

GEOGRAPHICAL ORGANISATION OF THE NOVÝ JIČÍN REGION: TRANSFORMATIONS OF ITS SELECTED ASPECTS DURING THE INDUSTRIAL REVOLUTION (CZECH LANDS)

Pavel KLAPKA, Klára NIEDŹWIEDŹOVÁ

Abstract

The 19th century witnessed important processes and changes affecting economic, political, social and cultural life. All these changes, mostly related to the phenomenon of the Industrial Revolution, were reflected in the spatial structures and landscape character. The first objective of the article is to identify and assess transformations of the selected aspects of the geographical organisation in the Nový Jičín region during the second half of the 19th century, the period of accelerating and accomplishing of the Industrial Revolution. The second objective of the article is to introduce possibilities for the delineation of nodal region in a period with insufficient data by applying methods of spatial interaction modelling.

Shrnutí

Geografická organizace Novojičínska: proměny jejích vybraných aspektů během průmyslové revoluce

Devatenácté století bylo svědkem důležitých procesů a změn, které ovlivnily ekonomický, politický, sociální a kulturní život. Všechny tyto změny, většinou spojeny s fenoménem průmyslové revoluce, se odrazily v prostorových strukturách a charakteru krajiny. Prvním cílem článku je identifikace a zhodnocení proměn vybraných aspektů geografické organizace Novojičínska v průběhu druhé poloviny 19. století, tedy v období zrychlování a následného završení průmyslové revoluce. Druhým cílem článku je představit možnosti vymezení nodálního regionu v období, za které nejsou dostatečné datové zdroje, a to pomocí modelování prostorových interakcí.

Key words: *geographical organisation, historical geography, Industrial Revolution, nodal region, spatial interaction models, Nový Jičín region, Czech lands*

1. Introduction

Geographical organisation of space has been for decades one of the key research issues in geography, though its understanding varies considerably in time and within different geographical schools. Seen from a historical point of view, the first major changes in the geographical organisation of space began to occur during the period of the Industrial Revolution, which in the Czech lands dates back to the 19th century.

These changes were reflected in many geographical phenomena and aspects, such as the society, economy, culture and natural environment. The Industrial Revolution initiated a number of innovation processes (industrialization, urbanization, migration of population, transportation and progress in

agriculture). Though the transformations of the geographical environment were enormous, they are sometimes hard to assess since certain insufficiencies exist in databases and sources, which are of only limited statistical relevance or are not spatially comparable.

Generally, the Industrial Revolution means “a transition from the manufacturing production and handicrafts towards the factory production” (Purš, 1973). The factory production represents the extensive use of machinery and the application of new technologies, particularly chemical technologies as well as the employment of the steam engine as a major driving force. In the Czech lands, the Industrial Revolution can be classified in three periods (Purš, 1960, 1973) as follows:

1. initial phase from the dawn of the 19th century to the 1820s, which is particularly related to the manufacturing of textile and later food;
2. development phase from the turn of the 1820s and 1830s to 1848; and
3. unfolding and completion phase from 1848 to the beginning of the 1870s, which is marked with the accelerating development of textile and food industries (particularly sugar industry), later with the development of heavy industry and machinery.

The general development continued since the 1870s in the so called Second Industrial Revolution (or scientific and technical revolution) unfolding in the Czech lands in its initial phase during the 1880s and 1890s, which is typical of the use of electric and combustion engines as a major driving force, development of heavy chemistry, introduction of improved machines, and beginnings of automation (Purš, 1973).

The Industrial Revolution crucially influenced the characteristics of basic spatial features: nodes, lines, and areas. The steam engine enabled the separation of the production from the natural energy sources (water, wind) and the separation of the place of residence from the place of work (origin of factories). Both processes increased the tendencies to centralize human activities in the industrial centres (towns – nodes) and accelerated the phenomenon of urbanization (Butlin, 1993; Atkins, Simmons, Roberts, 1998; Pollard, 1999). The general process of concentration produced further demands on the transportation of natural resources (particularly coal, but also for instance sugar beet) and factory products, which was reflected in the development of railway network – lines (Hlavačka, 1990; Vyskočil, 2010; Butlin, 1993). The Industrial Revolution initiated also the agricultural

advancements and thus influenced the land use (“use of areas”). This “agricultural” revolution basically featured the introduction of new crops (particularly technical crops), the shift towards animal production, and the introduction of new technologies in agricultural procedures (Jeleček, 1985; Kubačák, 1994).

Main objectives of this article are two. The first objective is an attempt to identify and assess selected changes in the geographical organization of a model region during the second half of the 19th century. In this respect, we are obliged to define briefly our concept of the geographical organization for the purpose of this article, since it is immensely complex and comprises several different approaches. Our attempt is also to make use of available statistical data so that our pursuit and conclusions are sufficiently supported. The second objective is concerned with an issue of the delineation of a model nodal region during the Industrial Revolution. In this respect, we resorted to the application of spatial interaction models, specifically the Reilly’s model, with an ambition to introduce them into historical geographical studies.

The region of our interest (i.e. a model region) is organized around the town of Nový Jičín in the north of Moravia (Fig. 1). Since the second half of the 18th century a germanization pressure influenced the population structure of the region, however, in the 19th century the Czech national consciousness started to form. Political interests and attitudes of the Czech and German public reached a considerable discord. The social and political scene was affected by incipient labour movements. Though initially protesting against inadequate economic living conditions, they later began defending national political and national cultural interests. Although the region faced a certain

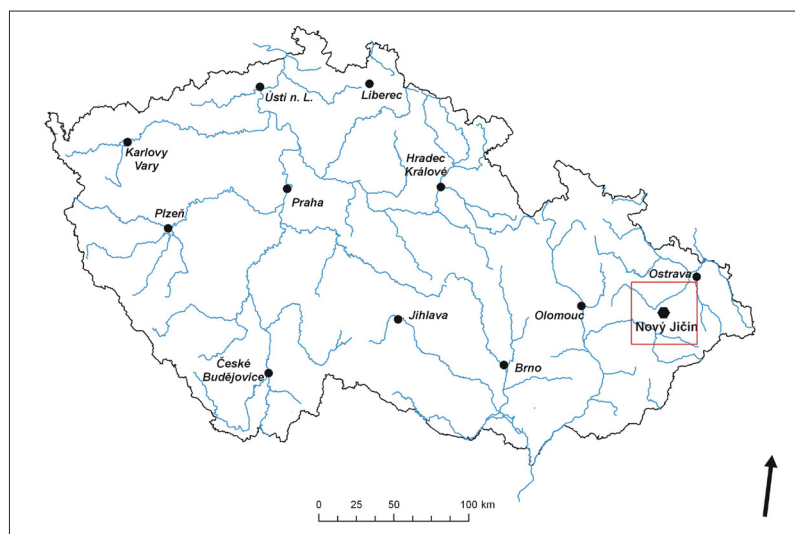


Fig. 1: The localization of the area of interest
Source: own design

level of emigration both to abroad and to industrially more developed areas of northern Moravia and Czech Silesia, its population increased since the second half of the 19th century, particularly the population of its newly industrialized centre, the town of Nový Jičín, fed by immigration from the adjacent rural areas (Chobot et al., 1996; Bartoš, Schulz, Trapl, 1995).

Several factors have influenced the development of its geographical organisation (see for instance Atlas československých dějin, 1965, map sheets 19, 21, 22, 23 and 24). Firstly, the region can be placed among the early industrialized territories within the Czech lands. Nový Jičín was one of the leading centres of textile and clothing industries since the first decades of the 19th century (or since the 18th century if we take into account the traditional manufactory production). Similar industrial development (even more progressive), not driven only by the manufacturing of textile products but also by machinery or metallurgy, can be witnessed in its broader surroundings, particularly in the Ostravsko region, which is an important fact regarding the delineation of the nodal region. Secondly, the location of the region has two distinct features: the vicinity of the resource base in the Ostrava basin, and the position near an important transport corridor at the north-eastern mouth of the Moravian Gate. Although the town of Nový Jičín lies at the important road connection, the main railway has avoided the regional centre (see also Fig. 6), which is the fact that can be seen as an “unnatural” intervention into the development of the geographical organisation of the region.

2. Concise theoretical background

2.1 Geographical organisation

Understanding the geographical organisation in the Czech geography is strongly influenced by geographers from Charles University in Prague (Hampl, Gardavský, Kühnl, 1987; Gardavský, 1988; Hampl, 2005). Their works put forward the population as a main factor of the geographical organisation of society (as they mostly call it). They emphasize the prominence of the population distribution (settlement system, concentration, sub-urbanisation) and its movements (labour and service commuting) in assessing the geographical organisation. They claim that natural, political, cultural, economic or social conditions are well reflected in the population characteristics and traits, although in his theoretical study Gardavský (1988) sees the regional (i.e. geographical) organization as a complex and at the same time substantial arrangement and concurrent action of all geographical phenomena and processes. Such an approach is relatively easy to

be applied on larger geographical scales, which is its greatest advantage. On the other hand, we think that particularly the interpretation of the results can be in a way simplified not taking into account other factors than the population-related ones.

The Anglo-Saxon approaches to the geographical organisation vary from very broad understanding of the issue (see for instance Abler, Adams, Gould, 1972 who make the geographical organization identical to complex human geography) to more inspiring and direct concept, which we have decided to favour (see also Klapka et al., 2010). Our concept of the geographical organisation comes out from and follows two seminal works. Haggett (1965) introduces an interesting view of the organisation of a region, later refined by himself (Haggett, 2001). He sees five region-building or spatial structure factors: movements, networks, nodes, surfaces and diffusion stages. He also introduces a concept of hierarchies into his concept.

Morrill (1974) provides many inspirations and suggestions regarding the location choice, emergence of hierarchies, spatial interactions through which he reaches a complex assessment of the spatial organisation of the regions. He puts a primary stress on the population, its spatial distribution and movements, but he also emphasizes the role of such varied factors as the physical environment, land use and space use, distance, distribution of economic activities and wealth, cultural and political conditions, historical development of a territory etc. He concludes that the spatial organization is best described by the intensity and extent of land use and by the pattern of complex interactions, which a location has within its environment.

Owing to the period when both works were published, they do not directly incorporate to their schemes the role of human behaviour, although they mention in several places its importance. However, they primarily stress the principles of maximum profit and minimum effort that are valid only to a limited extent. We suggest that human behaviour, political decision processes, cultural and historical background should be taken into account too when assessing the geographical organization if and when possible.

To be more factual and to sum up the above mentioned inspirations (both Czech and Anglo-Saxon), we see in an assessment of the geographical organisation three important factors (Klapka et al., 2010):

1. population (its distribution and interactions),
2. land use (in its very broad meaning including the location of activities and networks of different types), and

3. living environment (natural, economic, cultural, political and social),

when the crucial importance is attributed to the first factor.

We also feel the need for introducing a system of constraints of non-economic and non-quantitative nature in order to represent reality in a better way. Otherwise, there is an actual threat of succumbing to spatial (or space) determinism, which has been a main critique of the concept for over 30 years.

It is also to be noted at this place that

1. the hierarchical level of researched territory and
2. the time span (or period) matter to a great extent.

If we are for instance dealing with the organisation of a city our effort is centred merely on people, while large regions on the mezzo or macro level should be apart from their population studied also in terms of their land use and environment. The time span or period substantially influences the variety and liability of sources and data and thus possibilities of geographical organisation assessment. For instance, statistical data on the spatial interaction that can be used for the delineation of nodal regions (e.g. daily labour commuting) are available only since the second half of the 20th century. Approaches should be also slightly different and stress slightly shifted in case we study either the dynamic or the static geographical organisation of a territory. Finally, we have to admit that actually not every theoretical suggestion made above can be applied in a historical geographical study such as this article.

2.2 Delineation of region

The area of interest was already in the 19th century dominated by a centre in Nový Jičín, which gradually organised a nodal region around this centre. The problem of its delineation lies in the definition of relation between the centre and its hinterland. As there is no adequate record of horizontal population flows in the 19th century, we used one of spatial interaction models, the Reilly's model (Reilly, 1931), in order to delineate a nodal region.

A detailed general discussion of the Reilly's model and its applications, including other references, is provided by Řehák, Halás, Klapka (2009) and Halás, Klapka (2010). We applied one of its variants: the topographic version (Řehák, Halás, Klapka, 2009). The model is determined to identify a breaking point, or a set of breaking points, (see Equation 1) between two or more competing centres and their zones of influence. An expression of mass (e.g. population of a centre) and distance between the

competing centres are needed as input model variables. The topographic version makes use of real distances measured on a real transport network.

The principle lies in the determination of a set of competing centres (including the centre that is examined) and in the subsequent assignment of the tested location (or municipality in the sense of a spatial zone) to one of the defined centres by the constant comparison of the breaking point position to the position of the tested location in the following manner. First, the breaking point is calculated:

$$BP = \frac{d_{ALB}}{1 + \sqrt[x]{\frac{M_A}{M_B}}} \quad (1)$$

where BP is a distance of breaking point plotted on the line (in our case a road) from the smaller centre, d_{ALB} is a distance between the competing centre A , the tested location L , and the competing centre B , and M_A and M_B are masses (populations) of centres A (larger centre) and B (smaller centre) respectively.

Then, the tested location is assigned to one of the competing centres according to the following procedure: if $d_{LB} > BP$ then the tested location belongs to the sphere of influence of the centre A , and if $d_{LB} < BP$ then the tested location belongs to the sphere of influence of the centre B . Then the whole procedure is systematically repeated with a different pair of competing centres within the defined set of centres until the tested location is unambiguously assigned to one of the competing centres. After we have tested all locations that can be theoretically taken into consideration, we reach the final delineation of the nodal region of the examined centre. The boundary of the region is constructed according to the territorial delimitation of basic spatial units/zones (e.g. municipalities).

Finally, we provide a note regarding the value of root in the Equation 1. If we were to follow the physical analogy, we would have to use the square root. Of course, we can use also the cube root, the fourth or a higher root. The higher the value the larger is the influence of smaller centres and the smaller is a tributary area of larger centres.

3. The Nový Jičín region: historical geographical organisation

If the preceding section provided some general notes, we have to specify how we are going to tackle with the geographical organisation of the model region. This

task is determined by its hierarchical level and by the period in question. The former defines the aspects of the geographical organisation that are going to be analysed – i.e. population development, population concentration, inner structure of the region on one hand and dynamic land use in the region on the other. The latter, then, defines the character of population and land use data. This will be briefly commented in the below sections.

If we are dealing with the dynamic aspect of geographical organization, we have to secure comparability of the used data. We define municipalities as of the 1900 census as the basic spatial units and the nodal region delineation also dwells on the 1900 data. All earlier data regarding the population and land use, available for cadastral areas, were adjusted to the areas of municipalities in this year if needed. Fortunately, the spatial structure of the selected region was relatively stable during the second half of the 19th century. There were only minor differences between the municipalities in the surveyed periods in the order of units of hectares that could not be easily eliminated anyway.

The main data sources on the population were lexicons from the 1869, 1880, 1890 and 1900 censuses as well as the Retrospective lexicon of municipalities in the Czechoslovak Socialist Republic 1850–1970 (1978) and the Historical lexicon of municipalities in the Czech Republic (2006). The data on land use were retrieved from cadastral records of the Czech Office for Surveying, Mapping and Cadastre for 1845 (<http://archivnimapy.cuzk.cz/>) and for 1897 in the lexicon from the 1900 census. A note regarding the years of 1845 and 1900 should be made here. These are the years of the publishing of the data. The “1845” data are based on the cadastral mapping carried out in the Czech lands between 1821 and 1843 (in the researched region between 1833 and 1834), the “1900” data are then based on the revision of the cadastre from January 1st, 1897. However, in case of the first time horizon, we stick to the year of publishing when using and commenting upon these data in this article.

3.1 Nový Jičín as a centre of the nodal region

The first task is to identify municipalities that represent a competition to the town of Nový Jičín as potential centres of nodal regions and carriers of masses entering the Reilly's model. Competing centres were selected according to several criteria (apart from the approximate neighbouring position towards Nový Jičín). The first criterion sets the level of a minimum population in the competing centre to 5,000 inhabitants. In several cases, we have taken into account the population of structurally and functionally interconnected urban zones consisting of two or more

independent administrative municipalities. The first one is the town of Nový Jičín itself, which has been connected with the municipalities of Šenov and Žilina. Then we have these urban zones, each consisting of a dominating centre and a smaller settlement in its close vicinity: Valašské Meziříčí and Krásno, Fulnek and Jerlochovice, Studénka and Butovice. Finally, we have defined an urban zone consisting of the municipalities of Kopřivnice and Štramberk.

In case that some of the towns did not exceed the level of 5,000 inhabitants closely, two auxiliary criteria were used in order to assess the quality of the town as a potential centre:

1. location of industry (attractive force of the centre is enhanced by the presence of factories, which is the case of Fulnek, Odry and Studénka),
2. location of public service facilities (again the presence of an administrative office or an educational institution increases the nodal importance of the centre, which is the case of Fulnek and Odry, seats of judicial districts and schools).

These two criteria were almost completely valid also for competing centres exceeding the level of 5,000 inhabitants. Thus, we have defined following centres as representing a nodal competition to Nový Jičín (Tab. 1): Bílovec, Frenštát pod Radhoštěm, Fulnek, Hranice, Kopřivnice with Štramberk, Odry, Příbor, Studénka and Valašské Meziříčí. The issue of the competing centres selection in broader spatial context (larger area of central and northern Moravia and Silesia as well as the inclusion of the influence of Prague and Brno) using various versions of the Reilly's model is extensively discussed by Niedzwiedzová (2010).

The second task is to distribute all suitable municipalities (those roughly placed among centres) towards the selected centres by applying the procedure based on the Reilly's model as described earlier. However, two notes have to be made in this place (of course the masses in the model are the populations of centres as of 1900 – Tab. 1). The first one concerns the issue of a distance entering the model. The distance is measured along the actual road network in the shortest way in 1900. It has the advantage of taking into account physical geographical and human geographical characteristics of the space reducing thus slightly a possible geometric distortion. The second note, then, concerns the question of a root value in the model (x in Relation 1). We decided to use the cube root, which favours smaller centres with regard to their influence since Nový Jičín is considerably larger in its mass and thus the cube root is a tool for a certain levelling of its importance.

Centre	Population			
	1869	1880	1890	1900
Bílovec	4,217	4,626	4,764	5,125
Frenštát pod Radhoštěm	6,563	6,107	5,767	5,757
Fulnek*	4,267	4,362	4,111	4,182
Hranice	6,735	7,384	8,136	8,185
Kopřivnice and Štramberk	3,676	3,790	4,765	6,371
Nový Jičín*	11,656	13,908	15,848	16,969
Odry	4,182	3,678	3,990	4,191
Příbor	4,950	4,710	4,674	5,007
Studénka*	3,679	3,836	4,108	4,708
Valašské Meziříčí*	4,075	4,489	4,799	4,906

Tab. 1: The population of Nový Jičín and competing centres in 1869–1900

Note: Fulnek, Kopřivnice and Štramberk, Nový Jičín, Studénka, Valašské Meziříčí are defined as urban zones, see the text above.

Source: *Retrospektivní lexikon obcí ČSSR, 1978*; *Historický lexikon obcí ČR, 2006*; *Lexikon obcí pro Moravu, 1906*

After the procedure had been applied, we reached the required nodal region with the centre in Nový Jičín consisting of 37 municipalities (including Nový Jičín) – Fig. 2 and Tab. 2. The region is based on the 1900 data (number of municipalities, their area and population) and as such will be analyzed in the following section. The total area of the region is 27,821 ha and the total population is 41,895. Municipalities are already considered in their administrative boundaries, thence the difference in the population of Nový Jičín between tables 1 and 2. Twenty-eight municipalities were the part of the judicial district of Nový Jičín. Only four municipalities of the judicial district were not the part of the nodal region at the same time. Bartošovice were in the judicial district of Příbor, Suchdol nad Odrou and Hladké Životice in the judicial district of Fulnek, Perná in the judicial district of Valašské Meziříčí, and Dub, Hustopeče nad Bečvou, Heřmanice u Polomi, Poruba and Vysoká u Hustopečí nad Bečvou were parts of the judicial district of Hranice.

3.2 Development of the selected aspects of geographical organisation: interpretation

As noted earlier, our interest concerns the population development, population concentration, inner structure of the region, and dynamic land use as the selected aspects of the geographical organisation.

3.2.1 Population development and concentration

Let us begin with a simple tabular presentation of the very basic population development in the Nový Jičín region and its municipalities (Tab. 3) in the period from 1869–1900 to get a preliminary notion of the most important aspect of the geographical organization. Again, we remind that the territorial structure of the municipalities is as of 1900.

General population development is determined by several interconnected factors related to innovation processes of the Industrial Revolution and does not differ from the development in the Czech lands or Europe in the second half of the 19th century (cf. for instance Fialová, Kučera, Maur, 1996; Semotanová, 2002; or Butlin, Dodgshon, 1999). Improving life conditions, among other things e.g. sanitation, health care, stable political situation or social changes, supported the increasing birth rate and the consequent population growth in the region and in a majority of its municipalities. Figs. 3 and 4 present a general image of the population development between the two boundary years – 1869 and 1900. A more detailed commentary of the population development is provided in connection with the population concentration issue in the paragraphs below since both these aspects of the geographical organisation are closely related.

Population development is usually an uneven phenomenon, our region not being an exception. One of general processes during the Industrial Revolution is the population concentration, which was conditioned by the emigration of freed labour force released from relatively overpopulated rural areas to cities and towns with emerging factories after the revolution in 1848/9 (Jeleček, 1985). It is assessed by using a simple index proposed in the form used in this article by Hampl, Gardavský and Kühnl (1987) to express the spatial heterogeneity of population distribution, so called H index. It is defined as a minimal area of the territory (according to units of internal division – in our case the municipalities as of 1900) with a half concentration of the population in the territory (consequence of addition follows the population densities in the municipalities). The percentage of this area in the area

Municipality	Area (ha)	Population	Municipality	Area (ha)	Population
Bartošovice	1,899	2,006	Loučka	649	808
Bernartice nad Odrou	938	832	Mořkov	1,085	1,597
Blahutovice	599	401	Nový Jičín	558	12,003
Bludovice	522	609	Palačov	415	354
Dub	278	202	Perná*	304	262
Heřmanice*	396	247	Petřkovice	283	245
Hladké Životice	1,598	895	Polouvsí	342	317
Hodslavice	1,103	1,682	Poruba	412	282
Hostašovice	928	559	Rybí	902	905
Hrabětice	440	87	Starojická Lhota	554	364
Hukovice	498	632	Starý Jičín	347	657
Hůrka	441	293	Straník	480	472
Hustopeče nad Bečvou	1,144	1,162	Suchdol nad Odrou	1,684	2,010
Janovice	336	270	Šenov*	1,564	2,584
Jeseník nad Odrou	1,070	1,215	Vlčnov	441	431
Jičína	326	394	Vysoká*	474	206
Kojetín	267	206	Žilina*	1,138	2,382
Kunín	1,732	2,116	Životice*	905	835
Libhošť	769	1,373	Total	27,821	41,895

Tab. 2: Basic characteristics of municipalities in the Nový Jičín region (1900)

Note: Full names of municipalities marked with an asterisk are in the alphabetical order: Heřmanice u Polomí, Perná u Valašského Meziříčí, Šenov u Nového Jičína, Vysoká u Hustopečí nad Bečvou, Žilina u Nového Jičína, Životice u Nového Jičína. Maps and tables presented below include shortened names of the municipalities.

Source: Lexikon obcí pro Moravu, 1906

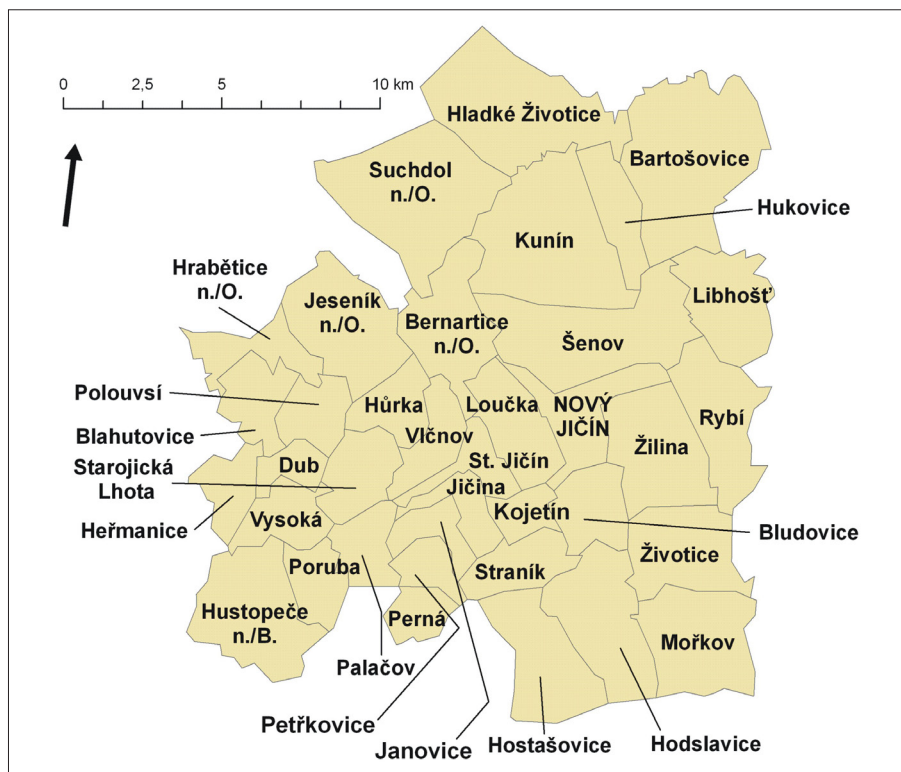


Fig. 2: The region of Nový Jičín according to the topographic version of the Reilly's model

Source: own design

Municipality	Population				Change index (in percentage points)		
	1869	1880	1890	1900	1880/ 1869	1890/ 1880	1900/ 1890
Bartošovice	1,848	2,023	2,032	2,006	9.5	0.4	-1.3
Bernartice nad Odrou	715	794	817	832	11.0	2.9	1.8
Blahutovice	401	381	363	401	-5.0	-4.7	10.5
Bludovice	538	563	558	609	4.6	-0.9	9.1
Dub	180	185	187	202	2.8	1.1	8.0
Heřmanice	212	240	243	247	13.2	1.3	1.6
Hladké Životice	934	976	958	895	4.5	-1.8	-6.6
Hodslavice	1,289	1,386	1,491	1,682	7.5	7.6	12.8
Hostašovice	466	484	556	559	3.9	14.9	0.5
Hrabětice	105	93	89	87	-11.4	-4.3	-2.2
Hukovice	526	569	567	632	8.2	-0.4	11.5
Hůrka	266	286	296	293	7.5	3.5	-1.0
Hustopeče n./B.	982	1,091	1,216	1,162	11.1	11.5	-4.4
Janovice	279	273	285	270	-2.2	4.4	-5.3
Jeseník nad Odrou	1,178	1,249	1,211	1,215	6.0	-3.0	0.3
Jičina	375	402	409	394	7.2	1.7	-3.7
Kojetín	213	187	191	206	-12.2	2.1	7.9
Kunín	1,954	2,105	2,159	2,116	7.7	2.6	-2.0
Libhošť	1,049	1,149	1,250	1,373	9.5	8.8	9.8
Loučka	628	742	754	808	18.2	1.6	7.2
Mořkov	1,315	1,371	1,497	1,597	4.3	9.2	6.7
Nový Jičín	8,723	10,274	11,562	12,003	17.8	12.5	3.8
Palačov	343	367	372	354	7.0	1.4	-4.8
Perná	239	261	251	262	9.2	-3.8	4.4
Petřkovice	217	252	252	245	16.1	0.0	-2.8
Polouvsí	391	333	312	317	-14.8	-6.3	1.6
Poruba	294	279	287	282	-5.1	2.9	-1.7
Rybí	788	817	890	905	3.7	8.9	1.7
Starojická Lhota	360	381	379	364	5.8	-0.5	-4.0
Starý Jičín	560	601	590	657	7.3	-1.8	11.4
Straník	445	436	449	472	-2.0	3.0	5.1
Suchdol nad Odrou	1,495	1,804	1,899	2,010	20.7	5.3	5.8
Šenov	1,189	1,631	2,105	2,584	37.2	29.1	22.8
Vlčnov	353	350	366	431	-0.8	4.6	17.8
Vysoká	230	249	233	206	8.3	-6.4	-11.6
Žilina	1,744	2,003	2,181	2,382	14.9	8.9	9.2
Životice	722	755	857	835	4.6	13.5	-2.6
Total	35, 415	39,222	42,004	43,795	10.7	7.1	4.3

Tab. 3: Population development in municipalities of the Nový Jičín region in 1869–1900

Source: *Retrospektivní lexikon obcí ČSSR, 1978; Historický lexikon obcí ČR, 2006; Vollständiges Orts-Verzeichniss des Markgrafenthumes Mähren, 1872; Special Orts-Repertorium von Mähren, 1885; Special Orts-Repertorium von Mähren, 1893; Lexikon obcí pro Moravu, 1906*

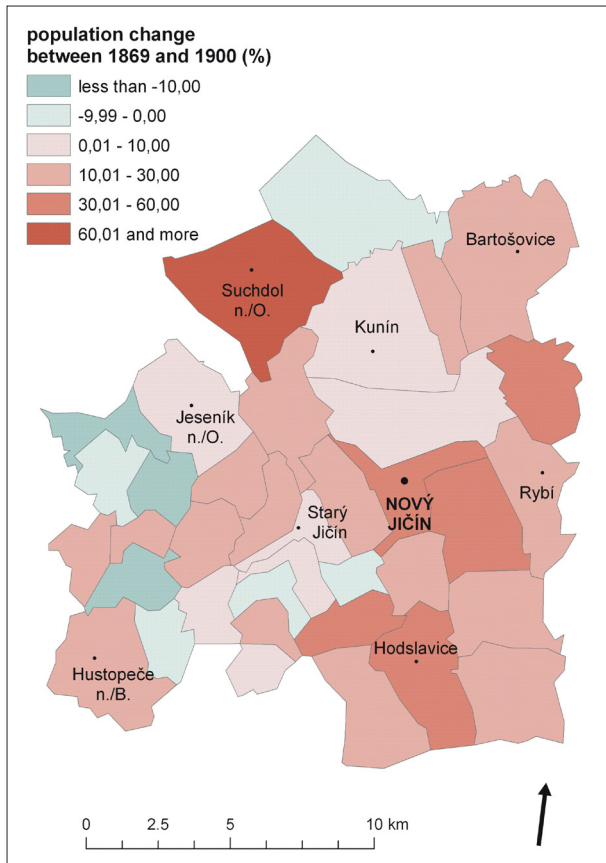


Fig. 3: Population development between 1869 and 1900
Source: Historický lexikon obcí ČR, 2006

of the whole researched territory is then subtracted from 100. Theoretically it assumes values ranging between 50 (maximal dispersion of the phenomenon) and 100 (maximal concentration of the phenomenon).

The development of the population concentration in the Nový Jičín region is, as the H index and its changes between consequent years, presented in Tab. 4. We see an accelerating concentration process in the Nový Jičín region with its maximum between 1890 and 1900. The general development of this process is in accord with the findings of Hampl, Gardavský, Kühnl (1987) and Hampl (2005) from the territory of the Czech lands.

Now, let us analyze more closely the population concentration and its development, since Tab. 4 does not say anything about the spatial image of the H index. The concentration process was in the Czech lands related to the process of industrialisation and consequent phenomena. Both 1850 and 1869 present a relatively fragmented pattern of municipalities with about a half of the population in the region (Fig. 5). In 1880, we see an increasing concentration in the eastern and southern part of the Nový Jičín region, which is accentuated in 1890 and 1900 (in these years the municipalities forming half a population of the region are the same, which is a sign of the completion of the process and stability of the settlement system) – Fig. 5.

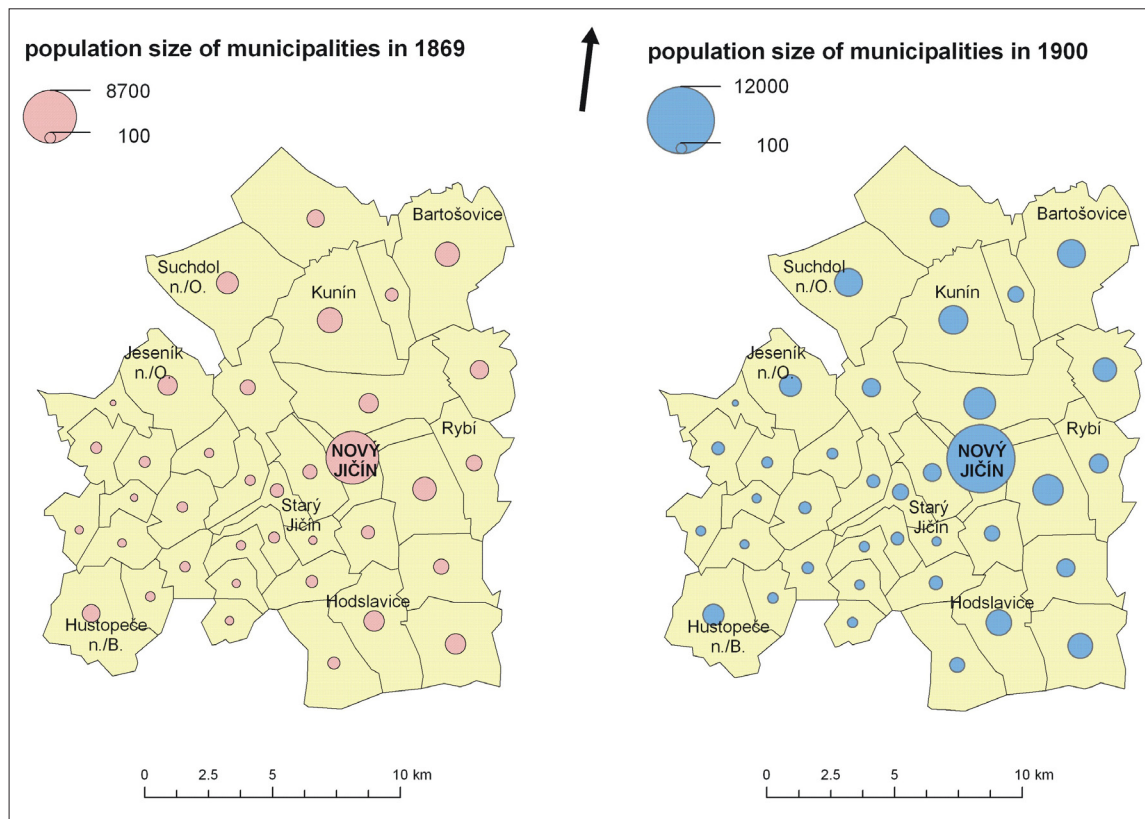


Fig. 4: The population size of municipalities in 1869 and 1900
Source: Historický lexikon obcí ČR, 2006

The population was concentrated in the town of Nový Jičín and its immediate hinterland in the first place as a response to the accelerating industrialization of the region, mainly of its centre. The prominence of Nový Jičín as a centre of the region is clearly documented in Fig. 4 both in 1869 and 1900. Fig. 4 also presents the population increase in municipalities situated in the immediate hinterland of the town of Nový Jičín

Year	H index	Change of H index
(1850)	73.92	X
1869	73.44	- 0.48
1880	74.67	1.23
1890	76.44	1.77
1900	80.31	3.87

Tab. 4: Development of the spatial concentration of population in the Nový Jičín region in (1850) 1869–1900
Note: Year 1850 serves only for illustration as it is not comparable with the regular censuses from 1869, 1880, 1890 and 1900 since the method of data collection somewhat differed

Source: *Retrospektivní lexikon obcí ČSSR, 1978*; *Historický lexikon obcí ČR, 2006*; *Vollständiges Orts-Verzeichniss des Markgrafenthumes Mahren, 1872*; *Special Orts-Repertorium von Mähren, 1885*; *Special Orts-Repertorium von Mähren, 1893*; *Lexikon obcí pro Moravu, 1906*

(today being administratively a part of the town): Kunín, Šenov, and Žilina. In 1848, the first factory with steam engines was established in Nový Jičín by J. N. Preisenhammer. From that time on, the number of factories increased and in 1865, a hat-making factory was established by the Hückel family in Nový Jičín. J. Hückle became a pioneer in the mechanized production of felt hats in the entire Austrian Empire. Since the capacity of the original factory became insufficient, he built a new factory with the modern technical equipment employing around 1,000 workers with a daily production of 1,800 hats. Moreover, he built several tens of blocks of houses, supporting thus the immigration into the town. In 1870, the production of tobacco was launched in the town and during the 1880s the tobacco factory became one of the largest employers in the region. By the end of the 1870s, J. Rotter established the production of carriage lamps, which was during the 1890s moved to Šenov. There, a hat-making factory of A. Peschel had been already located (Bartoš, Schulz, Trapl, 1995; Chobot, 1996).

As a consequence of the establishment of factories and creation of new job opportunities Nový Jičín and some of the adjacent municipalities experienced

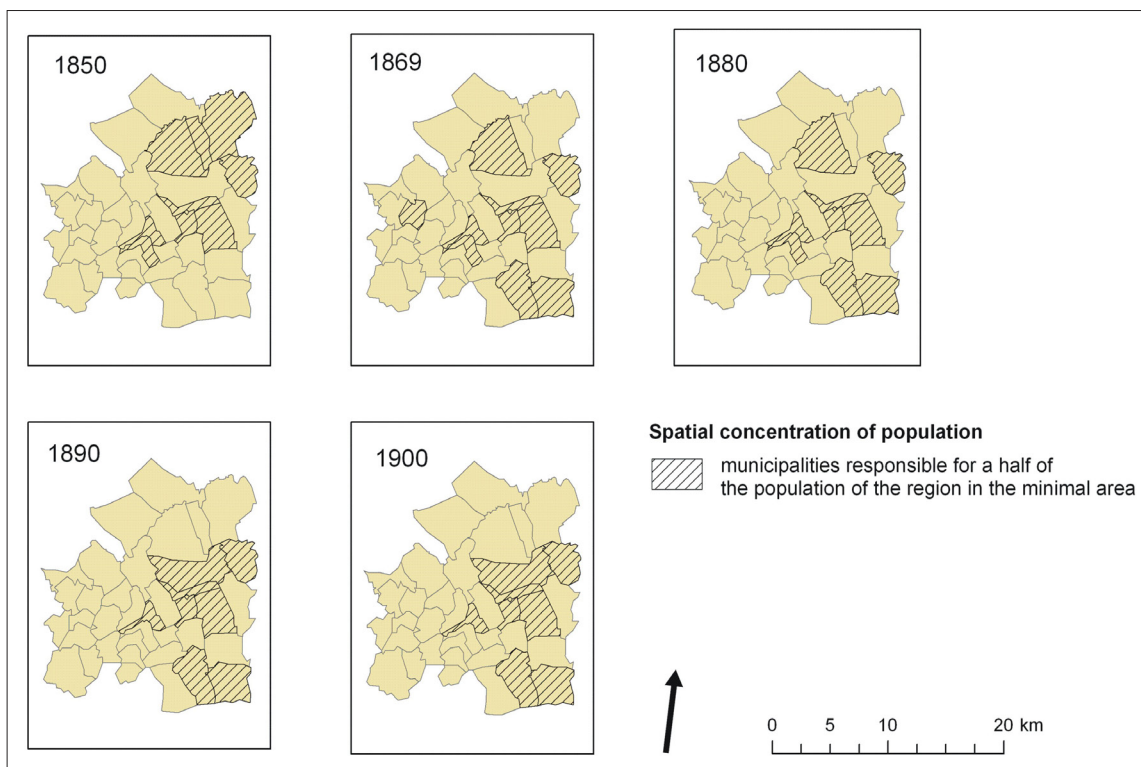


Fig. 5: Spatial expression of the H index in the Nový Jičín region in (1850) 1869–1900

Note: Year 1850 serves only for illustration as it is not comparable with the regular censuses from 1869, 1880, 1890 and 1900 since the method of data collection somewhat differed

Source: *Retrospektivní lexikon obcí ČSSR, 1978*; *Historický lexikon obcí ČR, 2006*; *Vollständiges Orts-Verzeichniss des Markgrafenthumes Mahren, 1872*; *Special Orts-Repertorium von Mähren, 1885*; *Special Orts-Repertorium von Mähren, 1893*; *Lexikon obcí pro Moravu, 1906*

a massive increase in their populations. Nový Jičín itself grew by 3,280 inhabitants in just 31 years (by 37 percentage points). Šenov grew rapidly by 117 percentage points, Žilina by 36, Libhošť by almost 31, Loučka by 29 percentage points, and Rybí and Bludovice by more than one eighth. Then we can see the formation of an important core in the Nový Jičín region exceeding the administrative boundaries of the town of Nový Jičín and the functional and structural interconnection of municipalities forming this agglomeration.

Besides the Nový Jičín agglomeration area, we can see the population concentrating in the south of the region – municipalities Hodslavice and Mořkov. Rather than the industrialization, the reason is a relatively large population of these municipalities in comparison to the rest of the region, of course excluding the agglomeration municipalities around Nový Jičín and some other settlements, for instance Suchdol nad Odrou. The last settlement included into the set of municipalities comprising half a population of the region is Starý Jičín. Though its population is not large within the region, the population density is relatively high.

The last mentioned municipalities (Suchdol nad Odrou and Starý Jičín) are connected with a transport phenomenon. The development of transport networks, mainly railways, is either a supporting factor of the population concentration or its main cause (an illustrative transport scheme is provided in Fig. 6). Nový Jičín and adjacent municipalities were connected to the railway network in 1881 (with Suchdol nad Odrou, through Šenov) and in 1889 (with Hostašovice through Žilina and Bludovice). Suchdol nad Odrou became an important railway junction on the Northern railway of the Emperor Ferdinand (opened in 1847) and its population grew considerably by almost 35 percentage points within 31 years.

A somewhat lesser importance has the road network, mainly a so-called imperial road through the whole region between Heřmanice, Dub, Starojická Lhota, Vlčnov, Starý Jičín, Loučka, Nový Jičín, and Libhošť. It can be put into connection with the population concentration in Starý Jičín and with the increasing population in some municipalities in the immediate hinterland of Nový Jičín (for instance Libhošť, which grew by more than 40 percentage points).

Together with the processes of the population concentration, we can see also the process of depopulation in marginal or peripheral areas of the Nový Jičín region. We can only guess that it was the emigration from these areas to industrial centres that

was responsible for the population decrease, since we can assume a positive natural population growth in the whole region during the second half of the 19th century (cf. also Fialová, Kučera, Maur, 1996). The largest population decrease between 1869 and 1900 can be seen in Polouvsí (by almost 19 percentage points), followed by Hrabětice and Vysoká (decrease by more than 17 and 10 percentage points respectively). In general, the process of depopulation was accelerated in the region between 1880 and 1900 in accord with the accomplishment of industrialization.

3.2.2 Inner structure of the region

The process of the population concentration raises a question of the inner structure of the region and its nodal character. Since we do not have data on the horizontal flows between the municipalities of the region, we are forced to model these interactions, this time by applying a simple gravity model in the following form:

$$T_{AB} = \frac{M_A M_B}{d_{AB}^2} \quad (2)$$

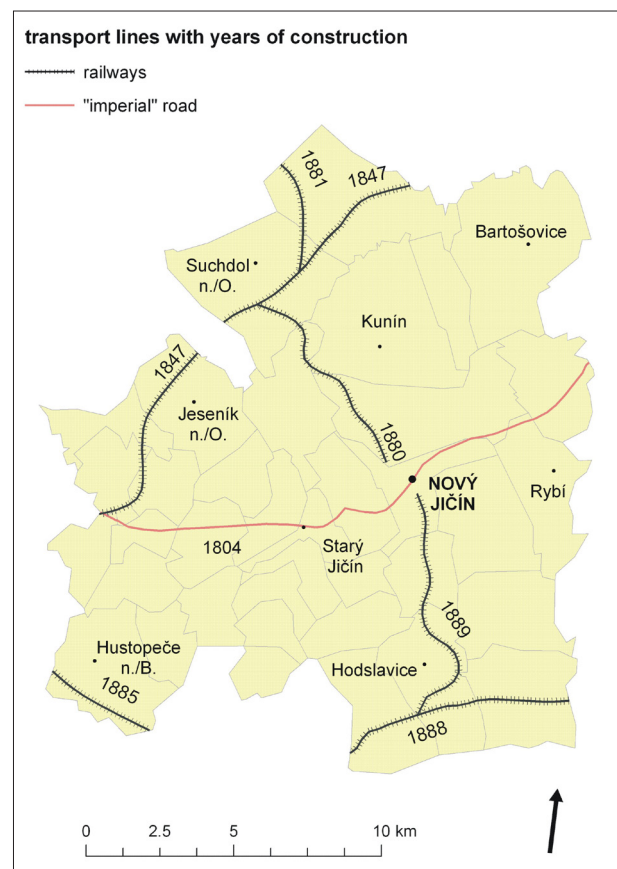


Fig. 6: The development of major transport lines in the Nový Jičín region

Source: *Atlas československých dějin*, 1965; Pavlíček, 2002

where T_{AB} is the interaction between municipalities A and B , M is the population, d_{AB} is the road distance between the municipalities A and B . The gravity model expresses the expected level of interaction between all municipalities of the region organised in the symmetric origin destination matrix.

All interactions in the matrix were relativized to the strongest interaction (taken as 100%) and distributed according to their intensities into three intervals according to a 1/3 step. Thus, we gained strong, medium and weak levels of interaction (Fig. 7). Fig. 7 presents graphically the strongest interaction (link) of each municipality in the region to a relevant municipality of the region in the period between 1850 and 1900. The theoretical orientation of the interactions is of course bidirectional because of the model variant used, but we can assume that the flow is usually oriented from the smaller to the larger municipality.

A simple graphical expression of the interactions in Fig. 7 confirms the increasing nodal character of the region with its very dominant centre in Nový Jičín, which gains gradually the links with almost all municipalities of the region and their intensity is increasing. If there is a link that does not include the town of Nový Jičín (mainly in marginal areas of the region), these municipalities are anyway linked

to the centre indirectly, see for instance the case of Hustopeče nad Bečvou in the south western part of the region. The only exception is Starý Jičín, which has the strongest links to Jičina and Vlčnov in the whole period from 1850 to 1900 and does not link to Nový Jičín at all. In general, we can observe more significant changes in the direction and intensity of the interaction between 1850 and 1880, during 1890 and 1900 these interactions were already stable (cf. stability of the population concentration in these years as mentioned several paragraphs above).

3.2.3 Land use development

The last aspect of the geographical organisation surveyed in this article is the land use change. We analyzed the following categories between 1845 and 1897: arable land, forests, permanent grassland, gardens, and others (including built-up areas and water bodies). The development of land use is characterized by three processes: increasing area of arable land, decreasing area of permanent grassland, and namely the fragmented development of the area covered by forests.

The share of arable land in the total area of municipalities increased mainly in the floodplains of watercourses, particularly along the Odra River (Fig. 8). The maximum value was reached in Hrabětice

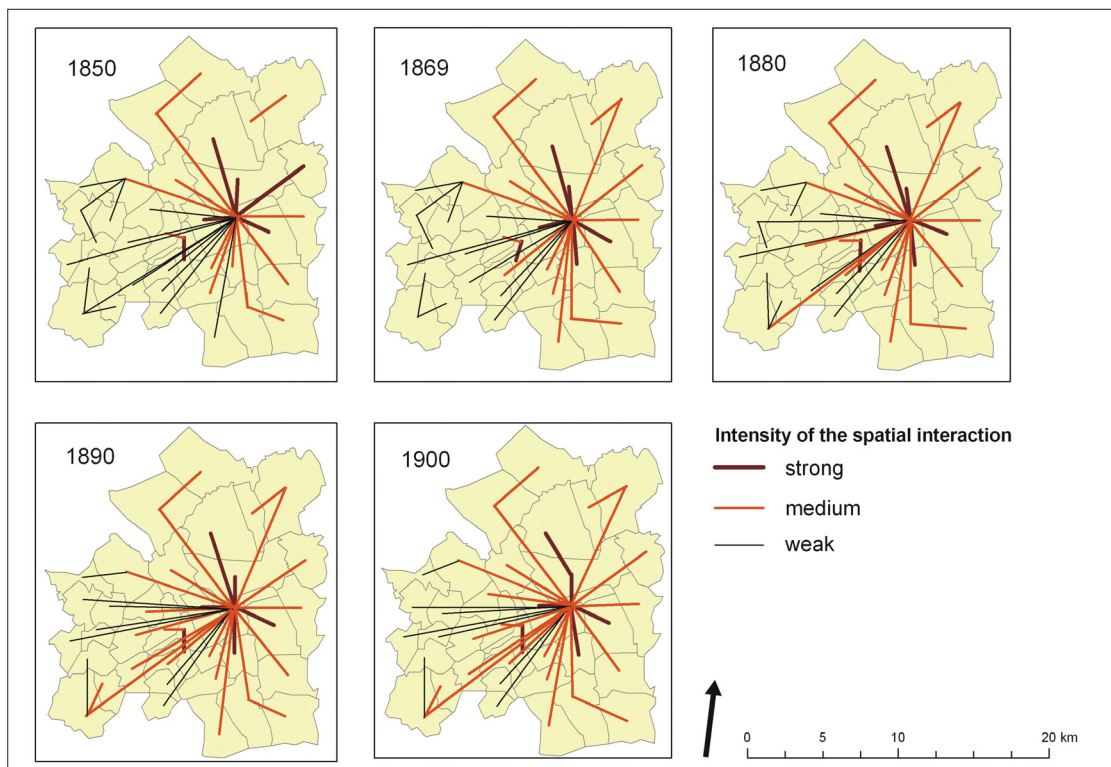


Fig. 7: The development of region's inner structure

Source: *Retrospektivní lexikon obcí ČSSR, 1978*; *Historický lexikon obcí ČR, 2006*; *Vollständiges Orts-Verzeichniss des Markgrafenthumes Mähren, 1872*; *Special Orts-Repertorium von Mähren, 1885*; *Special Orts-Repertorium von Mähren, 1893*; *Lexikon obcí pro Moravu, 1906*

(increase by 133 percentage points) at the expense of bottomland forests. Most municipalities experienced an increase by 5–10 percentage points. On the other hand, the share of arable land decreased in Nový Jičín due to the urbanisation process and building construction. The increases in the shares of arable land can be related to the growing population and to the need for producing more foodstuffs, which meant the pressure mainly on bottomland forests and wetlands in lower parts of the region, and also on permanent grassland (see the next paragraphs).

An opposite development is seen in the permanent grassland (Fig. 9). The share of permanent grassland decreased almost in all municipalities. It is to be noted here that we have to be aware of the problem of “small” numbers in the case of permanent grasslands. Their share in the areas of the municipalities is low (around 5%) and this has to be taken into account in their interpretation, since the significance of such a change is lower.

The development of the forest area differs in the region considerably. We can see (Fig. 10) both a decrease and an increase of this land use category. The increase exceeds

in some municipalities 100 percentage points. The share of forests increased mainly in areas inconvenient for agricultural production (southern hilly part of the region – Dub, Jeseník nad Odrou, Mořkov, Hodslavice, Hostašovice, Starý Jičín, Straník). These areas could not compete with the lower-situated parts of the region. The share of forests decreased either in lowland areas along the main watercourses in favour of arable land (Hrabětice, Blahutovice, Heřmanice and Hustopeče nad Bečvou) or in the eastern part of the region in the vicinity of the town of Nový Jičín (Žilina, Rybí, Životice, Bludovice, Kojetín, Loučka, Kunín, Libhošť, Bartošovice, Hukovice). The latter areas had probably several different reasons for the decreased share of forests: changes into arable land, changes into built-up areas, and sometimes even changes into permanent grassland.

A synthetic index of the land use change assessment was proposed by Bičík et al. (2001) as follows:

$$LUC_{index} = \frac{\sum_{i=1}^n |A_{t1i} - A_{t2i}|}{TA_{t1} + TA_{t2}} * 100 \quad (3)$$

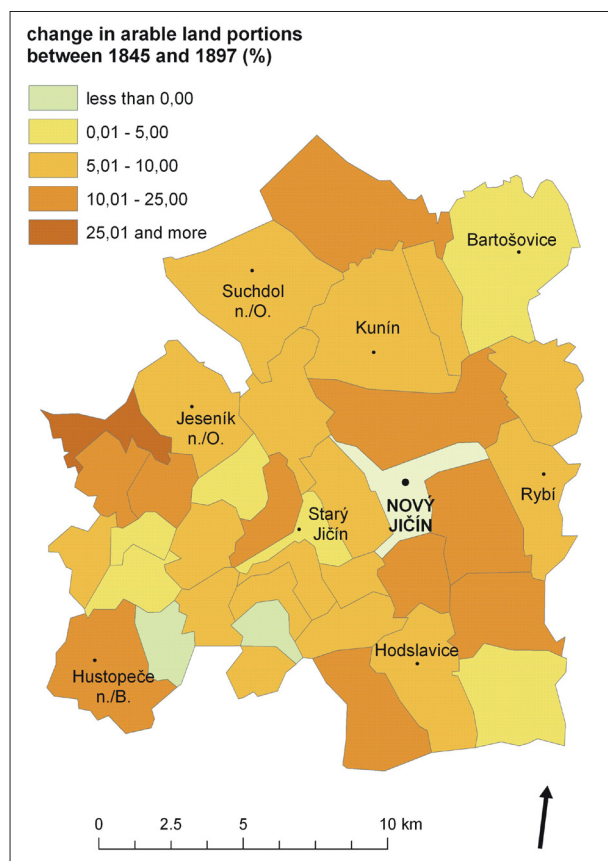


Fig. 8: Development of arable land in the period from 1845–1897

Sources: <http://archivnimapy.cuzk.cz/>; *Lexikon obcí pro Moravu, 1906*

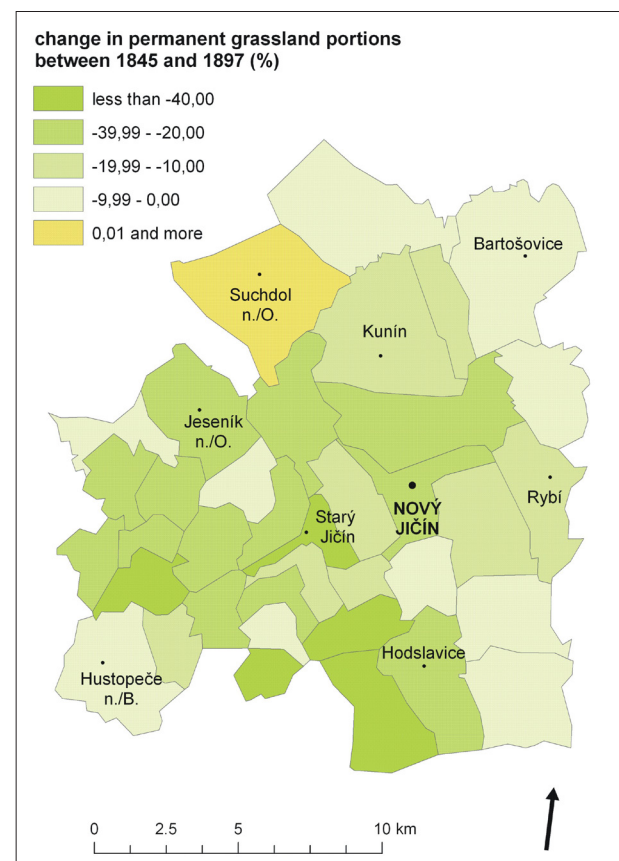


Fig. 9: Development of permanent grassland in the period from 1845–1897

Sources: <http://archivnimapy.cuzk.cz/>; *Lexikon obcí pro Moravu, 1906*

where LUC_{index} is the land use change index based on two time horizons $t1$ and $t2$, A is the area of i land use type and TA is the total area of the researched spatial unit, in our case of the municipality. The index expresses the share of areas within a spatial unit whose land use has changed between the given time horizons. In our case, the categories of arable land, permanent grassland, forests, permanent crops (gardens and orchards) and other land (including built-up areas, water bodies, factory yards, handling and transport areas) entered the Equation 3 and results are presented in Fig. 11.

Generally speaking the land use change index reached higher values in the peripheral depopulating lowland western parts of the Nový Jičín region (e.g. the floodplain of the Odra River) as a probable result of the relative instability of rural areas enabling an easy change from permanent grassland to arable land. Peripheral hilly areas of the eastern and south-eastern parts of the region with a higher representation of forested (i.e. more stable) areas show lower values of the land use change index. The central part of the region (town of Nový Jičín and parts of its immediate hinterland) shows a relative stability of land use. It is

to be noted here that the results are influenced by the area of the municipalities but the basic image of the land use change can be relatively sufficiently retrieved from Fig. 11. The land use change index for the whole region makes 5.66%, which does not differ much from similar regions in industrially developed areas with a similar natural environment in the north-eastern Bohemia, northern Moravia and Czech Silesia, all being characteristic of the textile and clothing production.

4. Conclusion

According to the analysis of the development of selected aspects, the geographical organisation of the Nový Jičín region was during the second half of the 19th century significantly affected by processes related to the industrial revolution, such as industrialization, urbanization, or agricultural and transport innovations. The development of industrial production and partly of railway network supported the dynamic population concentration in the eastern and south-eastern parts of the region, around its centre of Nový Jičín (Šenov, Žilina, Libhošť, Starý Jičín, Hodslavice, Mořkov). Municipalities situated near Nový Jičín were functionally and structurally

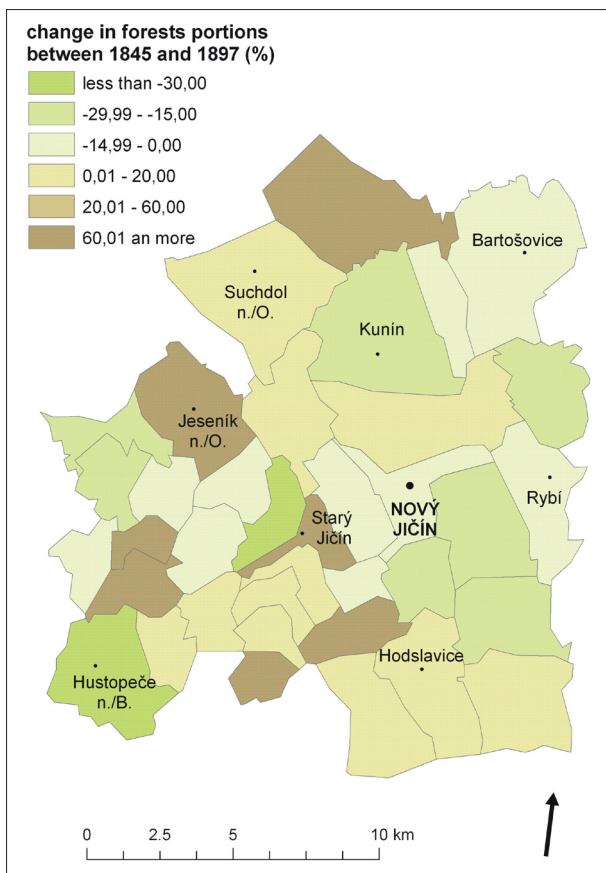


Fig. 10: Development of forest areas in the period from 1845–1897

Sources: <http://archivnimapy.cuzk.cz/>; *Lexikon obcí pro Moravu, 1906*

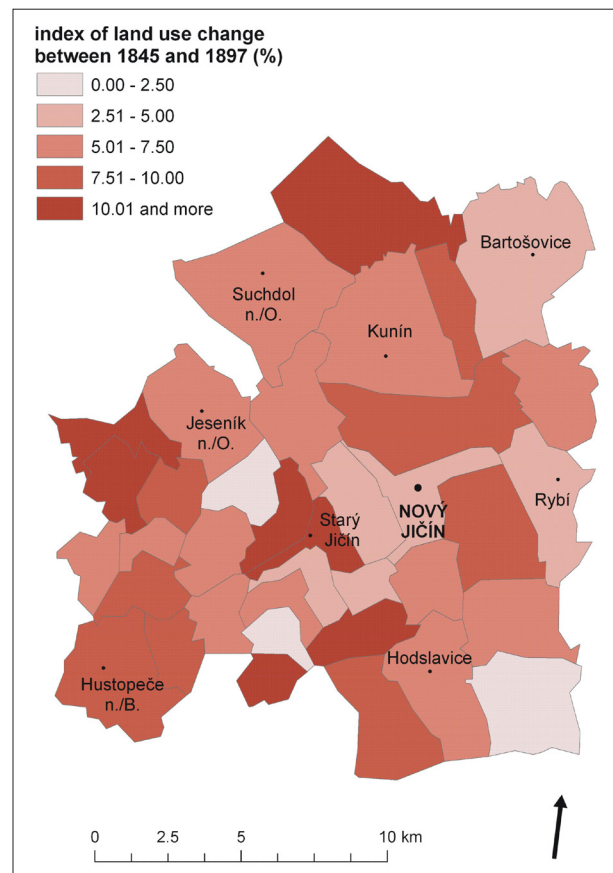


Fig. 11: Index of land use change between 1845 and 1897

Sources: <http://archivnimapy.cuzk.cz/>; *Lexikon obcí pro Moravu, 1906*

interconnected with the region's centre in the processes of urbanization and an agglomeration urban area was formed around Nový Jičín.

The population growth and concentration (mutually connected with the processes of industrialization and urbanization) resulted in new demands for agricultural production and considerably changed the landscape of the hinterland of the Nový Jičín agglomeration. Agriculture was intensified (production of cereals and potatoes) and the land was more effectively used in the convenient lower parts of the region at the expense of permanent grasslands and forests. Areas less convenient as well as areas affected by the depopulation process experienced an increase in the share of forests, which is confirmed also by the findings of Bartoš, Schulz, Trapl (1995) and Chobot (1996). The agglomeration of Nový Jičín witnessed also an increase in the built-up areas (both factories and houses for the increasing population, particularly workers).

The development of the selected aspects of geographical organisation in the Nový Jičín region in the surveyed period as presented in this article conforms to some earlier findings: those regarding the population made by Fialová, Kučera, Maur (1996) and its concentration made by Hampl, Gardavský, Kühnl (1987) and Hampl (2005) on the Czech lands, and also those regarding the land use in the Czech lands published by e.g. Jeleček (1985), Bičík (1998), Jeleček, Burda, Chromý (1999), Bičík et al. (2001), and on a region of similar size and structure (the Blansko region) by Vyskočil, Klapka, Martinát (2006) and Vyskočil, Klapka, Nováková (2007). We can conclude that general trends of the Industrial Revolution, as already briefly outlined above in the introduction

References:

- ABLER, R., ADAMS, J. S., GOULD, P. (1972): Spatial organization: The geographer's view of the world. Prentice Hall, London, 587 pp.
- ATKINS, P., SIMMONS, I., ROBERTS, B. (1998): People, land and time: an historical introduction to the relations between landscape, culture and environment. Hodder Education, London, 286 pp.
- Atlas československých dějin (1965): Ústřední správa geodézie a kartografie, Praha.
- BARTOŠ, J., SCHULZ, J., TRAPL, M. (1995): Historický místopis Moravy a Slezska v letech 1848 – 1960. Vol. XIV. Vydavatelství UP v Olomouci, Olomouc, 252 pp.
- BIČÍK, I. (1998): Land use in the Czech Republic 1845 – 1948 – 1990. Methodology, interpretation, contexts. Acta Universitatis Carolinae Geographica Vol. 32, p. 247–255.
- BIČÍK, I., CHROMÝ, P., JANČÁK, V., JELEČEK, L., KUPKOVÁ, L. (2001): Land Use/Land Cover Changes in Czechia over the past 150 years. An overview. Hokkaido University of Education, Asahikawa, 87 pp.
- BUTLIN, R. A. (1993): Historical Geography: Through the gates of space and time. Hodder Arnold, London, 320 pp.
- BUTLIN, R. A., DODGSHON, R. A. [eds.] (1999): An Historical Geography of Europe. Oxford University Press, Oxford, 373 pp.
- CHOBOT, K., [ed.] (1996): Okres Nový Jičín. Místopis obcí. Sv. I. Okresní úřad – referát regionálního rozvoje a Státní okresní archiv v Novém Jičíně, Nový Jičín, 185 pp.

(e.g. Purš, 1960, 1973; Hlavačka, 1990; Butlin, 1993; Atkins, Simmons, Roberts, 1998; Pollard, 1999), were confirmed to exist also in the Nový Jičín region.

As far as the issue of nodal regions in the second half of the 19th century is concerned, we can conclude that the period represented an important phase in the formation of nodal regions, mainly thanks to industrialization and urbanization but also thanks to the increasing mobility of the population, related to the development of railway network. This period significantly affected the hierarchical and organizational structure of the territory of the Czech lands (see also Hampl, Gardavský, Kühnl, 1987; Hampl, 2005) that is reflected for instance in the settlement system until today. It also witnessed the formation of the region's internal heterogeneity as presented in this article. The region has an unchallenged centre, which was not affected either by inconvenient tracking of the main railway outside the town of Nový Jičín; the immediate hinterland of the centre and the periphery of the region can be defined as well. In this sense, we consider the article as a contribution of historical geography to the issue of spatial organisation.

Acknowledgement

The article was supported by the grant project No. KJB300860901 "Quantitative methods and synthesizing graphical methods in the approximation, projection and modelling of geographical phenomena" of the Grant Agency of AS CR. The authors thank for the support.

The authors would also like to thank the reviewers for their valuable suggestions that helped to improve the article.

- FIALOVÁ, L., KUČERA, M., MAUR, E. (1996): Dějiny obyvatelstva českých zemí. Mladá Fronta, Praha, 399 pp.
- GARDAVSKÝ, V. (1988): Poznávací, aplikační a vzdělávací funkce geografie. *Studia Geographica*, Vol. 92, GgÚ ČSAV, Brno, 176 pp.
- HAGGETT, P. (1965): *Locational Analysis in Human Geography*. Arnold, London, 339 pp.
- HAGGETT, P. (2001): *Geography: A Global Synthesis*. Prentice Hall, Harlow, 864 pp.
- HALÁS, M., KLAPKA, P. (2010): Regionalizace Česka z hlediska modelování prostorových interakcí. *Geografie*, Vol. 115, No. 2, p. 144–160.
- HAMPL, M. (2005): Geografická organizace společnosti v České republice: transformační procesy a jejich obecný kontext. UK, Praha, 147 pp.
- HAMPL, M., GARDAVSKÝ, V., KÜHNEL, K. (1987): Regionální struktura a vývoj systému osídlení ČSR. UK, Praha, 255 pp.
- Historický lexikon obcí České Republiky 1869–2005, I. Díl. ČSÚ, 2006.
- HLAVAČKA, M. (1990): Dějiny dopravy v českých zemích v období průmyslové revoluce. Academia, Praha, 179 pp.
- <http://archivnimapy.cuzk.cz/>
- JELEČEK, L. (1985): Zemědělství a půdní fond v Čechách ve 2. polovině 19. století. Academia, Praha, 283 pp.
- JELEČEK, L., BURDA, T., CHROMÝ, P. (1999): Historická geografie a výzkum vývoje struktury půdního fondu Česka od poloviny 19. století. *Historická geografie*, Vol. 30, p. 253–261.
- KLAPKA, P., FRANTÁL, B., HALÁS, M., KUNC, J. (2010): Spatial organisation: development, structure and approximation of geographical systems. *Moravian Geographical Reports*, Vol. 18, No. 3, p. 53–65.
- KUBAČÁK, A. (1994): Dějiny zemědělství v Českých zemích. 1. díl (od 10. století do roku 1900). MZ ČR, Praha, 192 pp.
- Lexikon obcí pro Moravu. Zpracován na základě výsledků sčítání lidu ze dne 31. prosince 1900. Vydán c. k. Statistickou ústřední komisí ve Vídni, 1906.
- Lexikon obcí pro Slezsko. Zpracován na základě výsledků sčítání lidu ze dne 31. prosince 1900. Vydán c. k. Statistickou ústřední komisí. Ve Vídni, 1906.
- MORRILL, R. L. (1974): *The Spatial Organization of Society*. Duxbury Press, North Scituate, 267 pp.
- NIEDZWIEDZOVÁ, K. (2010): Proměna geografické organizace regionu v období průmyslové revoluce. Bachelor thesis, Department of Geography, Palacký University in Olomouc, 77 pp.
- PAVLÍČEK, S. (2002): Naše lokálky. Místní dráhy v Čechách, na Moravě a ve Slezsku. Dokořán, Praha, 156 pp.
- POLLARD, S. (1999): Industrialization, 1740 to the present. In Butlin, Dodgshon [eds.]: *An Historical Geography of Europe*, p. 280–299.
- PURŠ, J. (1960): Průmyslová revoluce v českých zemích. SNTL, Praha, 155 pp.
- PURŠ, J. (1973): Průmyslová revoluce. Vývoj pojmu a koncepce. Academia, Praha, 730 pp.
- ŘEHÁK, S., HALÁS, M., KLAPKA, P. (2009): Několik poznámek k možnostem aplikace Reillyho modelu. *Geographia Moravica* Vol. I, UP v Olomouci, Olomouc, p. 47–58.
- REILLY, W. J. (1931): *The law of retail gravitation*. Knickerbocker Press, New York, 75 pp.
- Retrospektivní lexikon obcí ČSSR 1850–1970, díl I/1. FSÚ, 1978, 678 pp.
- SEMOTANOVÁ, E. (2002): Historická geografie Českých zemí. Práce Historického ústavu AV ČR, Monographia Vol. 16, Historický ústav AV ČR, Praha, 279 pp.
- Special Orts-Repertorium von Mähren. Podrobný seznam míst na Moravě. Wien, 1885.
- Special-Orts-Repertorium von Mähren: neubearbeitung auf Grund der Ergebnisse der Volkszählung vom 31. Dezember 1890. Podrobný seznam míst na Moravě, Bd. IV. Wien, 1893.
- Vollständiges Orts-Verzeichniss des Markgrafenthumes Mahren. Brünn, 1872.
- VYSKOČIL, A. (2010): Bílé zlato a budování železniční sítě. *Listy cukrovarnické a řepařské* 126, No. 9–10, p. 284–287.
- VYSKOČIL, A., KLAPKA, P., NOVÁKOVÁ, E. (2007): Rekonstrukce proměny krajiny, sídel a sídelní struktury na příkladu Blanenska. *Historická geografie*, Vol. 34, p. 296–306.
- VYSKOČIL, A., KLAPKA, P., MARTINÁT, S. (2006): Proměny krajiny rurálního prostoru v zázemí průmyslového centra během 2. poloviny 19. století. *Historická geografie – Supplementum I*. Historický ústav, Praha, p. 137–162.

Authors' addresses:

Mgr. Pavel KLAPKA, Ph.D.
Institute of Geonics, Academy of Sciences of the Czech Republic
Department of Environmental Geography
Drobného 28, 602 00 Brno, Czech Republic
e-mail: *klapka@geonika.cz*

Bc. Klára NIEDŽWIEDŽOVÁ
Department of Geography, Palacký University in Olomouc
Třída 17. listopadu 12, 771 46 Olomouc, Czech Republic
e-mail: *klanie@seznam.cz*