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Road infrastructure in the regions of the Slovak Republic and Poland

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Abstract. One of the important assumptions and factors of social and economic development of countries and their regions is road infrastructure. This is particularly true in countries where road transport is the largest component of overall transportation, such as in Slovakia and Poland. Road infrastructure as part of the transport infrastructure is here regarded as one of the main pillars for achieving economic growth, to increase competitiveness and prosperity, contributing to the development of the Trans-European transport network and the improvement of transport infrastructure in support of a single European market in order to ensure the free flow of goods, people and overall competitiveness of the EU. This article offers a comparison of road infrastructure in Slovakia and Poland, highlighting regional disparities in road infrastructure in these countries.

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Contents:

1. Introduction, material and research methods

Sustainable economic growth and economic development are impossible without taking into account regional aspects. The development of individual regions is affected by the level of utilization of available resources of the region, but also through the influence of the instruments of regional and economic policy. The effect of the growth factors in the economy can be reduced if the existing potential of regions is not utilized and their development slows down. It causes persistence of the negative effects of differentiation in the developing regions. This is reflected at the national level and has impact on the economy.

The development of countries and regions is affected by their available resources, and road infrastructure is one of them. It includes all road categories, facilities, structures, signage and markings, electrical systems, etc. needed to provide safe, trouble-free and efficient traffic.

In this article we analyse the level of development of the road network and its disparities in the regions of Slovakia and Poland in the period 2005–2013. Our research is carried out in Slovak self-governing regions and Polish voivodships.

The geographical position of Slovakia, in the central part of continental Europe, and Poland with access to the sea and to major ports of Europe makes these neighboring states work together on building transport infrastructure, which is part of Europe's major transport corridors. Slovak territory is crossed by three of the nine European core network corridors, with the Baltic-Adriatic Corridor being one of the most important ones for the development of transport infrastructure of the Slovak Republic and Poland (Figure 1). International transport corridors influence the national transport network, built as part of the regional development of these countries.

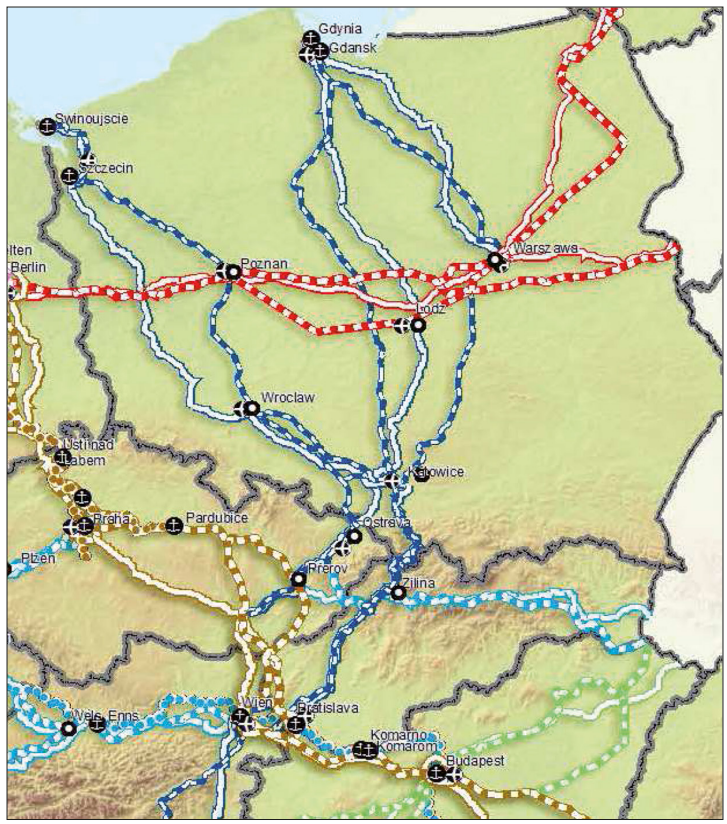

Fig. 1. Europe Core Network Corridors in Slovakia and Poland

Explanation: Baltic – Adriatic; North Sea– Baltic; Mediterranean; Rhine-Danube; Orient/East-Med

Source: http://ec.europa.eu/transport/infrastructure/tentec/tentec-portal/site/en/maps.html

We used the method of time series analysis, comparison and synthesis in this article. The method of comparison was used for comparing the road infrastructure and economic level in the regions of the Slovak Republic and Poland. The applied method of comparison and analysis is realized through localization and coefficient of variation.

The coefficient of localization represents the proportion of the types of roads (motorways and speedways) in regions to the total length of roads and to the area of regions. It is calculated according to the equation:

$$L_j = \frac{\frac{R_j}{R}}{\frac{A_j}{A}}$$

Where:

L_j = localization coefficient
R_j = the length of roads (motorways, expressways) in a given region
R = the length of roads (motorways and expressways) in a country
A_j = the area of the region
A = the area of the country

To calculate the coefficients, we took data in the time series between 2005 and 2013. The method of synthesis was used to draw conclusions resulting from the analysis.

The statistical data from the Slovak and Polish national and regional databases are used; some data are retrieved from the Eurostat.

2. The role of road infrastructure in regional development

Some authors deal with the importance of infrastructure in regional development in their scientific works, e.g. Nijkamp (1986), Tvrdoň et al. (1995), Ghosh and De (1998), Adamkovičová (2013) and others. Transport infrastructure as a part of infrastructure and its role in the regional development has been studied by Evers et al. (1987), Percolo (2003), Oosterhaven and Knaap (2003), Spiekermann and Wegener (2006), Hong et al. (2011).

Rietveld and Bruinsma (1998) and others have 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 has been examined by Linneker and Spence (1996), Rienstra et al. (1998), Habánik and Koišová (2011), Havierniková and Janský (2014) and numerous others.

Some international institutions, e.g. Organization for Economic Co-operation and Development (OECD) and World Bank have examined road infrastructure and its impact on economic and regional development. OECD investigated current evaluation studies of major transport infrastructure projects in OECD Member countries with an aim to identify impacts of transport infrastructure investment on regional development.

Although the role and importance of transport infrastructure in regional development have been researched for a long time, the views and opinions of some economists and geographers differ. Some authors consider road infrastructure to be a necessary condition (although not sufficient) in regional development, on the other hand there are more and more authors who criticize the overvaluation of the role of road infrastructure in regional development (Hey 1996, Bray 1992 and others).

The authors investigating searching the impact of motorways network development on regional development do not share one common opinion. One group of authors defends the opinion that motorways have a positive impact on regional development (Carlino, 1987; Garcia-Milà, 1992 and others). The other group of authors defends the opposite opinion claiming that building up motorways does not have a positive impact on regional development and does not result in higher economic effectiveness (Munnell, 1992; Holtz-Eakinand Schwartz, 1994; Rephann, 1994 and others).

At this point it is necessary to say that the research studies of the latter group of authors focus on countries with a developed motorways infrastructure and therefore its enlargement is considered to be ineffective. Of course, this is not the case of Slovakia and Poland, where a motorways and expressways infrastructure has not been completed yet, although it could have connected parts of the countries and made the road transport safer.

The term road infrastructure is used for a network of roads which which makes it possible to connect two or more municipalities or objects (buildings, natural phenomena, tourist attractions) and is used to transport people and cargo. According to Patarasuk (2013), 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 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.

3. Road infrastructure in the Slovak Republic

Road infrastructure in Slovakia has great importance, because road transport is the most widely-used mode of transport in Slovakia. The advantageous geographical location of Slovakia in Europe increases the importance of road infrastructure in the 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.Fig. 2 shows the division of Slovakia into self-governing regions.

Fig. 2. Administrative division of Slovakia (self-governing regions)

Source: http://snn.sk/dlhy-cas-zmien-a-hladania-optimalneho-modelu/

In the Slovak Republic, there are significant differences in the social and economic level of its regions. According to Šedivá (2012, p. 31), the differences arise not just from natural-geographic, demographic and historical background of the regions, but also depend on other socio-economic and political factors. These factors have greatly influenced the current socio-spatial situation in Slovakia, resulting in a very uneven distribution of economic and social activities in the territory of the SR.

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 greatest length of the roads is in the largest region of Banská Bystrica, with more than 7,484 km of roads. As of 2013, the region had no motorways, but it has the largest network of expressways among regions of Slovakia with almost 104

km, accounting for 1.4% of the network of roads in the country. The minimum length of road infrastructure is in the smallest region of Bratislava, less than 2,400 km. This region, however, has the longest network of motorways among the regions of Slovakia with nearly 112 km, which represents a 4.7% share of the network of roads in the country. There are no expressways built in the Bratislava region.

Since individual regions of Slovakia differ in size, to compare road infrastructure it is preferable to use a density in km per km2. The highest density of road infrastructure is in the Trenčín region, 1.18 km/km2, while the lowest density of only 0.70 km/km2 is in the Prešov region. In the reported period we can observe increase in the density of roads especially in Bratislava and Trnava. Conversely, a reduction in the density of roads mainly due to decrease in the length of local roads occurred in Žilina, Košice and Banská Bystrica.

Since a sufficient number of 1st class roads, 2nd class roads and 3rd class roads is built in Slovakia, most attention in recent years has been 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 take over considerable part of the traffic from parallel roads of lower class.

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 the Prešov region to the second place behind Bratislava and ahead of Trenčín when it comes to the length of motorways network in Slovakia.

There are no motorways built in the Nitra and Banská Bystrica regions, but these two regions have the largest network of expressways. During the period 2005–2013 their length increased in the Banská Bystrica region by more than 66 km to almost 104 km and in the Nitra region by some 52 kilometres to nearly 68 km. There are no expressways built in the region of Bratislava.Fig.3 shows the parts of motorways and expressways (in orange) built in Slovakia in 2005–2013.

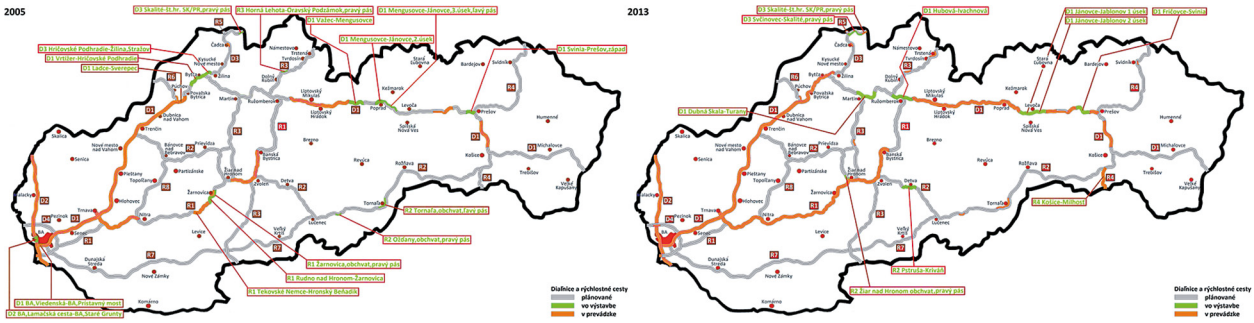

Fig. 3. Motorways and expressways in Slovakia in 2005 and 2013

Explanation: motorway/expressway in operation
motorway/expressway under construction
motorway/expressway under preparation

Source: http://www.historiadialnic.sk/historia-1999-2008/a2005/

The highest density of superior road infrastructure (motorways and expressways) is in the region of Bratislava, almost 0.054 km per km2 in 2013 followed by Trnava and Trenčín, while the lowest density of superior road infrastructure is in Košice (0.007 km per km2). During the reported period, the density of superior road infrastructure has most increased in Nitra and Banská Bystrica due to the completion of the new sections of expressways.

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 2013. The results are shown in Figure 4.

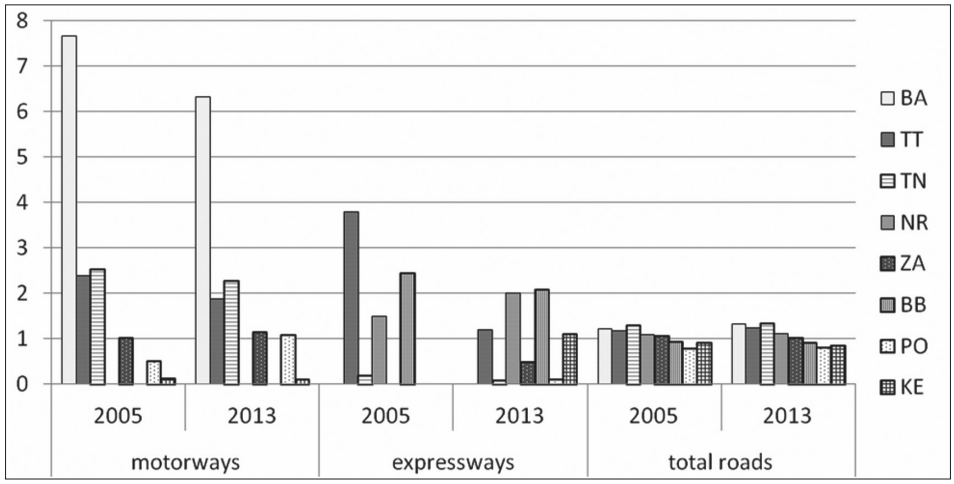

Fig. 4. Localization coefficient of road network in SR (by NUTS III)

Explanation: BA – Bratislava region TT – Trnava region TN – Trenčín region
NR – Nitra region ZA – Žilina region BB – Banská Bystrica region
PO – Prešov region KE – Košice region

Source: calculated and compiled by authors

From Figure 4 it is clear that in the regions of Slovakia the least evenly distributed are highways, especially in 2005, when the localization coefficient for motorways in the Bratislava region reached 7.66. The use of motorways in Bratislava region is thus more than 7-fold higher compared to the Slovak average. In 2013, 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 the Trnava region. Even in the case of expressways differences in their localization in 2013 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. the layout of the road network in the region is relatively uniform, with higher coefficients of localization in the western part of Slovakia.

4. Road infrastructure in Poland

Poland represents a link between Eastern/Western and Northern/Southern part of the European Union. This geographical location and the potential capacity of the domestic market provide an important opportunity for the development of Poland as a whole. (Musial-Malago, 2005). Fig.5 shows the division of Poland into voivodships.

In 2005, the condition of road infrastructure in Poland was one of the greatest barriers to the growth of the Polish economy and more specifically it had serious impacts upon specific industrial and commercial activities. The physical and technical condition of most of the other existing roads in Poland was very poor (Kapsa – Roe, 2005, p. 58)

In Poland there are the following types of roads: national (krajowe), regional (wojewódzkie), district (powiatowe), and local (gminne).

The longest network of the roads is in the largest Mazowieckie region (more than 35,000 km), the smallest network of the roads are in the Lubuskie and Opolskie regions (less than 8,500 km).

Due to the varying size of individual regions we examine the level of road infrastructure in the regions of Poland on the basis of the density of roads in km/km2. The highest density of road network is in the Slaskie (1.88 km km/km2) and Malopolskie (1.59 km/km2) regions, while the minimum density is in the Zachodniopomorskie and Lubuskie region (0.60 km/km2). Comparing 2013 to 2005, the biggest increase in the density of the road network was in the Slaskie region, while the smallest increase was in the Opolskie region.

Fig. 5. Administrative division of Poland (voivodships)

Source: http://www.gddkia.gov.pl/pl/1077/mapa-stanu-budowy-drog

Poland had gradually built up its network of superior road infrastructure during the period 2005–2013. Most of the motorways were built in the Dolnoslaskie region, nearly 222 km, followed by the Wielkopolskie region with the motorway network of the length of 210.5 km. There are no motorways built on the territory of the Lubelskie, Podlaskie, Swietokrzyskie and Warminsko-mazurskie voivodships. In the years 2005–2013, most of the new motorways were built and put into use in the Łódzkie voivodship, up to 170 km. More than 100 km of motorways was built in the Slaskie and Kujawsko-Pomorskie regions.

Along motorways, expressways are a very important part of the road network. The longest network of expressways is in the Mazowieckie region, followed by the regions of Warminsko-mazurskie and Zachodniopomorskie. The largest increase in the length of expressways occurred in the regions of Mazowieckie and Warminsko-mazurskie, about 137 km; an increase of more than 100 km was also noted in the regions of Lodzkie, Zachodnipomorskie and Wielkopolskie. By contrast, there are no expressways built in the region of Opolskie, while the region of Podkarpackie has only 11 km of expressways. In the Lódzkie, Podkarpackie and Podlaskie regions, expressways were built only in 2012. Fig. 6 shows the parts of motorways and expressways built in Poland in 2005–2013.

The highest density of motorways and expressways is in the region of Slaskie, namely 0.023 km/km2. Very low density of motorways and expressways is noted in the regions of Lubelskie and Podlaskie (0.002 km/km2). The highest increase in the density of superior road infrastructure is in the regions of Lodzkie, Slaskie and Lubuskie which was caused by the construction of new motorways and expressways. In Poland we can compare uniformity, respectively non-uniformity of road network through the localization coefficient (see Figure 7).

Figure 7 shows that major differences in the localization of motorways and expressways in the regions of Poland was in 2005, in 2013 there was a slight decrease. Overall, the highest localization coefficients were obtained in the localization of motorways in 2005 in the Opolskie region (5.31) and localization of expressways in 2005 in the Slaskie region (5.23).

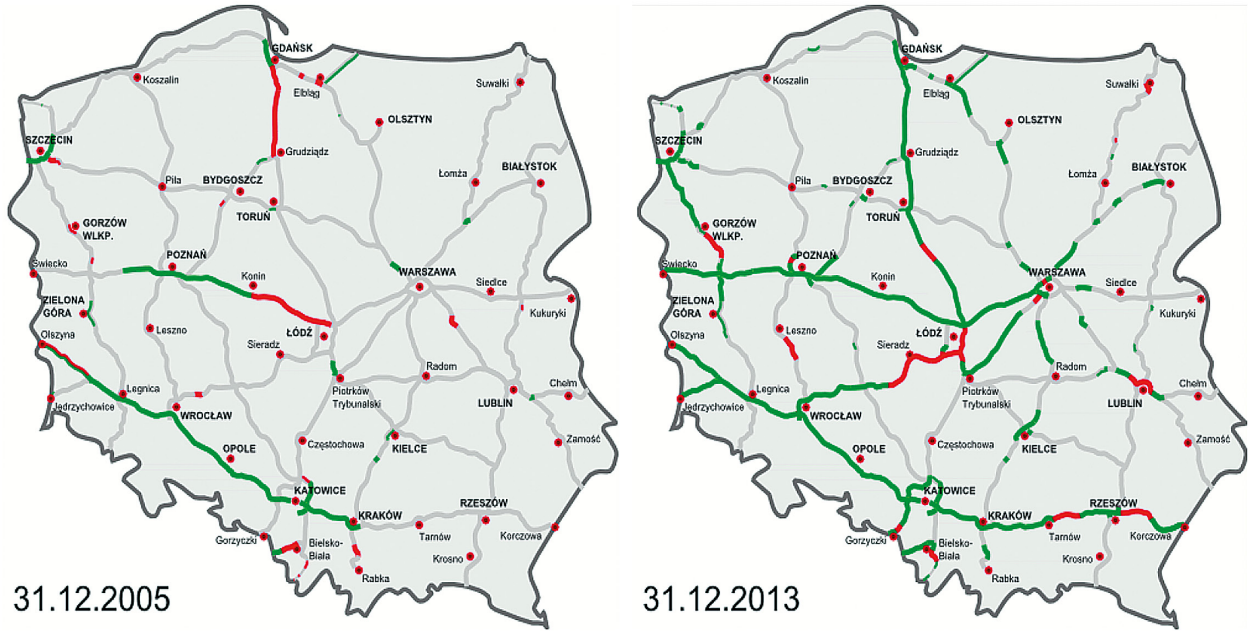

Fig. 6. Motorways and expressways in Poland in 2005 and 2013

Explanation: motorway/expressway in operation
motorway/expressway under construction

Source: http://www.wikiwand.com/en/Highways_in_Poland

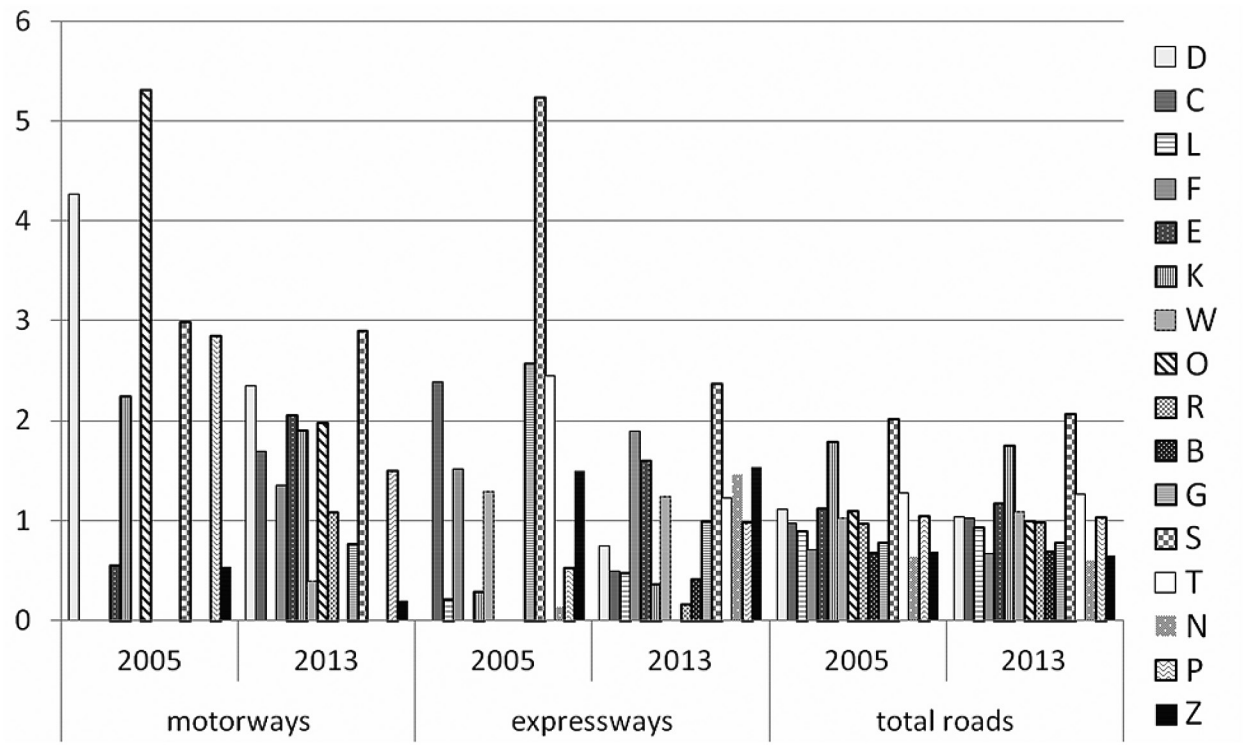

Fig. 7. Localization coefficient of the road network in Poland

Explanation: D – Dolnośląskie; C – Kujawsko-pomorskie; L – Lubelskie; F – Lubuskie; E – Łódzkie; K – Małopolskie
W – Mazowieckie; O – Opolskie; R – Podkarpackie; B – Podlaskie; G – Pomorskie; S – Śląskie
T – Świętokrzyskie; N – Warmińsko-mazurskie; P – Wielkopolskie; Z – Zachodniopomorskie

Source: calculated and compiled by authors

Localization coefficients of the total road network in the regions of Poland are lower compared to motorways and expressways; however, they remained largely unchanged during the analysed period.

5. Comparison of road infrastructure in Slovakia and Poland

The density of road infrastructure in the regions of Slovakia ranges from 0.70 to 1.18 km/km2, in some regions there is an increase while in some regions reduction due to the decrease of the total length of roads. The density of the road network in the regions of Poland in 2005 ranged from 0.51 to 1.64 km/km2; in 2013, we can observe slight improvement in all of the regions.

During the years 2005–2013, the length of motorways in the SR increased by only about 89.1 km, i.e. the share of motorways in the total road infrastructure increased from 0.76% to 0.97% by 2013. In Poland during the same period, 930.1 km of motorways was completed, their share in the total length of road infrastructure increased from 0.22% to 0.52%.

Slovakia built 180.2 km of expressways, their share of the total road network increased from 0.18% to 0.60%. In Poland, during the years 2005–2013, the length of expressways increased by 986.6 km, their share in the total road network increased from 0.10% to 0.44%.

As far as the density of motorways and expressways in Slovakia is concerned, the best region in this indicator is the Bratislava region, where the density of motorways and expressways in 2013 was 0.054 km/km2. In Poland the best region is Slaskie, where the density of motorways and expressways in the year 2013 was 0.023 km/km2. In order to compare the differences in the road infrastructure of regions of Slovakia and Poland, we recalculated the coefficient of variation, as shown in Figure 8.

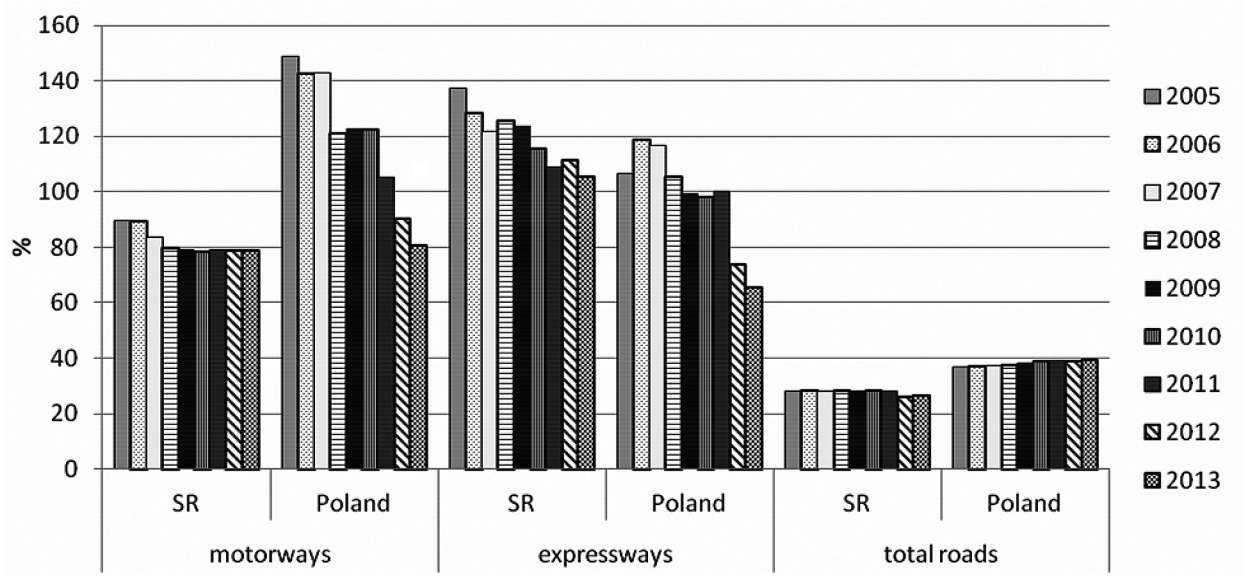

Fig. 8. Coefficient of variation of road infrastructure in Slovakia and Poland

Source: calculated and compiled by authors

Figure 8 shows that at the level of motorways in Poland there are more significant regional differences than in Slovakia; however, in recent years this difference has been decreasing. At the level of expressways, however, regional differences are higher in Slovakia; nevertheless, we can see their reduction. As far as the overall road infrastructure is concerned, it is clear that differences between regions of Slovakia are significantly lower than in the regions of Poland. In Slovakia, the coefficient of variation of the total road infrastructure decreased from 28% in 2005 to 26.2% in 2013; in Poland, by

contrast, it increased slightly from 36.7% in 2005 to 39.2% in 2013.

6. Discussion and conclusion

A developed road infrastructure is an important prerequisite for the functioning of the economy of each state and helps to reduce disparities between regions. This fact is valid for all regions in all phases of socio-economic development.

Improving the level of road infrastructure in countries and regions presents new opportunities for the growth of tourism, inflow of foreign investments, and higher levels of employment, thereby supporting overall economic and social development as a basis for increase of their competitiveness. It is therefore essential to devote permanent attention to modernization, development and maintenance of road infrastructure. Motorways and expressways play a particularly important role in the development of individual regions.

The road network in the Slovak Republic is dense enough, but there is low share of motorways and expressways. Over the last years the length of motorways and expressways was redoubled in Slovakia. Poland has gradually built up its network of superior road infrastructure too. The presence of road infrastructure in the regions of Slovakia and Poland is very uneven; however, the situation in both countries has been changing, especially in the recent years. The pace of development is faster in Poland than in Slovakia. The differences between regions of Slovakia are significantly lower than between the regions of Poland.

As noted by the EU Commission (2013a), further development of road infrastructure in the upcoming period shall be made within the framework of EU transport policy.

The new EU infrastructure policy triples EU financing to €26 billion for transport for the period 2014–2020. At the same time it refocuses transport financing on a tightly defined new core network. The new core TEN-T network will be supported by a comprehensive network of routes, feeding into the core network at regional and national level. The aim is to ensure that progressively, and by 2050, the great majority of Europe's citizens and businesses will be no more than 30 minutes' travel time from this comprehensive network.

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References

Adamkovičová, B., 2013: Regionálne analýzy a plánovanie (Regional analyses and planning – in Slovak), Trenčín: TnUAD.

Bray J., 1992: The Rush for Roads: a road programme for economic recovery? London: Transport 2000 Ltd.

Carlino, G.A., 1987: The determinants of county growth. In: *Journal of Regional Science,* Vol. 27, Issue 1, pp. 39–54.

Cestná databanka Slovenskej správy ciest (Road Databank of Slovak Road Administration), 2015: Mapy a štatistické výstupy Cestnej databanky (Maps and statistical outputs of Road Databank – in Slovak). Available from: http://www.cdb.sk/sk/Vystupy-CDB.alej, DoA: 9 January 2015.

Dlhý čas zmien a hľadania optimálneho modelu (A long-time of changes and seeking for optimal model – in Slovak). In: *Slovenské národné noviny*. Available from: http://snn.sk/dlhy-cas-zmien-a-hladania-optimalneho-modelu/, DoA: 30 July 2015.

European Commission, 2013a: New EU transport infrastructure policy – background. Brussels. Available from: http://europa.eu/rapid/press-release_MEMO-13-897_sk.htm, DoA: 25 February 2015.

European Commission, 2013b: TEN-T Core Network Corridor. Available from: http://ec.europa.eu/transport/infrastructure/tentec/tentec-portal/site/en/maps.html, DoA: 29 July 2015.

Eurostat, 2014: Area – NUTS 3 regions. Available from: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=demo_r_d3area&lang=en, DoA: 25 October 2014.

Evers, G.H.M., Van Der Meer, P.H., Oosterhaven, J. and Polak, J.B., 1987: Regional impacts of new transport infrastructure: a multisectoral potentials approach. In: *Transportation*, Volume 14, Issue 2, pp. 113–126.DOI: 10.1007/BF00837588.

Garcia-Milà, T. and J McGuire, T.J., 1992: The contribution of publicly provided inputs to states' economies. In: *Regional Science and Urban Economics*, Vol. 22, Issue 2, pp. 229–241.

Ghosh, B. and De, P., 1998: Role of Infrastructure in Regional Development: A Study over the Plan Period. In: *Economic and Political Weekly*, Vol. 33, Issue 47/48, pp. 3039–3048.

Główny Urząd Statystyczny (Central Statistical Office of Poland), 2015: Transport i Łączność. Available from: http://stat.gov.pl/bdl/app/dane_podgrup.hier?p_id=419099&p_token= 728204985, DoA: 12 January 2015.

Habánik, J. and Koišová, E., 2011: Regionálna ekonomika a politika (Regional Economy and Policy – in Slovak), Trenčín: TnUAD.

Havierniková, K. and Janský, B., 2014: The evolution of regional disparities in the Slovak Republic. In: *VADYBA*, Vol. 25, Issue 2, pp. 133–138. Available from: http://www.ltvk.lt/en/m/departments/research-magazine-management-/, DoA: 15 March 2015.

Hey Ch., Pfeiffer, T. and Topan, A., 1996: The Economic Impact of Motorways in the Peripheral Regions of the EU. Freiburg: EURES, Institute for Regional Studies in Europe.

Highways in Poland. Available from: http://www.wikiwand.com/en/Highways_in_Poland, DoA: 29 July 2015.

História diaľnic na Slovensku (History of motorways in Slovakia – in Slovak). Available from: http://www.historiadialnic.sk/historia-1999-2008/a2005/, DoA: 30 July 2015.

Holtz-Eakin, D. and Schwartz, A.E., 1994: Infrastructure in a Structural Model of Economic Growth, Working Paper No. 4824, Cambridge: National Bureau of Economic Research.

Hong, J., Chu, Z. and Wang, Q., 2011: Transport infrastructure and regional economic growth: evidence from China. In: *Transportation,* Vol.38, Issue 5, pp. 737–752. DOI: 10.1007/s11116-011-9349-6.

Kapsa, E. and Roe, M., 2005: The development of the motorway network in Poland and the future development of polish ferry shipping. In: *European Transport*, Issue 29, pp. 57–70. Available from: http://www.openstarts.units.it/dspace/handle/10077/5866, DoA: 15 January 2014.

Linneker, B.J. and Spence, N., 1996: Road transport infrastructure and regional economic development: The regional development effects of the M25 London orbital motorway. In: *Journal of Transport Geography*, Vol.4, Issue 2, pp. 77–92.

Mapa Stanu Budowy Dróg (Map of the state of road construction – in Polish). Available from: http://www.gddkia.gov.pl/pl/1077/mapa-stanu-budowy-drog, DoA: 30 July 2015.

Munnell, A. H., 1992: Policy watch: infrastructure investment and economic growth. In: *Journal of Economic Perspectives*, Vol. 6, Issue 4, pp. 189–198.

Musial-Malago, M., 2005: Transport infrastructure in Poland: the current state and projects for the future. In: *European Transport*, Issue 30, pp. 54–60.

Nijkamp, P., 1986: Infrastructure and regional development: A multidimensional policy analysis. In: *Empirical Economics*, Issue 11, pp. 1–21. DOI: http://dx.doi.org/10.1007/BF01978142.

OECD, 2002: Impact of Transport Infrastructure Investment on Regional Development. Paris:OECD.

Oosterhaven, J. and Knaap, T., 2003: Spatial economic impacts of transport infrastructure investments. In: Pearman, A., Mackie, P., Nellthorp, J., Giorgi, L. (eds.), *Transport Projects, Programmes and Policies: Evaluation Needs and Capabilities.*

Patarasuk, R., 2013: Road network connectivity and land-cover dynamics in Lop Buri province, Thailand. In: *Journal of Transport Geography*, Vol. 28, pp. 111–123. DOI: http://dx.doi.org/10.1016/j.jtrangeo.2012.11.011.

Percolo, M., 2003: Transport Infrastructure and Regional Development. In: *Trasporti. Diritto, economia, politica*, Issue 89. Available from: http://www.openstarts.units.it/dspace/handle/ 10077/5596, DoA: 12 January 2015.

Queiroz, C. and Gautam, S., 1992: Road Infrastructure and Economic Development-Some Economic Indicators. WPS 921, Washington, DC: World Bank. Available from: http://econ.worldbank.org/external/default/main?pagePK=64165259&theSitePK=475317&piPK=64165421&menuPK=64166093&entityID=000009265_3961004011323, DoA: 12 January 2015.

Rephann, T. J., 1993: Highway Investment and Regional Economic Development: Decision Methods and Empirical Foundations. In: *Urban Studies*, Vol. 30, Issue 2, pp. 437–450.

Rienstra, S.A., Rietveld, P., Hilferink, M.T. and Bruinsma, F.R., 1998: Road infrastructure and corridor development. Network Infrastructure and the Urban Environment. In: Advances in Spatial Science, pp. 395–414. Springer Berlin Heidelberg.

Rietveld, P. and Bruinsma, F., 1998: Is Transport Infrastructure Effective? Transport Infrastructure and Accessibility: Impacts on the Space Economy. Berlin:Springer.

Šedivá, M., 2012: Územno-správne členenie Slovenska v regionálnom kontexte. (Territorial and administrative division of Slovakia in the regional context – in Slovak). In: *Faktory sociálneho a ekonomického rozvoja regiónov Slovenskej republiky.* (*Factors of social and economic development of regions in Slovak Republic – in Slovak)*. Trenčín: TnUAD.

Spiekermann, K, and Wegener, M., 2006: The role of transport infrastructure for regional development in south-east Europe. In: *SEER-South-East Europe Review for Labour and Social Affairs*, Issue 01, pp. 51–61.

Štatistický úrad Slovenskej republiky (Statistical Office of Slovak Republic). 2014:Miestne komunikácie (Local roads). Regional database. Available from: http://px-web.statistics.sk/PXWebSlovak/, DoA: 27 December 2014.

Tvrdoň, J., Hamalová, M. and Žárska, E., 1995: Regionálny rozvoj (Regional development). Bratislava: Ekonóm.