Regional Development of the Transportation Systems of the V4 Countries

GYULA GAAL[1], MÁRIA CSETE[2], ÁDÁM TÖRÖK[3]
[1]*KTI Institute for Transport Sciences Non Profit Ltd.*
1119 Budapest, 3-5 Than Károly str.
Hungary
gaal.gyula@kti.hu

[2]*Budapest University of Technology and Economics*
1117 Budapest, 2 Magyar Tudósok körútja
Hungary
csete@eik.bme.hu

[3]*Budapest University of Technology and Economics*
1111 Budapest, 2 Sztoczek str.
Hungary
atorok@kgazd.bme.hu

Abstract

The commercial, business, scientific and touristic relations of the Czech Republic, Slovakia, Poland and Hungary, the so-called Visegrad countries are increasing intensively. Joining the Schengen Area also stimulated the trade between these countries. The developing of the North-South transport infrastructure connecting the V4 countries in a reasonable, planned and effective way needs a large-scale, extensive data recording and, based on that, a complex research series. If the Visegrad countries would like to step up uniformly, they have to recognize and define the common problems in order to create common solutions for them.

Key words: Visegrad countries, transport, bottlenecks, infrastructure

JEL Classification: O18, L91

1 Introduction

Significant progress has been made in the EU as for the establishment of West-East transport connections, for the access of the East European markets. Although over the recent years enormous transport infrastructure developments have been made, no North-South infrastructure corridor has been built up in the eastern border region of the EU.

The purpose of the research entitled “Preparations for the development of the North-South transport corridors between V4 countries” is the preparation and impact assessment of the North-South corridor to be established in order to interconnect V4 countries. The paper focuses on environmental sustainability and the improvement of transport efficiency in the V4 region. The aim is to analyse the extension of EU transport infrastructure network within the V4 region in order to enhance the interconnection of V4 countries and to vitalize their economic and social integration.

2 Theoretical Review

The commercial, business, scientific and touristic relations of the Czech Republic, Slovakia, Poland and Hungary, the so-called Visegrad countries (V4) are increasing intensively (Sinicáková, Šuliková, Árvayová, 2014). The scale of this increase is higher than in the case of the relations with the European Union's most developed countries, e.g. it reaches 35-45% of the trade with Germany. This can be recognized on the North-South direction of the road and rail network which connect the V4 countries. The number of the Czech, Polish, Hungarian and Slovakian vehicles is also increasing.

Joining the Schengen Area also stimulated the trade between these countries. Many new border crossings have been opened. Traffic is dynamically growing both on the road and the rail network infrastructure from South to North and vice versa. However traffic flows are quite small. Although the capacity affected by international traffic is not a problem yet, the quality of transport infrastructure is low at many sessions and hubs which consequently decreases the quality of traffic flows, too.

The developing of the North-South infrastructure connecting the V4 countries in a reasonable, planned and effective way needs a large-scale, extensive data recording and, based on that, a complex research series. Based on the recorded and adumbrated data and information a road and rail infrastructure development is needed, which is based on the expected traffic demands in the V4 countries.

During that special attention has to be paid on the traffic coming from the neighboring and further countries which also have effects on capacity. Because of the V4 countries' central location, these countries are inescapable both for the East-West and North-South traffic. The transit importance of this area is obviously high, therefore V4 countries must react uniformly to these challenges and they have to pay special attention on the environmental and transport safety aspects.

3 Methodology

3.1 Tendencies

Foreign trade and tourism relations basically determine transport and travel demands between the V4 countries. In the field of foreign trade – despite the fast increase of the North-South direction – the East-West relation is determining, especially to Germany, Russia and China. In 2012 the sum of export and import trade with Germany was 66 billion € in the case of the Czech Republic, 69 in Poland, 38 with Hungary and 20 in Slovakia. Poland has the most intensive relation with Russia (29 billion €) but other countries' are also remarkable. The Czech Republic, Poland and Hungary have similar traffic with China, and this is just higher than the traffic within the V4 countries.

Hungary traded with other V4 countries in the value of 18 billion € which is almost the half of the value traded with Germany in 2012 (Fig 1.). The rate is 34% in Poland, 45% in the Czech Republic. It is clear that trading within the Visegrad countries is comparable with the trading with the biggest European countries.

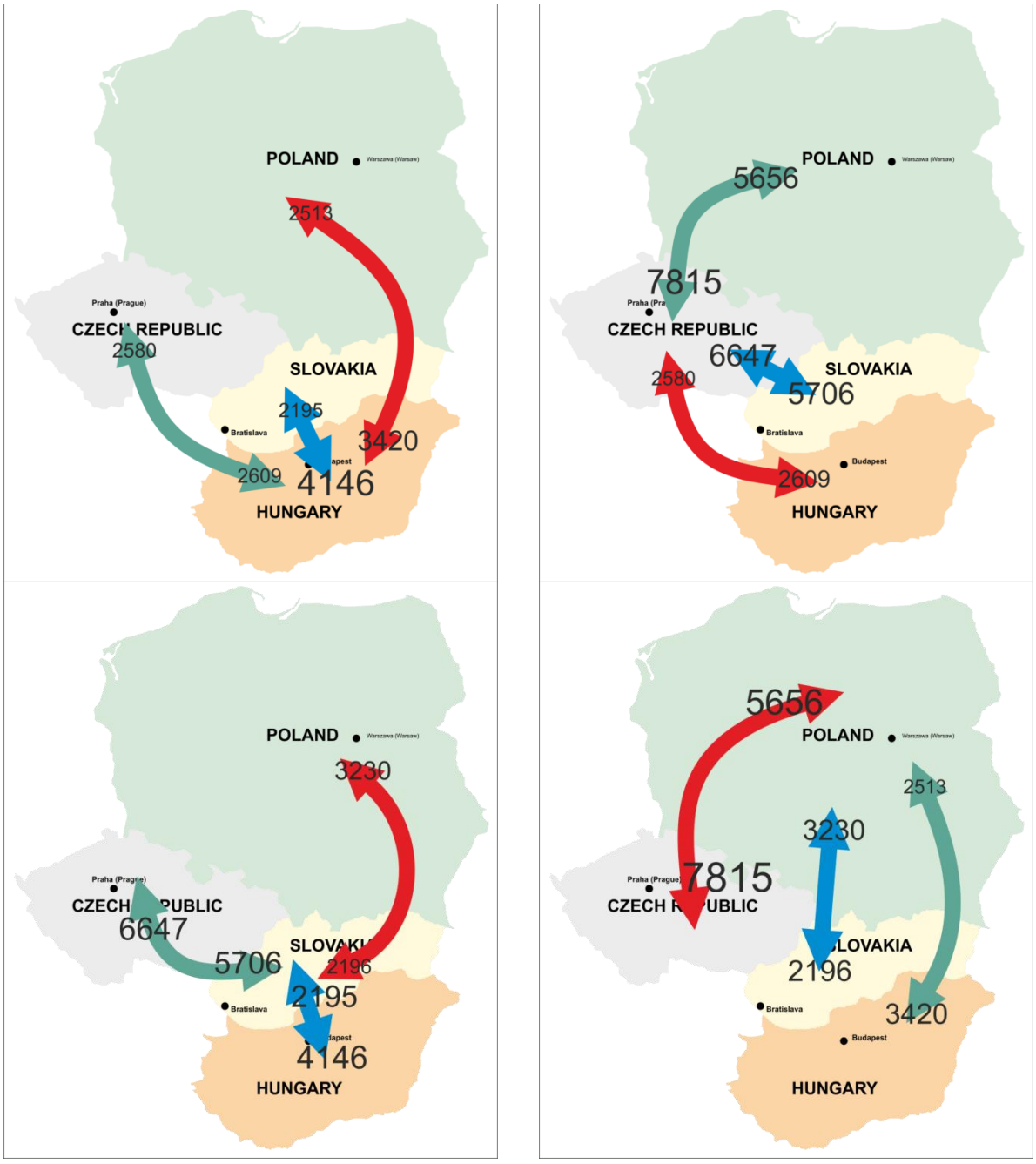


Fig. 1 Foreign trade of the V4 countries 2012 (M €)
Source: own compilation based on the data of the national statistical offices

The trade within the V4 countries more than doubled between 2003 and 2007, while it only grew by 50% with the older EU members in the same period.

On the next figure (Fig 2.) summarizes depicts the topic of tourism within the V4 countries. It also has to be noticed that tourism highlights the transport safety aspects (Pokorný, Lipl, 2014 and Jankowska, Wacowska-Slezak, Zukowska, 2014).

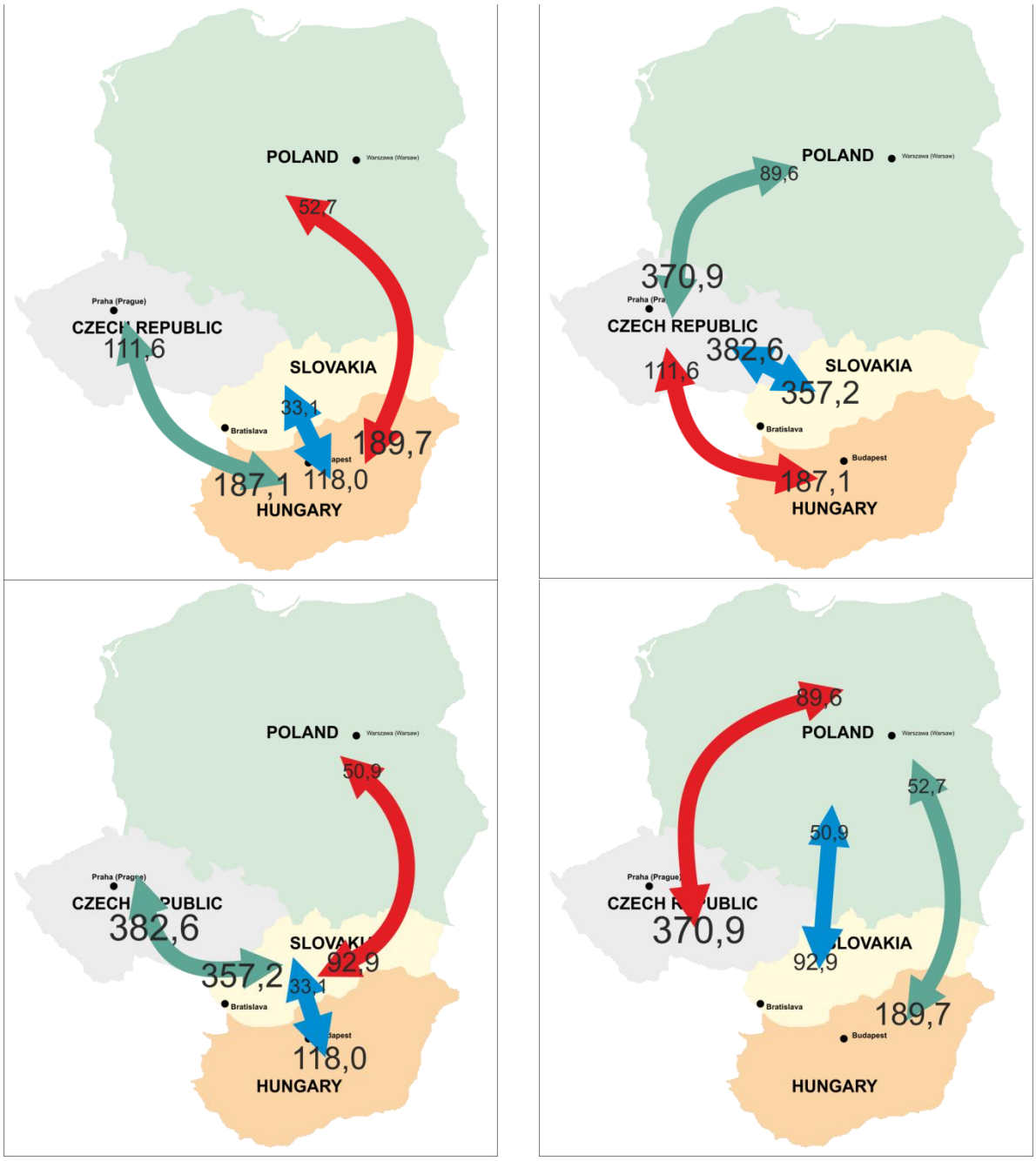


Fig. 2 Tourism in the V4 countries 2012 (1000 p)
Source: own compilation based on the data of the national statistical offices

3.2 Missing connections

Several problems exist in the Visegrad countries infrastructure which have to be solved (Molendowski, 2013). Regarding the road network (Fig 3a.) it can be stated that the East-West connections are more developed than the North-South. It has to be mentioned that the North-South connection in Poland is the stronger because of the country's capabilities, but the high service level infrastructure is missing in the Eastern part of the country. The Czech (Ostrava's) expressway connection through Brno is relatively new, but it has an important role in creating the North-South connection. In Slovakia the E77 European main road for geographical reason could be built economically only in the quality of a main road. In Hungary the M5 motorway had been built in it's total length, M6 is almost complete, while M15 and M2 are partly ready. M2 has role only in the agglomeration despite it is a connection to the North, namely Slovakia.

Fig 3a. Road network in the V4 countries
(Source: MMRD, 2010 p. 17.)

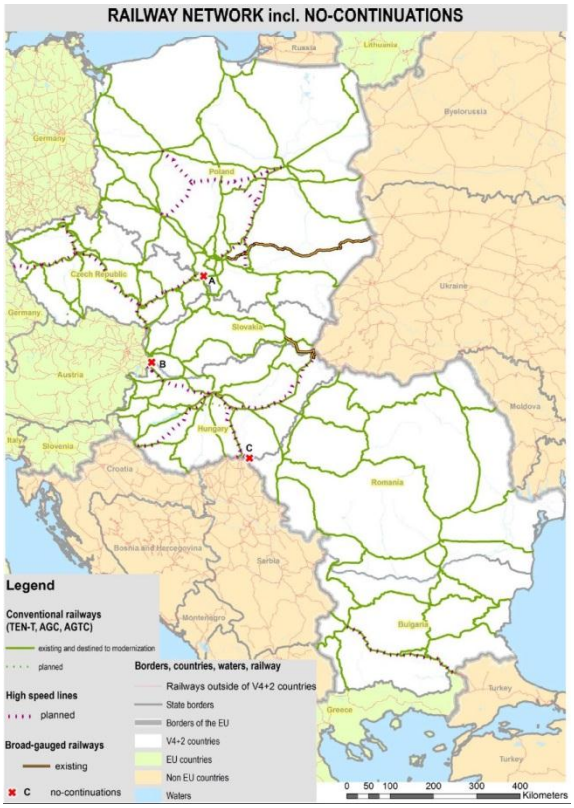


Fig 3b. Rail network in the V4 countries
(Source: MMRD, 2010 p. 16.)

The main traffic flows are the same in the case of rail and road transport mode but the average transport distance of international rail transport is higher. The international rail passenger transport is competitive with road only in a few cases. The existing level of the rail connections between the Czech Republic and Poland are acceptable, but the quality on the Polish side decreases the capacity and speed (Fig 3b.). The freight transport between Poland and Slovakia is thin, the international passenger trains are using the better built Czech lines. There is passenger transport only on the one-fifth of the Slovakian-Hungarian rail connections.

Inland waterways (Fig 4.) are only to be mentioned at this stage as inland navigation is not significant in the territory of V4 countries (Radmilović, Maraš, 2011 and Rohács, Simongáti, 2007).

Fig. 4 Inland waterways network in the V4 countries
Source: MMRD, 2010 p. 18.

Interesting numbers can be found in the field of border crossings. Traffic has to travel more to the nearest border crossing at the internal V4 borders (Table 1.) than in the case of the external V4 borders (Table 2.)

Tab. 1 Border crossings between the V4 countries

Border crossings between the V4 countries				
Border	Length [km]	Number of land border crossings	Average length between border crossings [km]	Number of air border crossings
Czech Republic - Slovakia	252	22	11,45	10 (CZ)
Poland – Czech Republic	762	36	21,17	20 (PL)
Slovakia - Hungary	515	26	19,81	3 (HU)
Poland - Slovakia	444	19	23,37	3 (SK)

Source: own compilation based on the data of the European Parliament and European Council

Tab. 2 Border crossings at the external borders of the V4 countries

Border crossings at the external borders of the V4 countries			
Border	Length [km]	Number of land border crossings	Average length between border crossings [km]
Hungarian - Austrian	366	22	16,64
Slovakian - Austrian	91	8	11,38
Czech - Austrian	362	26	13,92
Czech - German	646	46	14,04
Polish - German	456	36	12,67
Polish - Ukrainian	526	12	43,83
Hungarian - Romanian	443	15	29,53

Source: own compilation based on the data of the European Parliament and European Council

3.3 Development areas and axes

What can be stated in connection with the spatial development plans of the Czech Republic? The main expressways and railway lines are running parallel with the development axes (Fig 5.) (TPCR, 2005). In the area of Ústí Nad Labem–Chomutov–Most there are operating freight transport railway lines but with decreased capacities. The smaller part of the expressway network is being built, the rest is under planning. The existing network elements are strongly Prague centered and there are some smaller existing sub-network in Moravia (Kampf, Průša and Savage, 2011).

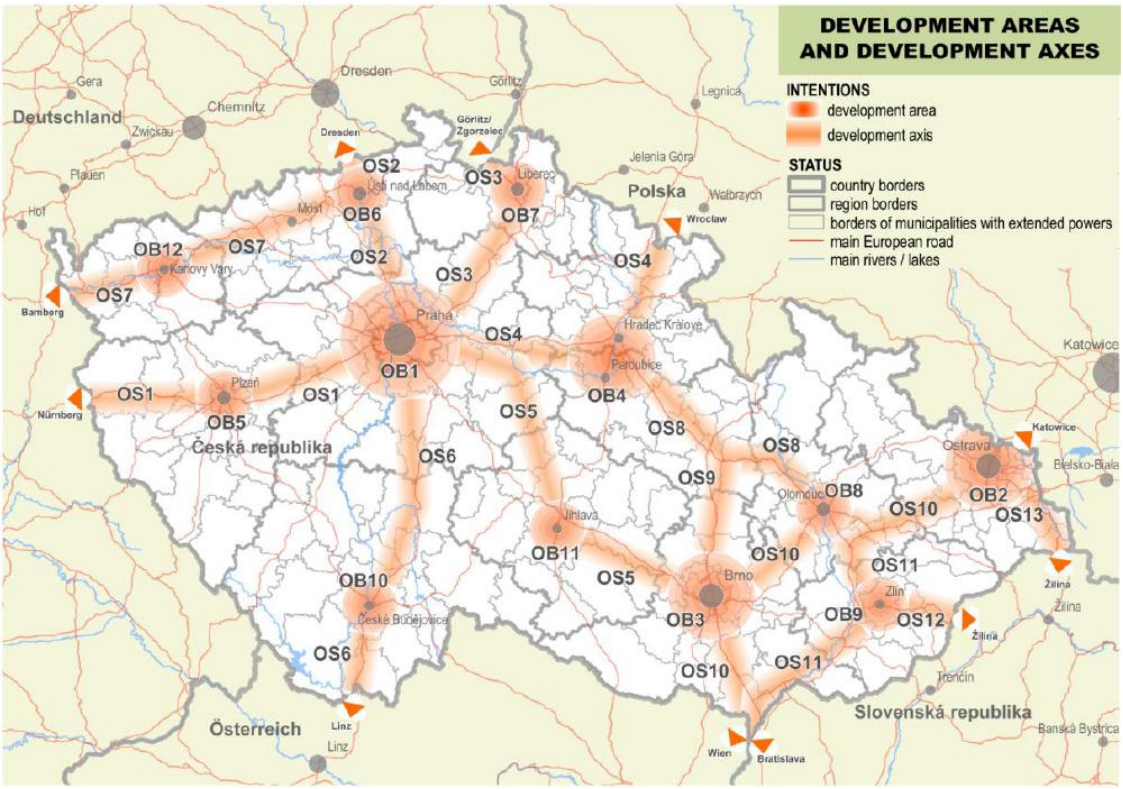


Fig. 5 Development areas and development axes in the Czech Republic
Source: MMRD, 2010 p. 33.

In Slovakia (GSR, 2005) proportional population and economic weight can be recognized in the separated twin city areas (Bratislava-Trnava; Žilina-Martin; Banská Bystrica-Zvolen; Košice-Prešov). There are two main transport corridors and development axes (Fig 6.) and limited North-South connections in the central areas.

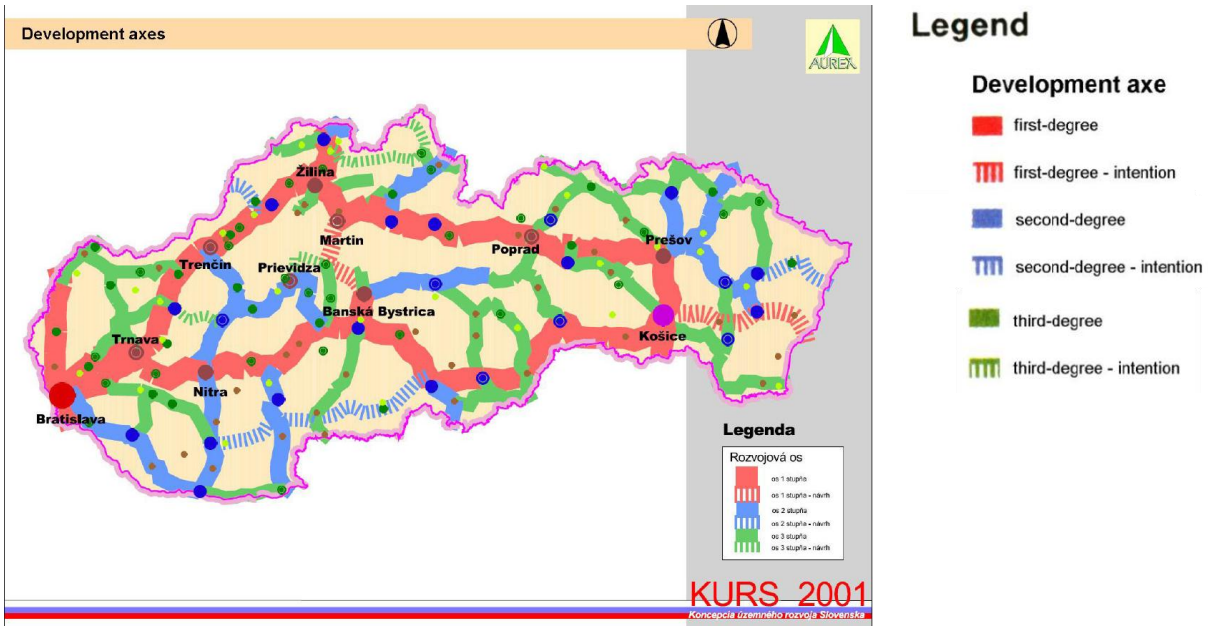
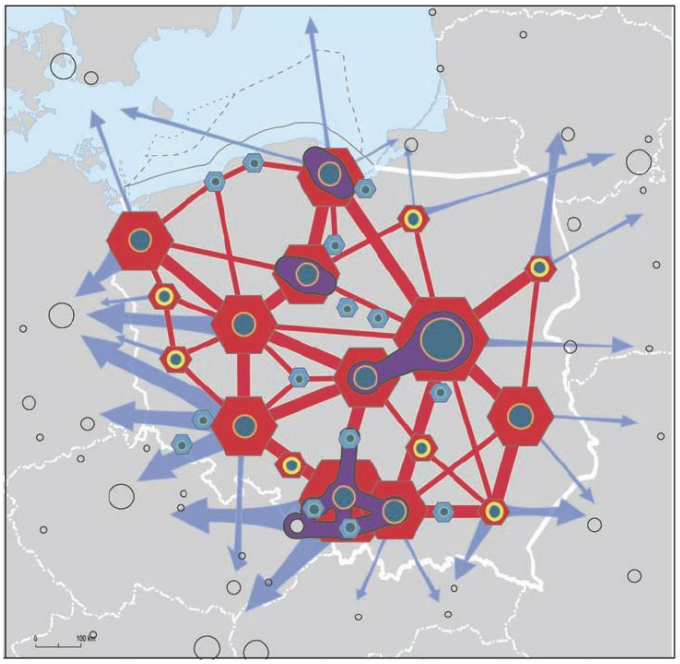


Fig. 6 Development areas and development axes in the Slovak Republic
Source: MMRD, 2010 p. 37.

In Poland (MRD, 2012) the population of the network of the cities is balanced (Fig 7.). The most important cities are Western direction from Warsaw in a half circle formation. The existing infrastructural connections are developed. The Eastern areas are less dynamic and relatively centreless, consequently the Polish North-South axe's level is low. There are remarkable functional connections only in the direction of Germany and the Czech Republic.



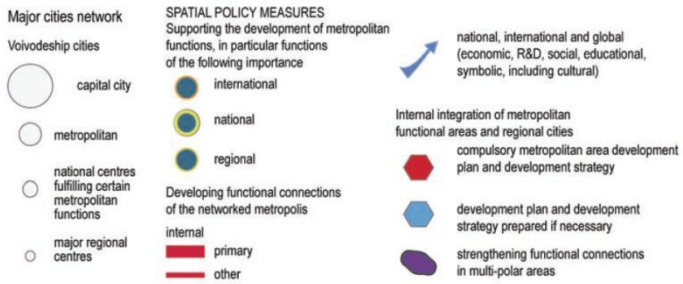


Fig. 7 Development areas and development axes in Poland
Source: (National Spatial Development Concept 2030) p. 77.

Hungary (NTH, 2012) can be characterized with the most concentrated city network, the predominance of Budapest (Fig 8.) and a radial motorway network. The bigger cities are located at these radiuses, near the borders, so the cross-border economic and social connections are warming up. Budapest has a theoretical potential directed to the capital cities of the V4 countries, but this is currently idle.

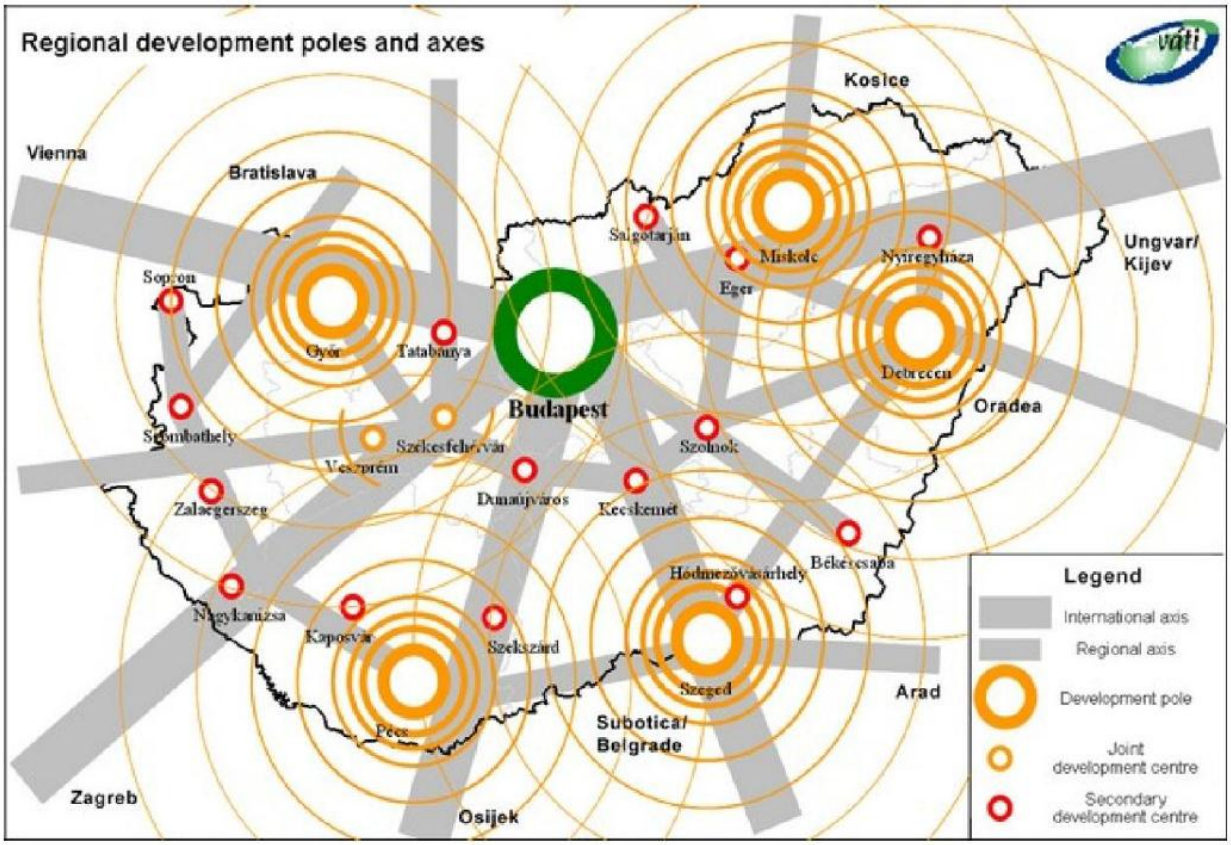


Fig. 8 Development areas and development axes in Hungary
Source: (V4+2, 2010) p. 34.

4 Conclusion

Let's sum up the most important aspects and attributions which have to be considered when the plans are created to solve the Visegrad countries' transport infrastructure issues. No doubt that developing infrastructure has a major spatial and economic developing effect. Secondly, railway is slower in every analyzed connection than the road. The East-West connections are much better than the North-South connections.

Regarding the exact cities, the connections between the capitals of the V4 countries are much better than other connections between the important regions but on the other hand it is difficult to reach Warsaw from the other 3 capitals and just like from the South. Bratislava has no air connections to V4 destinations, but Schwechat airport in Vienna replaces it well.

Bottlenecks are caused by domestic and agglomeration traffic can be found at metropolitan areas, worsening the quality of international traffic. The quick increase of the transit traffic through the V4 countries explains the established development of the infrastructure (e.g. around Budapest the expansion of the Southern section of the M0 ring-road surrounding Budapest from 2 to 3 lanes solved the problem).

One of the biggest misses is that aren't any available appropriate traffic data, the existing and their interpretation is not consistent so traffic count and traffic forecast is crucial (both O-D and cross-section traffic counting).

If the Visegrad countries liked to step up uniformly, they have to recognize and define the common problems in order to create common solutions for them. It seems that without reliable traffic flow data the expectations can be unrealistic (Mrówczyńska et al., 2007). Slovakia, Hungary, Poland and the Czech Republic should avoid that if they want to invest in a North-South transport corridor – with the most useful, reasonable and effective route. In the long run, North-South transport connectivity is a key development factor for the progressive economic and social development of Visegrad region.

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References

GSR 2005: *Transport Policy of the Slovak Republic until 2015*. (Approved by the Government of the Slovak Republic No. 445. from 8. June 2005) p. 42.

JANKOWSKA, D., WACOWSKA-SLEZAK, J., ZUKOWSKA, J. 2014: Foreign visitors from Visegrad countries with regard to road safety in Poland. In: *Periodica Polytechnica Transport Engineering*, Vol. 42, No. 1, pp. 77-83.

KAMPF, R., PRŮŠA, P., SAVAGE, C. 2011: Systematic location of the logistic centres in Czech Republic. In: *Transport*, Vol. 26, No 4, pp. 425-432

MMRD 2010: *Common spatial development document of the V4 + 2 countries. Submitted to: Meeting of Ministers responsible for regional development of the Visegrad Group countries, Bulgaria and Romania held in Budapest (Hungary) on the 29th of March, 2010*. p. 43.

MOLENDOWSKI E. 2014: The Visegrad Group Countries – changes in intra-industry competitiveness of their economies during the world financial and economic crisis. In: *Procedia - Social and Behavioral Sciences* Vol. 110, No 1. pp. 1006 – 1013.

MRD 2012: *National Spatial Development Concept 2030*. Ministry of Regional Development, Warsaw. p. 228.

MRÓWCZYŃSKA, B., ŁACHACZ, K., HANISZEWSKI, T., SŁADKOWSKI A. 2012: A comparison of forecasting the results of road transportation needs. In: *Transport*, Vol. 27, No 1, pp. 73-78.

NTH 2012: *Nemzeti fejlesztés 2020. Az Országos Fejlesztési Koncepció és az Országos Területfejlesztési Koncepció társadalmi egyeztetési változata*. Stratégiai vitaanyag. Nemzetgazdasági Tervezési Hivatal. p. 284.

POKORNÝ, P., LIPL, M. 2014: Road safety of drivers from Visegrad countries in the Czech Republic. In: *Periodica Polytechnica Transport Engineering*, Vol. 42, No 1, pp. 85-90.

RADMILOVIĆ, Z., MARAŠ, V. 2011: Role of Danube Inland Navigation in Europe. In: *International Journal for Traffic and Transport Engineering*, Vol 1, No 1, pp. 28-40.

ROHÁCS, J., SIMONGÁTI, GY. 2007: The role of inland waterway navigation in a sustainable transport system. In: *Transport*, Vol. 22, No 3, pp. 148-153.

SINIČÁKOVÁ M., ŠULIKOVÁ V., ÁRVAYOVÁ S. 2014: Interbank Interest Rate Transmission in the V4 Countries. In: *Procedia Economics and Finance* Vol. 15., pp. 71–79

TPCR 2005: *Transport Policy in the Czech Republic for 2005-2013*. July 2005. p. 64.