Chapter 4
Influence of Socio-Economic Conditions on Land Use

Abstract The main focus of this chapter is put on driving forces of land use changes. Authors distinguish among political, economic, social, technological, and cultural driving forces; the importance of different types much depends on how developed the society is. The greatest attention is devoted to social driving forces as these were behind the land use changes over the last 200 years especially in Europe and North America. Different phases of the "Complex Revolution of the Modern Age" are outlined and the spatial diffusion of new technologies are shown. In the nineteenth century Czechia, technological advance in agriculture and farming innovations were crucial and allowed to cultivate land in a more intensive way. Political driving forces of land use changes were especially important in the second half of the twentieth century. After Communists had seized the power in Czechoslovakia (1948), cooperatives and state-owned estates prevailed, private farming was suppressed. Later on, following the collapse of Communism in 1989, rural areas were significantly influenced by economic and social transformation. Socio-economic conditions in Czechia are outlined in brief, with special emphasis on geographical location and transport infrastructure. The concepts of centrality and peripherality are seen as crucial; core areas, neutral, and peripheral (marginal) regions are defined. The steady urban growth meant that most of the decision-making processes moved from rural areas to cities and towns—process that keeps continuing. The effects of transport infrastructure are studied too. The advance of railways seems to have a big influence on land use patterns in the fertile regions especially in the nineteenth century; later on, highways and modern roads became more important.

Keywords Driving forces · Complex revolution of the modern age · Technological diffusion · Social and economic conditions · Core · Periphery

4.1 Basic Dilemma: Structure Versus Actor

Land use changes can be studied from different perspectives where space, time, and institutions are taken into consideration. The institutional scale covers the global level, international organizations, nation states, regions, localities,

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communities, and individuals. When large spatial units (for instance, nation states) are studied, motivations of all actors cannot be identified, of course. Thus, one should focus on the analysis of "driving forces" and social structures. The behaviour of individual actors is difficult to study, especially when such a research spans a long period of time (Bičík et al. 2012, part 1). However, it is the motivation of individual actors behind the land use changes that includes a lot of information (Kolejka 2007).

The past analyses of land use changes have so far focused mostly on economic conditions and related theories differential land rent (von Thünen's intensity theory). Human behaviour, however, includes much more than just economic concepts (homo economicus). Moreover, sustainable land use cannot rely fully on economic relations, but must include also environmental and social aspects (Fanta 2013).

Most research projects that examined factors influencing land use changes in detail (i.e. at smaller scale than nation states) were based on "empirical structuralism" (Kabrda 2004), i.e. on quantitative assessment of selected proximate factors. These factors, however, represent just one part of the decisions made by individuals. Social and cultural aspects have been rarely studied so far—probably because quantitative analyses are difficult to carry out in this case. The high importance of cultural patterns (ideology, faith, social habits, knowledge, etc.) for land use studies was stressed, for instance, by Bürgi et al. (2004). In the Czech context, sociological research studying the relations between different social groups and landscapes was carried out by Librová (1987). It is essential for any detailed research to identify motivations, knowledge, and values of individual actors (Kabrda and Jančák 2007). This kind of knowledge is also important when various policies regarding future land use are formulated (Lipský et al. 2013).

4.2 Driving Forces of Land Use Changes

4.2.1 Types of Driving Forces: Political, Economic, Social, Technological, Cultural

Social driving forces of land use changes (that primarily have economic reasons and consequences) have been studied by a number of scholars. Turner et al. (1995) argues that in some regions driving forces are the main reasons for functional changes.

The concept of driving forces used in this research is described in Sect. 2.4. Bürgi et al. (2004) as well as Ellis (2007) took also natural driving forces into consideration. It has been underlined that "…Landscape is the prime sphere, where the combined effects of society and nature become visible. As societies and nature are dynamic, change is an inherent characteristic of landscapes" (Bürgi et al. 2004, p. 857). Such a holistic approach towards land use/cover driving forces (i.e. natural and social driving forces intertwined) means that "…the forces that cause observed landscape changes. i.e. they are influential processes in the evolutionary trajectory of the landscape" (Bürgi et al. 2004, p. 858).

Brandt et al. (1999 in Bürgi et al. 2004, p. 859) also suggest that natural driving forces are part of the land use/cover driving forces. These authors recognize five types of driving forces: (1) socio-economic; (2) political (socio-economic and political forces are closely interconnected); (3) technological; (4) natural; (5) cultural. They argue that space, time, and institutional framework of the research define the driving forces of land use.

Due to the advance in economic forces, modes of production, technologies, etc., the society was becoming less and less dependent on the nature. Purš (1980) argues that while the so-called "Complex Revolution of Modern Age" had started already in the sixteenth century (i.e. during the Renaissance), humans really became "liberated" from the dependence on the nature as late as during the Industrial Revolution—thus, in Czechia not before the nineteenth century. The fast spread of steam engines meant that manufactories and later factories were no more spatially bound to energy resources (hydro, wind) and deposits of raw materials. Railways and steamers brought new signs of globalization and directly influenced the acreage of arable land as well as the spatial distribution of major crops in Europe and North America. Mather (2006, p. 182) argues that "…Without the railroad and steamship in the nineteenth century, for example neither wheat farming in the Great Plains nor colonial coffee production would have attained their respective scales or significance in terms of land-cover change". Bičík (2004) suggests that in this way, new forms of internal (social) and external (socio-geographical) organization of the society came to existence.

Some social driving forces have far-reaching, almost global effects. Let us mention the differential land rent, Industrial and Agricultural Revolution followed by urbanization, new modes of transport, spread of technological innovation (at present computers, Internet, and genetic modification), global economic and cultural trends, etc. Lambin and Geist (2007) argue that social driving forces include first of all activities of multinational corporations and banks, international organizations (UN, IMF, WB, EU, etc.), environmental organizations, and—last but not least—also wars.

Seen from the Czech (Central/Eastern European) perspective and with respect to the turbulent history of the twentieth century, major underlying driving forces of land use/cover change have developed in this part of the world. Especially in the second half of the twentieth century these were influenced by political changes of 1948 and 1989 (see Sect. 6.2, Table 6.1). Moreover, there are also social driving forces with limited (regional) influence: agrarian reforms, different laws, ownership types, environmental protection, agricultural management, and competition, state investment strategies, etc.

Social driving forces that influenced land use patterns in Czechia have been analysed with attention to detail by this research team already in a number of past studies (Bičík and Jeleček 2005; Bičík et al. 2001; Jeleček 1995, 2002, 2006; Mareš and Štych 2005, etc.). Sections 6.4–6.7 examine the social driving forces in the periods 1845–1900–1948–1990–2010.

4.2.2 General Driving Forces of Landscape Changes in Developed Countries

Social driving forces, together with natural driving forces, have been behind the land use changes over the last 200 years especially in Europe and North America. In the second half of the twentieth century, increasing pressure on the landscape resulted in global environmental crisis. These driving forces are formed and act in a close relation with societal changes in space and time. They are spread by diffusion and develop fully first in the core areas. The rate of diffusion (the term "revolution" is sometimes used) usually slows down in regions distant from the core area. In this context, using the term "revolution" (Agricultural, Industrial, Demographic Revolutions, etc.) means fundamental changes of the past trends, qualitative changes of the content, innovation, and speed of elapsing time.

The most dynamic land use changes over the past 170 years have been recorded in the period of the so-called Industrial-Scientific Revolution (Purš 1973b, 1980; Jeleček 1985, 2006; Bičík et al. 2010). Purš argues that it was the last phase of the so-called Complex Revolution of Modern Era. The profound changes that had begun during the revolutionary years 1848–1849 gave birth to a new economic and social system.

Box 4.1 Complex Revolution of Modern Age

"The structure and dynamics of this general revolution were determined by the interaction of series of partial revolutions affecting asynchronously different areas of the development of society, e.g. the scientific and philosophical revolution, the social revolution, as well as the technological, communication, agricultural, demographic revolutions, and finally the three phases of the industrial and scientific revolution (industrial, technological and scientific, and scientific and technological). If the superior term of industrial and scientific revolution has been used here for the three phases of the summary term, it was in an effort to express right the principal trends of this historical process from the lower forms to the higher, from industry to technology and science, from industry as manufacturing (making) via technology to industry as an applied science. The fundamental feature (of that revolution) was the gradual penetration of the dynamic principle into the main areas of the intellectual and social development of the European civilization and its diffusion into the areas of other civilizations."
Source: Purš 1980, pp. 135–136.

Geographical aspects of the so-called Industrial-Scientific Revolution are evident. Purš (1980, p. 365) describes that "…the Industrial-Scientific Revolution had three phases that overlapped in various countries… and reflected the uneven rate of diffusion, which was delayed in peripheral developing countries…". The

Table 4.1 Time delay measured by the performance of steam engines in industry (in hp) in 1900 per 1000 inhabitants

Countries time delay behind Great Britain	Retardation index		
	Asynchronous t = years	Synchronous r = hp/1000 inhabitants	a = Synthetic coefficient of retardation
Russia/Great Britain	86	156.2	13.43
Austria (Cisleithania) /Great Britain	41	134.6	5.52
France/Great Britain	27	118.2	3.19
Czechia/Great Britain	24	108.2	2.60
Germany/Great Britain	11	90.6	1.0

Explanations t = approximate delay behind Great Britain measured by combined performance of steam engines per 1000 inhabitants; r = difference between combined performance of steam engines per 1000 inhabitants; a = (r × t)/1000. *Source* Purš 1973a, b, p. 477

same was true for other modernization processes, namely in the case of Industrial Revolution. Purš used the uneven spread of innovation during the Industrial Revolution in selected European countries (including Czechia) to construct a simple "retardation index" (see Table 4.1). This index is based on the combined performance of steam engines (in horsepower) in industrial enterprises per 1,000 inhabitants in different countries. In this way, Purš identified how individual countries lagged behind Great Britain, the cradle of Industrial Revolution, and proved that at least some historical processes can be measured rather exactly. Importantly, the territory of present-day Czechia ranked second on this list—fact that confirms its position as the "factory" of Austria-Hungary.

According to Purš (1973b), the Industrial-Scientific Revolution was composed of three phases. The Industrial Revolution (also called First Industrial Revolution by some Western historians) was the most important of all modernization processes and became the catalyst of further two phases: the so-called Technical-Scientific Revolution (Second Industrial Revolution), and finally Scientific-Technical Revolution (Third Industrial Revolution).

In Czechia, however, it was the Agricultural Revolution that influenced land use and landscape changes most. Contrary to the so-called English Agricultural Revolution (Kerridge 1968; Chambers and Mingay 1966), the former was based on the transition from ley farming towards crop rotation system (Jeleček 1995, 2006). Consequently, fallow land as a factor of natural fertility became gradually non-existent. Forage crops (clover, alfalfa) and legumes expanded significantly as did potatoes and sugar beet. These changes allowed intensive animal farming; consequently, animal husbandry as a whole rose significantly (including milk production). Arable land could be cultivated in a more intensive way (deeper tillage, more manure), and also the extent of arable land expanded through "invading" the former meadows and pastures that were no longer needed.

Fertilizers were gradually introduced (guano and potassium chloride at the beginning, industrial fertilizers later) as were better tools, machines, and new technologies based on scientific research. These innovations were first applied on large estates. The Agricultural Revolution in Czechia started in the second half of the eighteenth century, intensified in 1850s and 1860s, and finally peaked in 1880s when the innovations reached most agricultural businesses including small farms.

The territorial expansion of agricultural land reached maximum in 1860s and 1870s; in this period, less than 5 % of arable land lay fallow. Differential land rent I kept increasing: regional differences of land fertility rose as did the importance of geographical location (urbanization, transport).

Industrial Revolution is usually defined as transition from hand production methods to machines and factories. It included introduction of new chemical technologies (in Czechia 1820s and 1830s) and especially introduction of steam engines, the true "engines of the Industrial Revolution". The latter was accomplished between 1850s and 1870s. In the same time, the Industrial Revolution was more or less completed also in Czechia: modern factories were already prevailing in all key industrial sectors, including food industry (Purš 1973b, 1980). This modernization was fuelled by expansion of railways that connected industrial centres with coalfields and deposits of other raw materials.

As serfdom has been abolished in 1848–1849 and agricultural productivity kept increasing, more and more farmers were becoming jobless. Several rural regions were relatively overpopulated (Fialová et al. 1996). New industrial enterprises were springing up in cities and towns where workforce was available; this change initiated the large-scale migration from rural regions to urban areas—process that has been in effect till present. General modernization and the influence of Technical-Scientific Revolution (so-called second Industrial revolution; Purš 1980, pp. 140–141) led to a special type of Technical-Scientific Agricultural Revolution (compare Jeleček 1985, 1995, 2002, 2006—pp. 588–590).

The above-mentioned modernization secured enough food for the growing non-agricultural population. With the exception of railways, steam engines could not compete with other types of energy including electricity (transferred at long distances) and combustion engines (in lorries, tractors). Production in general (also agricultural production) was becoming more effective; the costs of production, however, kept rising as well. The advancement of chemical industry brought increased production and thus use of fertilizers; new factories (often located in the fertile regions) produced modern agricultural machinery. This phase of Industrial-Scientific Revolution started in 1870s and came to an end in 1945.

Box 4.2 The definition of technical-scientific revolution

"At the time the final phase of the Industrial Revolution was underway in the most industrial countries of West and Middle continental Europe, a new, technological and scientific revolution, began to develop, characterized by

the use of electric power to drive machines, by combustion engines, by the development of heavy chemistry, introduction of improved machines and technological chemical processes in a number of the main industries, by the beginning of formation, production of belt systems and a more extensive use of scientific knowledge in production practice, for the purpose of which companies began to expand their specialized laboratories and research departments. The new development of economic forces was based on entrepreneur organization in an increasing number of limited companies and could be no longer controlled within the narrow limits of individual private business of the period of free competition capitalism. The beginnings of the technological and scientific revolutions, associated closely with the results of the Industrial Revolution, became, among other things, the material base for the transition from free-competition capitalism into the monopolistic stage of capitalism."
Source: Purš 1980, p. 140–141.

The Technical-Scientific Revolution in Czech agriculture has two different phases. The first one was taking place in 1880s and 1890s. Crop rotation was typical; more advanced machines (ploughs powered by steam engines, seed drills, harvesters, etc.) were being introduced as were fertilizers. Drainage systems helped to improve productivity in large areas, scientific findings enabled new breeding programmes. Electricity and combustion engines, however, were so far used exclusively on large estates. It was the period of transition towards more effective farming, based on differential land rent II. In many areas, forests were being cut and lakes drained to provide space for new fields; fallow land became virtually non-existent (Jeleček 1986, 1995, 2002, 2006—pp. 588–590).

The second phase of Technical-Scientific Revolution lasted from the turn of the twentieth century till the end of 1940s. All the improvements and technological innovations described above were increasingly used also by small farmers. The use of fertilizers and machinery was essential and increased the natural fertility of soils. Pesticides were being gradually introduced. The spread of electricity allowed night work, encouraged factory farming (large stables), processing forage and other products within the farms.

The introduction of combustion engines and electricity brought fundamental changes to agriculture. Tractor as a universal farming vehicle delivering high tractive effort was equally important for farmers as was steam engine in industry. Tractors and electricity triggered mass use of machinery in agriculture since the end of the nineteenth century, and especially in early twentieth century (Jeleček 1995, 2006—pp. 588–590).

As new technologies and farming innovations required a lot of funds, the importance of the so-called intensification of differential land rent II has increased more than differential land rent I (see Sect. 4.3). As a result, much of the capital was invested into fertile regions where profits were realistic in short term. Thus,

regional differences among the so-called agricultural production areas (Novák et al. 1925; Purš 1965, map 21b) were rising. Also the economic and social gaps between great landowners and small farmers were widening. Many small farmers were heavily indebted; of some help was the advance of cooperatives since the end of nineteenth century that included—apart from classical cooperatives—also sugar factories, milk factories, breweries, distilleries, slaughterhouses, etc. All these businesses were abolished under Communism (1948–1989) and only few re-established after 1990 as the privatization laws applied only to individuals.

The third phase of Industrial-Scientific Revolution is called "Scientific-Technical Revolution" by Purš (1973b, 1980). It was based on advanced technologies that in many cases had originally been developed for the war industry and included nuclear energy, mass spread of automation in industry (especially heavy industry), expansion of plastic and new types of fuel, etc. This third phase started in the end of World War II when scientific findings and inventions were gradually applied to practical life (Purš 1973b, p. 369).

In the post-war Czechia (Czechoslovakia), the Scientific-Technical Revolution was in progress under the conditions of Communist regime and Soviet domination. Since early 1990s, Czechia has experienced fast, largely uncontrolled economic and social transformation that naturally influenced also rural areas. Cooperatives and state-owned estates that had become consolidated during the last phase of Communist regime, were transformed into large profit-oriented enterprises and usually took the form of limited companies. Any kind of return towards small-scale farming did not materialize and the landscape patterns (typically with vast fields) have not changed much either. The high proportion of cereals has even increased since 1990; maize and rapeseed expanded significantly, including highlands. Peripheral regions have become even more peripheral (Havlíček et al. 2008). Farming as a whole faces stiff international competition including subsidized products from other EU countries.

4.3 Basic Overview of Socio-Economic Conditions in Czechia

The influence of social systems on landscapes and environmental changes keeps rising. Some scholars argue that new geological era has already started: Anthropocene, period in which humans form the main driving force. Consequently, the role of social factors is more and more important when processes of landscape changes are studied. This chapter deals with the role of selected social and economic conditions on land use patterns in Czechia with special emphasis on geographical location and transport infrastructure.

The core-periphery relations have been studied by a number of researchers in the past; a whole array of approaches have been adopted. The dual, uncomplicated concept "core versus periphery" has been altered by introduction of the term "semi-periphery" (Wallerstein 1979), and later also by the continuous idea

of "pyramid of power". In the latter concept, the terms "core" and "periphery" are substituted with varying degree of centrality (Schuler et al. 1983). Havlíček et al. (2005) have discussed in detail different approaches towards "centrality" as part of the research focused on peripheral areas.

Regarding centrality and peripherality, the ideas of Hampl et al. (1987) are followed in this publication. Centrality/peripherality of a region is understood as their geographical location combined with the relative importance within the whole social-geographical system. The degree of centrality/peripherality has been defined in terms of:

1. distance from major cities and towns;
2. size and importance of the respective regions;
3. population density in the environs.

The "macro" factors, i.e. the location of major core areas and axes that form the backbone of the whole system, play the most important role (Hampl et al. 1987).

Centrality and/or peripherality are typically linked to other parameters that may influence land use patterns. Centrally located areas are the most attractive ones, with the highest degree of human activities. The so-called metropolitan areas (in Czechia currently all regional capitals and environs minus Jihlava) play the key role (Hampl 2005). At present, especially the outlying parts of cities (urban–rural fringe) are witnessing conflicts among different spatial functions due to unprecedented suburbanization, commercial development, and construction of new roads. These processes influence deeply the existing land use structure.

Further away from cities, the fertile rural areas show much lower rate of land use changes. Such landscapes remain rather stable, with a high proportion of arable land. Apart from the natural conditions, also the distance and accessibility of markets (i.e. the second component of differential rent I) play an important role.

On the contrary, peripheral regions are characterized by low population density and rather traditional economic structure. Ongoing depopulation and high unemployment are common; elderly and less educated people tend to live in such areas. It should be distinguished between "classic" peripheral regions (sparsely populated frontier) and the so-called inner periphery (Musil 1988). The latter is found namely near the regional boundaries. The lack of jobs in industry and service sector in such areas results in higher-than-average proportion of farmers. With respect to usually poor natural conditions, the peripheral regions usually show higher proportion of arable land than expected (see the Vysočina example—Kabrda 2004).

The so-called marginal regions form part of a different concept of space. Andreoli et al. (1989) distinguishes among core, periphery, and marginal regions; the latter are integrated into the existing system only at a very limited scale. Military training areas, to a certain extent also national parks, and the former border zone (that existed under Communism along the Iron Curtain) can be labelled as "marginal regions" in Czechia. Land use research in these areas, however, is difficult due to methodological problems (too big Stable Territorial Units, large proportion of "remaining areas").

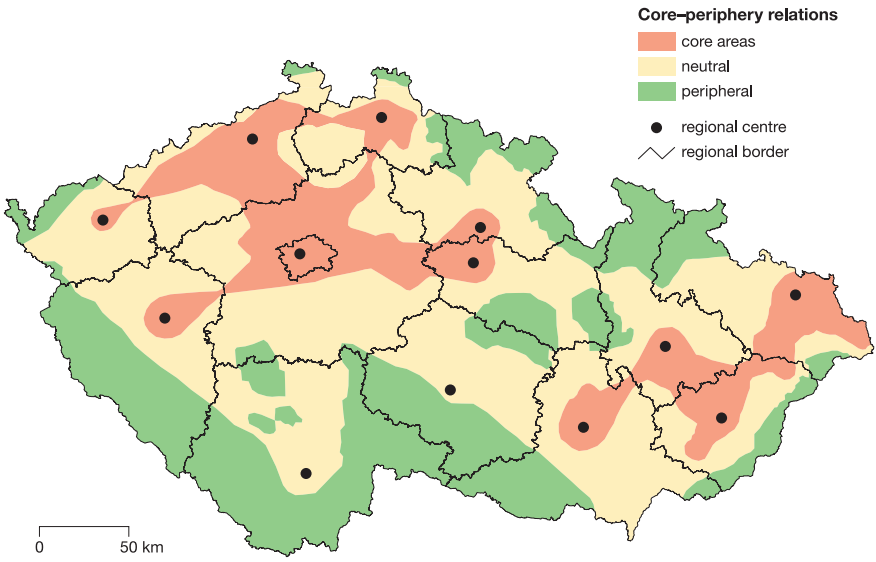

Fig. 4.1 Core-periphery relations in Czechia. *Source* Hampl et al. (1987), simplified. *Note* Core-periphery relations as of 1980; administrative boundaries as of 2013

Changing land use patterns with relation to centrality/peripherality was studied by Mareš and Štych (2005). Regions were sorted into three main classes: (1) core areas, (2) neutral, and (3) peripheral (Fig. 4.1). This classification is based on the 1980 data; however, conditions in different regions have been changing over the whole period 1845–2010.

4.3.1 Changes of Core-Periphery Relations in the Framework of the Settlement System

Hampl (2005) and Hampl et al. (1987) define three main phases of the history of Czech settlement system. The pre-industrial society was characterized by a very low proportion of urban population and urban economy—vast majority of people lived in rural areas and worked as farmers. Urban centres kept expanding and shrinking without any clear tendency. Industrialization brought significant growth of urban regions, hierarchically organized system of settlement structure came to existence. Within the Industrial Age, Hampl (2005) distinguishes four basic trends that led towards bigger and more important differences among urban areas (including creation of metropolitan areas). Though the urban growth (in terms of population) has slowed down or even stopped during the Post-Industrial Era, concentration of decision-making processes into the biggest cities continues. Such a shift reflects the more general transition from (physical) concentration towards concentration of relations that is typical for the current period (Hampl 2005).

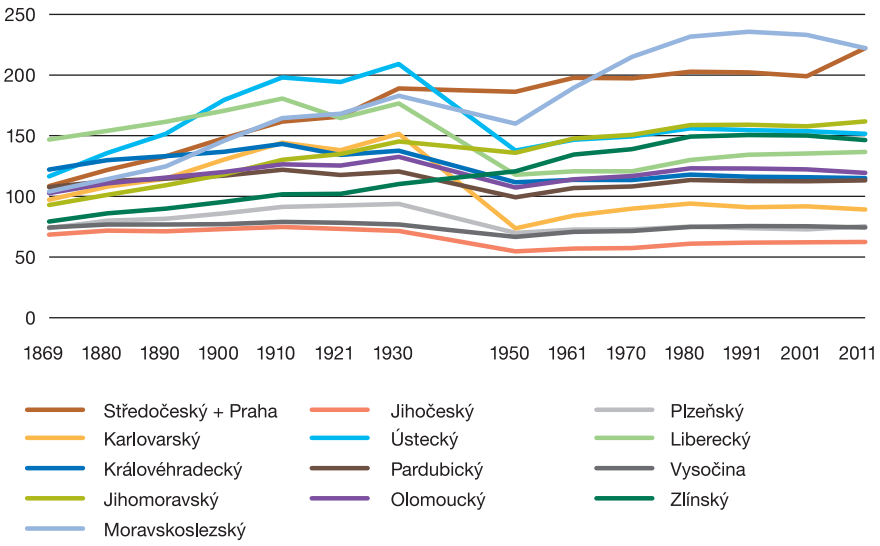

Fig. 4.2 Changes of population density in Czech regions 1869–2011 (inhabitants per km^2). *Sources* ČSÚ (2006), ArcČR 500 (2013)

The above-mentioned trends of settlement patterns have influenced also the core-periphery relations in various Czech regions. The post-war transfer of Czech Germans to Germany and Austria, namely from the border areas, was the single most important event that affected the spatial structure of core-periphery relations. Many villages and small towns in the frontier perished (Kučera 2007) and newcomers were few. Consequently, the centrally located Czech regions became more important in terms of population. This fact is well seen in the chart showing changes of population density in different regions (Fig. 4.2). Karlovarský, Ústecký, and Liberecký kraj (region) suffered badly from depopulation after World War II. (For the overview of present administrative divisions of Czechia see Fig. 4.3). On the contrary, the Ostrava region—with a lot of heavy industry encouraged by the Communist regime—has experienced a significant population boom during the period 1950–1975. In some regions, no major population changes have been recorded (Vysočina, part of the inner periphery). In general, interregional differences increased over the time as the regional division of labour gradually grew.

The above-mentioned concentration of power and decision-making also influenced the way of landscape utilization, as "…already the oldest written accounts bring convincing proofs: the real 'landscape makers' have always been members of the political, economic, and intellectual elite" (Matoušek 2010, p. 315). As the influence and power of urban/industrial population were steadily rising during the so-called Second Industrial Revolution, decision-making processes ultimately moved from rural areas to cities and towns (Matoušek 2010). Technological and scientific innovations then spread into peripheral regions through diffusion. Hägerstrand (1967) explained in detail the phenomenon of spatial diffusion in one of his classic works "Innovation diffusion as a spatial process".

Fig. 4.3 Administrative division of Czechia. *Source* Authors

Globalization, foreign investments, and cross-border trade (including trade with farming land) moved the decision-making processes to a higher hierarchical level and to global economic centres. Consequently, changing land use patterns in a certain region may be affected by social and economic activities in another, rather distant region. Such effects are called *land use teleconnections* (see for example Haberl et al. 2009) and make land use studies even more complex. These *teleconnections* were made possible by cheap long-distance transport in the twentieth and twenty-first centuries that allows easy transfer of various products on global scale.

4.3.2 The Effects of Transport Infrastructure on Land Use

The direct effects of the fixed installations like roads, railways, dams, terminals, etc. on land use in general are rather small in terms of area—one can talk about local changes only. Major roads, railways, etc., however, often bring new economic activities into the given area and these may influence the land use structure profoundly. It is not just a one-sided process: any boom of new economic activities sooner or later requires new transport networks—see Matoušek (2010). Though the advance of railways in England was pushed by the needs of booming industry, in Bohemia and Moravia railways were ahead of industrial development during the first three decades (after the revolution of 1848/9). Such types of land use changes are more important in terms of size (warehouses, depots, or commercial centres are typical examples at present). From the land use perspective, it is an important problem especially in the suburban zones in developed and developing countries as the land in the environs of big cities is often of high quality—it is the same land which sustained the urban population till recently. The above-mentioned processes in the environs of Prague have been analysed by Spilková and Šefrna (2010).

Railways and roads have gradually reached almost every single corner of the country and have facilitated important changes of rural landscapes (and changes of the whole primary sector). Local natural resources became linked to economic core areas more intensively (Matoušek 2010). The opening of local energy and material cycles of the pre-industrial agriculture together with concentration/separation of different land use types on higher levels have been studied by the Austrian school of social metabolism (Krausmann et al. 2003 and other authors; in Czechia see Grešlová-Kušková 2013). It has been proved that increasing specialization and division of labour results in more homogeneous land use structure in small regions, and—on the contrary—in higher differentiation in the framework of large regions.

4.3.3 The Progress of Transport Infrastructure

Historically, the story of railways in Czechia can be divided into four phases (see Fig. 6.7). Though the first part of horse-drawn railway connecting České

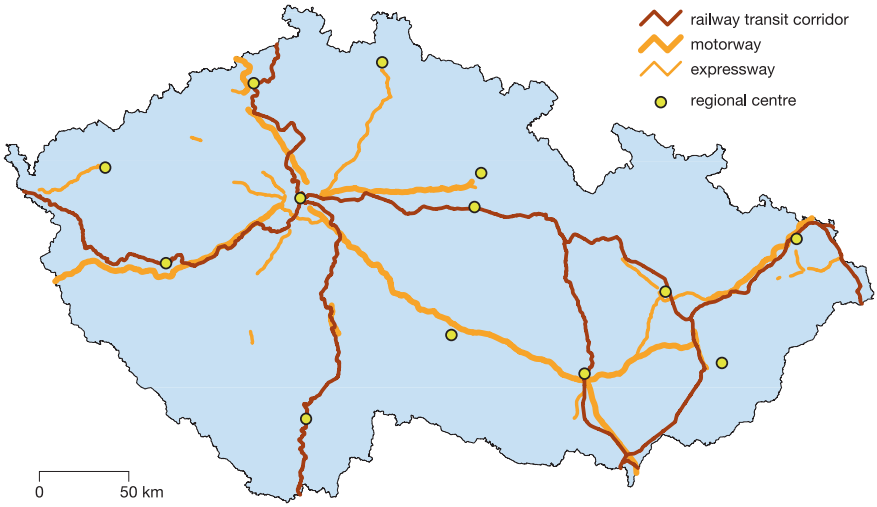

Fig. 4.4 Network of major railways and roads (2013). *Sources* Database ArcČR 500 (2013); SŽDC (2013). *Note* In the case of railways, the figure shows the would-be state—many sections have not been modernized yet

Budějovice and Linz had been opened already in 1827, the really important changes came later with the steam locomotives. The first modern railway line on the Czech territory was opened in 1839, connecting Vienna and Břeclav. All major cities became interconnected by railways by 1854. The basic rail network was finished in 1880. Later on, mostly short local and regional railways were built including private narrow-gauged railways for special purposes (mines, forests, sugar factories—see Fig. 6.8). A few more passenger railways were put into operation after World War I, especially in peripheral regions.

A number of railways have been electrified under the Communist regime; in spite of that, the rail network was very outdated and pretty neglected in late 1980s. Modernization of railways have become one of the important tasks since early 1990s. The government has defined four key lines (Fig. 4.4) to be modernized; the work started in 1993. Constant lack of money caused delays; moreover, economic priority is currently given to highways and trunk roads. Railways receive only 37.8 % of the available transport funds (SFDI 2014).

The advance of modern roads in Czechia was much slower in comparison with other economically developed countries. The basic network in early twentieth century consisted largely of untarred roads that had been built before 1850. The boom of tarred roads came only in 1930s. In the same period, the first plans to build a major highway through the whole of Czechoslovakia were made. The work had begun in 1939 and due to World War II it was suspended soon (1942). The idea of a motorway linking Prague and Brno was renewed much later; it was finally put into operation in November 1980 (Čihák et al. 2013). Since 1990, the network of motorways has expanded from 335 to 776 km; in the case of expressways it was

from 209 to 458 km (Čihák et al. 2013—Fig. 4.4). Compared to the western countries, the network of motorways remains inadequate.

The restoration of democracy and civil rights after 1989 brought real chances to defend citizens' rights also with respect of land use. A number of conflicting interests among different functions in the landscape (especially tensions between highway builders and conservationists) resulted in a number of long-term court cases: the best known example is the—still unfinished—motorway between Prague and Dresden across Central Bohemian Uplands.

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