

DEVELOPMENT OF SUBURBANIZATION IN RELATION TO DISTANCE FROM A MAJOR CITY. CASE: NORTH-EAST FRINGE OF BRNO, MORAVIA

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Abstract

The paper poses the question of how suburbanization levels change in relation to the distance from a major city. The north-eastern surroundings of Brno were chosen as a case study area. Indicators like demographic development, unemployment, occupation in individual economic areas, and level of formal education were taken into account. The results show that differences in values of the indicators mentioned can be observed. Migration balance and construction of new flats are the most expressive indicators. Employment in productive and post-productive sectors and the level of education are also important, with unemployment playing no role. However, the results should be verified in other territories and stages of the post-productive transformation.

Key words: suburbanized countryside, ageing, education, employment, Brno, Moravia

INTRODUCTION

The current social and political systems of post-communist countries are in a stage of transition from a productive to a post-productive society as part of the general process of globalization. The society of production is changing to the society of consumption. This has far-reaching consequences including recent political changes in Eastern and Central Europe. Suburbanization can also be considered as one of the manifestations of the transition to the post-productive countryside. Living places are separated from working places. The suburbanized countryside is changing from a place of food production to a place of consumption, for housing, rest and leisure.

It is clear that the transition from a productive to a post-productive society does not run evenly in time nor in place. It depends primarily on the innovation level of individual countries and regions, and can be slightly modified by the national and regional politics of individual states. Differences between the urban and the rural seem to be one of the most significant

diversities at the innovation level. However, not even the countryside is uniform. One of the most important typological indicators can be found in the distance from regional metropolises. It is very well known that the countryside can be divided into three classes: suburban, intermediate and peripheral – or as Hedlund (2016) designates: within the urban shadow, out of the urban shadow, and in the periphery.

The Hägerstrand's theory developed by Rogers (1995) explains that innovation is diffused from sources (big cities) to their surroundings incrementally. It means that the territory close to the city adopts the innovation earlier than the more distanced territory. Is it also valid in the present situation when the internet facilitates the spread of information in real time evenly throughout the territory? Is it possible to relate this theory to the spread of the post-production?

Currently information is diffused without any limitations throughout Europe. It means that the application of innovations does not depend on information availability and its level of diffusion. Diffusion of innovations evenly across a territory has been a reality since radio and TV started to be commonly used. However, the internet enables an active search for information and data from any place. The problem consists rather in an ability to look for the relevant information.

Our main research question asks: Is there any evidence of decreasing post-productivity in relation to the distance from a regional metropolis? The city of Brno was chosen as a case study. The north-eastern segment of its surroundings was studied.

The post-productive transition

The productive (industrial, Fordist) countryside is usually related to intensive agricultural production, using heavy mechanization, chemicals and highly organized operations with a high productivity of labour. The post-productive (post-industrial, post-Fordist) countryside should then in theory be connected with lower intensity of production, paying more attention to environmental and social aspects of production. Rural landscape ceases to be mainly a source of production and starts to be a source of consumption (Cloke, 2006). The rural social system depends on the primary sector less and less.

This rural restructuring (Hoggart & Paniagua, 2001), which started in most developed countries in the 1970s (partly in a reaction to the oil crisis), was hampered by means of planning tools in the post-communist countries until the end of the 1980s. Ideologically, communist regimes originated as a feature connected with the productive capitalist society and lost their sense with the transition to the post-productive one. In the 1990s, the post-socialist countries,

freed of braking mechanisms, had to cope with a jump change which is sometimes called revolution instead of transition.

The post-productive transition of society and the economy has been driven by increasing productivity of work in productive industries. Services, especially individually focused ones, are not able to follow this trend. Additionally, environmentally demanding and workforce demanding productive industries are devolved from the most developed countries to developing parts of the World.

That is why in the sphere of employment, this transition means a significant reduction of jobs in productive industries (firstly in the primary sector, later also in the secondary one) and their shift to the tertiary or quaternary sectors. Some authors (Kasimis & Papadopoulos, 2017) speak about the de-agriculturalization of the countryside. Vaishar and Šťastná (2019) stated that only every other 16th economically active resident of the Czech countryside is a farmer, a forester or a fisherman. In the sphere of lifestyle, the transition means a shift from production as a sense of existence to consumption. The rural space is changing incrementally from an area of intensive agriculture to an area of multifunctional agriculture, tourism and dormitories of people often employed in cities. In the demographic sphere, the second demographic transition could be considered as a part of post-productive development.

Post-productive development in the countryside means a commodification of rural space (Woods, 2005). It is often related to tourism development and to a change of the rural landscape from a productive source to the milieu of leisure consumption and thus to its multifunctional use (Almsted et al., 2014), taking into account demands for amenities, ecological services and protection of the cultural landscape (McCarthy, 2005). Zasada (2011) sees the post-productive transition of the suburban countryside as a growing multi-functionality of agriculture, which meets changing consumer-oriented demands of the urban population for the rural space (tourism, second housing, specialized food). The consumption of the countryside is more often connected with urban tourists (e.g. Eusebio et al., 2017). However, not only urban but also rural societies themselves become more and more post-productive. Brouder, Karlsson and Lundmark (2015) suggest measuring post-productivity by means of hyper-production. Other authors also discuss post-productive changes in agriculture (e.g. Casadevall, 2016, Navrátil et al., 2019). Nevertheless, post-productive changes are not only found in the production but also in societal life.

This paper is focused not so much on post-productive changes in agricultural production or on multifunctionality but more on post-productive changes of rural populations which are to be seen in changes of employment, education, and demographic development. We are of the

opinion that the diffusion of the post-productive aspects of societal development could show similar characteristics as the classical diffusion of innovations.

THE TERRITORY UNDER STUDY AND METHODS OF RESEARCH

The territory north-east of Brno was investigated. The rural municipalities (Fig. 1) were divided into three groups according to their distance to the centre of Brno: 0 – 29 minutes (which is a distance considered generally suitable for commuting: Ochoz, Mokrý-Horákov, Kanice, Březina, Babice nad Svitavou, Olomučany, Křtiny, Habrůvka), 30 – 39 minutes (Jedovnice, Rudice, Petrovice, Krasová, Vilémovice) and 40 minutes and more (Holštejn, Lipovec, Ostrov u Macochy, Sloup, Vavřinec, Šošůvka, Žďár). The urban municipalities of Blansko and Adamov were excluded from the investigation.

The territory under study is situated in the rugged relief of Drahanská vrchovina highland, where accessibility (measured by the time distance) plays an important role. Moreover, it is a karst area with unsuitable natural conditions for intensive crop production. A large part of the territory is covered by forest. It is under large-scale protection as a Protected Landscape Area of Moravian Karst (Zapletalová et al, 2016).

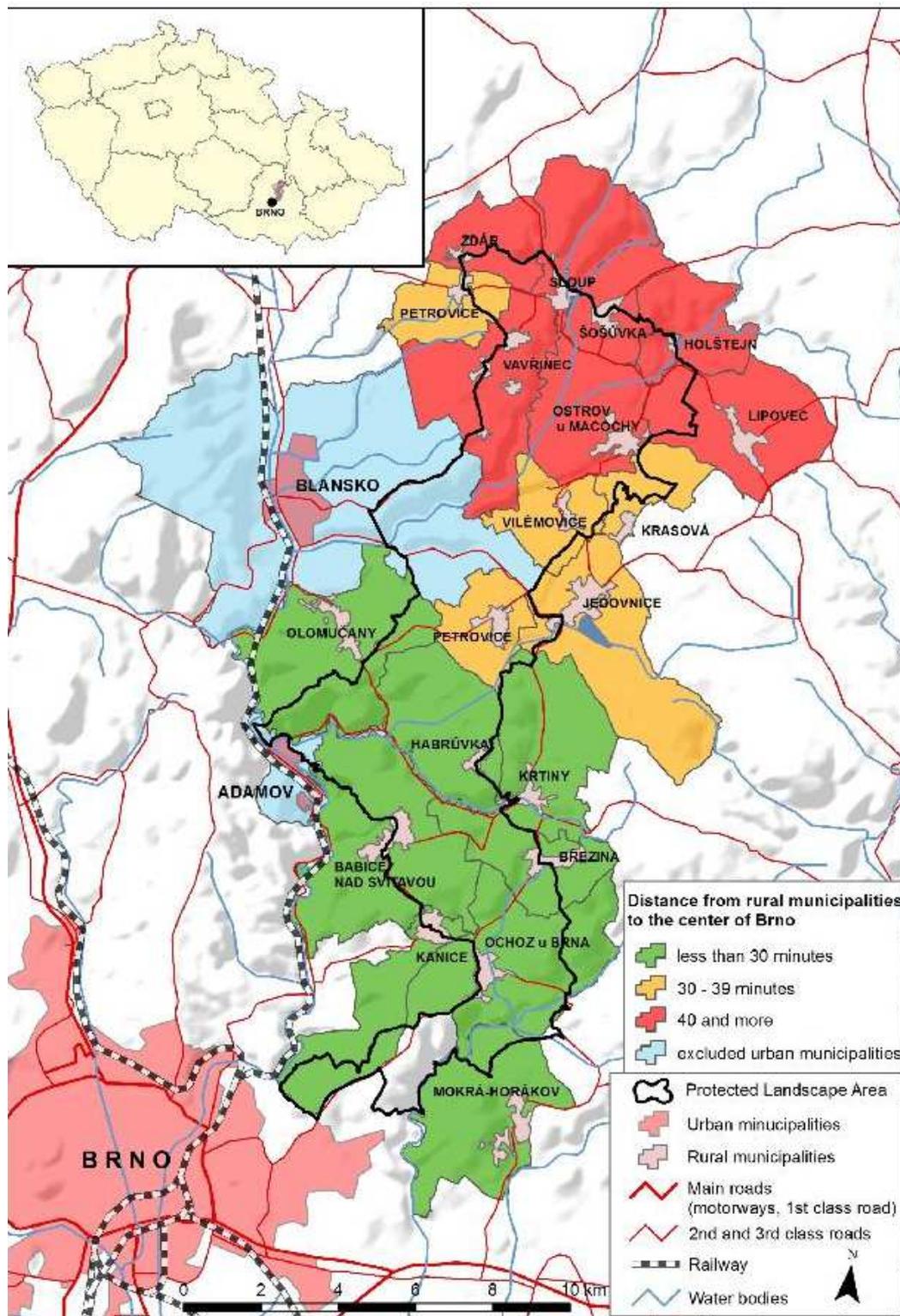
Commuting for work from rural municipalities to urban centres started a long time ago – originally into industrial plants in Brno, Blansko, Adamov, and Boskovice. Currently, tourism is developing – both as a leisure hinterland of Brno and as cultural tourism on a national and international scale. The area is situated away from major transport routes.

The settlement system consists mainly of large and middle-sized villages. Of 20 municipalities in total, only five have less than 500 inhabitants. Such a settlement structure allows rural settlements to be equipped with basic services. The public transport within the Integrated Transport System of the South-Moravian Region is frequent. Services of the state administration are to be found mostly in the district town Blansko, whereas Brno is the most important centre of the services of a higher order. There are no significant populations of ethnic minorities in the area.

The following indicators have been chosen in the analysis of the changes in relation to increasing distance from Brno: (1) the population balance review where it was presupposed that this indicator worsens with increasing distance from the regional centre, similarly as with the age structure; this indicator was completed with the number of recently built flats, (2) the level of formal education, where it was assumed that educational standards are decreasing with increasing distance from the regional centre, (3) proportions of the economically active

population employed in individual economic sectors, where it was assumed that the share of those employed in productive industries increases with the distance from the regional metropolis.

Figure 1 Geographical location of the area under study



Drawn by P. Dvořák

A public database of the Czech Statistical Office was used for the gathering of data, namely the population census of 2011 and population balance reviews from the period 2007 – 2017. The time distances for individual car transport were estimated by means of the mapy.cz server. The frequency of public transport was taken from the public materials of KORDIS, joint stock company (operator of the Integrated Transport System of South-Moravian Region). Data about unemployment were taken from the server of the Ministry of Labour and Social Affairs.

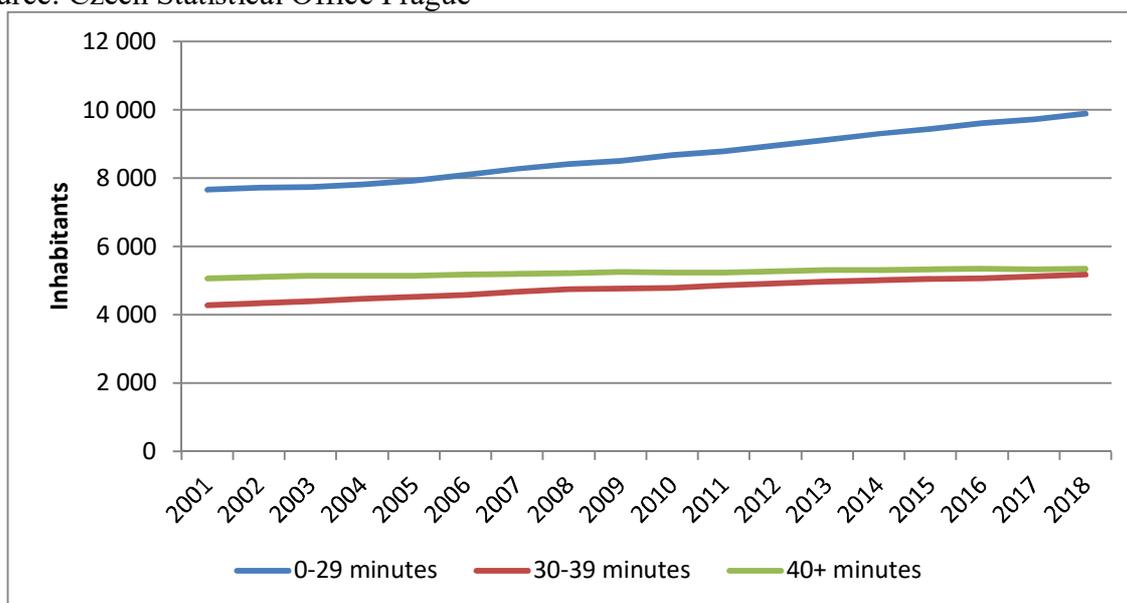
RESULTS

Population development of municipalities in the Moravian Karst in the decade from 2005 – 2017 (Fig. 2) shows a general population increase. A part of the most southerly situated rural settlements grew due to the suburbanization process, whereas others play a role of rural sub-centres with their own functions (e.g. Jedovnice). There were 417 new flats built in the area in the period from 2013 – 2017. Six villages reported fewer than 25 residents per one new flat: Březina, Krasová, Vilémovice, Kanice, Babice nad Svitavou, and Křtiny. These settlements can be considered to have been affected by the suburbanization process in the last decade.

Ageing of the population is indicated by the age index, defined as ratio of seniors (age 65+) to young people (age 0-14), which is 1.09 for the whole set of municipalities under study. However, some municipalities exhibit a progressive age structure. The age structure is better than the national average (1.18) – partly due to the suburbanized character of the southern part of the territory. In comparison the same index for Brno is 1.35, which suggests that the city ages more quickly. The dependency index is 0.54 (children + seniors / population of active age), which is worse than the national average (0.50). The population of Moravian Karst is economically active more than the national average.

In the Moravian Karst in 2011, 54% of the population had a lower than secondary education, 32% had secondary and 13% had higher education. The population of the Moravian Karst is ethnically homogenous. There are 0.8% of Slovaks and 0.2% of Ukrainians in the territory. Although many people did not declare any ethnicity in the last census (2011), experiences from the field do not indicate the substantial presence of foreigners.

Figure 2 Recent population development in the territory under study. Own elaboration. Data source: Czech Statistical Office Prague



The Moravian Karst is situated near the regional capital of Brno. Consequently, some villages are subjects of suburbanization. However, the population is also growing in remoter parts of the Moravian Karst, which are out of the suburbanization zone. They are parts of functional regions of the district town Blansko (population 20,000) and the small town of Boskovice (population 11,000). In fact, the spheres of influence of all three centres partly overlap. Villages in the Moravian Karst have been losing their rural character, and depending increasingly on commuting for jobs, education, services and hence on individual and public transport. The quantitative changes can turn into qualitative ones. When considering the limit of 1,000 inhabitants between mid-sized and large villages, two settlements in the Moravian Karst have exceeded this limit in the last decade.

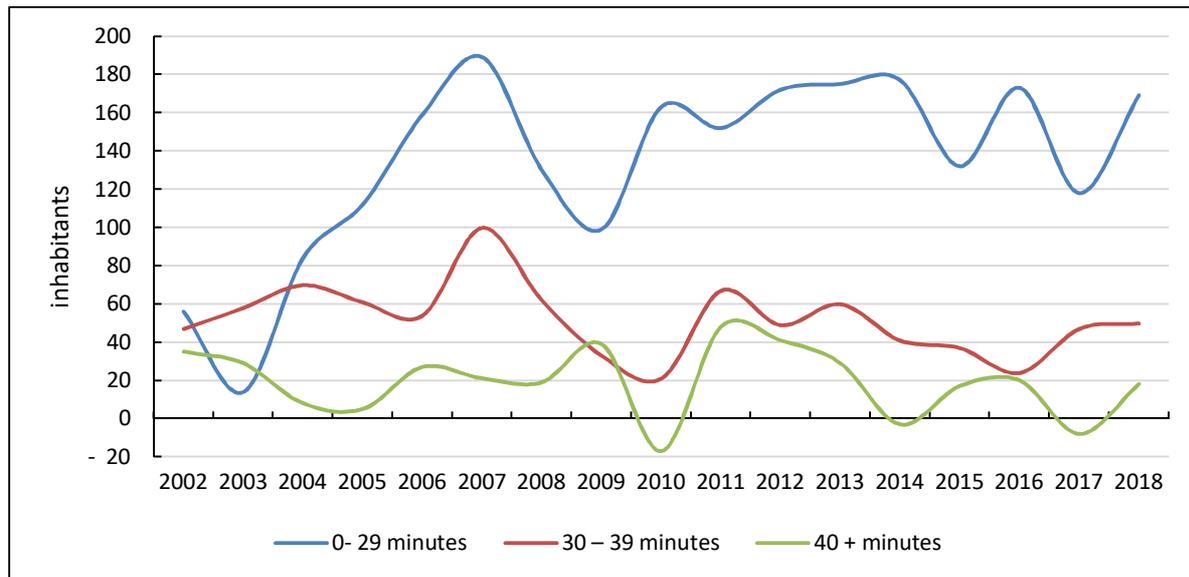
The situation of groups in relation to the distance from the regional capital is documented in Tab. 1 and Fig. 3.

Table 1 Population development in the respective zones according to time distance from Brno (2013-2017)

Group	births	deaths	immigrants	emigrants	average population number	Population balance [%]	Population number 31 Dec.2017
0- 29 min	559	424	1721	1081	9,436	+82.1	9,736
30 – 39 min	284	237	687	525	5,042	+41.5	5,117
40 min and more	225	265	603	508	5,315	+39.3	5,489

Data source: Czech Statistical Office Praha, Own elaboration

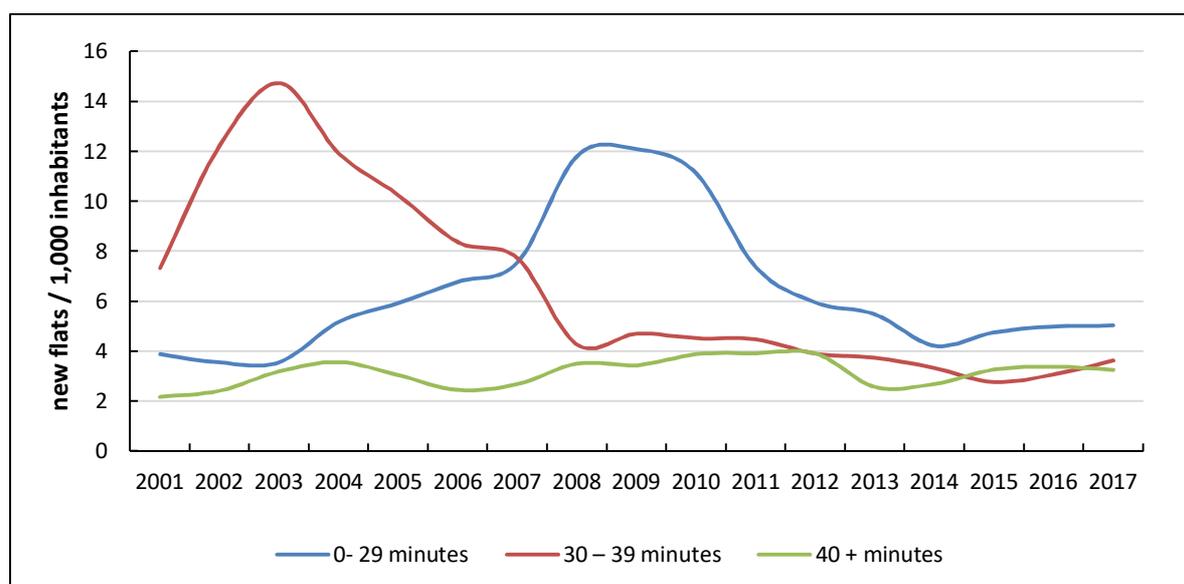
Figure 3 Population growth in the territory under study. Own elaboration. Data: Czech Statistical Office Prague



The following partial conclusions can be drawn from Table: [1] The population number increased in all three zones in the last period; [2] The population increase slows down with the time distance from the regional metropolis; [3] Whereas in the first two zones the population increases due to both natural and migrational reasons, in the third zone the population increase depends fully on migration, whereas the natural balance is negative there. Hypothetically, the 40-minute distance is a limit of classic suburbanization in the surroundings of Brno (in the northern direction). The population growth in the more distant zone can be connected with counter-urbanization or amenity migration rather than with suburbanization. It is possible that older people move into areas with cheaper and quieter living. The attractive landscape of the Moravian Karst, together with the frequent public transport support such a behaviour. To learn more about these processes, we will examine the population's age structure in the respective time zones.

The age structure was characterized as a ratio of young people (age 0-14) to seniors (65+). This ratio was 1.06 in the time zone up to 30 minutes (youngsters prevail over seniors); in the second zone (31-40 minutes), it was 0.89, and 0.84 in the most distant time zone. It shows that whereas the age structure in the 30-minute zone is progressive, beyond this commuting zone, seniors prevail over children and this prevalence increases with the increasing distance from the regional metropolis.

The rate of the construction of flats shows a clear relation to the distance from Brno: in the first zone, 23 flats per 1,000 inhabitants were built (2013-2017) while in the second zone the number of new flats was 17, and the most distant zone recorded 14 newly built flats per thousand residents. According to dwelling construction development (Fig. 4), suburbanization take place even in this part of Brno metropolitan area.

Figure 4 Housing construction (3-year moving average) per 1,000 inhabitants in the territory under study. Own elaboration. Data: Czech Statistical Office Prague

Business activities are not so much differentiated: the number of business per 1,000 inhabitants recorded in the first, second and third zone by 31 December 2017 were 124, 115 and 109. As for tourism, the closest zone shows the least number of overnight stays, which is logical because visitors probably use hotels and other accommodation facilities in Brno.

As shown in Table 2, the structure of employment in the respective sectors changes with the distance from the metropolis. The ratios of productive sectors (agriculture and industries) increase significantly with increasing distance from Brno. However, the share of people engaged in the primary sector barely exceeds 4%. It indicates that dependence of the Moravian Karst's social system on agriculture is low – also taking into account that forestry is highly developed in the area. At the same time, it shows that the job market in this rural area depends mostly on industry.

Table 2 Shares of economically active population [%] by individual sectors in March 2011 (the last population census).

Sector/Zone	up to 30 min.	30-40 min.	40 min. and more
Agriculture, forestry, fishery	2.9	3.7	4.6
Industry and construction activities	35.5	40.1	45.4
Retail, transport, communication	15.4	13.0	12.2
Accommodation and gastronomy	2.7	3.3	2.3
Finance, IT services, real estate etc.	15.9	11.2	7.2
Education, health and social care	18.1	19.2	15.6

Source: Population census 2011. Czech Statistical Office Prague. Own elaboration

The ratio of employees in retail, transport, and communications decreases with increasing distance from the city as well as the ratios of persons engaged in private high-level services (finance, IT, real estate). Employment in services focused on tourism is lower than in the primary sector. It follows that despite the significant tourist character of the region, services in accommodation and gastronomy can hardly balance the decline of jobs in agriculture. The number of employees in social services (education, health, and social care) occupies second place in employment in all three zones. Taking into account that the data from the last population census are seven years old, a further movement of employees to services could be expected.

The number of people (aged 15+) with complete secondary and higher education decreases with increasing distance from Brno, the nearest zone, middle zone and the most distant zone reporting 46.4%, 43.6% and 36.6% of people with higher qualifications. The percentage of commuters for work in the nearest zone, middle zone and the most distant zone amounts to 49.4%, 50.1% and only 40.1%. (2011).

Unemployment slightly decreases with increasing distance from the metropolis and amounts to 2.4%, 2.0% and 1.9% in the nearest zone, middle zone and the most distant zone. (August 2018). It is possible that people employed in a large city behave more freely and change their jobs more frequently than people in the periphery, who have to rely on a lower number of employers and tend to keep their jobs. It is very difficult to come to any conclusions with such a low unemployment rate which at that time in Brno was 4.6%.

In spite of the much longer time spent on the road, commuting is pre-conditioned by frequent public transport among other things. As an example we can choose the village of Křtiny in the first zone (up to 30 minutes). There are 121 connections by public transport on working days and 47 connections on weekends. The village is directly connected with the regional capital of Brno (37/19 connections per day: working days/weekends), with the closest railway station in Adamov (11/3), with the closest large village of Jedovnice (27/16), with the neighbouring district town of Vyškov (8/3) and with the neighbouring villages of Habrůvka and Bukovinka (28/6).

The connection in the second zone (30-40 min.) is much worse, e.g. from Rudice there are 48/17 connections to the district town of Blansko and to the sub-central village of Jedovnice. The third zone is represented by the village of Sloup. It has 64/26 bus connections daily to Blansko, Boskovice (the second largest town in the district), to the closest railway station in Rájec-Jestřebí and to neighbouring villages. The most distant commune of Lipovec has 20

connections to Jedovnice and Blansko (9 connections on weekends) and 17(9) connections to the neighbouring village of Studnice.

It is clear that in the closest vicinity to Brno, public transport is very frequent, which was expected. However, in the zone of 40 minutes and more, the frequency is still sufficient (buses departing on average every 15 min.). A more important fact is that the space is interlaced with a dense network of public transport lines connecting individual villages not only with the main centre but also with small towns and rural nodes, railway stations and even other villages of the same size level in the vicinity. The situation provides a wide range of possibilities to choose jobs and services at alternative places and to connect families and friends across the rural micro-regions. McArthur et al. (2016) found that depending on distance, commuting could be a substitute for migration.

Of course, many commuters prefer a car. The intensity of transport between 2010 and 2016 increased¹. The biggest increase (by 40-50%) has been recorded in the most overloaded sections, meaning in the vicinity of the regional metropolis Brno and the district town Blansko. The shortcomings of public transport are frequently mentioned as a barrier to rural development both in the Czech Republic and abroad. Moreover, the possibility of alternative transport (individual or public) increases the attractiveness of rural settlements. In fact, the possibility of using public transport is important for those who are not able to drive or do not own a car. Additionally, car drivers are more stressed (Gatersleben & Uzzell, 2007), often lose much time looking for parking, are not allowed to consume alcohol or drugs. A well-developed public transport network can also successfully prevent social exclusion in rural areas (Marada & Květoň, 2016). Moreover, public transport is very cheap for seniors, children, students and people who use season tickets, the discounts reaching up to 75% of usual fares.

DISCUSSION

The gained knowledge depends on time and location. It is necessary to take into account that the period under investigation was characterized by a minimal unemployment rate (then nationally under 3%). The economic crisis of 2007 was already over. It is possible that in a less favourable economic situation, the results would be slightly different (Anthropoulou et al., 2017). In the period affected by the COVID 19 pandemic (August 2020), unemployment rates are 2.6% for the nearest zone, 2.1% for the middle zone, and 2.4% for the outermost zone.

¹ Road Transport Census 2010, Road Transport Census 2016. Prague: Headquarters of roads and motorways of the Czech Republic.

Unemployment in Brno was 5.1% at the same time. The demographic situation was also specific to the time of the research because the “baby boomers” of the 1970s were contributing to the population growth.

Not only the spread of the post-productive lifestyle, but also economic and environmental factors play a role in the process of spreading suburbanization. In a situation where it is almost impossible for the middle class to get an apartment in big cities, their attention turns to the suburban zone. Similarly, seniors are looking for cheaper housing outside the big city. The prices of flats and land are developing in response to this. People also prefer to live in more attractive, natural locations. These aspects also need to be taken into account.

It is also necessary to understand geographical specifics of the territory under study – namely the karst, an area unsuitable for intensive agriculture, with a relatively rugged relief without any high-speed communication. It is possible that the situation could be different in a more easily accessible area. Geographical patterns can, however, be better discerned in a diverse territory.

The validity of the data presents another obstacle. The hard statistical data are usually based on the permanent residences of inhabitants. As it is, the place of residence may not always correspond to the actual place of peoples’ activities. However, the differences are probably not influenced by the distance from the regional metropolis.

CONCLUSIONS: DIFFUSION OF THE SMART COUNTRYSIDE

It can be concluded that the relationship between the level of suburbanization and the distance from a regional metropolis was confirmed for the chosen case. Although modern information and communication technologies provide information in any place in real time, the diffusion of innovation is still spreading from centres to their hinterlands. It is probably not the information itself, but an ability to accept and elaborate the information and to reach conclusions. Amongst others, it depends on the educational structure. As well as digital information, physical contacts in relation to physical distance play a role.

The question is whether such a conclusion is valid in general. The results should be checked in different cases (countries, cities), in different times (taking into account the onset of post-productive change), in different types of countryside. A future comparison of the same micro-region would be a very useful opportunity for observing development.

It seems that the diffusion of innovation depends not so much on the information availability but rather on the ability to identify the relevant information, to elaborate it, to draw conclusions from it and to apply them. It is probably not a function of physical distance but rather a

consequence of the quality of human capital – formal and informal education, which is lower in rural areas and which decreases with the distance from regional metropolises incrementally (Vaishar & Šťastná, 2019b). It would be appropriate to focus further research in that direction. Diffusion of a smart countryside would be a new research question.

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