Differences in the amenities of road infrastructure in the regions of Slovak Republic

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Abstract
Regional development is affected by a number of factors: natural resources, labour resources, production activities and infrastructure. Road infrastructure as a part of the transport infrastructure is one of the important assumptions and factors of social and economic development of countries and their regions. This is particularly true in countries where road transport is the largest component of overall transportation, such as in Slovakia. In this article we explore the differences in the amenities of road infrastructure (motorways, expressways, 1st class roads, 2nd class roads, 3rd class roads) in the Slovak regions and their development in 2005-2014.

We explore the length and density of road network and superior road infrastructure in the regions of Slovak Republic. The regional differences in the regions of Slovakia we measure by the coefficient of variation and the localization coefficient. We found that there are significant regional differences in road infrastructure in Slovakia, in recent years they have been decreasing.

Key words: regional development, road infrastructure, motorway, expressway, road density.

Introduction
Slovak Republic is conveniently located in the centre of Europe and Slovak territory is crossed by three of the nine European core network corridors. International transport corridors in Slovakia are followed by the national transport network, which is being built under the development of its regions. For the regional development are required a well-developed network of roads and superior road infrastructure (motorways and expressways). However, all categories of roads are needed in the country and its regions.

This article introduces comparison of road infrastructure in the regions of Slovakia. The aim of this article is to explore the differences in the amenities of road infrastructure in the Slovak regions and their development.

The basis for the analysis of the regions is their classification, called Nomenclature of territorial units ("Nomenclature des StatistiquesUnitésTerritoriales" - NUTS). It is introduced by the Statistical Office of the European Commission (Eurostat) in cooperation with the National Institutes for Statistics. The level of development of the road network in Slovakia is analysed at NUTS III level, it is 8 self-governing regions.

We use the method of time series analysis, comparison and synthesis in this paper. Method of time series analysis was employed to analyse the road network in the regions of Slovak Republic. The method of comparison was used for comparing the road infrastructure level in the regions of Slovak Republic. The method of synthesis was used to draw conclusions resulting from the analysis. Data used in the analysis were obtained from national and regional statistics.

1. Road infrastructure as a factor of regional development
Socio-economic, historical and political development in the country in a period of time creates conditions for uneven regional development. Availability, quality and degree of utilization of the resources, may cause a smaller or larger differences (disparities) in the development and economic level of individual regions.

In analysing the regional disparities, we shall monitor the achieved level of development in various areas, including their dynamics. An integral part of the analysis is the investigation of the causes and consequences of these disparities as well as exploring of options for mitigation. (Grmanová, 2012, p. 79-80)

The growing disparities between regions are the reason for carrying out target oriented regional policy. Regional policy is the management of activities of the state institutions and territorial scope, which seeks to create optimal conditions for a dynamic and versatile development of regions with maximum use of their geographic, human and economic potential. Regional policy is according to Habánik (2012, p. 241) closely linked to regional development, since its tools help lagging regions to achieve the average level of developed regions.

As stated by Havierniková (2008), regional development is a complex and difficult issue affected by a number of factors. Factors of regional development include not only internal resources of the region but also external conditions (for instance the state economic policy). Regional development can be seen as to ensure economic growth, development of social capital in the region whose use shall lead to an increase in the standard of living of its people, to social and economic development of the country, with the maintenance of sustainable economic development. (Košťová, 2011).

Development of regions is affected by resources of the region. Resources of the region can be considered not only natural conditions, but also human, technical, economic and social conditions that affect the economic level of the region and its further development.

We can agree with Tvrdoň et al. (1995) that the basic factors of regional development are considered to be natural resources and the environment, population and labour resources, economic activities and conditions of regional development (production activities, social amenities and infrastructure). According to Adamkovičová (2013, p. 23), infrastructure is the main factor of economic and social development of regions. Quality of life in the region is strongly influenced by development level of facilities of technical and social infrastructure.


Rietveld and Bruinsma (1998) and others examined the direct and indirect effects of transport infrastructure on regional development, as well as costs associated with the development of transport infrastructure. The role of road infrastructure in regional development was examined by Linneker and Spence (1996), Rienstra et al. (1998), and numerous others.

The road infrastructure and its impact on economic and regional development were examined by some international institutions, e.g. OECD and World Bank. OECD investigated current evaluation studies of major transport infrastructure projects in OECD member countries with an aim to identify impacts of transport infrastructure investments on regional development. The OECD Road Transport and Intermodal Linkages Research Programme established a Working Group to undertake a comprehensive study on how transport infrastructure investments affect regional development and how such impacts could be handled in project appraisals. The aim was to develop guidance for governments and transport administrations on how to identify such impacts and include them in appraisal methodologies in order to improve the efficiency of investments in transport infrastructure. Experts from the World Bank processed some documents related to road infrastructure, e.g.: Road infrastructure and economic development: some diagnostic indicators (1992), The

In this article we deal with the road infrastructure as a factor of regional development.

The road infrastructure comprises all types of roads in a given area, including various structures, facilities, signage and markings, electrical systems, and so on needed to provide for safe, trouble-free and efficient traffic. The term road infrastructure is used for network of roads, which allows the connection of two or more municipalities or objects (buildings, natural phenomena, tourist attractions) and is used to transport people and cargo.

According to Patarasuk (2013, p. 111), roads are viewed as a means of social and economic development because they link regions, places, people and economics together. Improvement of the road network increases accessibility and mobility while reducing the distance to destinations, travel costs and travel time. Development of road networks has been proven to help social development and economic prosperity.

Road infrastructure is a prerequisite for transporting of materials, raw materials, semi-finished and finished products intended for sale. Road infrastructure affects the flexibility and mobility of the workforce, which is reflected in the employment level. The level of development of road infrastructure also affects other factors, such as the development of tourism, the influx of foreign investments, regional development, etc. Higher employment rates also causes increase in average wages. The wage level affects the volume of consumption and savings, and hence investment, which are macroeconomic variables that affect economic growth (GDP growth) and standard of living of the population.

Road infrastructure affects the flexibility and mobility of the workforce, which is reflected in the employment level. Moreover, higher employment level contributes to growth of standard of living. The degree to which the road infrastructure is developed has an impact on several areas, such as for instance the development of tourism, influx of foreign investments, regional development, etc.

According to Banister and Berechman (2001, p. 212) the transport infrastructure investments are location specific and have potential growth effects on local economies. Hence, to actually identify and measure the economic growth resulting from such investment, analysis must take place at the local level. It is at this scale that the impact on local economic development, income levels, accessibility and employment should be assessed.

Eventually, all the indicators – employment, wages, consumption, savings, investment, benefits of tourism – will have an impact on the volume of gross domestic product, the key macroeconomic indicator, which measures the economic output of the state. In addition, transport is significant in international context in terms of foreign trade and cooperation in different areas.

2. Road infrastructure in the regions of Slovak Republic

Road infrastructure in Slovakia has great importance, because road transport is the most widely-used mode of transport in Slovakia. Advantageous geographical location of Slovakia in Europe increases the importance of road infrastructure in international context. In this respect, a well-developed network of roads and superior road infrastructure (motorways and expressways) are required. However, all categories of roads are needed in the country and its regions.

Slovak Republic is characteristic of the significant differences in the social and economic level of its regions. According to Šedivá (2012, p. 31) differences arise not just from natural-geographic, demographic and historical background of the regions, but also depend on other social-economic and political factors. These factors greatly influenced the current state of socio-spatial situation in Slovakia, resulting into economic and social activities in the territory of the SR being distributed very unevenly.

The road infrastructure in Slovakia comprises the motorways, expressways, 1st class roads, 2nd class roads, 3rd class roads, local roads and special purpose roads. All arrangements and buildings situated on it are inseparable from it.

The motorways and expressways have the special importance for the development of country and its regions. They are designed to link important centres of national and international significance and
create the connection to the road network of neighbouring states. 1st class roads are a fundamental component of the road network connecting cities, regions, and border crossings and are of special significance for national and international transportation. Roads of lower level - i.e. 2nd and 3rd class roads provide connection for the population in settlements in which there are more civil amenities. Local roads create conditions for transport in towns and villages. Special purpose roads include forest and field paths, roads in production sites etc. The length of special purpose roads is not statistically assessed. In this paper we will examine the the narrower concept of road infrastructure, we examine the motorways, expressways, 1st class roads, 2nd and 3rd class roads without the local roads and special purpose roads. The structure of road infrastructure in the regions of Slovakia in 2014 is shown in Chart 1.

Chart 1: The structure of road infrastructure in the regions of Slovak Republic in 2014 (km)

As is apparent from Chart 1, the greatest length of the roads is in the largest region of BanskaBystrica, with more than 3196 km of roads. As of 2014 the region had no motorways, but has the largest network of expressways among regions of Slovakia with almost 109 km, accounting for 3.4% of the network of roads in this region. The minimum length of road infrastructure is in the smallest region of Bratislava, less than 353 km. This region however has the longest network of motorways among regions of Slovakia with nearly 112 km, which represents a 13.9% share of the road network in this region. There are no expressways built in Bratislava region.

The proportion of first-class roads varies from 13.6% in the Trnava region to 24.9% in the Žilina region. Second class roads make up 16% (Žilina region) to 27.1% (Trnava region). The most extensive network of roads are third class roads, in the Prešov region the proportion of these roads is more than 60%, while in the Bratislava region it is nearly 44%.
Since individual regions of Slovakia differ in size, to compare road infrastructure it is preferable to use a density in km per km². Changes in the density of road infrastructure in 2014 compared to 2005 in the Slovak regions are shown in Chart 2.

Chart 2: The density of road infrastructure in the regions of Slovak Republic (km/km²)

Source: Road Databank of Slovak Road Administration, compiled by authors

The highest density of road infrastructure is in Trnava region, 0.47 km/km², while the lowest density of only 0.30 km/km² is in the Žilina region. In the reported period we can observe increase in the density of roads especially in Nitra, Prešov and Žilina region. Conversely, a reduction in the density of roads occurred in Trnava region.

Since 1st class roads, 2nd class roads and 3rd class roads are built in the sufficient extent in Slovakia for the area they serve, most attention in the recent year was paid to the construction of motorways and expressways. Especially motorways and expressways have a special status in developing regions. They follow the route of the heaviest traffic load and under certain conditions, assume a considerable part of the traffic from parallel roads of lower class. They are labelled as the superior road infrastructure. Length of motorways and expressways is classified by Koišová and Habánik (2012, p. 22) as economic indicators affecting differences between regions.

As mentioned, the largest network of motorways in the observed period is in the smallest Bratislava region, while the regions of Nitra and Banská Bystrica do not have any motorways. During the reported period most of the motorways were built and put into use in the Prešov region (more than 55 km), moving Prešov region to the second place behind Bratislava and ahead of Trenčín in the third place when it comes to length of motorways network in Slovakia.

There are no motorways built in Nitra and Banská Bystrica regions, but these two regions have the largest network of expressways. During the period 2005-2014 their length increased in Banská Bystrica region by more than 71 km to almost 109 km and in Nitra region by some 52 kilometres to nearly 68 km.

In Chart 3, we compared the density of motorways and expressways in the regions of Slovakia in 2005 and 2014.
Chart 3: The density of motorways and expressways in the regions of Slovak Republic (km/km²)

Source: Road Databank of Slovak Road Administration, calculated and compiled by authors

From Chart 3 it is evident, that the highest density of superior road infrastructure is in the region of Bratislava, almost 0.054 km per km² in 2014 followed with a distance by Trnava and Trenčín, while the lowest density of superior road infrastructure is in Košice region. During the reported period, the density of motorways and expressways has raised the most in Nitra and Banská Bystrica due to the completion of the new sections of expressways.

For comparison of the differences in the road infrastructure of Slovak regions we recalculated the coefficient of variation, as shown in the Chart 4.

Chart 4: Coefficient of variation of road network in SR (by NUTS III)

Source: calculated and compiled by authors

Chart 4 shows that at the level of expressways there are the most significant regional differences in Slovakia, however in recent years these differences have been decreasing. The coefficient of variation of motorways decreased from 89.4% in 2005 to 78.8% in 2014. The coefficient of variation of total road infrastructure was almost unchanged in the reporting period.
For the assessment of uniformity, respectively inequalities of road network in different regions of Slovakia, we recalculated the localization coefficient for motorways, expressways and road network together, in 2005 and 2014. The results are shown in Chart 5.

**Chart 5: Localization coefficient of road network in SR (by NUTS III)**

![Localization coefficient chart](chart.png)

*Source: calculated and compiled by authors*

From Chart 5 it is clear that in the regions of Slovakia the least evenly distributed are motorways, especially in 2005, when the localization factor for motorways in the Bratislava region reached 7.66. Use of motorways in Bratislava region is thus more than 7-fold higher compared to the Slovak average. In 2014, the differences in the localization of motorways in the regions of the SR decreased slightly. Regarding expressways, in 2005 the highest localization coefficient reached 3.80 in Trnava region. Even in the case of expressways differences in their localization in 2014 decreased slightly. However, when we examine the total road network in the regions of Slovakia, the localization coefficient only slightly deviates from 1, i.e. layout of the road network in the region is relatively uniform, with higher coefficients of localization in the western part of Slovakia.

**Conclusions**

Developed road infrastructure is an important prerequisite for the functioning of the economy of each state and acts on reducing disparities between regions. Improving the level of road infrastructure in the countries and regions presents new opportunities for growth of tourism, inflow of foreign investments, higher levels of employment and thereby supporting overall economic and social development as a basis for increase of their competitiveness. It is therefore essential to devote permanent attention to modernizing, development and maintenance of road infrastructure. Important role in the development of individual regions meet particular motorways and expressways.

Based on the above we can conclude that the current state of the road infrastructure in Slovakia is characterized by relatively dense road network, but with a relatively low share of the higher classes of roads (motorways and expressways). Although the road density is sufficient for the area, the technical condition of roads and related road buildings, especially bridges, is unsatisfactory.

The density of road infrastructure (motorways, expressways, 1st class roads, 2nd class roads, 3rd class roads) in the regions of Slovakia is ranging from 0.30 (Žilina) to 0.47 km / km² (Trnava). As far as the density of motorways and expressways in Slovakia is concerned, the best region in this indicator is Bratislava region, where the density motorways and expressways in 2014 were 0.054 km / km².
The most significant regional differences in Slovakia measured by the coefficient of variation are at the level of expressways, in recent years they have been decreasing. Based on the localization coefficient we can say that in the regions of Slovakia the least evenly distributed are motorways, especially in 2005, when the localization factor for motorways in the Bratislava region reached 7.66. In 2014, the differences in the localization of motorways and expressways in the regions of the SR decreased slightly.

References


