Regional Development of the Transportation Systems of the V4 Countries

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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, Šulíková, 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.
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).
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.
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, Simongátí, 2007).
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**

<table>
<thead>
<tr>
<th>Border</th>
<th>Length [km]</th>
<th>Number of land border crossings</th>
<th>Average length between border crossings [km]</th>
<th>Number of air border crossings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Czech Republic - Slovakia</td>
<td>252</td>
<td>22</td>
<td>11,45</td>
<td>10 (CZ)</td>
</tr>
<tr>
<td>Poland – Czech Republic</td>
<td>762</td>
<td>36</td>
<td>21,17</td>
<td>20 (PL)</td>
</tr>
<tr>
<td>Slovakia - Hungary</td>
<td>515</td>
<td>26</td>
<td>19,81</td>
<td>3 (HU)</td>
</tr>
<tr>
<td>Poland - Slovakia</td>
<td>444</td>
<td>19</td>
<td>23,37</td>
<td>3 (SK)</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Border</th>
<th>Length [km]</th>
<th>Number of land border crossings</th>
<th>Average length between border crossings [km]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hungarian - Austrian</td>
<td>366</td>
<td>22</td>
<td>16,64</td>
</tr>
<tr>
<td>Slovakian - Austrian</td>
<td>91</td>
<td>8</td>
<td>11,38</td>
</tr>
<tr>
<td>Czech - Austrian</td>
<td>362</td>
<td>26</td>
<td>13,92</td>
</tr>
<tr>
<td>Czech - German</td>
<td>646</td>
<td>46</td>
<td>14,04</td>
</tr>
<tr>
<td>Polish - German</td>
<td>456</td>
<td>36</td>
<td>12,67</td>
</tr>
<tr>
<td>Polish - Ukrainian</td>
<td>526</td>
<td>12</td>
<td>43,83</td>
</tr>
<tr>
<td>Hungarian - Romanian</td>
<td>443</td>
<td>15</td>
<td>29,53</td>
</tr>
</tbody>
</table>

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.

![Development areas and development axes in the Slovak Republic](image1)

**Fig. 6 Development areas and development axes in the Slovak Republic**


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.

![Development areas and development axes in the Polish Republic](image2)
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.

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**


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