# SUBURBANIZATION PROCESS OF REGIONAL CITIES IN SLOVAKIA

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*Abstract:*
*The formation of suburbs in the background of regional cities in Slovakia brings new residential and socio-spatial changes associated with population and economic growth, greening of housing and growing mobility of population. The aim of this paper is to confirm the hypothesis that municipalities less distant from the core have a higher potential to become suburban than municipalities on the periphery with a great distance from the core city. The object of our research is the residential suburbanization of eight regional cities of Slovakia. The authors have combined the methodological approach based on two approaches, Batty's model of symmetric flows and the share of immigrants to a rural municipality from a regional city out of the total number of immigrants for the period 2014-2017. The suburbanization space of the solved regional cities of Slovakia takes the shape of a loop. In the case of two metropolises of Slovakia, the capital Bratislava and the metropolis of eastern Slovakia, Košice, has this suburbanization zone up to 20-30 km wide, in other regional cities, this loop reaches 10-15 km suburbanization zone. Municipalities in the immediate proximity of regional cities have the strongest ties with the city, and towards the periphery this intensity of relations decreases.*

*Key words:*
*suburbanization, population migration, basic flow model, regional towns, Slovakia*

# 1   INTRODUCTION

High population density in cities, together with a fast-paced life, higher living costs, less healthy environment and other problems (such as fear of a dangerous urban environment (Trembošová et al., 2020a), were in many cases the reasons why a part of the population from the beginning of the 1990s, it gradually began to relocate to rural municipalities, especially in the backgrounds of large cities, which often provided, and still remains to provide, sufficient job opportunities (Danielová, 2019). Undoubtedly, cheaper housing and easier access to background housing have played an important role here, which has also been supported by the increasing mobility of the population (Šveda and Tóth, 2014). While until the year 2000, construction in the background of cities was exclusively a matter of individual landowners, in the first decade of the 21st century, a strong investor took the initiative (developers in the form of construction of large residential zones (Danielová, 2019). Also, the disintegration of municipalities in the early 1990s, when several city districts (originally rural municipalities) separated from cities and thus became independent municipalities. Cities are settlements with a high concentration of economic, social and cultural development of society (Lauko, 2001) and at the same time, they are the center and acceleration point of further economic and civilizational development (Gajdoš and Moravanská, 2011). At present, intense manifestations of the process of suburbanization can be observed in the backgrounds of cities (especially Bratislava), which represents the transfer of development dynamics within the urban region from its core to the hinterland/background (Šveda et al., 2019). It represents an intraregional deconcentration of the population from the city to the adjacent background and from the point of view of the volume of migration, housing construction and impacts on the environmental and social environment, it is one of the most dynamic processes transforming the spatial organization of society in Slovakia (Šveda et al., 2016).

It is understandable that the suburbanization process of cities in Slovakia is influenced by globalization and the effort for ecology and greening, and thus the increase of life. Slovakia is characterized by a dense settlement network, which has been formed over many centuries and which has always been characterized by intense relations and influences between the city center and its rural hinterland. In this complex set of relations (socio-cultural, economic, service, transport), certain social and spatial patterns of urban-village relations have also emerged. It is obvious that this dense network of settlements around Slovak cities, as well as the network of multilateral and intensive relations between cities and their hinterland, influences the nature of suburbanization in Slovakia (Gajdoš and Moravanská, 2011).

The aim of this paper is to allocate the space affected by residential suburbanization of all regional cities (Bratislava, Trnava, Nitra, Trenčín, Banská Bystrica, Žilina, Prešov and Košice) of Slovakia and to determine the intensity of interactions in the relationship between the regional city and the suburbanization zone. Two cities have a specific position in the set of regional cities - Bratislava and Košice. Bratislava is the capital of Slovakia with a number of inhabitants of 437,726 (2019) and Košice is the metropolis of eastern Slovakia with 238,593 inhabitants (2019). The methodology is based on a combination of two approaches, the Batty model with symmetric flows and the share of immigrants to a rural municipality from a regional city out of the total number of immigrants of a given rural municipality.

## 2    THEORETICAL BACKGROUND

The process of suburbanization manifests itself in different regions in different forms, which causes inconsistencies in the definitions of the process itself. Different world perceptions of suburbanization are characterized by (Phelps, 2017). According to (Sýkora, 2013), the European approach points to changes in the spatial distribution of population and human activities in metropolitan areas by comparing the core area and the suburban zone as the suburban zone grows while the urban core population decreases. Interesting is the amenity suburbanization, typical in Switzerland in particular, which is manifested by the migration of the population from urban to rural areas to localities with beautiful natural scenery, which people often seek as a change from the hustle of the city. American cities are in turn a typical form of suburbanization called the "urban sprawl," so the American approach uses a number of indicators and their combinations to analyze suburbanization. These include population density, compactness or looseness of buildings, concentration or even distribution of human activities, degree of centrality, segregation of functions in metropolitan space, etc. Both approaches use data capturing the spatial structure of the metropolitan area or its changes, with certain changes in this structure then being considered suburbanization. Ouředníček (2007) names residential density, the ratio of newly built housing estates to the original development, the social status of the participants, the place where they come from or the degree of interaction with the center as defining characteristics of suburbanization.

According to Hungarian authors Nagy and Hegedűs (2016), suburbanization refers to population growth, and city growth refers to population growth beyond the administrative boundaries of the city. In initial research, urban growth was identified as suburbanization, but the authors state that urban growth within an urban boundary is understood as urbanization. Suburbanization is mostly (not exclusively) considered to be the emigration of the population to the neighboring settlements of the city. Therefore, the classical definitions of suburbanization refer to the migration process itself. British authors Harris and Larkham (1999) have a contrasting view of this difference, according to which the main distinguishing feature is development. According to them, the term 'suburban area' refers to separate family and / or two-storey living quarters in the outer parts of the city, which were mostly built during the pre-war and post-war periods. On the other hand, in the sense of Peiser (2001), urban growth applies in particular to all negative land uses, monotonous development, poor roads and infrastructure, as well as the damaged environment and lack of free space.

There are also significant differences between the "inner city", and a specific area at the urban-rural interface, i.e. the "rural urban fringe". Spatially, the largest form of suburbanization is referred to as an urban region or city region. The size of an urban region is determined by the sectors and zones that are created around the perimeter of the city, thus forming a ring or a loop. Municipalities located in the immediate proximity of the city have the highest population density, the best transport infrastructure and accessibility, but also the best relations with the city (thanks to attendance at work, schools, services, etc.). According to Batty (2013), residential suburbanization in particular brings the greatest potential for change in rural communities. With the increasing distance from the city center, the influence of the city decreases in the municipalities, but also dies the density and transport infrastructure. Municipalities that no longer belong to this ring of the urban region retain their rural way of life.

In the Slovak environment, suburbanization manifests itself more in the classical form, which is characterized by the emergence of new residential colonies in the rural hinterland of large cities, from which residents come daily to the city for work (Kóňová, 2019). One of the most visible manifestations is the construction of new residential sites, which fundamentally

reshapes the structure and functional orientation of settlements in the background of large cities. These residential areas are inhabited mainly by people from the city.

The suburbanization process in addition to Bratislava (as evidenced by the publication Suburbanization: How the background of Bratislava changes authors Šveda et al. (2019) and a number of other works, e.g. Krnáčová and Štefunková (2011), Šveda (2014), Šveda and Pazúr (2018), Pazúr et al. (2017), Rochovská and Miláčková (2012) has not received sufficient attention yet. The issue of suburbanization of Košice was dealt with in e.g. Dická (2007), Novotný (2014), Prešov - Matlovič and Sedláková (2004), Nitra - Repaská et al. (2015, 2017), and Trenčín - Danielová (2008).

The current countryside is characterized not only by the movement of the population from the city to the hinterland (residential suburbanization), but also by redistribution of production activities, retail and services supported by lower land prices, sufficient cheap skilled labor and, to a large extent, very good transport accessibility (commercial suburbanization).

The location of new residential and commercial functions in the suburban zone acts as an impulse for the reorganization of the social, recidential, and environmental development sites. In addition to the positive trends, it also has a negative impact on the life of the entire urban region (Trembošová et al., 2019 and 2020b). It is this negative perception that leads to the evaluation of suburbanization as a process that conflicts with the principles of sustainable development, which should be a balanced social, economic and environmental development of a territory. However, this points to the need to evaluate suburbanization processes in the overall context of the territorial development of the Slovak Republic, which is also programmatically provided in the Concept of Territorial Development of Slovakia (Aurex, 2001).


## 3  RESEARCH METHODOLOGY, DATA AND RESEARCH AREA

Most authors, such as Sýkora and Bouzarowski (2012) and Sýkora and Posová (2007) used population relocation data to single out and analyze the ongoing suburbanisation. The decline of the population in central cities and the growth of the population around cities is caused precisely by the migration (emigration and immigration) of part of the urban population into the hinterland of cities. Population movement within suburbanization is associated with migration, which originates from the core of the metropolitan area or from the suburban zone itself.

To determine the space of suburbanization zones of regional cities in Slovakia, the authors have used the methods of "flows" of the work of Batty et al. (2013) and is a multiple of two variables: i) the share of immigrants from the regional city to the total number of immigrants to the municipality from all directions, this share had to reach a higher value than the share of immigrants from other directions. The movement was monitored for a period of 4 years (2017-2014), and the data was provided by ŠÚSR (2017): ii) the average distance between the regional city and the surveyed municipality, resulting from Batty's basic flow model based on the Newton law of universal gravity, which states that villages less distant from the regional city have a greater chance of becoming suburban (compared to municipalities further from the regional city). The authors used the average distance of the village in the calculation, as there may be more roads from the city to the village. The resulting value was then multipled by the constant $c$ with the value 1,000,000 for a more visual cartographic processing of statistical data. The complete formula for calculating the intensity of relations between a regional city and municipalities in its suburbanization area can therefore be defined as follows:

$$T_{ij} = \frac{I_i \times 100}{I} \times \emptyset\, d_{ij}{}^{-2} \times c \tag{1}$$

where: $T_{ij}$ - the intensity of relations between the regional city (i) and municipalities in its hinterland (j),

$I$ - the total number of immigrants to themunicipality j from all directions for a given year,

$I_i$ - the number of immigrants to the municipality j only from the regional city in the observed year,

$\emptyset\, d_{ij}$ – the average distance between the regional city (i) and the municipalities in its hinterland (j) and c is a constant (1,000,000).

Based on the intensity of the resulting values, interactions of 5 types was obtained - very weak, weak, medium, strong and very strong, which were presented by the method of cartogram in the urbanization ring of each regional city of Slovakia.

## 4   SURVEY RESULTS

According to statistical data, Slovakia does not belong to urbanized countries; in 2018, 53.5% lived in the cities of Slovakia. According to the World Bank in Slovakia was overtaken not only by city-states such as Singapur, Monaco, highly urbanized states such as Japan, Luxembourg, the Netherlands, but also countries such as Belarus, Bulgaria, Finland, Australia and others (Danielová, 2019).

### 4.1  Emigration of inhabitants of regional cities of Slovakia

The processes of suburbanization – i.e. the transfer of population and its activities from the cores of metropolitan regions to their hinterlands - have been taking place in Slovakia and especially in the suburban region of the capital for more than 20 years (Šveda, 2014 and Novotný, 2016). The emigration of the population from regional cities to the countryside in the period 2014-2017 had the most significant effect in Bratislava and the least in Trenčín. The share of emigrants from individual regional cities to their total population (Fig. 1) reached a value of around 1.96%, with the largest share recorded in Bratislava in 2016 (2.86%) and the smallest share in 1.40% Trenčín in 2014.
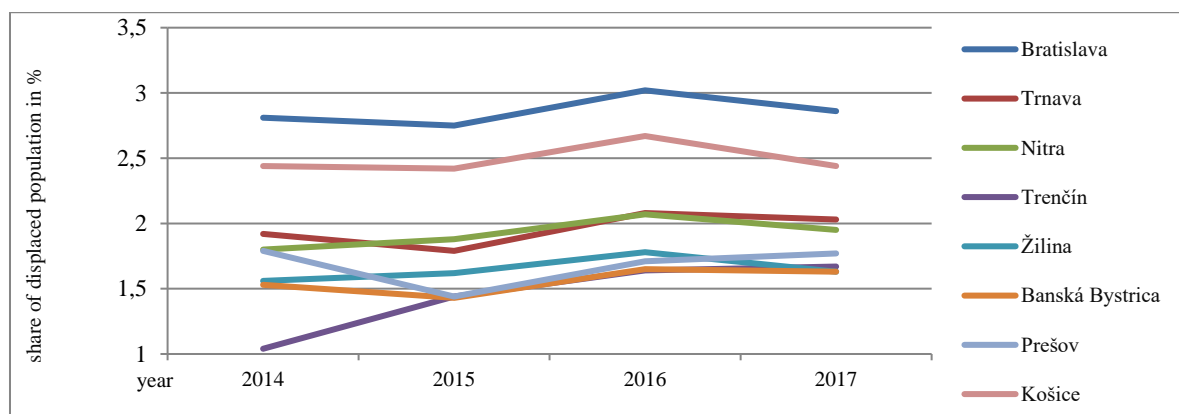


**Fig. 1** _Proportion of emigrants from regional cities of Slovakia in 2014-2017_
_Source: [16]_

## 4.2  Formation of suburbs of regional cities in Slovakia

Suburbs are emerging on one hand as new localities within administrative boundaries on the outskirts of cities or on the other hand, emerging as new localities with urban population in the rural environment, which change their identity and behavior and disrupt its identity with their urban way of life, behavior, customs, but also with architecture. The suburbanization process is the strongest in municipalities in the immediate proximity of large cities. Municipalities less distant from the core have a hgher potential to become suburban than municipalities on the periphery of urban regions with a great distance from the core city. At the same time, it was confirmed that the higher the number of inhabitants in a regional city, the higher the number of emigrants and the greater the interest in living in a rural environment. Other attributes of defining the sub-urban zone of cities include socio-economic, locational-spatial and natural specifics of individual regional cities and their urban regions. Each suburbanization area is specific in distance from the regional city, the number of inhabitants of the regional city and the number of suburban municipalities (Fig. 2). Its shape is also formed by physical-geographical factors, and the geographical location factor is evident in the case of suburbs of the metropolitan cities of Bratislava with the nearby city of Trnava, as well as Košice and Prešov (Fig. 2). In this case, the stronger metropolitan core (Bratislava and Košice) "wins". The strength of the urbanization process is influenced by the size of the population of cities and their accessibility, which is represented by the distance of the suburb from the city. Daily attendance to places of work and schools depends on the level of construction of the transport infrastructure. With growing automobilism, the traffic network is congested in the immediate proximity of large cities, which is reflected in particular in a significant loss of time during daily commuting, which can also lead to the return of residents to cities, as is currently happening in the Bratislava suburbanization zone.
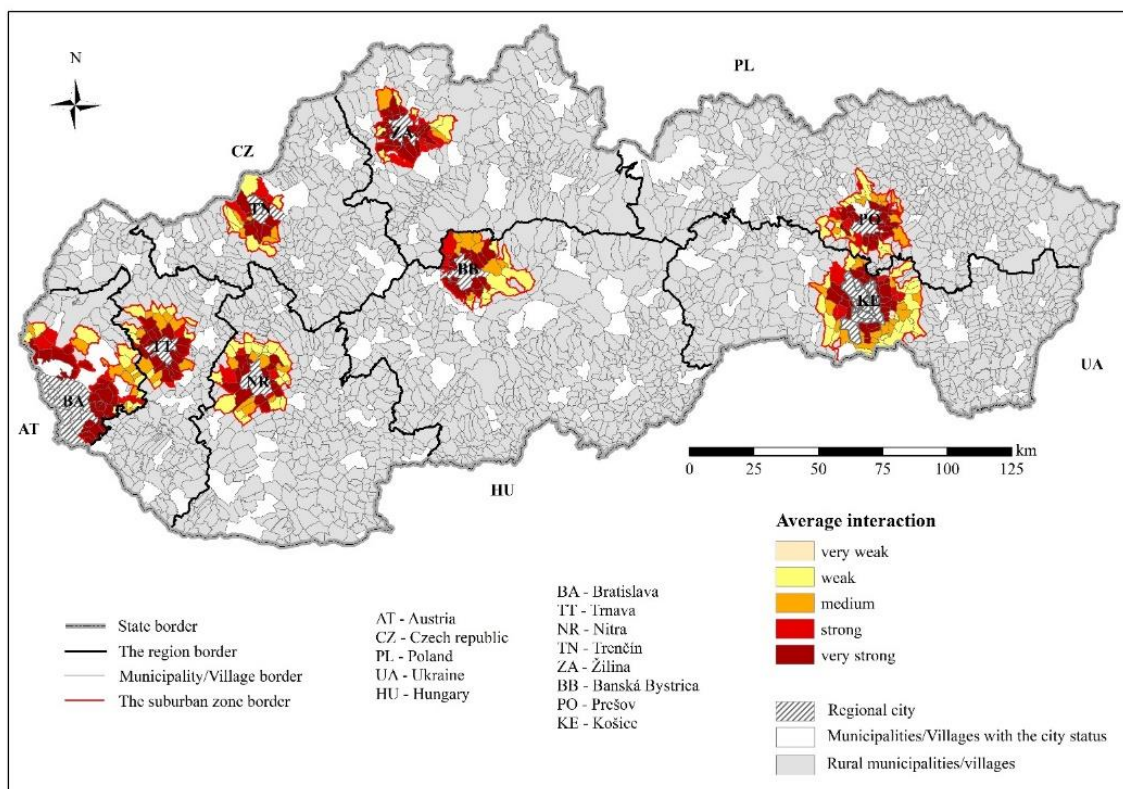


*Fig. 2 Suburban zones of regional cities of Slovakia*
*Source: Own elaboration of the authors, 2021*

As can be seen in Fig. 2, individual regional cities create variously large spatial suburbanization zones of various shapes. The suburbanization space of the solved regional cities of Slovakia takes on the form of a ring or a loop. It is specific in the Bratislava suburbanization zone, where it is not developed from the western part. There is an artificial barrier - the state border, but also a natural barrier - the river Danube. At present, the people of Bratislava overcome this barrier effect and use the border villages of Austria (Kittsee, Wolfstahl) and Hungary (Rajka) to build their houses. The specifics of Bratislava as the capital of Slovakia are significant migratory flows throughout the territory of Slovakia, which also create pressures on the background of the city, where immigrants are looking for cheaper accommodation options. The suburbanization zone of two metropolises of Slovakia - the capital Bratislava and the metropolis of eastern Slovakia, Košice, has an average width of up to 20-30 km, in other regional cities this ring reaches 10-15 km. Another specific feature of these metropolises is their position in the settlement structure of Slovakia. Due to their size and strength of economic potential, they influence the creation of suburbanization zones of regional cities - 44 km distance Bratislava-Trnava (Bratislava - Trnava suburbanization zone - TTSZ) and 36 km distance Košice-Prešov (Košice - Prešov suburbanization zone). Although Košice has the largest suburbanization zone (948.9 km²) among regional cities, the population density is relatively low, reaching only 89.1 inhabitants per 1 km². As can be seen from Table 1, the Bratislava urbanization zone is smaller than the one of Košice and reaches the highest population density (136.7 inhabitants / km²). There is also a high concentration of population in the area of Žilina, Trnava, Banská Bystrica and Nitra urbanization zone (Tab. 1).

**Tab. 1** *Basic characteristics of suburbanization zones of regional cities*

| Suburbanization zone | Number of municipalities | Area km² | No. of inhabitants | Inhabitant for km² | Average zone distance in km² | | |
|---|---|---|---|---|---|---|---|
| | | | | | A | B | C |
| BASZ | 52 | 829 | 112 989 | 136.3 | 14.9 | 58.4 | 31.1 |
| TTSZ | 39 | 519.3 | 60 805 | 117.1 | 3.85 | 22.8 | 13.3 |
| NRSZ | 45 | 614.4 | 67 354 | 109.6 | 6.25 | 24.2 | 15.7 |
| TNSZ | 24 | 391.7 | 37 455 | 95.6 | 4.50 | 19.2 | 12.1 |
| ZASZ | 41 | 441.3 | 59 438 | 134.7 | 5.15 | 18.9 | 11.2 |
| BBSZ | 36 | 575.6 | 28 057 | 48.74 | 5.08 | 26.8 | 14.8 |
| POSZ | 57 | 511.6 | 55 967 | 109.36 | 4.00 | 27.0 | 13.0 |
| KESZ | 77 | 948.9 | 84 484 | 89.1 | 8.10 | 34.0 | 20.2 |

*Legend:*
*BASZ - Bratislava Urbanization Zone, TTSZ - Trnava Urbanization Zone, NRSZ - Nitra Urbanization Zone, TNSZ - Trenčín Urbanization Zone, ZASZ - Žilina Urbanization Zone, BBSZ - Banská Bystrica Urbanization Zone, POSZ - Prešov Urbanization Zone zone, A - shortest distance, B - longest distance, C - average distance.*

Based on the intensity of interactions, each suburbanization zone (ring) is divided into 5 types of bands. Municipalities that no longer belong to this ring still retain their predominantly rural character.Municipalities in the immediate proximity of regional cities have the strongest interactions with the city, and towards the periphery this intensity of relations decreases. It often happens that the suburbanization zones do not form a compact ring, the individual zones around the city gradually move to another zone. In the first very strong zone, the number of municipalities in the suburbanization zones of regional cities in the Slovak Republic ranges from 27 to 9 municipalities (Tab. 2).

**Tab. 2** *Indicators of suburbanization zones of regional cities of Slovakia according to average interaction*

| Suburb zone | Number of municipalities | | | | Area in km$^2$ | | | | Average distance in km | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **A** | **B** | **C** | **D** | **A** | **B** | **C** | **D** | **A** | **B** | **C** | **D** | **average** |
| **BASZ** | 22 | 5 | 10 | 15 | 358.8 | 86.8 | 129.4 | 253.7 | 22.1 | 30.4 | 35.7 | 41.56 | 31.17 |
| **TTSZ** | 18 | 3 | 8 | 10 | 235.5 | 25.2 | 136.0 | 122.4 | 9.73 | 13.7 | 14.4 | 18.8 | 13.34 |
| **NRSZ** | 14 | 4 | 7 | 20 | 189.1 | 58.2 | 94.64 | 272.4 | 10.5 | 13.3 | 16.3 | 19.69 | 15.75 |
| **TNSZ** | 9 | 3 | 5 | 7 | 128.3 | 62.9 | 45.73 | 154.6 | 7.85 | 10.4 | 13.7 | 17.26 | 12.14 |
| **ZASZ** | 25 | 5 | 3 | 8 | 229.7 | 60.8 | 57.32 | 93.36 | 9.17 | 12.4 | 15.1 | 15.69 | 11.27 |
| **BBSZ** | 17 | 3 | 7 | 9 | 189.7 | 58.9 | 129.5 | 196.8 | 10.0 | 16.2 | 17.9 | 20.93 | 14.83 |
| **POSZ** | 21 | 5 | 11 | 20 | 172.1 | 51.7 | 109.5 | 178.2 | 9.2 | 13.0 | 14.1 | 16.49 | 13.06 |
| **KESZ** | 27 | 7 | 17 | 26 | 243.6 | 91.6 | 208.6 | 40.04 | 13.8 | 19.0 | 21.6 | 26.26 | 20.22 |

*Legend:*

*BASZ - Bratislava Urbanization Zone, TTSZ - Trnava Urbanization Zone, NRSZ - Nitra Urbanization Zone, TNSZ - Trenčín Urbanization Zone, ZASZ - Žilina Urbanization Zone, BBSZ - Banská Bystrica Urbanization Zone, POSZ - Prešov Urbanization Zone zone, A - very strong, B - strong, C - medium, D – weak*

The Košice suburbanization zone with 27 municipalities is in the first place, followed by the suburbanization zone of the city of Žilina with 25 municipalities and the suburbanization zone of the city of Bratislava, which has very strong interactions with 22 municipalities. The indicators of the area of very strong band range from 355.88 km² to 128.37 km². The Bratislava suburbanization zone has the largest area and at the same time the longest average distance of the very strong suburbanization zone, as its zone of very strong interactions has a size of 358.8 km² with an average distance of 22.16 km. The second place is naturally held by the city of Košice suburbanization zone and a band of very strong interactions with an area of 243.6 km² and an average distance of 13.83 km. In the area indicator, the Trnava suburbanization zone with an area of 235.56 km² has the third place. The average distance of the suburbanization zone with very strong interactions ranges from 22.16 km (BASZ) to 7.85 km (TNSZ).

## 5    CONCLUSION

Suburbanization leads to the deconcentration of the urban population in the rural environment, to the change of traditional rural forms and identity under the influence of the urban way of life, behavior and customs. The authors agree with the opinion Šveda et al. (2016), that suburbanization in the conditions of Slovakia is characterized by several specifics, which manifests both the nature of the settlement of Slovakia and the historically long-term nature of relations between the city and its hinterland - the countryside (Ekers et al., 2012). Although Keil (2018) writes that the development of a suburban country is currently driven by post-Fordist regional economies through globalization and neoliberalization, in Slovakia it is still associated with the industrialization and decentralization of housing. The authors of the paper consider the ongoing industrialization through the automotive industry providing job opportunities in the city of Bratislava - Volkswagen since 1991, Trnava - PSA Peugot Citroën since 2006, Žilina - Kia Motors Slovakia since 2007 and Nitra - Jaguar Land Rover Slovakia since 2018 to be a driving economic element of suburbanization in the Slovak environment. Suburbia formulating factors of housing decentralization in the hinterland of regional cities of the Slovak Republic are geographical location (distance), number of

inhabitants of the original town, accessibility (quality of road and railway transport) and migration flows. The authors consider as other influencing variables not only the position of regional cities in the hierarchy of Slovak cities, the most important of which is the process of metropolitanization of Bratislava and Košice, but also the presence of the least developed districts, such as Banská Bystrica, Košice and Prešov.

The intensity of interactions between urban and rural distances from the city decreases. Municipalities less remote from the core have a higher potential to become suburban than municipalities on the periphery with a great distance from the city core. At the same time, it was confirmed that the higher the number of inhabitants of the regional city, the higher the number of emigrants, and the higher the number of inhabitants in the suburban zone. These two suburbs forming variables from the point of view of defining the suburban zone complement the socio-economic and locational-spatial specifics of individual regional cities.

The suburbanization space of the solved regional cities of Slovakia takes on various forms of a ring or loop. In the case of two metropolises in Slovakia, the cities of Bratislava and Košice, the suburbanization band is up to 20-30 km wide, in other regional cities, this ring reaches 10-15 km of the suburbanization belt. Based on the intensity of relationships, the ring was divided into 5 bands. Municipalities in the immediate proximity of regional cities have the strongest ties with the city, and towards the periphery, this intensity of relations decreases. It often happens that the peripheral zone does not form a compact ring around the previous two zones, but gradually spreads to more distant villages.

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