid-sized cities with the lowest socioeconomic ranking out of the 14 microregions. High social pathology, high emigration and unemployment, a low percentage of university graduates and low new home construction characterise these microregions. The cheapest homes are also located here (Bílina and Teplice). The population age structure is highly differentiated: the youngest people live in the microregions at the foot of the Ore Mountains; the oldest people tend to live in peripheral areas, such as Pacov. The population density fluctuates similarly (i.e., the foot of the Ore Mountains vs. the periphery). The average life expectancy is low, corresponding to the disturbed natural and social environment. Bílina is the microregion with one of the highest divorce and abortion rates, lowest home construction and lowest percentage of university graduates in Czechia. The area has long been under substantial pressure by mining industries (i.e., brown and black coal) and related heavy industry (e.g., steel, energy, and chemical industry). There are extensive areas of devastation that remain from mine pits, disposal sites, and industrial sites. Currently, a high concentration of industrial brownfield sites remains.

4. Discussion

The results of the socioeconomic ranking of Czechia demonstrate clear differences. It is interesting to compare the ranking with development areas and axis. The Prague metropolitan area, i.e., the hinterlands of Prague (population 1.2 million), dominates the ranking (Figure 1). Prague itself (which was eliminated by the expert group due to its highly specific nature) creates a very extensive development area in its vicinity. This expansion of the high socioeconomic ranking is supported by the current trend of building satellite towns in the easily accessible hinterlands of small settlements near Praha. Young university-educated families have higher standards for living conveniences and associated services. Residential neighbourhoods are thus increasing in smaller settlements, which subsequently "snowball" to include other services (e.g., nursery and primary schools and sports and

recreation centres). Figure 1 also clearly shows good connections to the south-, east- and northeast-bound motorways.

Brno represents another development area. There are distinct areas with a high ranking from Brno (the 2nd largest city with a population of 400,000) towards the northwest, along the D1 motorway (Praha-Brno, the country's main motorway). Another axis with a high socioeconomic ranking is positioned from to the northeast towards Ostrava (population of 300,000) and northwest towards Olomouc (population of 100,000). Like the hinterlands of Praha, younger residents with a high percentage of university graduates live here. The area has a large positive net migration rate and features intensive new home construction and high home prices. Between the two development centres, i.e., Praha and Brno, a development axis can be found, which is gradually becoming connected. The hinterlands of Zlín (on the Czech-Slovak border) also have a high ranking. The regional capitals of Plzeň and České Budějovice (western and southern Czech Republic) also exhibit above-average values.

The Ostrava district, which is strongly urbanised, is a special case. The district's high unemployment rate separates the region from other core areas. The urbanised space in northwestern Bohemia is characterised by similar features. The determinative factors here are the high unemployment rate, unstable population, low percentage of university graduates and minimal new home construction. Due to the large area with a very low socioeconomic ranking, Northwestern Bohemia is the most troubled region in the country. A large percentage of asocial residents and national minorities are concentrated here. Moreover, isolated areas are beginning to expand. Conflicts between various population groups are also starting to appear. The western Bohemian-Moravian Highlands (Vysočina) represents a less extensive and less strictly defined area. This predominantly rural area is characterised by a lack of job opportunities and low new home construction. This combination results in the flight of younger, more educated residents. There is a similar situation in the Jeseník district (on the Czech-Polish border). The area's low socioeconomic ranking is the result being highly forested and having a low number of jobs and poor settlement structure (predominantly small settlements with no major, easily accessible development centre).

A comparison of the socioeconomic ranking of Czechia index (Figure 1) and distribution of new home construction provides interesting similarities. New home construction is the best predictive indicator according to Figure 3. Most new home construction can be found in towns with populations of approximately ten thousand in Central Bohemia, i.e., the Praha hinterlands (Brandýs nad Labem – Stará Boleslav, Černošice, Říčany). The indicator is very intense in Jesenice, which is not yet a city even though its population is 6,600 and is located in the immediate hinterlands of Praha. Moreover, Milovice has the third largest new home construction intensity, where new residential units are being built in a former military zone. Černošice is primarily experiencing extensive construction of detached single-family homes. Another area with a high ranking and new home construction is the hinterlands of Brno (Šlapanice and Kuřim). In contrast, the towns with the lowest new home construction intensity are concentrated in northwestern Bohemia and the Ostrava area. There are long-term causes for these towns lagging behind other regions.

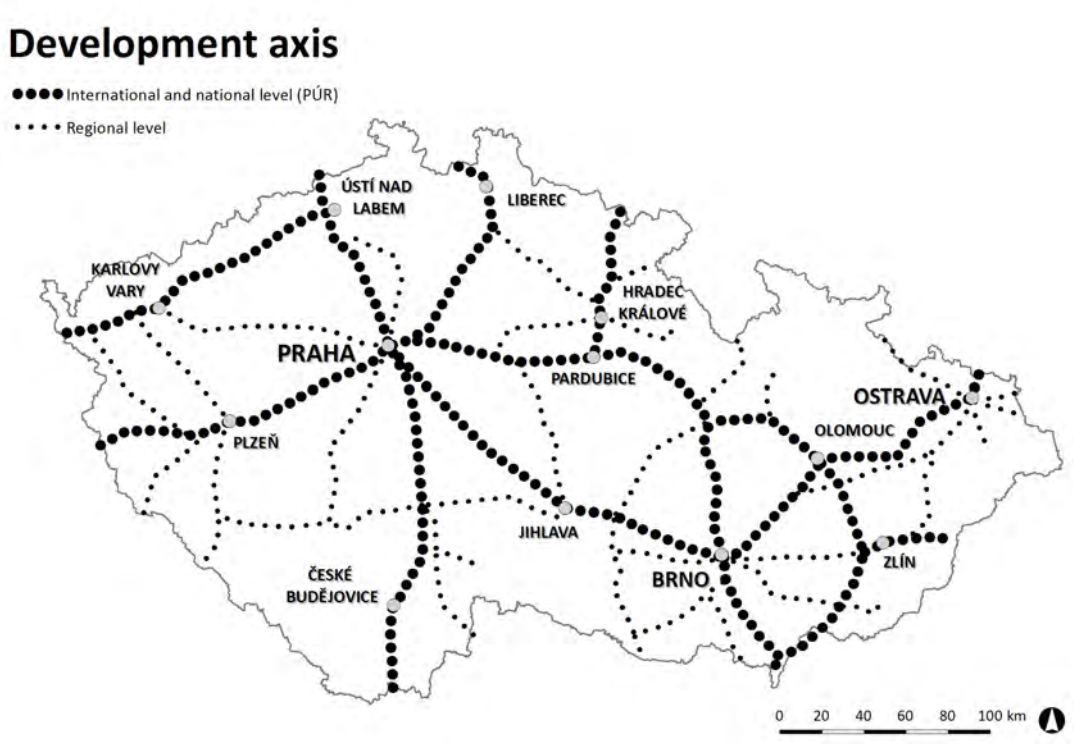

Figure 2 Developing areas and axes in Czechia

Source: Regional Informations Services (RIS)

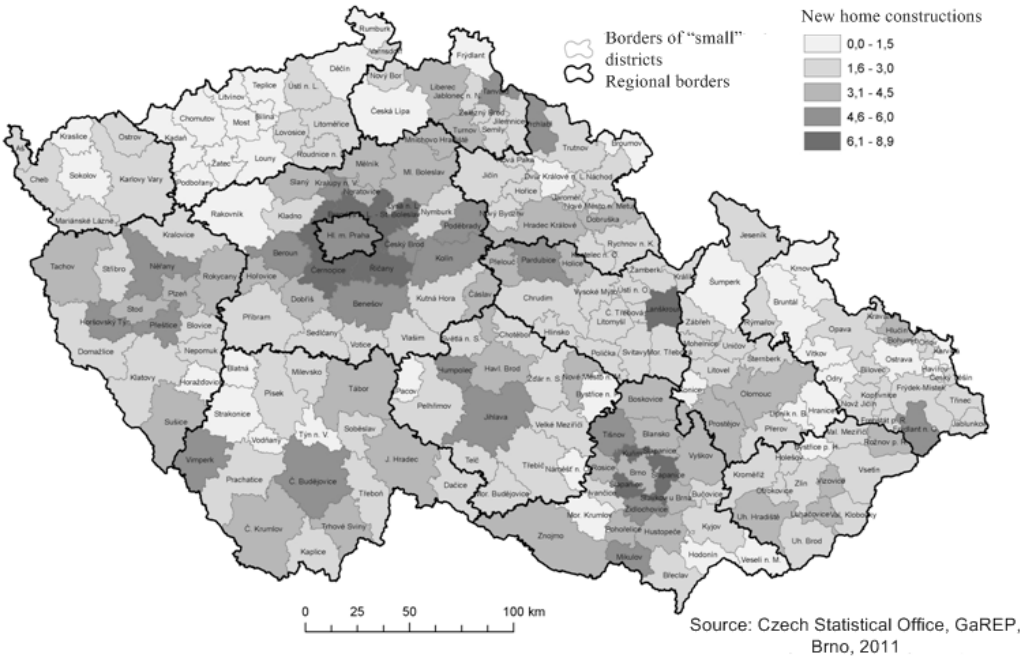

Figure 3 New home constructions per 1,000 people (average 2006-2010)

The results confirm the existence of two types of troubled regions in Czechia (Blažek 1996, Blažek a Netrdová 2009, Hampl 2007): structurally impaired regions (northwestern Bohemia) and undeveloped, economically weak rural regions (the west and southwest parts of the country, South Moravia, western Vysočina, and the Jeseník district). The centre of gravity for the socioeconomic system positive orientation is Praha and its suburbanised hinterlands. Other major cities (except Ostrava) are also positive centres. It is interesting to compare the extent of national policy support for microregions

with the lowest socioeconomic ranking. The Czech Ministry for Regional Development updated the national policy for 2010 – 2013 due to the substantially deteriorating economy and skyrocketing unemployment. Incentives from European Union operational and departmental grant programmes should be concentrated in structurally impaired and undeveloped rural regions, especially from the industry and trade, agriculture, labour and social affairs, transportation, environment and regional development departments (Pileček 2011).

Structurally impaired regions are areas with a high concentration of existing mining and heavy industry, numerous brownfields and a high degree of urbanisation. Industry is undergoing restructuring associated with a high level of unemployment, including northwestern Bohemia and the Ostrava district. Structurally impaired regions occupy 5.4% of Czechia and are home to nearly 10% of the population. Economically weak regions have a low standard of living. Moreover, the level of urbanisation is low. These areas are primarily situated along the country's borders (such as the southeastern, northern and western parts of the country and northern Moravia). The third area with concentrated government support includes regions with high unemployment that are not included in the preceding types. These areas include the Česká Lípa district, Jablonec nad Nisou district and the city of Ostrava. Generally, regions with focused government support occupy 31% of the country and are home to a third of the population.

In general, according to the definition of regions with focused government support, national policy corresponds to regions having the lowest socioeconomic ranking. Two-thirds of the structurally impaired regions are in the 14 lowest rated microregions. However, policy and ranking are not entirely identical. Based on our calculations, the western Czech Republic should also belong to this group. However, this region is different. Karlovy Vary spa is primarily known for its film festival and high proportion of Russian-speaking residents and investors. This different national composition may influence the low socioeconomic ranking. Furthermore, in terms of national policy, the hinterlands of Brno are considered structurally impaired or economically weak even though the region exhibited a high ranking in this study.

The analysis indicated complex spatial relationships between individual indicators, representing a pronounced differential dimension for forming regional units. More indicators that reflect different socioeconomic spatial differentiation aspects assist in expressing a comprehensive understanding of the spatial organisation of society, as highlighted by Novák a Netrdová (2011). Like rural typology (Perlín et al. 2010), measuring the socioeconomic ranking can serve as a basis for forming microregion development studies. Using the ranking, support tools can be better formulated for the specific individual components of Czechia.

In methodological terms, in addition to the advantage of providing an unambiguous evaluation, weaknesses also appear when aggregate indicators are used. These weaknesses may be related to the selection of non-representative indicators or determination of non-corresponding weightings. For readers or users of the aggregate indicator, not knowing the structure and reasons for selecting the partial indicators may be a disadvantage. Another potential limitation is related to the application of the method to territories with different ranking levels. There are limitations in each level regarding data types and methods for obtaining the data. It is important to eliminate overlapping content and information and provide objective assessments. The methodology used can remove these overlaps. The methodology also corresponds to the "optimal" number of partial indicators (using approximately 10 indicators is recommended) and can be applied to different ranking levels. The indicators used may be applied at both the micro (municipalities with extended competence) and interregional levels (Czech regions) and the macroregional (national) level with certain limitations.

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