Matthias Gather (ed.)

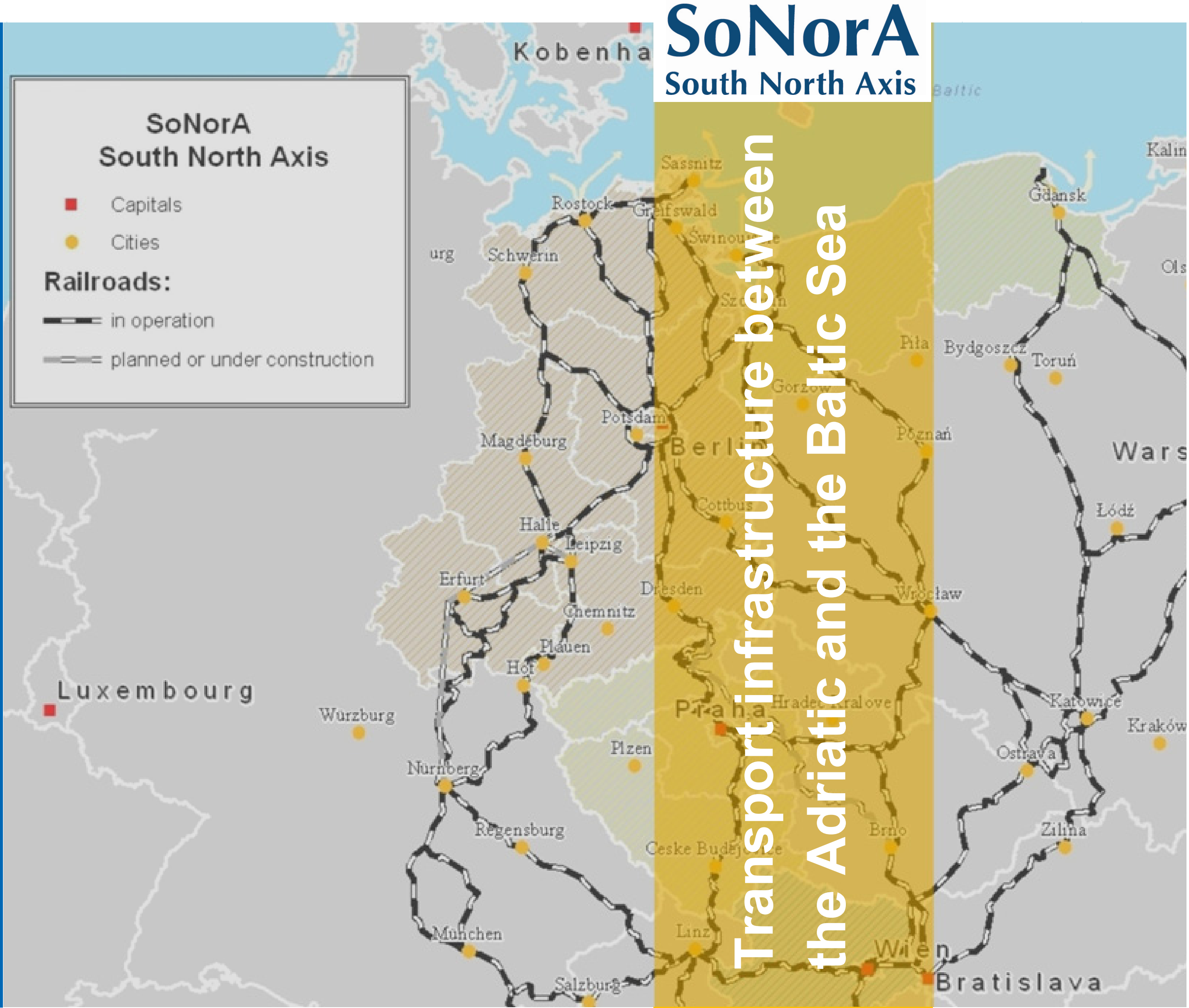
Attila Lüttmerding (ed.)

FACHHOCHSCHULE ERFURT UNIVERSITY OF APPLIED SCIENCES

INSTITUT VERKEHR UND RAUM der Fachhochschule Erfurt

SoNorA
South North Axis

Transport infrastructure between the Adriatic and the Baltic Sea



CENTRAL EUROPE COOPERATING FOR SUCCESS.

EUROPEAN UNION EUROPEAN REGIONAL DEVELOPMENT FUND

Repubblica Italiana

REGIONE DEL VENETO

Proceedings of the 2nd SoNorA University Think Tank Conference ISSN 1868-8411

16th of June 2009

Transport infrastructure between the Adriatic and the Baltic Sea

Transeuropean Networks of Transport in Central Europe

Simulation and modelling, forecasting and infrastructure

Proceedings of the 2nd SoNorA University Think Tank Conference

The SoNorA project is implemented through the
CENTRAL EUROPE programme co-financed by the ERDF

Editors: Matthias Gather
Attila Lüttmerding

16th of June 2009

Transport and Spatial Planning Institute (Institut Verkehr und Raum)
University of Applied Sciences Erfurt (Fachhochschule Erfurt)
Altonaer Straße 25
99085 Erfurt, Germany

phone: +49 / 361 / 6700 396
fax: +49 / 361 / 6700 757
email: gather@fh-erfurt.de, attila.luettmerding@fh-erfurt.de
internet: www.verkehr-und-raum.de

ISSN 1868-8411

Contents

INTRODUCTION

SoNorA (South-North Axis) is a transnational cooperation project of the European Union which aims to improve the infrastructure and services in the south-north orientation within Central Europe. An integral and important part of SoNorA is the University Think Tank as a network of transport scientist which has three main roles and tasks within the project:

Firstly, it aims on the creation and consolidation of a network of universities in Central Europe which are related to research and education in transport and/or spatial planning. These partners participate in SoNorA conferences, round-table discussions, the writing of scientific articles, and further research projects emerged out of SoNorA.

Closely related to point one, the second task of the Think Tank is to generate inputs for the whole project. The Think Tank gives methodological support to project partners and creates strategies and inputs for SoNorA. These scientific papers are presented on separate conferences during the regular SoNorA consortium meetings.

Thirdly, the Think Tank reviews the 24 core outputs of the project which are generated by the project partners. The core outputs will be presented to the Think Tank by the partners on the consortium meetings and then will undergo a scientific review process including ex-post-analysis and best-practice identification.

The first SoNorA University Think Tank conference was held on the 12th of February 2009 in Prague and was mainly focussed on the presentation of the members of the Think Tank and their scientific background. The Think Tank consists of transport researchers of different faculties of various Central European countries. It is planned to organise ten Think Tank conferences, thus one on each consortium meeting. Each conference deals with a specific topic of transport research which is related to the content of the core outputs to be delivered on that time. The planned topics of the Think Tank conferences are the following:

No	Date	Place	Topic
1	Feb '09	Praha	Get to know
2	Jun '09	Gdynia	Transport infrastructure between the Adriatic and the Baltic Sea
3	Oct '09	Berlin	Railway policies, High speed trains
4	Feb '10	Koper	Infrastructure and regional development
5	Jun '10	Erfurt	Transport in the wood-paper / solar-wind sector, Economic cooperation
6	Oct '10	České Budějovice	Future of rail freight
7	Feb '11	Trieste	Harbour hinterland transports
8	Jun '11	Szczecin	Transport and the environment, sustainable transport
9	Oct '11	Bologna	Preparation final conference
10	Feb '12	Venezia	Final conference

The topics of the 2nd SoNorA University Think Tank conference are:

- Infrastructure between the Adriatic and the Baltic Sea
- Transeuropean Networks of Transport in Central Europe
- Simulation and modelling, forecasting and infrastructure

Selected members of the Think Tank have written six scientific papers on different aspects of these topics which were presented at the conference in Gdynia, Poland, on the 16th of June 2009. The authors are from the University of Gdańsk (Poland), Technical University of Dresden (Germany), University of Žilina (Slovak Republic), and the Budapest University of Technology and Economics (Hungary).

The papers are dealing with the opportunities and challenges of an improvement of the south-northwards oriented infrastructure in the area between the Adriatic and the Baltic Sea. The possibilities of a realisation of specific railway sections are discussed as well as the role of the European instrument of Transeuropean networks on the development of transport infrastructure in Central Europe. Furthermore, aspects of the harbour-hinterland connection of ports, the inclusion of certain regions in the south-north network as well as the freight transport demand are analysed by the authors. This is the first volume of a series of "Proceedings of the SoNorA Think Tank Conferences" where all accepted contributions of the authors are presented. It shall provide a basis for further discussions and be the start of a successful scientific network in the field of transport and spatial planning.

BARRIERS IN REALIZATION OF TEN-T CORRIDORS IN BALTIC AREA IN THE CONTEXT OF TRANSPORT POLICY IN THE NEW MEMBER STATES

Przemysław Borkowski, Monika Bąk
University of Gdańsk
Department of Comparative Analysis of Transport Systems
Armii Krajowej 119/121, 81-824 Sopot, Poland
przemyslaw.borkowski@univ.gda.pl, monika.bak@ug.gda.pl

ABSTRACT

TEN-T network in Baltic area constitutes northern part of Central European North-South axis, an important transport link which is supposed to connect Scandinavia and other states on the Baltic Sea (Poland, Germany, Latvia, Lithuania, Estonia) with Balkans and Italy. TEN-T was decided in order to establish a single, multimodal network that integrates land, sea and air transport networks throughout the European Union and allows goods and people to circulate quickly and easily between Member States. Within the 30 key projects, 18 are railway projects, 3 are mixed rail-road projects, 2 are inland waterway transport projects and one refers to Motorways of the Sea. In the Baltic area there are several specified TEN-T projects: axis no 23 (Gdansk – Warszawa – Brno / Bratislava – Wien), axis no 25 (Motorway axis Gdansk – Brno / Bratislava – Vienna and "Rail Baltica" axis no 27 (Warsaw-Kaunas-Riga-Tallinn-Helsinki).

Major transport links within this part of the network are still underdeveloped or within planning stages of development. Although addition of New Member States (NMS) to the EU has created great growth opportunities for the Community as a whole and each country separately it is conditioned by better infrastructure. Although the idea of North-South axis which will allow for better inclusion of NMS area into EU wide transport network is not new and had been in fact discussed even before accession its development is still lacking.

This paper deals with major barriers and problems that handicap development of North – South axis within NMS. It concentrates mainly on Baltic region as it is both northernmost part of the axis and at the same time area where most new investments should be done. From theoretical point of view it provides also a very good example for showing policy inconsistency. Development slowness and general problems with transport infrastructure related to that axis are not only as common wisdom says result of insufficient funding for infrastructure but in no lesser degree effects of confused national transport policies goals and local priorities which often rival those set up on European scale.

Major policy issues like lack of political will, support for different axes and lack of international cooperation in development of N-S axis are discussed. Most important issues in national transport plans of involved countries which negatively impact this project are analyzed. Barriers are described and necessary steps to better coordinate axis investments and their timing are proposed. Along with political also economic, environmental and social problems encountered during realization of integrated transport network are considered.

INTRODUCTION

Enlargement of European Union opened new eastern dimension for European transport policy. It is both opportunity as new potential for economic growth opens and challenge since New Member States have peculiar needs for infrastructure improvement as current state of its development is falling behind EU-15. In the Baltic there are 4 new members of the EU – Poland, Lithuania, Latvia and Estonia. Primary transport policy objective of the Community is integration of national networks into one sustainable Europe-wide network. The vehicle used to accelerate this aim is TEN-T system of Trans-European infrastructure projects. Accordingly major infrastructure investments should be primarily located within Pan-European transport corridors. At the same time when TEN-T concept gains momentum within EU-15, NMS countries face dangerous state of deteriorating infrastructure and need to modernize existing transport links in parallel with new investments. Since NMS network in almost all nodes of transport is underdeveloped in comparison to EU-15 additional needs arise – usually much broader than those defined by TEN-T. It is therefore often a situation when national infrastructure development aims of NMS prioritize different than EU-level policy objectives. This leads to significant confusion in regard to financing, infrastructure planning and policy measures. One of the most notable examples is development of North-South axis. On European level set of projects accompanying this route is given top priority, at the same time NMS are often rather more interested in creation of west-east links. In Baltic area within NMS group, infrastructure network policy is dominated by choices made by Poland both due to its sheer size and geographic location between EU-15 and Baltic States of Lithuania, Latvia and Estonia. Moreover from the point of view of N-S axis northernmost part of it is set at major ports of Poland. Other Baltic States are also interested in linking their land based infrastructure with this northern tip of N-S axis. Necessary investments have to be done quickly, otherwise there is a significant risk of petrifying unbalanced European system for many years to come as NMS infrastructure under new usage patterns (4-5 time increase in traffic volumes after transformation) will begin to deteriorate rapidly. Unfortunately development of new infrastructure in NMS and even more importantly its coordination with European transport policy goals faces number of barriers: political, financial, environmental and social which might handicap its realization.

POLITICAL AND TRANSPORT POLICY BARRIERS

Political barriers in development of transport infrastructure on North-South axis in NMS could be mainly contributed to differences between EU level transport policy aims and Baltic Area countries objectives. While from the European point of view balanced transport system of south-north and east-west axes is sought, from the perspective of NMS it is useful in the future but current needs determine prioritization of west-east transport links.

This is primarily case of Poland where investments along second and third Pan-European transport corridors are quite advanced while investments along 6th corridor are few and those of the first corridor (at least in road part of the corridor) are almost nonexistent. Other NMS Baltic States (Lithuania, Latvia, Estonia) each has its own transport strategy not necessarily compatible with that of other NMS. From all NMS Baltic States Poland is the biggest and it is Poland on which territory northern part of N-S axis lies. Therefore all policy issues regarding networks connecting to N-S axis have to be tilted towards Polish priorities.

Strategy for development of road network in Poland is established within general frame of the strategy of transport policy and states that most new investment will take place in four axes in the financial perspective of 2008-2012 [7]:

- Corridor I: on sections between Budzisko and Warsaw,
- Corridor II on sections between Swiecko and Kukuryki,
- Corridor III on sections between Olszyna / Zgorzelec and Korczowa,
- Corridor VI on sections between Gdansk and Cieszyn / Gorzyczki / Zwardon.

Unfortunately after one year of activities there are already some postponements. Section of Corridor II between Siedlce and Terespol has already been considered certain candidate for move into next financial frame ending 2020. In other policy documents we might also read than primary objective is finishing links between Warsaw and German border in central Poland and Krakow and German border in southern part of the country [10].

At the same time Baltic States of Latvia, Lithuania and Estonia have differing transport policy objectives. Estonia primary concern is on development of close links with Finland, Latvia struggles to connect its land based infrastructure to this of neighboring countries. Lithuania has sound and clear goal of connecting with western parts of EU through Via and Rail Baltica. This link is also important from the north-south axis point of view. Although Lithuanian policy aims primarily at establishment of land connection with Poland and through Poland further to Germany those links will add to the northern tip on N-S axis, improving economic condition of neighboring areas as well as creating additional transport demand justifying increased investments in the axis.

The main vehicle allowing for completion of the above policy aim is realization of Via Baltica. Here major political obstacle lies. From the point of view of Poland – this project is secondary or maybe even tertiary after development of W-E link and N-S link along Corridor 6. Also from the rational investment point of view it would be very sensible to create land connection (preferably motorway) connecting Berlin, Hamburg and German Baltic ports with Polish costal area. This road should extend from Germany through Szczecin towards Gdansk as efficient connector of all Baltic cost. This idea has been discussed at many BSR forums [4] and considered important part of strategy for development of Baltic Sea Region. In terms of real actions it is not planned nor realized at the moment. Reasons are twofold: political and financial. For political reasons there is no necessary cooperation between Germany and Poland in promotion of this idea. As a result no funding is available without EU co-financing and this project does not lay within any of EU primary transport links. It should be however mentioned that it has a potential for integration of strong economic area which will naturally tilt toward connection with N-S axis. From the point of view of N-S axis this investment would allow for broader area (both in terms of economy and populace) to be included into N-S traffic flows. Moreover it would benefit N-S axis projects more if the ending points of the axis are not single city/port areas but rather multiple and differentiated areas.

Another political barrier is inefficient way of contracting infrastructure investments. Questions and problems surrounding realization of contract between government of Poland and GTC (Gdansk Transport Company – a consortium that won contract for construction of northern parts of E75 motorway) have resulted in number of postponements of investments. Thus far only a section from Gdansk to Nowe Marzy – c.a.90 km is finished.

It should be also noted that there is no parallel motorway to A1 planned along western border connecting Szczecin with Silesia with possibility of extension to the Southern Europe. From the development of N-S axis point of view it would be useful supplement. Current pattern of motorways reduces importance of port in Szczecin – Swinoujscie in favor of ports in Gdansk and Gdynia.

In regard to rail component - for the perspective till 2012 some major investments along N-S axis are planned: modernization of E65 line between Gdynia/Gdansk and Warsaw, modernization of E-59 rail line on many sections between Wroclaw-Poznan and Szczecin.

Both investments have huge impact on quality of N-S links since they connect Polish ports with central and southern areas of Poland and further along the axis extend links to the Balkans and Italy. As supportive to N-S link priority investment in Silesia and Little Poland regions –line E30 between Zabrze-Katowice-Krakow and CE-E 30 Legnica-Wroclaw-Opole might add some depth to N-S axis. There is also a project oriented at improving rail accessibility of Port of Gdansk which would strengthen northernmost tip of the axis.

On the political side in regard to rail infrastructure only recent investment plans accent need for inclusion of Baltic States to the N-S axis. For example Rail Baltica project of modernization of E75 line (Warsaw – Bialystok-Suwalki-Trakiszki than to Lithuania) has been accepted for financial perspective of 2009-2012 with founding at 2 373 854,1 thousands of. PLN. Still most prioritized sections are those in close vicinity of Warsaw. In case of Lithuanian goals International Corridor No. 1 in a north-south direction (the Via Baltica motorway and the Tallinn-Riga-Kaunas-Warsaw railway) is set as top priority along with Corridor No. 9 [8] It should be noted that there is a divergence of primary objectives between Poland and Lithuania in this regard with Poland more interested with west-east corridors. There is however hope for more compatible policies as pressure from Baltic States on realization of Polish part of Via Baltica and Rail Baltica grows.

As for two other Baltic States, Estonia is primarily interested in strengthening its links across the Gulf of Finland with Finland giving secondary attention to southern cost of Baltic. Estonia is probably too far away from N-S axis in order to benefit significantly from it. Almost as distant is also Latvia – here however Latvian authorities believe that their primary objective of national transport policy is connection to Western Europe network. Although this could be achieved primarily by means of maritime transport but also importance of land connection through Lithuania and Poland is often stressed [9].

Also important distraction is need for improvement of the quality of already existing roads to fulfill European standard of 115 KN per axis. Currently this standard is met by 2191 km of roads, however only 1071 km are those within Pan-European transport corridors of TEN-T. At the same time Poland has accepted obligation to have at least 2.5 thousand road km of adequate standard till 20011. Therefore modernization of existing infrastructure is often given priority before construction of new road networks [7].

FINANCIAL BARRIERS

Financial barrier is obviously among most important in development of transport infrastructure. Transport investments are usually large scale financial commitments moreover they are also long term. Insufficient financing is main reason behind out of schedule investments in roads in case of Poland, Estonia or Latvia. Case of Lithuania is separate since it managed to build its motorways number of years ago. In most investments significant support of EU funds is always sought by country's authorities.

Problem of financing is also that of method of financing adopted. In Poland there is a mix of PPP procurements and public investments. While the first alternative is often considered as better due to involvement of private capital as co-financer it might be discussed whether it is really more cost effective than use of only public financing. In Poland as in many other countries concession system within PPP framework has been decided as primary way to construct motorways. E75 motorway which currently constitutes most important part of N-S axis northern tip is being orchestrated under this type of scheme. But in case of Poland as in other investments utilizing PPP concept preliminary cost calculations were much below real development costs. This follows the pattern already encountered within financing of key TEN-T infrastructure. For example cost of Great Belt link exceeded planned by 54%, Great Belt rail tunnel by 110%, Karlsruhe-Bretten light rail construction witnessed 80% increase in costs as compared to original plan.[2] Similar situation occurs with most infrastructure objectives in Poland and other Baltic countries – cost of single km of motorway E75 which build under provisions of contract signed three years ago averages

5,67 mio EUR. However new sections are under price negotiations and will cost 11.7 mio EUR - about twice that number [5].

Often change in financial commitment is done under pressure from private partner. Current economic crisis seems to serve as excuse for almost unlimited price demands. Some proposals already mention price per km as high as 20 mio EUR which is far beyond capabilities of any country budget.

Realization of important links connecting Polish and Lithuanian, Estonian and Latvian cost and ports with North-South axis could be nevertheless completed if sufficient financing is provided and money is being used in wise manner. This means hard negotiations within existing PPP schemes to keep price level reasonable or public procurement in cases where costs of this solution are less than cost of employment of PPP type of contract. Financing should be regarded in long term as infrastructure construction is long process and subcontract agreements usually extend beyond yearly budgetary planning. Under current legal solutions expenditure for new infrastructure is based on resources from various sources, in case of Poland those would be:

- National Road Fund (Krajowy Fundusz Drogowy) – income based on fuel tax,
- Budgetary means –in case of Poland it is Title 39 of National Budget in disposal of Ministry of Infrastructure – it is mainly composed of excise and reserves,
- European Funds,
- Other sources.

Details as to the projected financial means for the perspective of 2008-2012 are given in table 1.

Table 1: Financing road network expansion in Poland [7]

Source	**2008**	**2009**	**2010**	**2011**	**2012**
Title 39 – national budget	2800396	2933500	3054600	3192100	3332500
Other national budget sources (including transfers of EU funds)	16003704	28346972	27101258	18411543	8093628
National Road Fund	1996700	1077300	123400	1617600	1799500
Private or municipal	3300	n/a	n/a	n/a	n/a

Main problem with above forecast is that it is highly income dependant. Expenditure is based on assumed taxation which in turn is based mainly on number of fuel taxes. In fact it is dependent on future traffic flows. Those are supposed to be increasing in the future however exact numbers are only estimated. Positive occurrence is that EU co-financing demands own input therefore creates incentives to move money from other areas if necessary. Private involvement and municipal involvement are so volatile that have not even been estimated for further years.

Similarly in rail transport financing for earlier mentioned projects which will have direct impacts on improving N-S axis bear significant cost (table 2).

Table 2 Selected projects connected to N-S axis in Poland [11]

Project	Financing needed in thousands of PLN
Accessibility to Port of Gdansk	426230,0
Number of projects on E30 and CE-E 30	3773538,7
Projects on E65 Gdynia-Warsaw	10330802,6
Projects on E59 Wroclaw-Poznan-Szczecin	9449645

For all rail infrastructure projects in the country two sources of funds are considered – fuel tax and Rail Fund (table 3).

Table 3 Financial resources for rail infrastructure in Poland, 2010-2015 [11]

Source	2010	2011	2012	2013	2014	2015
From fuel tax	1989,00	2030,00	2080,00	2129,00	2179,00	2241,50
From Rail Fund	397,80	406,00	416,00	425,80	435,80	448,30

Rail Fund is specially established fund which manages money from both budgetary sources (from fuel taxes – 20% of which goes directly to the Fund and EU financial support). The main problem jeopardizing success of those projects is that for all rail investments in Poland planned for 2009-2012 financial resources from about 10 years of money collection by the Rail Fund are needed. Obviously some of the projects will have to be postponed. Prioritization of the projects on N-S axis depends on political decisions. While Gdynia – Warsaw route seems to be relatively safe, funding for Western Poland projects is not set in stone. From other NMS on Baltic it is always Rail Baltica project with its Tallinn-Riga-Kaunas-Warsaw railway that has priority financing.

ENVIRONMENTAL AND SOCIAL BARRIERS

In the light of current transport policy goals and challenges of sustainable development, environmental issues seem to be important in transport investment projects. It is a significant determinant influencing the success of TEN-T corridors in Baltic area. It has to be mentioned that this part of Europe includes environmentally sensitive areas, especially in the north-eastern part of Poland.

The area is called 'the Green Lungs of Poland'. The idea of Green Lungs of Poland was introduced in 1983. It was intended to integrate the environmental protection with the economic growth and the progress of civilization in the north-eastern region of the country belonging to the last existing areas of the uncontaminated nature of unusual tourist and cultural values in Europe [3]. In 2004, an agreement between voivodhips (Polish administrative units) was signed to strengthen objectives indicated in 1983 plan. Its main task is to continue former obligations and encourage actions in the area for development to be in line with the principle of sustainable development. The Agreement is mainly aimed at preserving the cultural, natural, ethnic and religious diversity of the region as well as promotion of sustainable development of the region. Priorities and strategic issues can be enumerated as follows:

- implementing well balanced social and economical development of 'The Green Lungs of Poland' region, sustainable development of agriculture, tourism and forest management,
- considering specific values of the region in spatial and regional policy,
- financial initiatives as the base for 'The Green Lungs of Poland' development,
- increasing the attractiveness and competitiveness of the region,
- increasing local, Polish and European society's education about natural and cultural values of the region.

Green Lungs of Poland cover the territory or parts of territory of five Polish voivodships. Its area encompasses about 20% of Poland's territory with only 13% of urban areas in the country (see table 4). What is important from the N-S axis perspective it is that most of its northernmost links are in the GLP area. Additionally possible extensions of the Axis towards Lithuania, Latvia or Estonia are fully within this sensitive area. Also on Lithuanian part of the border similar preserves are located. This might create additional financial burden on infrastructure construction.

Table 4: Green Lungs of Poland, basic data [3]

Specification	Total area in km^2	Poviats		Cities with poviat status	Gminas				Urban areas
		total	in GLP		total	urban	urban-rural	rural	
Poland	312683	314	x	65	2478	307	582	1589	889
Green Lungs of Poland	63234	58	12	7	386	45	72	269	117
Share in country as%	20,2	18,5	x	10,8	15,6	14,7	12,4	16,9	13,2
Voivodships:									
Kujawsko-pomorskie	3442	7	4	1	33	5	3	25	8
Mazowieckie	14811	15	4	1	114	10	13	91	23
Podlaskie	20187	14	–	3	118	13	23	82	36
Pomorskie	794	3	3	–	6	1	1	4	2
Warmińsko-Mazurskie	24000	19	1	2	115	16	32	67	48

Within the Green Lungs of Poland, also some protected areas of EU Nature 200 program are designated. Natura 2000 is the centrepiece of EU nature & biodiversity policy. It is an EU-wide network of nature protection areas established under the 1992 Habitats Directive. The aim of the network is to assure the long-term survival of Europe's most valuable and threatened species and habitats. It is comprised of Special Areas of Conservation (SAC) designated by Member States under the Habitats Directive (figure 1), and also incorporates Special Protection Areas (SPAs) which they designate under the 1979 Birds Directive (figure 2). The establishment of this network of protected areas also fulfils a Community obligation under the UN Convention on Biological Diversity [5].

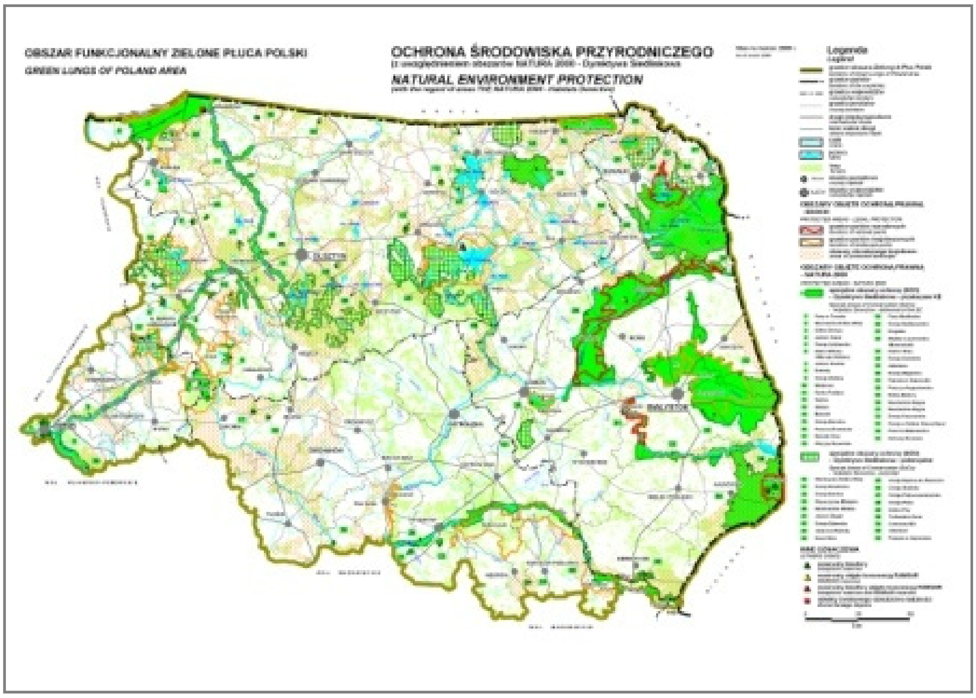


Figure 1: Habitat Directives in the area of Green Lungs of Poland [1]
(*Green indicates protected areas)

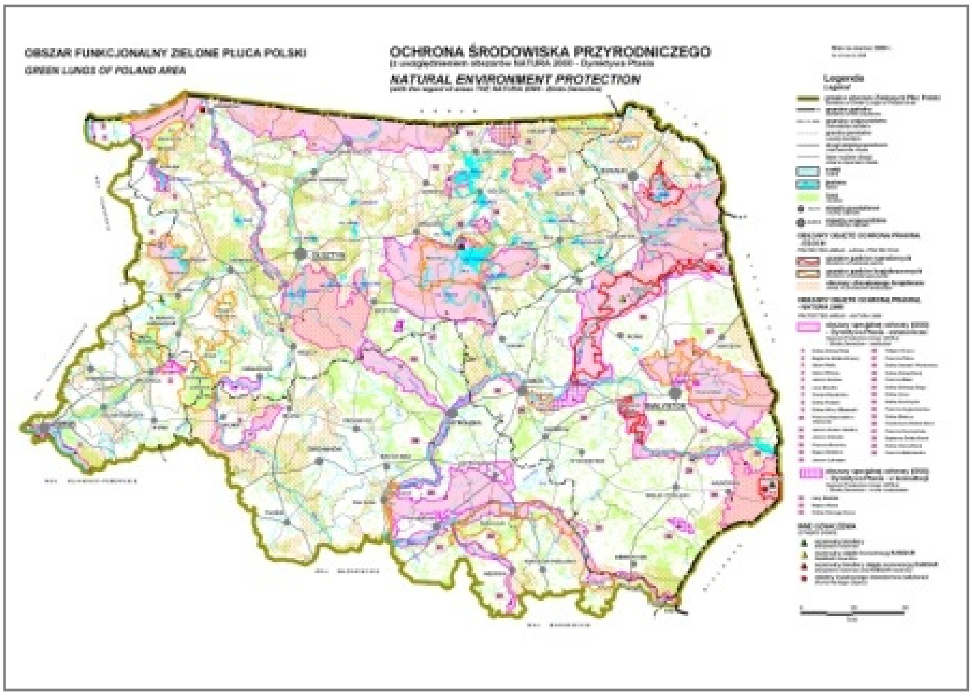


Figure 2: Birds Directives in the area of Green Lungs of Poland [1]
(*Pink indicates protected areas)

The special case which illustrated very well the environmental and social barriers of TEN-T realisation in Baltic region is the conflict of the Rospuda Valley. The Via Baltica road which is a part of the link from Prague to Helsinki via Poland is set to carve its path through the wetlands of the Rospuda Valley and comes with an environmental price tag. The planned expressway and the construction work would cause environmental damage in that wilderness area. The noise, pollution and construction would damage breeding grounds of various bird species, some of which are protected, as well as some endangered plants and the unique mire complex. In the last years several times ecologists and conservationists protested against the construction projects. On the other hand, the construction of the bypass is strongly supported by the people of Augustow city who have to live side by side with the heavy vehicles and trucks continuously passing through their town.

In December 2006 the European Commission opened legal infringement procedures against the Polish government for consenting to the road developments which would severely damage important and protected natural sites. In February 2007 the governor of the local province signed the go-ahead for the construction works to start, claiming that all legal requirements had been met, despite the fact that the region is protected by the EU Natura 2000 program and Poland can be severely fined by the EU Commission for constructing the highway. Then Poland launched an appeal against the decision which could have halted construction works altogether. The appeal was based on suspicion that alternative routings of the bypass were not taken into consideration. An independent road designer's variant omits the Rospuda valley and was estimated to cost €17 million less than the currently planned environmentally damaging variant. This in turn has been addressed as overly optimistic cost estimate. Other designers were of the opinion that changed variant will effectively cost more not less if chosen. There have been strong protests by activists and politicians both in Poland and abroad. However, the construction has not been called off. In February 2007 a number of environmental activists pitched a camp in the endangered region to prevent the construction work. At about the same time the construction of the Augustow bypass expressway began with the taking of geodetic measurements. There was unofficial information that earthworks have been begun only from the Augustow side, away from the protected area, and where both road variants overlap.

Finally, in 2009 the Polish authorities announced that the plan to build the highway through Rospuda valley has been abandoned, and a new alternative route that will avoid the valley has been selected. The example of Rospuda conflict proves that in the Baltic region due to geographical conditions, environment protection objectives are one of the important factors of the success of realisation of TEN-T investments. Moreover, underinvestment and bad condition of road network in the regions cause some social effects and conflicts, because citizens demand intensive improvements in transport infrastructure what is in some cases necessary in a urban areas congested by transit flows. At the same time strict environmental conditions must be met which makes projects extremely expensive.

CONCLUSIONS

The realization of TEN-T corridors in Baltic area is dependent on many factors influencing success of the investments. Baltic countries have different transport policy objectives and differentiated transport systems. The major problem is divergence of infrastructure priority objectives. Furthermore N-S axis in its northern part is not finite investment at the moment. Alternative links are still discussed. Moreover although basic N-S axis has its northern tip in Germany and Poland other NMS in Baltics – notably Lithuania, Latvia and to lesser degree Estonia express interest in joining this project. This would mean development of additional infrastructure in major part through areas environmentally sensitive. Financial barrier is of course also one of the most important barriers, notably in the context of insufficient funding and possibly not best methods of financing used. It should be noticed that the area of Baltic states and northern-east part of Poland is full of nature preserves, so also many environmental conflicts appear on the horizon. Environmental issues are closely related to social factors and as the example of Rospuda Valley shows, it is very difficult to find the consensus between citizen's needs, huge investment projects requirements and maintaining environmental standards. There are no easy methods to resolve those problems, but there is room and need for EU initiatives and instruments aiming at overcoming barriers rising at local and state level.

REFERENCES

[1] Characteristic of the region. Foundation Green Lungs of Poland, available at: http://www.fzpp.pl/obszar_zpp_mapa.html

[2] Flyvbjerg B., Bruzelius N., Rothengatter W., Megaprojects and risk. An anatomy of ambition, Cambridge University Press, Cambridge 2003

[3] Green Lungs of Poland. Central Statistical Office, Statistical Office in Bialystok, Bialystok 2008

[4] Intelligent transport and infrastructure in the Baltic Sea region – an innovative key to future growth and prosperity. Baltic Development Forum Round Table Report, Stockholm, October 2006.

[5] MEMO on Commission strategy to protect Europe's most import ant wildlife areas, available at http://ec.europa.eu/environment/nature/info/pubs/docs/nat2000/2003_memo_natura.pdf

[6] Ministry of Infrastructure of the Republic of Poland, official communiqué from 2.07.2008, available at: http://www.mi.gov.pl/files/0/1787151/prezentacjakonfprasowaA1272008.pdf

[7] Program budowy dróg krajowych na lata 2008-2012 (Programmme of road construction for years 2008-2012), Ministerstwo Infrastruktury, Warsaw 2007

[8] Resolution no 692 of 23 June 2005 on the approval of long term (until 2025) development strategy of the Lithuanian transport system, Vilnius 2005, available at http://www.i-manager.lt/upload/200612/Strategy_EN.doc

[9] Satiksmes ministrijas darbības stratēģija 2007.-2009.gadam (Apstipr.MK 06.07.2006.Rīk.Nr.507 prot.Nr.30 44§)

[10] Sprawozdanie okresowe z realizacji Programu Operacyjnego Infrastruktura i Środowisko za II półrocze 2008 roku (Report on progress of Operational Programme Infrastructure and Environment for 2nd part of 2008). Ministerstwo Rozwoju Regionalnego, Warszawa 2008.

[11] Szafrański Z., Stan techniczny i finansowanie infrastruktury kolejowej (Technical conditions and financing of rail infrastructure), PKP Polskie Linie Kolejowe S.A. Warszawa 2009

A STUDY ON HIGH-SPEED TRANSPORT IN PAN-EUROPEAN CORRIDOR IV

Wolfgang Fengler
Technische Universität Dresden
Faculty of Transportation and Traffic Sciences
Institute of Railway Systems and Public Transport
Hettnerstraße 1 – 3, DE-01062 Dresden, Germany
wolfgang.fengler@tu-dresden.de

ABSTRACT

This paper reports on the results of a preliminary feasibility study on a ground-based high-speed connection in the northern part of the Pan-European Corridor IV between Berlin and Budapest. The study was completed in March 2007. The results of the study are presented and the further development up to now is discussed.

BACKGROUND

The preliminary feasibility study was awarded by the Saxonian Ministry of the Interior and was associated with the Interreg IIIB project SIC! (Sustrain Implement Corridor) of the European Union which addresses the development of economy as well as the development of traffic and transport in eastern Central Europe [1] [2] [3] [4] [5].

The background of the study was that, in competition with motorways and air traffic, guided transport can only acquire a noteworthy share of the passenger transport segment if it is able to provide a competitive commercial speed of at least 180 to 200 km/h between stop stations. With stop distances of around 100 km, only high-speed transport facilities with a minimum top speed on the line of 280 to 300 km/h can achieve this goal. However, European rail network plans for the year 2020 assigned to this axis a maximum top speed on the line of only 160 to 200 km/h leading to commercial speeds of around 100 to 120 km/h, which does not seem to be competitive in the future. In the meantime, the goals of the European high-speed network in this region are somewhat more ambitious (see Fig. 1).

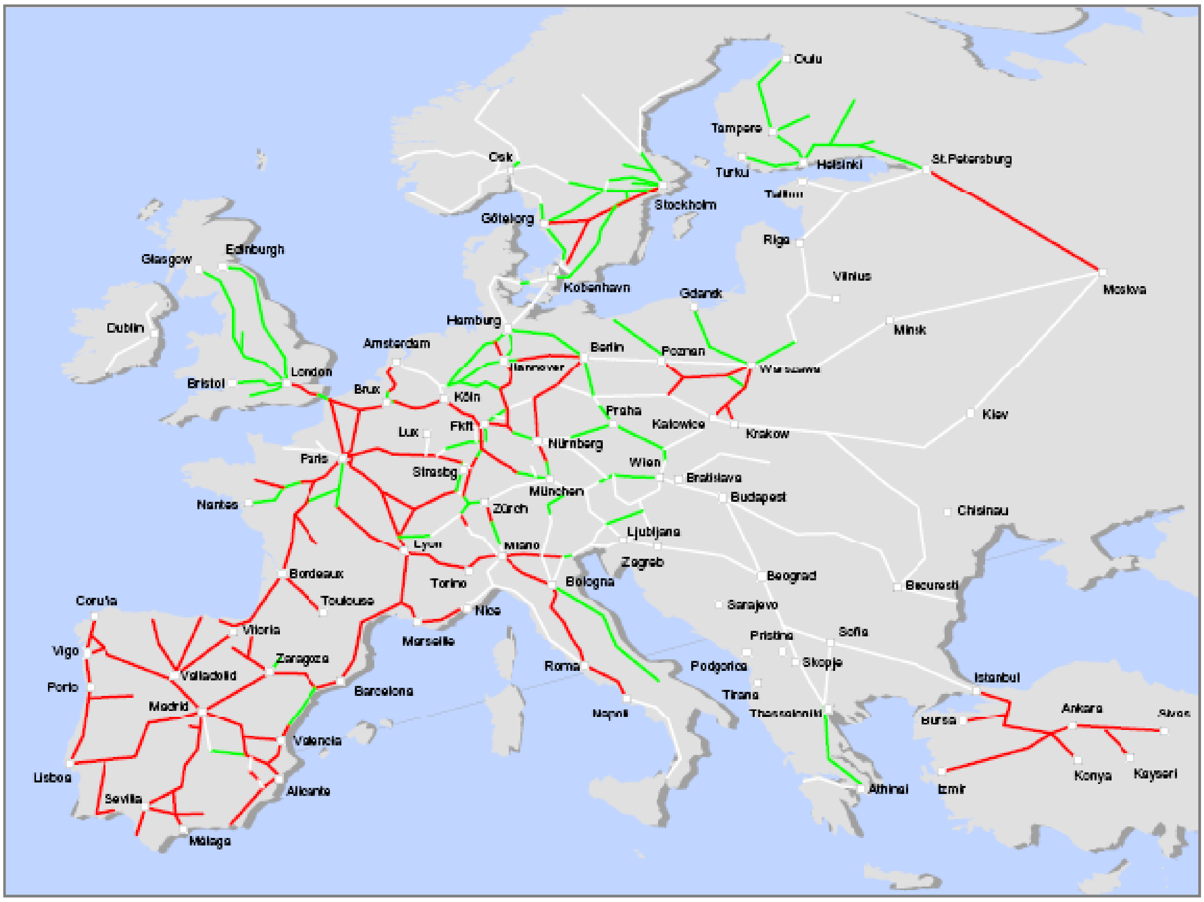


Figure. 1: European high-speed network, forecast for 2025 [6]
(green: 180 ≤ 250 km/h, red: > 250 km/h)

A special quality of the study lies in the comparison of two applicable technologies: the realisation of this link in the classic high-speed railway technology, on the one hand, and in the magnetic levitation technology of the Transrapid, on the other hand. Due to the known decision of the German federal government made in spring 2008 not to build the maglev airport link in Munich through which an end was put to Transrapid technology at least in Europe, the aim of the investigation, from a current point of view, was reduced to assessing whether the installation of a ground-based high-speed link in railway technology between Berlin and Budapest would be reasonable in terms of micro-economic, macro-economic and spatial aspects.

DESIGN OF THE FEASIBILITY STUDY

In order to achieve the objectives, it was necessary to assess the expected costs of line construction, vehicles, operations and maintenance as well as the expected revenues from the sale of tickets. This required both a forecast of the traffic volume, and the complete planning of operations including vehicle circulation. The appropriate study design resulted from the aspects mentioned and is outlined in Fig. 2. ‘Feedback’ and ‘Refining’ were not carried out within the study but may be the subject of further investigations.

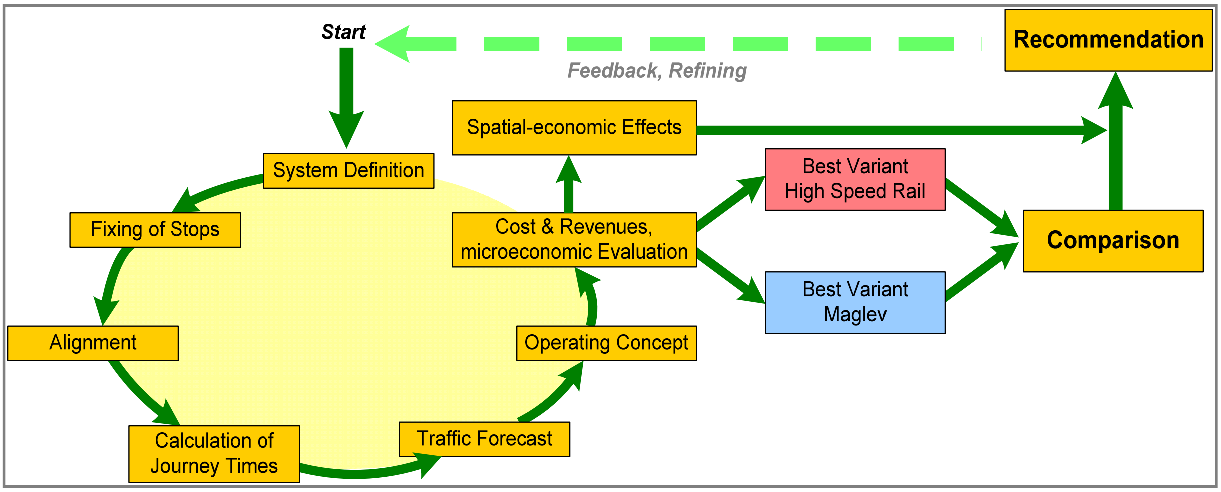


Figure. 2: Design of the study [2]

SYSTEM DEFINITIONS, STOP STATIONS AND SYSTEM EDGES

The planning horizon of the study was the year 2020. The reference train selected was the German ICE 3-M, the operational top speed selected was 300 km/h, given the distance between stop stations. To ensure comparability with the Transrapid, a pure passenger transport line was assumed also for the railway variant. While this line has the disadvantage of not being suitable for freight trains (e.g. during the night), it can be constructed with steeper gradients and tighter curves in the mountains. So we assumed a separation of the modes of rail transport, with freight and regional passenger trains which would use the existing network, and with high-speed passenger trains, which would use a new double-track rail line over the full distance between stop stations.

The stop stations selected along the line were all capital cities (Berlin, Prague, Bratislava and Budapest) as well as the regional centres Dresden, Pardubice and Brno. Furthermore, the airports of Berlin and Vienna were connected to the lines as well. In Germany, two other line variants were investigated: the line course via Leipzig and the line course via Cottbus; the latter in order to connect the line to the Pan-European Corridor III leading to southern Poland and Ukraine (see Fig. 3).

Figure 3: Stations and system edges [2]

LINE ROUTING

Railway line routing is governed by the line layout parameters and by topography, settlement and existing infrastructure. The governing parameters of railway line routing in ground view are the minimum and standard curve radii. The standard radius, which causes only a slight lateral acceleration, is used whenever applicable without additional expenditure; otherwise the minimum radius with higher lateral acceleration and consequently lower passenger comfort has to be applied. For a line speed of 300 km/h, the standard radius amounts to slightly above 6000 m, the minimum radius is about 3500 m. The governing line layout parameter of the vertical section is the maximum longitudinal gradient. For a pure passenger high-speed rail, it amounts to 3.5%. Given these parameters, even a pure passenger transport line cannot follow the topography in mountainous regions so that long tunnels and viaducts have to be constructed. **Figure** Figure 4 shows the longitudinal profile of the Ore and Bohemian Mountains crossing between Dresden and Prague. The total tunnel length of this section leads to considerable construction costs.

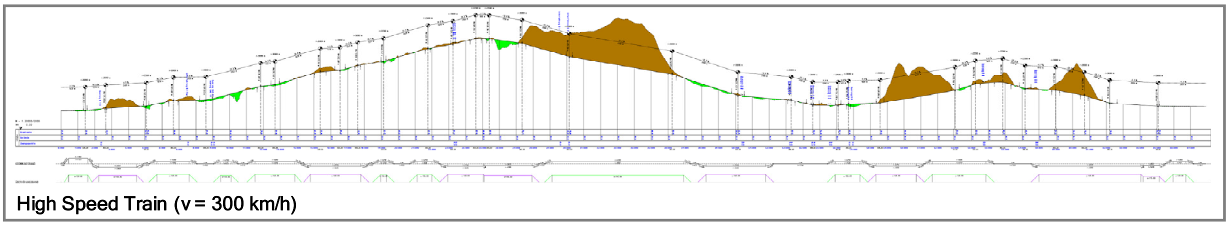


Figure 4: Longitudinal profile of the Ore Mountain crossing between Dresden and Prague [2]

The total length of the direct route between Berlin and Budapest amounts to 937 km for the high-speed rail variant and 885 km for the Transrapid variant. The difference is related to the higher climbing ability of the Transrapid permitting a straight-lined and thus shorter line layout especially between Brno and Vienna (see Figure 5).

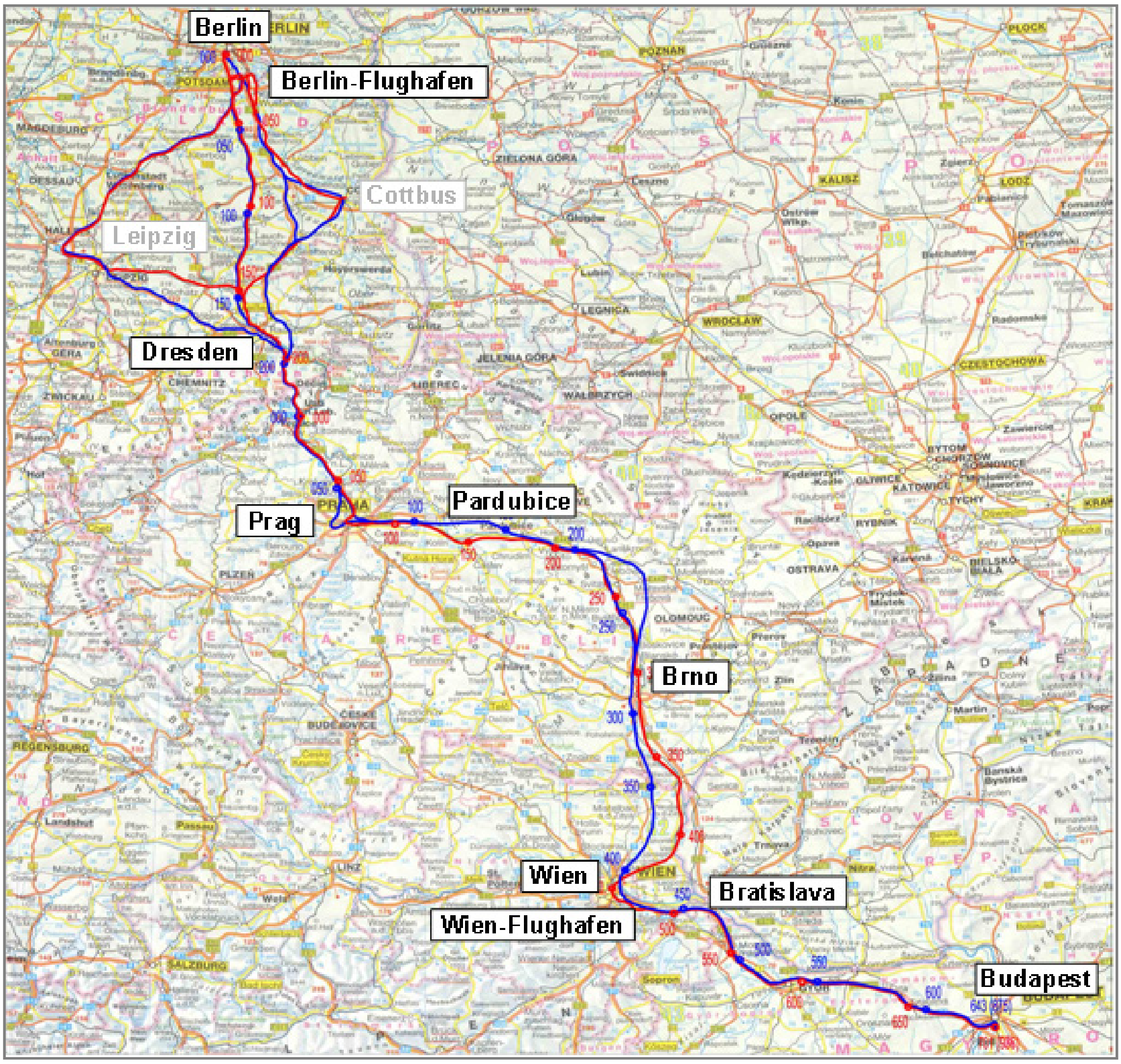


Figure 5: Route variants (red: railway, blue: maglev train) [2]

RUNNING TIME CALCULATIONS

The next planning step following the line layout is the calculation of running times. Even if the Maglev train would be one third faster (3:20 h versus 5:16 h), the achievable regular running time of the ICE high-speed link of just over five hours is a quantum leap in comparison with the current situation if we consider that this is only 40% of today's railway running time of about 12 hours. This time already includes 10% extra time for operational imponderables as well as an additional 10% margin for detours that may become necessary in the course of a more detailed route design in further planning phases[1] . The commercial speed of the ICE link along the whole line including all stops amounts to 180 km/h and to 200 km/h without the planning reserve. Thus, a major part of the line from Berlin to Budapest falls within a maximum travel time of four hours. This duration is generally considered as the upper time limit under which the railway is competitive against the airplane for, in particular, one-day business trips.

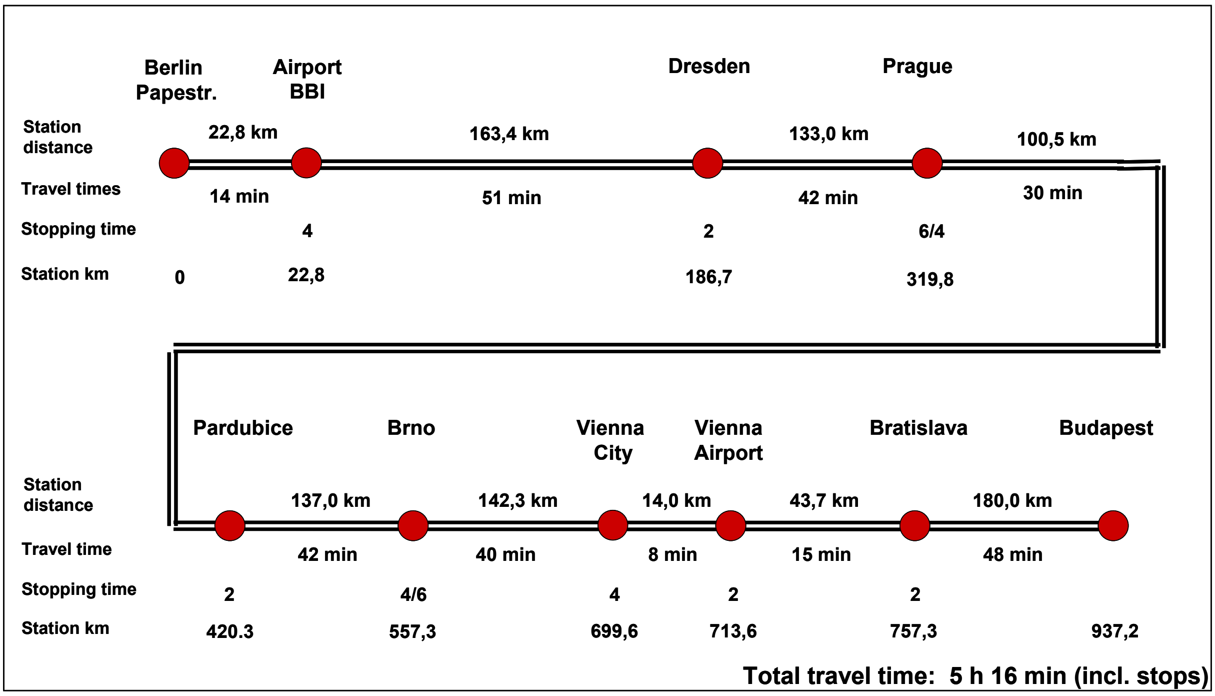


Figure 6: Distances and scheduled running times of the high-speed railway line [3]

TRAFFIC FORECAST

Based on the station's location in the cities, the scheduled travel times of the investigated high-speed systems, the macro-economic data on population distribution, economic situation and mobility, a detailed traffic forecast was carried out by an external specialist. To perform this important step of the investigation, a basic operating program for both systems had to be assumed. This procedure implies a contradiction because the operating program normally is just the result of the traffic forecast. But a forecast is impossible without a basic timetable concept. So an iterative procedure was required to cover this aspect.

Since the future development is subject to imponderables, the traffic forecast includes three different scenarios of which the following scenario as compared with the year 2000 was finally selected as the basis for further investigation: fuel costs of individual transport +80%, flight costs +8%, passenger car motorway toll 7ct/km.

[1] Regular running time: technical running time + operational extra time, scheduled running time: regular running time + planning reserve

The results of the traffic forecast for the direct line variant (not leading via Leipzig or Cottbus, see Fig. 3) are shown in Fig. 7. “Direct traffic” only comprises passengers whose departure and arrival points of their long-distance train journey are on the new high-speed line whereas “total traffic” also comprises passengers using the new line only on a maybe short part of their journey.

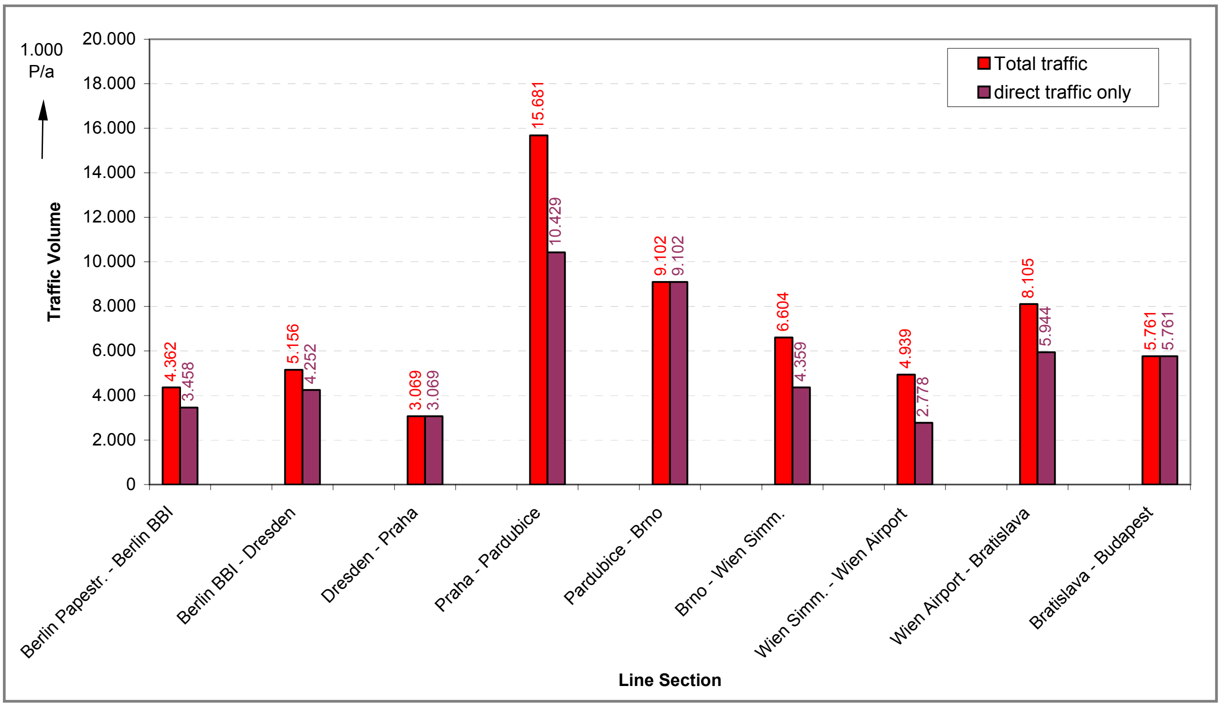


Figure 7: Traffic forecast for a high-speed railway line Berlin – Budapest [3]

The passenger volume data show a rather unequal distribution regarding the different line sections. Whereas the section between Prague and Pardubice is highly loaded (with a substantial portion of “line crossing passengers”), the traffic volume on the German branch is only small, especially on the border crossing section between Prague and Dresden, and particularly high in cost due to the mountainous section over the Ore Mountains. Considering only the traffic volume, and hence the revenues, the southern part of the line between Prague and Budapest is without doubt the more interesting one.

OPERATIONAL CONCEPT

Based on the scheduled travel times, the passenger volumes and the necessary operating processes at the line ends, a detailed operating program was developed. The differences in passenger volume levels along the line lead to divergent requirements concerning train frequencies and vehicle capacity. Based on the chosen train headway of 30 minutes in peak operation periods and of 60 minutes in normal operation periods, practical train courses (round trips) were set up and the number of vehicles required was determined. Furthermore, the requirements on the track layout (number of platform tracks, junctions, switches, holding and siding tracks) resulting from the operating program were defined.

COSTS AND REVENUES, ECONOMIC EFFICIENCY

Both the operational concept defining the required numbers of trains and vehicles, staffing, energy consumption and so on, as well as the infrastructural requirements, delivered the basis for the calculation of costs. In a similar manner, the revenues could be calculated on the basis of the forecast traffic volume transformed into fare receipts.

Table 1: Basic parameters of the operating concept [3]

Basic operating parameters	Unit	Railway system
Total line length	Km	937,2
Daily operating period	hours	18
Min. headway during peak period	Min	30 (15)
Min. headway during normal period	Min	60 (30)
Passenger km per year	Pkm/a	6,575,740,899
Train km per year	Trkm/a	25,990,150
Seat km per year	Skm/a	11,903,488,631
Average train load	%	55,2
Total number of trains	1	44
Total number of single cars	1	352
Total number of seats	1	20,152
km per train and day	km/d	1,618

The total investment costs of infrastructure and rolling stock were estimated at 13,700 million €. In the chosen scenario, the transport revenues added up to 873 million € per year. Assuming stable non-petrol energy prices, the operational costs and costs of maintenance were estimated at 308 million € per year, and at 323 million € per year assuming a 40% increase in non-petrol energy prices.

Within an investigated time period of 50 years, revenues and costs will generate a financial internal rate of return (FIRR) of 2.0% with stable non-petrol energy prices, and of 1.8 % assuming a 40% increase in non-petrol energy-prices.

Compared to a calculative interest rate of 3% (which is often used for the calculation of public investments in traffic infrastructure), a FIRR of only 2.0% or 1.8% indicates that the project is not rewarding in a microeconomic view. But this is the case for many investments in public transport infrastructure.

The cashflow of the project is displayed in Figure 8Figure . It shows the typical cashflow character of large investments. Regarding both the investment period and the operating period, the break-even point is not yet reached in the 50 years under review. However, in the microeconomic view of a railway manager, the fact is important that the operating period considered apart would be financially feasible and generate a considerable yearly benefit which can be used as a marginal return of the investment costs. A remarkable point is the negligible effect of a probable increase of the costs of electrical energy.

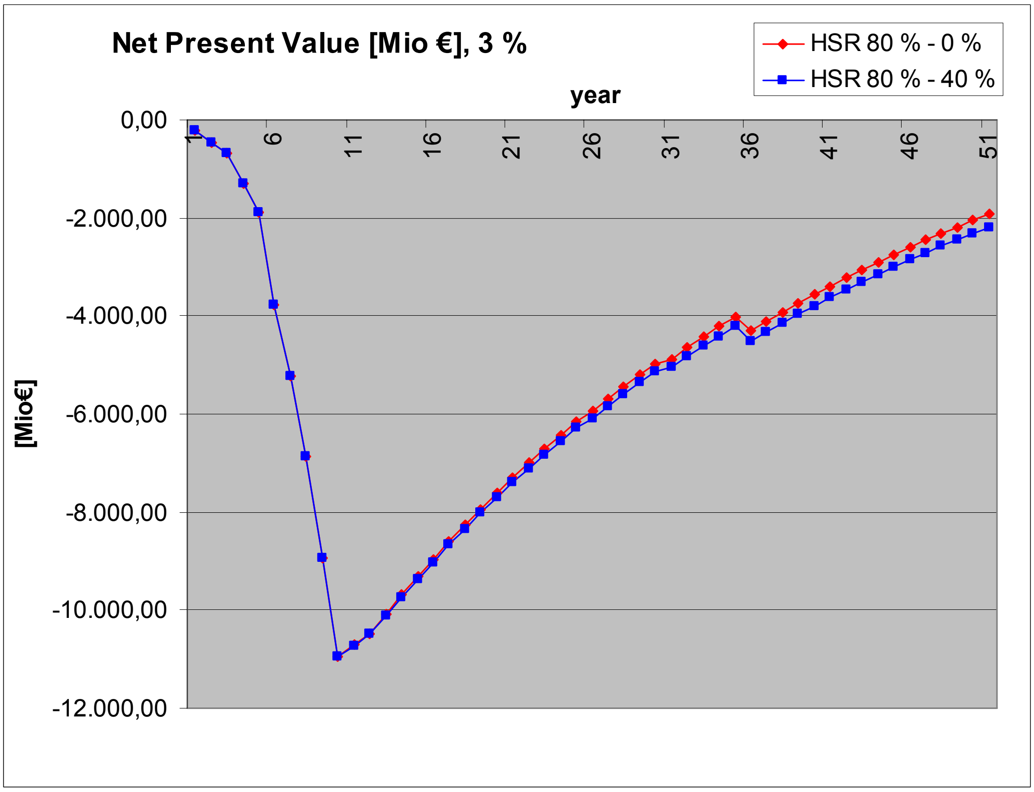


Figure 8: Cash Flow for 3 % calculative interest rate (start of railway operations in the 11th year) red: high-speed railway, no increase of non-petrol energy costs assumed, blue: high-speed railway, 40 % increase of non-petrol energy costs assumed (based on [2])

WHAT HAS HAPPENED SINCE THEN?

Since the study was presented in spring 2007, significant changes and developments in the situation of railway strategy and transport policy are to be noted in this fields:

- Maglev Transrapid
- Railway connection Berlin – Dresden – Prague
- Increase of freight rail traffic
- Freight transport strategy of the European Union
- Network strategy of Deutsche Bahn AG

Maglev Transrapid

With the cancellation of the maglev project “Munich Transrapid Airport Link”, there is no realistic perspective for a maglev long-distance transport project in Europe in the next decades – if at all.

Railway connection Berlin – Dresden – Prague

East German – notably Saxon – policy is endeavouring to achieve that the corridor Berlin – Dresden – Prague is classified as a priority axis in the trans-European railway network. This requires inclusion of the section Dresden - Czech border (- Prague) in the German federal transport network plan. Since the Elbe valley line will have reached its capacity limit in 2015, the Saxon government demands a new line Dresden – Prague. However, Deutsche Bahn does not seem to support this idea. Besides network strategy considerations, the high costs for the necessary long tunnels through the Ore Mountains and the Bohemian Mountains may be a key obstacle. This applies in particular if the new line is laid out for freight train needs, which seems advisable from today's perspective (see Figure 9 and Figure 10), as explained in the following:

Increase of freight rail traffic

As a result of increasing globalisation and the ensuing high rise in cargo volume handled in the seaports, rail freight traffic has increased more than proportionally in the last years while long-distance passenger rail traffic has stagnated or grown to a minor degree. The impact of the world economic crisis is largely assessed as temporary so that – after a considerable decline over several years – further growth in freight rail traffic is assumed. This particularly concerns the long-distance international traffic, notably between seaport and hinterland.

In addition, the aggravating environmental and climatic problems speak in favour of an expansion of rail freight transport lines. In contrast and owing to its high power consumption in railway terms, high-speed rail traffic with its expensive infrastructure has a much less beneficial impact on the environment than freight rail traffic. In comparison with high-speed traffic, the specific infrastructure expenditures to increase freight rail transport are considerably lower, despite the longer tunnels required in individual cases. A condition for acceptance by the population is, however, that the railway companies manage to reduce the noise emissions by freight rail traffic. This is considered feasible within the next 10 to 15 years if emphasis is put on technical measures to improve the freight cars.

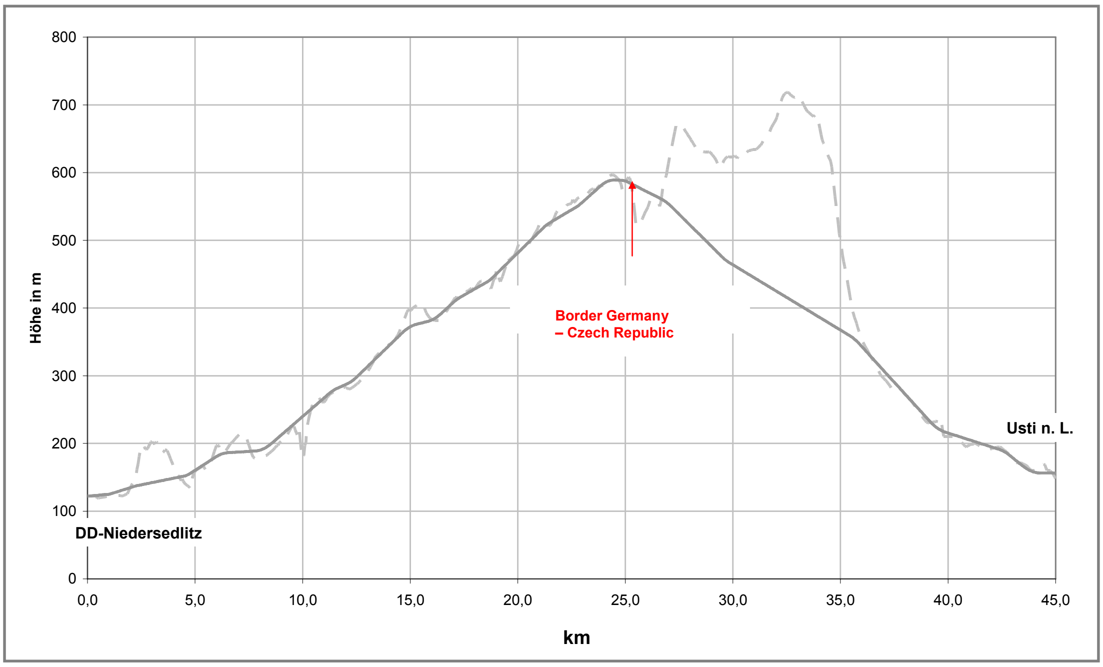


Figure 9: Longitudinal profile of the Ore Mountain crossing for pure passenger transport (dashed: relief of terrain, solid: railway line) (unpublished, 2007)

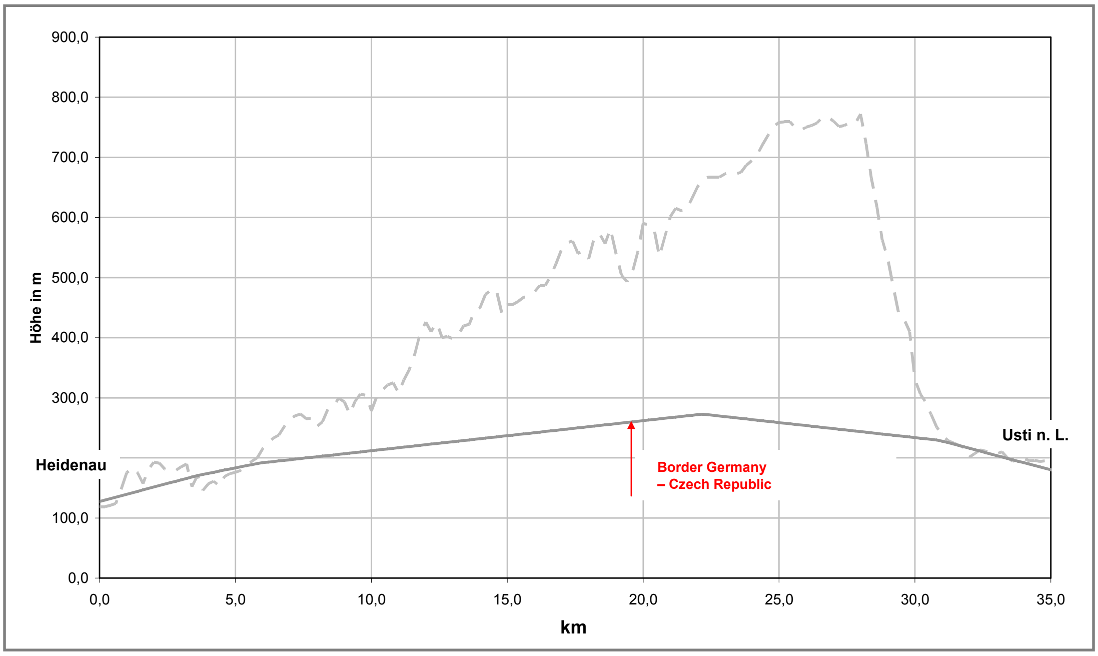


Figure 10: Longitudinal profile of the Ore Mountain crossing usable for heavy freight transport (dashed: relief of terrain, solid: railway line) (unpublished, 2007)

Freight transport strategy of the European Union

The European Union is increasingly opting for the extension of cross-border freight transport corridors as part of the conventional trans-European railway network (see Figure 11: European ERTMS corridors (based on [7]). An essential means to ensure that these corridors can be used freely is the consistent equipment of infrastructure and engines with ERTMS / ETCS (European Rail Traffic Management System / European Train Control System). Others are the elimination of bottlenecks from the lines and stations of the corridors, and the harmonisation of rules of train operation in the countries concerned. The measures will be financially supported by the EU but will have to be paid mainly by the countries and the railway companies concerned. It is the avowed aim of the EU to link the most important freight transport zones by ERTMS corridors by 2020.

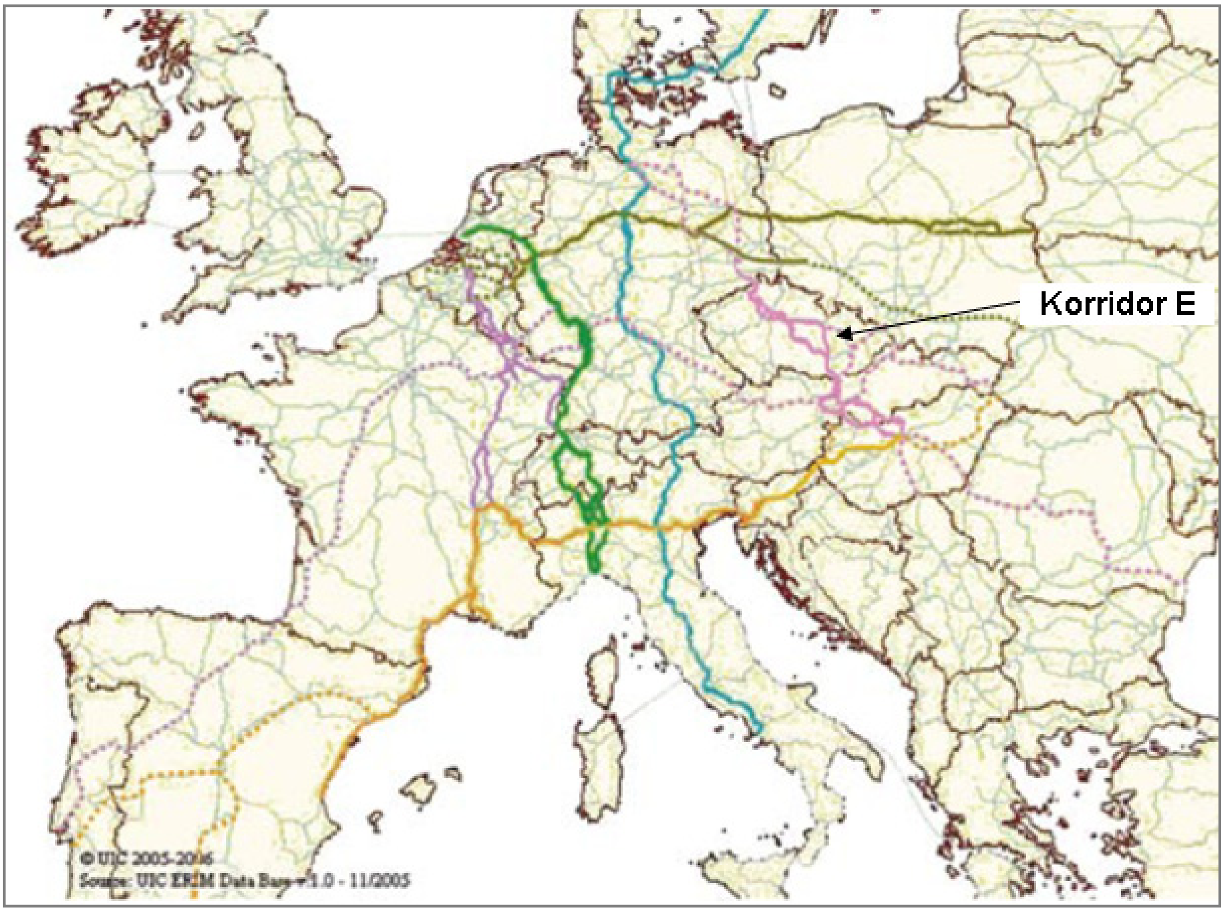


Figure 11: European ERTMS corridors (based on [7])

Network strategy of the Deutsche Bahn AG (DB networks)

On account that the company's business expectations from the development of freight rail traffic have risen, the investment strategy of DB Netz AG is increasingly being focused on freight rail transport - to the detriment of desirable projects in the field of high-speed transport. DB Netz AG has decided on a three-step approach:

- Up to 2013: Immediate action programme "Seaport Hinterland Transport":
  "Low-investment measures" for improvement of the control and safety technology, additional cross-overs, junction curves, extension of passing tracks, some corresponding measures of the German federal transport network plan, incentives for using alternative routes
- 2013 to 2017: "Growth programme"
  Steering of freight rail transport via alternative routes for high-load lines, node measures (see Fig. 12)
- 2017 to 2020: Unfinished measures of the German federal transport network plan Hanover – Hamburg / Bremen (Y line), Stuttgart – Ulm, Karlsruhe – Basel, Rhine / Main – Rhine / Neckar
  (Halle/Leipzig – Erfurt 2017 prospective completion)

The function of the east corridor (via Leipzig, Hof and Regensburg, bypassing Nuremberg) included for the first time in the growth programme, is the accommodation of additional southbound traffic to Munich and Passau, as stated by DB AG. This contrasts significantly with the EU concept containing the ERTMS corridor E via Prague and Dresden, important in particular for the Czech Republic (see Figure 12). It is thus clear that DB AG intends to route the traffic to Southeastern Europe mainly via Passau and not via Dresden, with the advantage of higher train path revenues from this line for Deutsche Bahn.

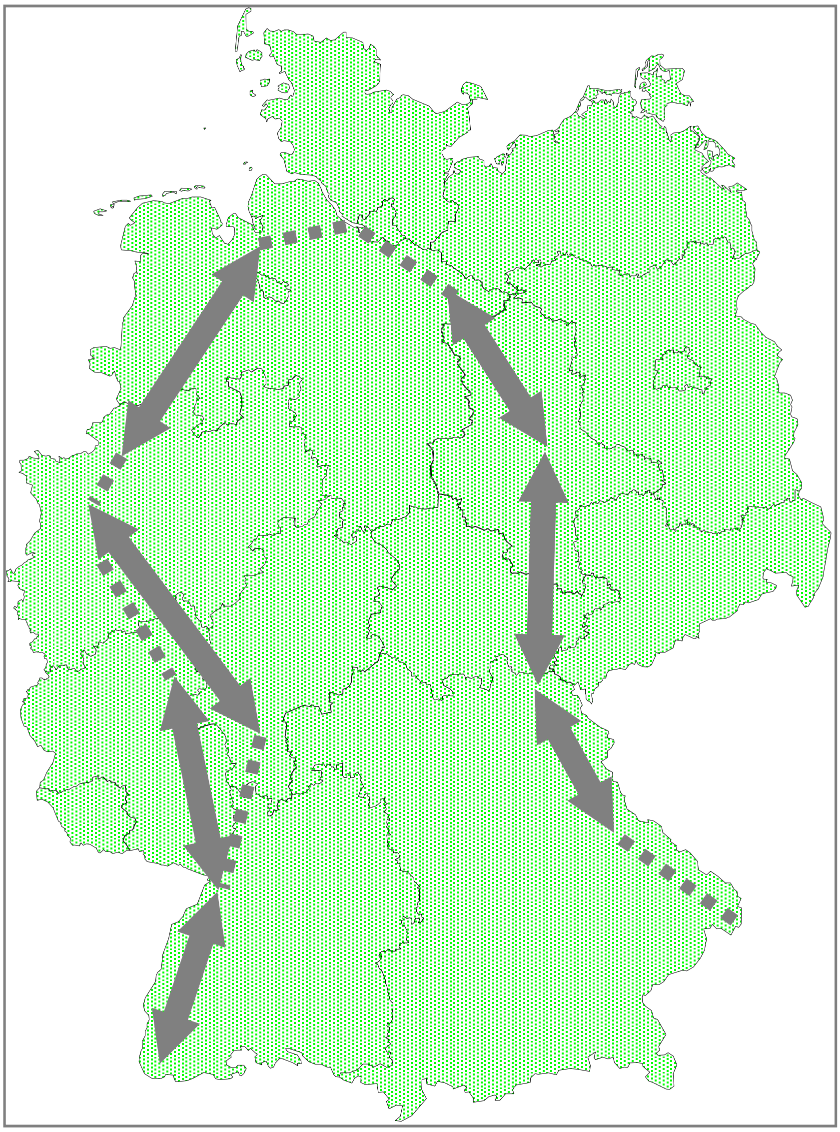


Figure 12: Freight transport corridors in the "Growth Programme" of DB AG (based on [8])

SUMMARY

Worldwide processes such as globalisation, climate change and increasing environmental impact are leading to a shift of emphasis in the role that railways should play in the future: with freight rail, better climatic and environmental effects can be achieved at less cost than with high-speed passenger rail transport.

In view of this background, it may be expected that, at best in the long term, there will a chance to realise the complete high-speed rail passenger transport connection from Berlin to Budapest via Dresden, Prague and Vienna, especially as this link is not being supported by Deutsche Bahn at present. This is clear to see from the fact that the refurbishment of the section Berlin – Dresden was repeatedly postponed, but nevertheless is now scheduled to be started.

But one should not succumb to the temptations of playing off the two modes of rail transport, freight and high-speed passenger transport, against each other. Now and in the future, the goal should be to increase the share of traffic in *percentage* terms for both freight and passenger transport significantly, as traffic volumes continue to grow in absolute terms.

High-speed transport should also not be neglected as it solely captures significant shares of traffic from "overland" air traffic, which consumes fossil resources and pollutes the atmosphere, and this at a significantly better environmental footprint. This dilemma can only be solved by significantly increasing the budgets allocated to rail transport.

Since the passenger transport link Berlin – Dresden – Prague – Vienna – Bratislava is definitely justified, considering the development to be expected in eastern Central Europe in the medium term, the concept of a continuous high-speed link should be further pursued. Furthermore, it is necessary to call for a network concept regarding cross-border high-speed transport in eastern Europe, as this is the only way to prevent that individual high-speed lines in this area will be incompatible with a useful overall concept (see Figure 1).

REFERENCES

[1] SIC! Sustrain Implement Corridor – Vergleichende Untersuchung von Hochgeschwindigkeitssystemen im Verkehrskorridor Berlin – Sachsen – Praha – Wien – Bratislava – Budapest (Comparative Study on High Speed Systems in the Transport Corridor Berlin – Saxony – Praha – Vienna – Bratislava – Budapest), Ministry of the Interior, Freestate of Saxony, Dresden 2007.

[2] Fengler, W., Platzer, G., 2006. A Study for High Speed Transport in Paneuropean Corridor IV. In: Schach, R., Witt, M., (Eds), Maglev' 2006 Germany (Proceedings), pp. 759 – 766.

[3] Stephan, A., Fritz, E., 2006. Operating Concept and System Design of a Transrapid Maglev Line and a High-Speed Railway in the Paneuropean Corridor IV. In: Schach, R., Witt, M., (Eds), Maglev' 2006 Germany (Proceedings), pp. 767 – 779.

[4] Fengler, W., Schach, R., Stephan, A., Stehle, J., 2008. Hochgeschwindigkeitsverkehr: Vorstudie zur Strecke Berlin – Budapest. (High speed Transport: Pre-feasibility Study of the Line Berlin – Budapest). Eisenbahningenieur 03 / 2008, pp. 35 – 43.

[5] SIC! Sustrain Implement Corridor – short factbook. http://www.landesentwicklung.sachsen.de/download/Landesentwicklung/SIC_ShortFactbook_en_060907.pdf

[6] UIC Union Internationale des Chemins de Fer, 2008, http://uic.asso.fr/

[7] UIC Union Internationale des Chemins de Fer, 2005-2006, http://uic.asso.fr/

[8] Müller, Wolfgang, 2009. Upgrade and new conception of the network of DG AG concerning to „Masterplan Rail, Seaport – Hinterland Transport (original: Ausbau- und Neukonzeption des Netzes der DB AG entsprechend „Masterplan Schiene, Seehafen-Hinterland-Verkehr“), speech given on IZBE Symposium „The Masterplan freight transport and logistics – response on the challenges of european freight transport“, Leipzig (2009-04-28/29)

ACCESS TO THE SLOVAK RAILWAY INFRASTRUCTURE

Eva Nedeliaková, Anna Dolinayová
University of Žilina
Faculty of Operation and Economics of Transport and Communications
Department of Railway Transport
Univerzitná 8215/1, 010 26 Žilina, Slovakia
eva.nedeliakova@fpedas.uniza.sk, anna.dolinayova@fpedas.uniza.sk

ABSTRACT

The Railways of the Slovak Republic, as the infrastructure manager, shall allocate the infrastructure capacity if the applicant fulfilled the conditions for capacity allocation identified in the published Network Statement and the infrastructure capacity permits it. Train path allocation follows business principles. Transport operator with confirmed capacity is in the advantage when the path is allocated. This paper describes Slovak railway infrastructure manager, legal framework for railway transport, principles of infrastructure development in the Slovak republic and general access conditions as well as presents charges for the use of railway infrastructure as a subject to regulation.

INTRODUCTION

The Railways of the Slovak Republic (ŽSR) were founded on January 1, 1993 by a decision of the Government of the Slovak Republic on establishment of a state company following the split-up of the Czechoslovak Federal Republic and thus the split-up of the Czech and Slovak State Infrastructure into two independent entities.

ŽSR was established by Act No. 258/1993 Coll. on the Railways of the Slovak Republic, under which the activities of a track and track transport operator shall be performed. As of January 1, 2002 ZSR was further divided into two independent entities according to the ŽSR Transformation and Re-organisation Project – into ŽSR and Železničná spoločnosť, a.s. Within the meaning of the approved transformation and restructuring project, ŽSR was transformed by Act No. 259/2001 Coll. into Železničná spoločnosť, a.s., and on amendments and supplements to Act of the National Council of the Slovak Republic No. 258/1993 Coll., with effect as of January 1, 2002. Pursuant to the said legal regulations, the Railways of the Slovak Republic shall undertake activities related to the operation of railway tracks and the management of track transport and operability of railway tracks.

Infrastructure manager provides transport services as well as other related activities in the line with the state transport policy and market demands. The main mission of ŽSR is as follows:

- management and operation of railway infrastructure,
- provision of operation-related services,
- founding and operating of railway, telecommunication and wireless networks,
- construction, regulation and maintenance of railway and funicular infrastructure,
- and other business activities as recorded in the Commercial Register.

INFRASTRUCTURE DEVELOPMENT

The appropriate railway network density is characteristic for the railway infrastructure. The backbone of the Slovak railway network is a triangle of the tracks: Košice – Žilina, Žilina – Bratislava and Bratislava – Zvolen – Košice.

Railway infrastructure development is focused mainly on the modernization of the tracks which are parts of the pan-European corridors IV, V, VI and which are parts of the TEN-T network. Modernization of the corridors to AGC and AGTC parameters is based on the need of offering the quality ŽSR infrastructure for the international and domestic passenger and freight transport in direction North – South and East-West.

Figure 2 describes Slovak railway infrastructure as a part of pan - European corridors IV, V, VI, TEN-T network and AGC and AGTC agreement.

Upgrading of the rail tracks is co-financed through the EU funds. Table 1 interprets the structure of funds for financing investment expenditures.

Table 1: Structure of funds for financing investment expenditures (EUR) [3]

Funds	Year				
	2009	2010	2011	2012	2013
Equity	92 942 973	92 942 973	92 942 973	92 942 973	92 942 973
State subsidies + co-financing	105 523 468	137 920 733	138 153 090	148 244 042	132 078 603
Structural funds	89 092 478	132 775 675	99 581 757	119 498 108	99 581 757
Cohesion fund	105 058 753	165 969 594	149 372 635	175 927 770	165 969 594
Total	392 617 672	529 608 976	480 050 455	536 612 893	490 572 927

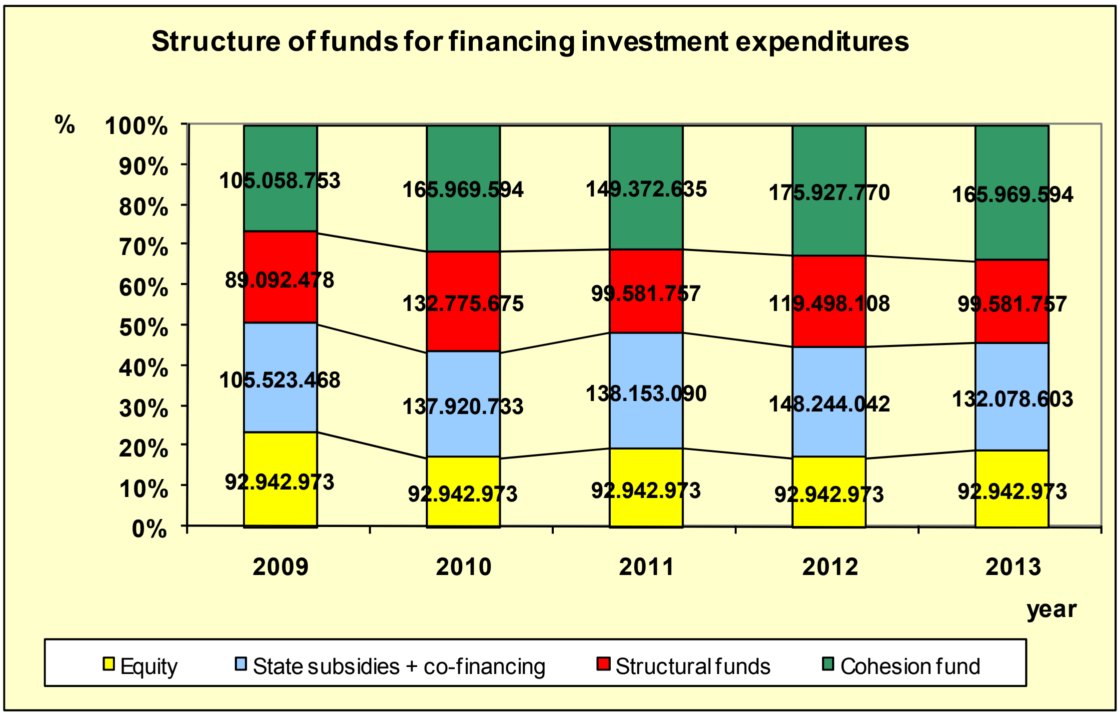


Figure 1: Structure of funds for financing investment expenditures [3]

The European Commission and European Parliament have decided to solve the problems of lack of funds and unsatisfied technical level of infrastructure through financial support to investments of European significance. Company's own resources make up only 20% of total planed investment expenditures during the period 2006 – 2013. The rest is planned to be financed from the state budget and European funds. [6]

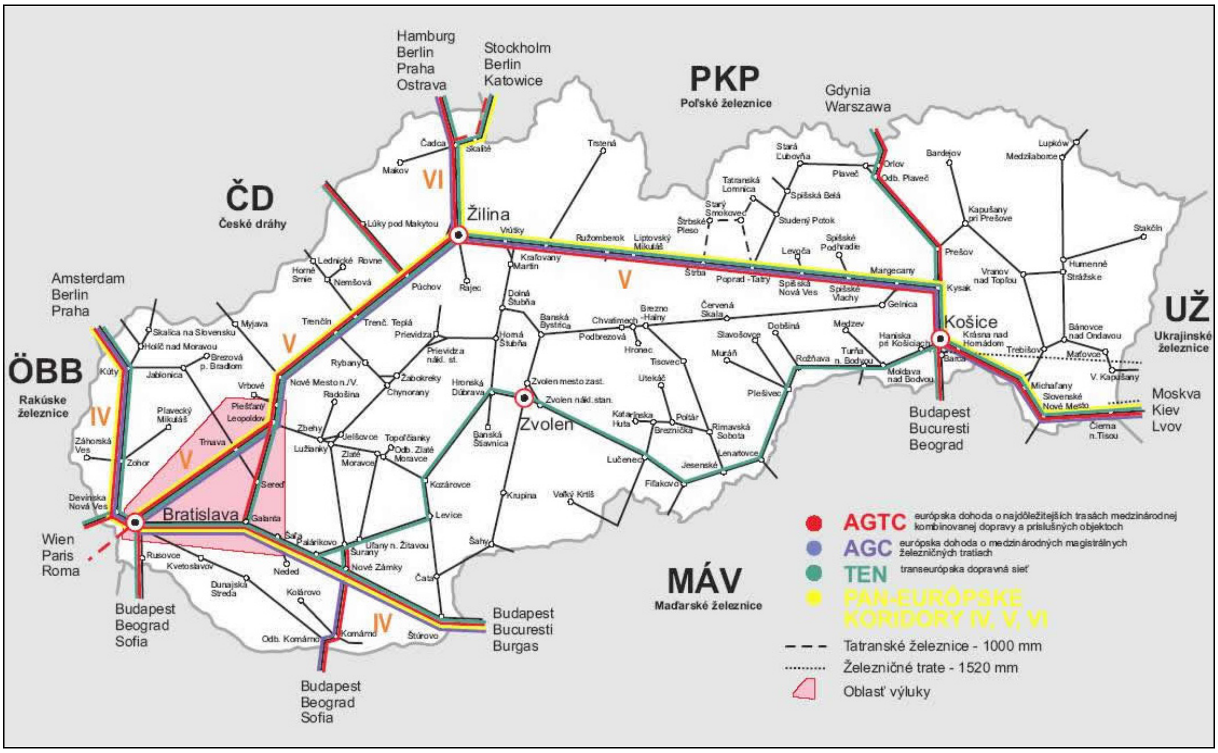


Figure 2: Slovak railway infrastructure as a part of pan - European corridors IV, V, VI, TEN-T network and AGC and AGTC agreement [7]

LEGAL FRAMEWORK

The operation of infrastructure and transport on the network of ŽSR is governed by:

- European legislative regulations,
- National legislative regulations,
- Regulations and technological processes of ŽSR,
- Regulations and technological processes of the transport operator within the scope specified in the abovementioned legislative regulations.

Legislative regulations of the Slovak Republic

Legislative regulations of the Slovak Republic for railway infrastructure are as follows:

- Act of the National Council of the Slovak Republic No 164/1996 Coll. on Railroads and on Amendment to Trade Licensing (Trade Law) No 455/1993 Coll. as amended by later regulation.
- Act of the National Council of the Slovak Republic No 258/1993 Coll. on the Railways of the Slovak Republic as amended by later regulation.
- Ministry of Transport, Posts and Telecommunications Decree No 249/1997 Coll. on the model for the preparation of transport rules on railroads,

- Ministry of Transport, Posts and Telecommunications Decree No. 250/1997 Coll. through which transport rules are issued,
- Decree of The Railway Regulatory Authority No. 545/2008 Coll. valid by 1 January 2008.

GENERAL ACCESS CONDITIONS

Transport operator may operate transport on the national or regional infrastructure on the base of:

- Valid licence for transport operation on the national or regional infrastructure, issued by a competent Member State's authority,
- Allocated capacity,
- Valid safety certificate,
- Track access agreement concluded with the infrastructure manager,
- Insurance,
- Agreement with the Institution of Railways protection against fire – applicable for freight transport,
- Agreement with the Railway power stations in the event that the operator will operate transport with traction units with dependent traction.

Conditions for submitting a request to obtain a licence, safety certificate and their content are defined by the NC SR Act No 164/1996 Coll. on Railroads and on Amendment to Trade Licensing (Trade Law) No 455/1993 Coll. as amended by later regulation.

Licence in the Slovak Republic is issued, withdrawn and controlled by Authority for Railways Transport Regulation (ÚRŽD). ÚRŽD at the process of decision making defines conditions for transport operation on the infrastructure related mainly to the securing of regional transport needs and transport safety on the infrastructure.

Licence issued by a competent authority of a Member State is valid on the whole region of the Slovak Republic. It is necessary to submit the licence to ÚRŽD in order to issue a safety certificate.

On the day of launching the transport operation on national or regional tracks operated on the base of the licence, the transport operator must have a safety certificate. Safety certificate is issued by ÚRŽD on the base of transport operator request.

The rights and obligations of the applicant and ŽSR in the relation to the allocated infrastructure capacity define framework agreement. Framework agreement is legally binding general agreement concluded in terms of public or private law for the period longer that the validity of a train timetable.

Framework agreements are generally concluded for the period of 5 years. In specific cases and after a mutual approval it is possible to conclude this agreement for shorter or longer period.

Between the infrastructure manager (ŽSR) and the applicant is concluded Contract on the transport operation on the rail infrastructure in administration of ŽSR, containing requirements and conditions for transport operation on the rail infrastructure.

Capacity allocation

Transport operator shall submit the capacity request to the competent ŽSR GD Department. If ŽSR has sufficient capacity for the requested sections, the ŽSR department issues a confirmation on the capacity allocation for the regular transport.

When requesting an irregular transport, ŽSR cannot guarantee that the path will be allocated. In the event of insufficient capacity, ŽSR shall notify the fact to the transport operator and suggests him a different track with sufficient capacity.

Applicant submits the request for transport path capacity allocation after the publication of the network statement at the latest 12 months before the day of train timetable validity.

Transport operator submits requests for train paths in terms of the Schedule for train timetable configuration, which is configured according to the RNE guide for customers.

Transport operators requests for the path allocation for the whole timetabling period have to be applied in terms of the Schedule for train timetable configuration issued by ŽSR GD annually in accordance with the national legislative regulations.

Request of the transport operators for irregular changes (exceptional paths) are provided as follows:

- An appropriate path offered by ŽSR published in the timetable will be used. If the transport operator is not satisfied with it than ŽSR does not guarantee meeting the total driving time from the leaving to arriving station on the base of transport operator request.
- A new path according to the transport operator will be designed - competent ŽSR GD Department will design timetable of the special train in 30 days of receiving the request (only in the event that there is a sufficient capacity on requested track sections or if it is commercially lucrative for ŽSR).

It is also possible to give requests during the validity of train traffic diagram and ad-hoc requests.

Applicant submits a written request for exceptional train implementation to ŽSR in following cases:

- for domestic trains at the latest 5 days before the time of requested departure from the leaving station,
- for international trains at the latest 21 days before the time of departure from the leaving station or exchange station at entering trains and at the transports between neighbouring railway administrations.

For transports which have been arranged in advance with the framework agreement; in reasoned cases the time for writing request submission can be shorter.

ŽSR without delay, at the latest 5 working days reply to the request of the transport operator for train path allocation. Information on the available capacity is at the disposal for all potential applicants requesting for certain infrastructure capacity during the timetable validity.

If the applicant cannot use ordered path of exceptional train, he shall ask ŽSR for recantation of the train journey:

- for domestic trains at the latest 6 hours before its planned departure from the leaving station,
- at international trains at the latest 5 working days before its planned departure from the leaving (exchange) station.

The infrastructure manager shall proceed in such a way as not to favour any of the applicants. However, the infrastructure manager is authorized to preferentially allocate transport path capacity to that applicant, who provides the transport services by the Public Services Agreement or whose core business activity is public transport operation.

If the usage of contractually arranged paths at the track section will be during 1 month lower that 50%, the infrastructure manager will ask the transport operator to abandon the right to use the train path. The infrastructure manager shall allocate non-used transport path capacity to the applicants during the timetable validity according to the time order of submitted requests for capacity allocation; he will preferentially allocate the transport path capacity to that applicant who has a state confirmation for provision of the transport services in the region by the agreement on the transport operation and whose core business activity is public transport on the rail infrastructure.

CHARGING PRINCIPLES

Maximum prices for the use of railway infrastructure in domestic freight and passenger transport include the infrastructure costs related to the management and organisation of traffic on the infrastructure, operation of the infrastructure according to the Act on Railroads.

Maximum charges for use of railway infrastructure in national transport of passengers and goods are described in table 2 and 3.

Table 2: Maximum prices for passenger transport [2]

Track category	EUR/train kilometres	EUR/thousand gross tonne kilometres	Per one train
	C_z	C_d	C_p
1.	1,6179	0,7532	5,9135
2.	1,5900	0,6695	5,9135
3.	1,4227	0,5859	5,9135

Table 3: Maximum prices for freight transport [2]

Track category	EUR/train kilometres	EUR/thousand gross tonne kilometres	Per one train
	C_z	C_d	C_p
1.	9,5117	0,7811	47,4198
2.	9,4838	0,7253	47,4198
3.	6,5273	0,6138	47,4198

Note:

Train-km	– train kilometres,
Gross ton-km	– gross tonne-kilometres,
Cz	– maximum charge for train-kilometre for passenger or freight transport by trains on the particular track category,
Cd	– maximum charge for 1000 gross tonne-kilometres for passenger and freight transport by trains on the particular track category,
Cp	– maximum charge for passenger and freight trains for the access to the transport path,
Cs	– maximum price for the operation of individual traction units of all types.

RESULTS AND DISCUSSION

The capacity of railway infrastructure in the Slovak Republic is allocated in a non-discriminatory manner, while the decisive factor is the time order in which the application were submitted.

Maximum prices for use of the railway infrastructure are defined by the Authority for Railway Transport Regulation. Charges are levy on the transport operators on the base of account invoice for use of the railway infrastructure which ŽSR monthly issues to individual transport operators.

Price for railway infrastructure is on the base of Ministry of Finance of the Slovak Republic decision included in the list regulated price items. It represents the maximum price applicable for all potential transport operators authorised to carry out their business on the territory of the Slovak Republic. [5]

Type of train, track category, length of the train sections of transport operation and gross weight of train are decisive for maximum price calculation for the use of the railway infrastructure in domestic passenger and freight transport.

CONCLUSIONS

The main problem in the management of railway infrastructure in the Slovak Republic covers charging principles. The absence of market prices in the railway transport expresses itself negatively on the market of transport services. It deforms relative prices for individual services and so generates unbalance within means of transport. The road transport market share is higher in comparison with other means of transport. This fact makes overcharge of road infrastructure, increases risk and accident rate, pollutes environment. [1]

The European Commission responds to this situation by other regulations. These regulations indirectly increase costs and prices of road operators that would increase attractiveness of other means of transport.

The transport regulation problems are large and serious and their solutions are divided in partial methods nowadays. [4] The transport regulation is an objective demand and it plays a key role in implementation within European Union transport policy.

REFERENCES

[1] Buková, B., Nedeliaková, E., Gašparík, J., 2009. Business in the railway transport. IURA Edition. ISBN 978-80-8078-248-1

[2] Decree of The Railway Regulatory Authority No. 545/2008 Coll. valid by 1 January 2008

[3] Internal sources of the Railways of the Slovak republic, annual report, year 2008

[4] Kopicki, R., – Thomson, S., 2005. Best Methods of Railway Restructuring and Privatization. CFS Discussion Paper Series, n. 111, the World Bank.

[5] Nedeliaková, E., Dolinayová, A., Harmanová, D., 2007. Economics of railway transport. University of Žilina. ISBN 978-80-8070-781-1.

[6] Nedeliaková, E., Hrivnák, M., 2007. The consequences of price regulation for the use railway infrastructure. In: Railway market, Central and Eastern European Review. p. 33-37, Rynek Kolejowy, Tor Consultants Group LtD., Warsawa, Poland, ISSN 1896-3528.

[7] Network statement, The Railways of the Slovak republic, 2009

TRANSPORT INFRASTRUCTURE INVESTMENTS IN NORTH-SOUTH TEN-T CORRIDORS AS A FACTOR ACTIVATING POLISH SEAPORTS

Aleksandra Koźlak, Barbara Pawłowska
University of Gdańsk
Department of Comparative Analysis of Transportation Systems
Amii Krajowej 119/12,181-824 Sopot, Poland
a.kozlak@univ.gda.pl, barpa@gnu.univ.gda.pl

ABSTRACT

Trans-European transport network (TEN-T) policy aims at providing the infrastructure needed for the European economy to function smoothly and to achieve the objectives of the Lisbon Agenda on growth and jobs. It is well known that transport infrastructure is fundamental for the mobility of persons and goods and for the territorial cohesion of the European Union. The sustainable use of resources is also an essential aspect of the policy on the TEN-T since the priority projects give a privileged status to those modes which are more environmentally friendly.

The Commission identifies the maritime sector as an alternative to overland transport, particularly because it has considerable potential over short distances, as illustrated by the concept of "motorways of the sea". The White Paper on European transport policy for 2010 highlights the role that Short Sea Shipping (SSS) can play in curbing the growth of heavy goods vehicle traffic, rebalancing the modal split and bypassing land bottlenecks.

The paper analyses briefly the role which the trans-European transport network (TEN-T) plays for Polish seaports activation, especially to achieve one of EU transport policy priorities to shift the flow of goods for more sustainable modes of transport than road, to improve the interoperability of networks and to enhance economic cohesion.

The paper will be focus on land accessibility to seaports as it is crucial for a port competitiveness and for enhancing economic development both in land-locked and coastal regions in Poland. The basic principles of the EU transport policy which can have a major impact on land accessibility to sea ports can be summarized as follows:

- integrate national transport networks into a trans-European transport network (TEN) through technical interoperability of different systems;
- create a free market for transport, allowing for free and fair competition among transport modes and operators;
- internalize the transport external costs to equalize the competitive conditions among transport modes;
- develop information technologies to improve efficiency and transparency.

The integration of national transport networks into TEN-T is crucial in case of Polish seaport. They are located on the main transit routes between the North and the South. However, due to the lack of motorways as well as insufficient networks and the poor standard of the roads, the underdeveloped system of combined transport, the lack of logistics centers, and the high degree of deterioration of fixed assets in the ports, the market position of Polish seaports is far from satisfactory.

INTRODUCTION

It is out of discussion that a fully integrated transport network is a prerequisite for a real freedom of movement of goods and people and for bringing together the peripheral, island or isolated areas with the central regions. A modern, interconnected and interoperable network allow, through a better use of transport, to enhance trade and the competitiveness of the

European economy as a whole. Without implementing the necessary infrastructure and an appropriate regulatory framework for an efficient network management, the concepts of the internal market and the territorial cohesion of the Union will remain unfinished.

The development of the TEN-T policy dates back to the 1990's when it was recognized that a clear Community structure was fundamental to move towards an integrated and interoperable network amongst the Member States. This objective, inserted in the Treaties since 1995, remains vitally important and valid. Improving the operation of this network in an overall European way must also be addressed. In this context, there is a need to foster a more dynamic coordination between Member States and Infrastructure Managers, for both operational matters and investments [1].

The past decade was not only a worrying increase in traffic congestion in urban areas, but also a new phenomenon of congestion on the major arteries of the trans-European network, increasing the number of bottlenecks. Missing links in the infrastructure, and a lack of interoperability within specific transport modes and for intermodal transport systems, are all reasons aggravating this congestion of the network.

All transport modes are affected: road transport, but also railway transport –20% of the railways track represent bottlenecks. Also air traffic is increasingly affected by delays. In contrast, the peripheral regions still suffer from isolation due to a lack of connections with the centre of the continent, and also congestion on the central parts of the network.

Bearing that in mind and in light of public budgetary constraints, scarcity of energy resources and environmental goals, co-modality (i.e. the optimum use of each transport mode in combination with others) should be one of the main driving forces for the evolution of transport policy in Europe[2]. Specifically, a business-oriented strategy is essential to the success of an international corridor approach.

Implementing TEN-T policy we should have in mind that transport makes a significant contribution to a number of environmental problems in the EU. Road transport alone accounts for 17,8% of EU27 PM2.5 emissions and 17.9% NMVOC emissions. Road transport and national navigation are together responsible for 43,1% of EU 27 NO_x emissions and 38,1% CO emissions. Transport emits more than a quarter of all the EU's carbon dioxide emissions – and is the only sector where, since 1990, emissions have grown significantly [3]. Noise is also an environmental problem arising from transport. Continued transport growth is predicted and by 2020 freight transport is expected to have grown by more than 34% and passenger transport more than 27%. These impacts arise from the use of transport infrastructures, but the construction of infrastructures can also cause environmental problems, such as impacts on biodiversity, ecosystems and water courses [4].

In the new context of sustainable development, the Gothenburg European Council of June 2001 asked that, in future, stress should be laid on the development of rail, maritime and river transport. The European Commission also placed the re-balancing between different modes of transport at the heart of a sustainable development strategy.

One of possible solution is waterborne transport. It consists of maritime transportation, short-sea shipping, inland navigation, but also port operations and the part of land operations which consists in cargo handlings/transshipment between the waterborne transport system and the other modes of transport. It is characterized by (1) less pollution, (2) less energy consumption, (3) lower transport cost, and (4) higher free capacity, to compares to other modes.

In September 2001 the Commission presented its "White Paper on European Transport Policy for 2010: time to decide" [5]. The Paper sets a number of ambitious targets to ensure competitiveness and sustainability of mobility also in 2010. Short Sea Shipping is an obvious choice to play a key role in reaching these targets. It can help curb the 50 % increase in heavy goods vehicle traffic forecasted in the Paper, it can help rebalance the modal split, bypass land bottlenecks, and it is safe and sustainable.

The Commission presented the notion of “Motorways of the Sea” in its White Paper on European Transport Policy. These Motorways should alleviate major land bottlenecks in the European transport system and enhance the logistics integration of Short Sea Shipping. Sea Motorways should make it possible to bypass land bottlenecks in Europe as part of comprehensive door-to-door logistics chains.

Waterborne transportation is a well promoted transport mode for cargo transport in EU, in conforming to the current European transport policy, to contribute to a balanced development of the transport system. In particular, the promotion of waterborne transportation is regarded as an effective measure to reduce environmental impacts while sustaining mobility, which is considered as the natural consequence of economic growth. Recent statistics indicate the significant development of waterborne transportation in the global transport market shares as the effects of waterborne transport promotion and of the development of intermodal transportation. The most remarkable growth in waterborne transport is found in the short-sea shipping segment. However, even if it shows the highest growth among waterborne operations, it cannot yet catch up with the growth rhythm of the road transport mode.

TRANSPORT ACCESSIBILITY AS A FACTOR OF SEAPORTS’ DEVELOPMENT AND COMPETITIVENESS

Seaports are set in maritime and land areas and networks and must therefore be considered as nodes. Cullinane and Talley [6] note that port is a “node” in a transportation system, connected to other ports and inland destinations by spokes or transportation routes or corridors. We can also say that seaports are nodes in chains of intermodal transport. In many markets two or more ports compete for common hinterland. Containerization was a major technological innovation that revolutionized the nature of maritime-based freight transport of manufactured goods. With containerization, ports in the same region become closer substitutes, and hence are more exposed to competition from other ports and other routes. The emergence of intermodal rail and barge corridors has extended gateway ports’ geographical reach. The extension of hinterlands leads to more overlap among ports’ hinterlands and hence to stronger competition [7].

Different seaports can have captive and competition/overlapping hinterlands. The captive (main) hinterland is the space over which a port has almost the exclusivity for providing its services. The competition margins and overlapping hinterlands are the areas, where ports are in competition.

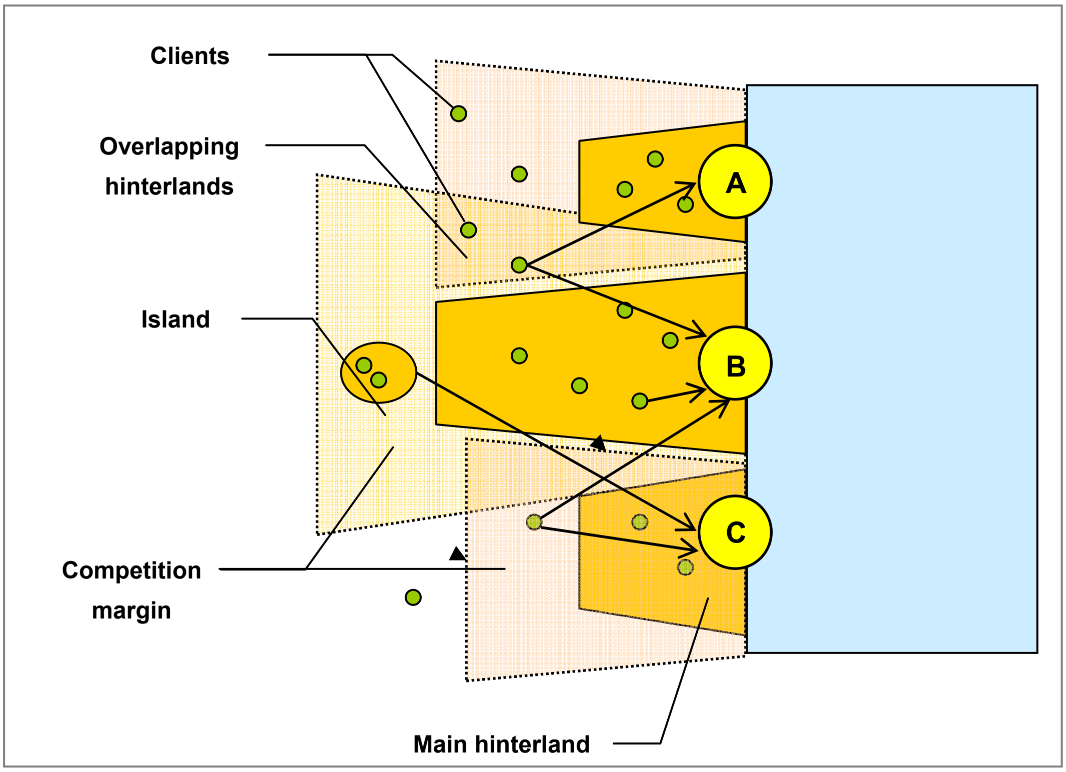


Figure 1: Different types of hinterland

A range of factors can be quoted which determine the competitiveness of seaports and their potential for growth and development. Among them hinterland accessibility plays one of the most important role. Fleming and Baird [8] note in their observations about competing ports Hamburg-Le Havre, that each of them has a competitive advantage in its local hinterland, to which it has best access. Land access to European ports varies according to transport modes, generalised transport costs and spatial scope. In other words, for the same efforts (in terms of journey times or monetary costs), a different range of destinations can be reached from two or more sea ports. The differences in accessibility can be illustrated by the modal split of inland transport from the ports.

Ports are not "perfect substitutes" - gateway ports still have a strong position in at least some of their service area, as hinterlands do not overlap completely and the congestion in ports or in their hinterland transport networks can mute effect of containerization. When a port or its hinterland facilities are more strongly congested, the quality of that port's service may be lower, because it takes more time to access and egress the port, the reliability of service declines and this weakens its competitive position [9].

Infrastructure condition of access to seaports is one of the most important factors that decides about the position of a seaport on the market. Well-developed infrastructure of transport leads to creation of both fast and cheap connections from a seaport with its hinterland. It also influences the time of handling goods in sea-land relations and the costs of transportation. Due to the improvement of accessibility to the port from the land side, its attractiveness rises, which may cause the handling of goods to a greater extent. A seaport, that has the access to the network of efficient land connections with the market, will always take over the loads in comparison to a seaport operating at the same level of services, but has no such connections.

Competition between ports is treated as competition between intermodal transportation chains, while the hinterland access conditions are represented by the corridor facilities and by the inland roads. Interactions between hinterland access conditions and port competition were examined by Zhang [10]. He has found that when ports compete in terms of quantity, an increase in the corridor capacity will increase the port's own output, reduce the rival port's output and increase the port's own profit. On the other hand, an increase in the inland road capacity may or may not increase the port's own output and profit because while more road capacity reduces local delays and moderates the negative impact of the output expansion, it also induces greater local commuter traffic.

As far as other factors are considered, hinterland transport costs have become relatively important, as the cost per kilogram per km on the hinterland is 5 to 30 times as high (depending on the hinterland transport mode) as the maritime shipping cost. Routing choices, and to some extent port choices, are strongly dependent on the hinterland transport conditions and the reliability of the total route has become increasingly important to those in the supply chain making the routing decisions [11].

The physical hinterland is a matter of transport supply, both from a modal and intermodal perspective. It considers the transport infrastructure network, modes and terminals connecting the port to its hinterland, the means to achieve regional accessibility in freight distribution. Various inland modes such as road, rail, inland waterways and pipeline are used to access the hinterland. The quality of the access to and from the hinterland differs between seaports and affects their competitiveness. Improving the access to the port allows them to wide their captive hinterland. A larger captive hinterland for a port would:

- allow for more frequent services by shipping lines;
- allow shipping lines to use larger ships, deriving the economy of scale;
- yield a higher load factor for shipping lines, so the port is more likely to be chosen as a "load center" or in their scheduled stop on the route;
- facilitate the growth of third-party LSPs (logistics services providers) and forwarders at/near the port;
- allow more value-added "clusters" to be developed (transport product, logistics product and port-related manufacturing product), further attracting more liners, LSPs and forwarders.

All these effects would make the port more competitive in competing for the overlapping market. Especially a larger captive hinterland for a port results in higher traffic density which in turn will influence a reduction in freight rates [12]

The economies of scale generated in transhipment can be translated into improved land access to the port. It is not the distance itself that decides about transport accessibility. As far as land transport is concerned it is rather time that seems to be essential and it could be shortened by extending and modernising the infrastructure. With a higher volume and thus lower generalised unit transport costs, a port can penetrate more efficiently and more deeply into the hinterland.

Intermodal transport systems seem especially suited to transforming scale advantages during transhipment into better land access in terms of efficiency and spatial reach. This is because intermodal transport requires relatively high volumes and long distances to be commercially viable. By investing in intermodal transport, ports can gain a competitive edge over other ports and improve their "hinterland potential". The corollary of this is that the port's traditional market is being replaced by hinterlands structured along transport corridors [13].

All the time particularly important and visible changes relate to the range of ports' hinterland. Captive hinterlands shrink or totally disappear, although the other day they were assigned to each port, due to the spatial distance, time or cost of transport. Therefore, the origin and destination places of cargo were shared between neighbouring ports. Currently, forwarders select a port in the scale of an integrated sea-land transport chain (where the port is only a part thereof). Their selection is based rather on qualitative criteria than on the traditional criteria – the distance, the time and the cost. Reducing the captive hinterland is accompanied by enlargement of the overlapping hinterland – an area in the sphere of influence of different ports. Each of these ports must actively seek new clients in conditions of increasing competition. Sometimes even cargo from cities and regions located not far away from a port is distributed using distant ports.

Transport improvements have impact on the economic activities. With regard to the product market, transport improvements have an impact on firms not only through transport cost reductions but also through the scope for cost reductions via the logistics chain. Transport investment has an obvious role to play in reducing the travel time. Changes to the logistics chain mean that the reliability of transport networks is important as well as the speeds that they offer [14].

Landward connections by road, rail and rivers create many difficulties both at local, regional and national levels. The transport infrastructure providing access from the hinterland to the port is divided into the infrastructure functioning in the port neighborhood (micro scale) and the port connections on the back (the regional and national network infrastructure). They are complementary each to other, but the impact of the ports on their development is definitely different (decreasing with increasing the scale).

POSSIBILITIES OF INCREASING TRANSPORT ACCESSIBILITY OF POLISH PORTS DUE TO INFRASTRUCTURE INVESTMENTS

The trends that can be observed on the European transportation market such as a rapid increase in transportation of containers, expansion of the ro-ro transport, the necessity to develop combined transportation systems and short sea shipping, as well as the constantly growing traffic congestion on the roads create a great opportunity for development of Polish seaports. Now Polish seaports are at a competitive disadvantage, when compared to any of north-western European ports. The main reason is the relatively poor location with respect to major transoceanic routes. In order to make up for the poor geographical location, Polish seaports require a better infrastructure and better access, however, the current infrastructure providing access both from the sea and the hinterland is poor and leads to longer dwelling times in ports and higher costs of services [15].

The prosperity of the Polish coastal area as a gateway region and development of seaports depends on meeting the following requirements:

- provision of an interconnected land-and-sea network of multimodal transport corridors with a priority for unitized cargo,
- provision of smooth intermodal transport in ports, along transport links and across borders,
- securing a high level of interoperability between transport modes, with an increased emphasis on railways and short sea shipping,
- innovative solutions in cargo logistics, especially in port operations [16].

The South Baltic Sea area plays an important role as a gateway between Scandinavia and Continental Europe and functions as a market place for maritime-related intermodal transport services, where ports offer interfaces to a wide range of destinations. Polish sea ports are located on the main transit routes between the North and the South. However, due to the lack of motorways as well as insufficient networks and the poor standard of the roads, the underdeveloped system of combined transport, the lack of logistics centres and the high degree of deterioration of fixed assets in the ports, the market position of Polish sea ports is far from satisfactory [17].

The quality of and the accessibility to the transport infrastructure is one of the crucial factors determining the performance of gateway regions because a port can penetrate more efficiently and more deeply into the hinterland. Failure to improve the road and rail infrastructure in the Polish section of the North-South transport corridor could make it difficult to attract cargo transported through Polish ports. Multimodal transport technology is another element which could be used to effectively compete with North European ports over high-value unitised cargo. The need for an improved accessibility stems from the fact that shippers and carriers continually assess service quality in ports through their effective hinterland connections.

The opportunities of activation of Polish seaports must be looked for through the identification of the most important factors that influence ports development. The document “Strategy of seaports development till 2015” included SWOT analysis, which contained the strengths and weaknesses of Polish seaports in the context of appearing opportunities and threats. Weaknesses of ports included, among other things, an insufficient quantity of well-functioning transport connections (road, rail and inland waterways) with hinterland, which are the main economic centres in Europe and Poland. Moreover, the document mentioned the limited hinterland areas, high decapitalization of port assets, insufficient infrastructure of modern cruise and ro-ro terminals, weak integration of all participants of port trade and the co-ordination of development plans [18].

In order to achieve the aim, which is the development of Polish seaports and improvement of their competitiveness, some negative factors will need to be reduced. The Polish seaports in Gdańsk, Gdynia and the port group of Szczecin-Swinoujscie will be able to compete effectively with other Baltic ports only if the condition of the infrastructure connecting the port with the hinterland improves radically and modern intermodal connections are used. Therefore, the extension and modernization of the ports as well as the road and railway infrastructure are recommended.

It is the task of Poland to support sea shipping (ferries) tracks that cross the Baltic Sea and are a natural extension of the Polish land infrastructure, not only serving the bilateral Polish-Scandinavian relations, but also connecting Scandinavia with the south of Europe. It is also very important to extend the hinterland of the Polish seaports and the strength of great metropolitan centres in the country and abroad (Germany, the Czech Republic, Slovakia, Belarus and the Ukraine). Most of the throughput of the Polish ports is generated by production and trade centres localized inland: in the regions of Warsaw, Lodz, Wroclaw and Silesia. The extension of port hinterlands is strictly connected with the improvement of the infrastructure in such slanting directions as: Gdansk-Warsaw, Gdansk-Poznan, Szczecin-Poznan, Szczecin-Berlin and in further hinterlands: Poznan-Wroclaw, Warsaw-Krakow i Warsaw-Lublin-Rzeszow-Ukraine [19].

The policy of the European Union in favour of maritime transport development is a chance for the development of the greatest Polish seaports. From the point of view of the motorways of the sea, the priority is to enlarge the throughput of seaports and to improve the land connections. To achieve this priority it is inevitable to make investments that will improve the access to the ports within urban agglomeration (microeconomics) as well as investments of transregional importance (macroeconomics). It is possible to co-financing the programme of Short Sea Shipping development thanks to the TEN-T fund and the Marco Polo programme. According to the TEN-T 2008-2013 budget, 212.3 M euros is going to be spent on building the Baltic Sea motorways. The maximum amount that can be obtained from the TEN-T budget is 20% of the infrastructure projects and 50% of the experts' reports and documentation costs [20].

In Poland, the TEN-T network consists of roads that are equivalent to the target motorways (A-1, A-2, A-4, A-18) and some already planned expressways (S-3 and some part of S-5, S-7, S-8, S-10, S-12, S-17, S19, S-22 and S-69). As far as the railroads are considered, two basic tracks were included in the network. These are the east-west, north-south railroads (in the Pan-European Transport Corridor VI, but through Warsaw) and parallel tracks from Wroclaw to Szczecin (through Poznan and Rzepin – a freight traffic track). The port in Gdansk will be one of the most important links in the VI Pan-European Transport Corridor. Out of 30 priority investments within the TEN-T network, only six concern the Baltic region. What is more, 4 of them apply to Poland. These are:

- Priority Project 21: Motorways of the Sea, including Baltic seaways of not an exactly defined structure;
- Priority Project 23: Railway axis Gdańsk-Warsaw-Brno-Bratislava-Vienna (the anticipated lead time 2010-2015)
- Priority Project 25: Motorway axis Gdansk-Brno-Bratislava/Vienna (the anticipated lead time 2009-2010)
- Priority Project 25: "Rail Baltica" axis: Warsaw-Kaunas-Riga-Tallinn (the anticipated lead time 2010-2016) [21].

The completion of the above mentioned projects will improve the transport accessibility of the ports in Gdynia and Gdansk. Unfortunately, neither of the priority projects concerns the ports in Szczecin and Swinoujscie. Due to this fact it is essential to support these ports located in Western Poland through cooperation between regions in order to assign new corridors in the north-south direction. For activation of the Polish ports the development of transport infrastructure in the South-Nord corridor is more important than in West-East corridor.

A scheme of transport corridors which are essential for the development of the region has been formulated within the cooperation of the Baltic south regions. Some of the corridors include the TEN-T network, but a new corridor has been also proposed. In fact, they are important from the point of view of the Polish seaports. As far as Poland is concerned, there are two sea-land transport corridors that link the North and South parts of Europe [22]:

- The Central European Transport Corridor (CETC) reaches from Copenhagen via Skåne to Poland and includes the ports in Ystad, Swinouscie and Szczecin. The corridor runs along the Odra river valley in Zachodniopomorskie and Lubuskie Voivodeships, further through Dolnośląskie Voivodeship in Poland to the Czech Republic and further south towards the Mediterranean (the ports in Venice and Trieste) ;
- The Baltic Link connects the port in Gothenburg with Karlshamn/Karlskrona in Sweden and the ports of Gdynia and Gdansk in Poland. The Baltic Link runs further south in Poland to Lodz and Katowice. The link includes both road and rail services and the ferry link between Karlskrona and Gdynia. The main hinterland for the ports of Gdansk and Gdynia is central Poland including Warsaw and the industrial belt in Silesia. The main routes connecting to these centers (the motorway A1 from Gdansk to Katowice, and the railway from Gdansk to Warsaw) are included among the EU TEN-T priority projects. The development of the expressway S7 from Gdansk to Warsaw is included in the Polish infrastructure plans.

These two corridors are completed by the Via Hanseatica land corridor because there is a need to develop a high quality road and railway link parallel to the sea along the Polish coast, to create a high-class connection between capitals of northern Polish regions (Szczecin-Gdansk/Gdynia-Olsztyn), the Kaliningrad region and Lithuania and to integrate this link into the TEN-T network. The local road and rail connections to the port cities of Szczecin and Gdansk/Gdynia from the northern Polish Coast area and in relation to the hinterland in Warmia-Masuria are important to facilitate cargo transport to and from the ports [23].

Some interesting projects concerning the development of transport infrastructure as well as influencing the improvement of accessibility to Polish seaports include two that should be mentioned – project A-B Landbringe and its continuation SoNorA. The aims of these projects are to do research and analysis involving the development of transport of goods and passengers in that direction as well as improvement of land connections between the south part of Baltic Sea and the Adriatic Sea.

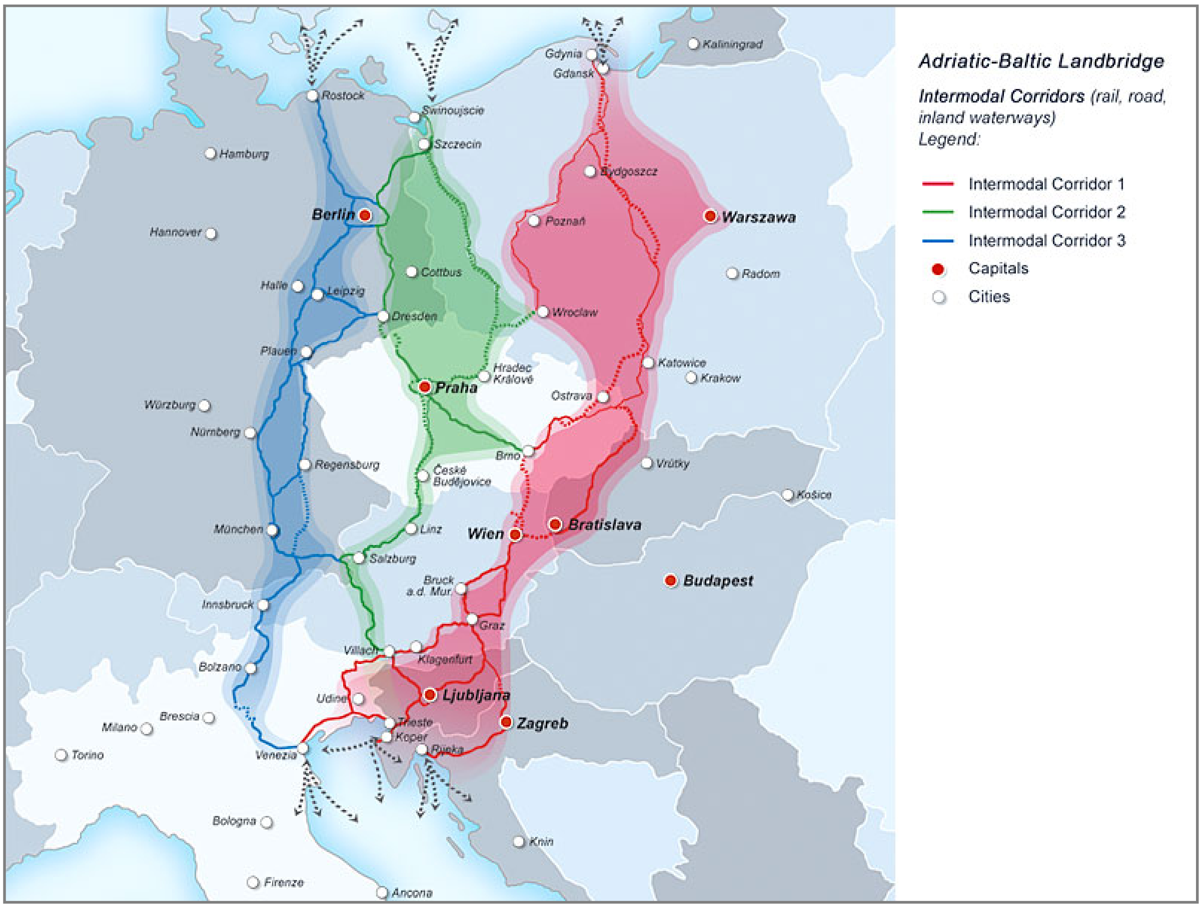


Figure 2: Intermodal corridors under the Adriatic-Baltic Landbridge project [24]

A-B Landbridge and SoNorA bring together more than one South-North itinerary development under one project. One of the objectives of Sonora is ensuring network interconnections within a broader Pan-European network. Three intermodal corridors of which two start in Polish ports are planned:

- Intermodal Corridor 1 – starts in Gdansk/Gdynia,
- Intermodal Corridor 2 – starts in Szczecin/Świnoujście.

The corridor from Szczecin/Świnoujście provides the shortest land connection between the Baltic Sea and the Adriatic Sea, but it has not been included among the TEN-T corridors.

The proper justification for creation of new corridors is important to the extent that it is highly possible to correct the location of the European transport networks in 2010. In June

2008 the Ministry of Infrastructure prepared a list of potential changes in the TEN-T network supported by Poland, including some important investments as far as the transport integration of Baltic European countries is concerned. These are e.g. expressways S-6 (Gdansk-Szczecin), S-10 (Torun-Szczecin), S-11 (Pyrzowice-Poznan-Koszalin) and S-16 (Grudziadz-Olsztyn-Augustow), railroads Gdynia-Bydgoszcz and Inowroclaw-Olsztyn-Elk, the correction of Rail Baltica from the track through Augustow to the railroad through Elk, the seaport in Police as well as the of the motorways of the sea: Gdynia-Karlskrona, Swinoujscie-Ystad and Gdansk-Rotterdam [25].

Within continents and between them, long-distance transportation is connected with the need of creation of international transport chains, using different modes of transport, and that has a beneficial influence on the development of intermodal transport. Therefore the technical parameters of the infrastructure, load units and means of transport must be standardized. Due to the globalization of economic relations, the development of intermodality becomes a necessity in order to eliminate the differences in transport systems and lead to their integration. One of the most important tasks that the Polish seaports face today is the improvement of their compatibility with other EU seaports which requires the adjustment of the seaport infrastructure and suprastructure to the demands of modern multimodal transport systems.

The participation of the seaport in an international handling of multimodal transport, especially in the handling of containers and ro-ro units, is at present a measure of being modern and having a competitive position. The handling of unitized cargo is a basic source of the seaports' income, and thanks to the development of their logistics and distribution services, it is the main factor rendering an added value. Specialization of seaports requires modern storage and transhipment terminals which are appropriate for container, ro-ro, liquid cargo and ferry transport. Investments in the development of such terminals are the best way not only to improve the condition of the Polish ports, but also to increase the level of services offered by them. This may cause the appearance of new haulier handling Polish ports, but in case of container traffic and properly functioning market, it is crucial to ensure appropriate connections from and to seaports which is strictly connected with road and railway investments.

The development of transport corridors will obviously influence the future role of Polish ports. Well-functioning and efficient transport infrastructure which is adequate to the transport market requirements as well as the organizational solutions and trade conditions, which should convince the shippers to use the offer of transport corridors, belong to the basic conditions stimulating the future directions in transport.

Although the political framework conditions have been quite favourable for intermodal transport during the last decades, the focus on infrastructure improvements on the supply side (e.g. terminals, rail tracks, port infrastructure, ITS systems) has not had the intended effects on the modal split. The influence of the transport policy makers on the modal shift is rather limited, since most of the recent logistical trends that drive transport growth are independent from regulative policy measures. The implementation of modal shift policies of governments at the local, regional, national and supranational levels are often hampered by the existence of infrastructural bottlenecks and a low interoperability and interconnectivity between modal transport systems (both point and line infrastructures). Under-developed corridors with a low intermodal supply, but high intermodal potential, should receive priority attention for developing intermodal transport. This relates specifically to the corridors running via Poland and the Baltic States. There is a need to connect actors representing "supply", "demand" and "policy" in order to improve communications and to close information gaps.

Improved preconditions for cross-border connections, with the help of harmonised, upgraded and new communication services in ports, and along transnational transport corridors, will facilitate intermodal transport and global trade by using a combination of rail and short sea shipping services.

CONCLUSIONS

The "motorways of the sea" concept aims at introducing new intermodal maritime-based logistics chains in Europe, which should bring about a structural change in our transport organisation within the next years to come. These chains will be more sustainable, and should be commercially more efficient, than road-only transport. Motorways of the sea will thus improve access to markets throughout Europe, and bring relief to our over-stretched European road system. For this purpose, fuller use will have to be made not only of our maritime transport resources, but also of our potential in rail and inland waterway, as part of an integrated transport chain.

Summing up, the Polish ports should try to take over some of the freight throughput going from the Baltic regions to the European continent countries by road. The maritime transport is perceived as more economic and environment friendly. The increasing relevance of the role of ports in the TEN-T network/corridors is becoming crucial for freight transportation. Thus, ports need to grow and expand accordingly with the rest of the network despite the physical reorganization and/or upgrading of ports. There is a need to improve accessibility to the ports. A more sustainable growth of the port system will bring cost efficiency and further gains of reliability to the whole TEN-T network. To take this advantage we should improve the accessibility of the Polish ports by including maritime projects in the TEN-T corridors.

REFERENCES

[1] Communication from the Commission Trans-European networks: Towards an integrated approach, COM(2007) 135 final, 21.3.2007,

[2] Green Paper 2009, TEN-T: A policy review towards a better integrated transeuropean transport network at the service of the cpmmon transport policy, COM (2009) 44 final, 4.02.2009,

[3] EEA 2009, Transport at a crossroads. TERM 2008: indicators tracing transport and environment in the European Union. Report 3/2009, Copenhagen,

[4] Focus Group report, 2009, The Future of transport, http://ec.europa.eu/transport/strategies/2009_future _of_transport_en.htm

[5] White Paper 2001, European transport policy for 2010: time to decide, COM(2001) 370 final, 12.09.2001.

[6] Cullinane, K. and Talley, W.K., 2006, Introduction. In: Cullinane, K. and Talley, W.K., (Eds), Port Economics: Research in transport economics, vol. 16. London: Elsevier, pp. 1-10.

[7] Port Competition and Hinterland Connections. Summary and conclusions. Discussion Paper no 2008-19. Paris: Joint Transport Research Center OECD/ITF, Round Table, 10-11 April 2008.

[8] Fleming, D.K. and Baird, A.J., 1999, Some reflections on port competition in the United States and western Europe. Maritime Policy and Management 26(4), 384-394.

[9] Port Competition and Hinterland Connections. Summary and conclusions. Discussion Paper no 2008-19. Paris: Joint Transport Research Center OECD/ITF, Round Table, 10-11 April 2008.

[10] Hang, A., 2008, The impast of hinterland Access conditions on rivarly between ports. Discussion Paper no 2008-8. Vancouver: Joint Transport Research Center OECD/ITF.

[11] Notteboom, T., 2008, The relationship between seaports and the intermodal hinterland in light of global supply chains. European challenges. Discussion Paper 2008-10. Antwerp: Joint Transport Research Center OECD/ITF.

[12] Hang, A., 2008, The impast of hinterland Access conditions on rivarly between ports. Discussion Paper no 2008-8. Vancouver: Joint Transport Research Center OECD/ITF.

[13] Klink A.van, 1998, Optimisation of land access to sea ports: beyond infrastructure. In: Land access to sea ports. Land Access to Sea Ports, Report of the hundred and thirteenth round table on transport economics, European Conference of Ministers of Transport, Paris, 10-11 December, pp. 122-141.

[14] Koźlak, A. and Pawłowska, B., 2008, Improvement in the transport infrastructure accessibility as important factor of the regional development in Poland. In: Martin U., et al., (Eds)., Networks for mobility. Stuttgart: Universitat Stuttgart, pp. 69.

[15] Strategy of seaports development till 2015. Ministry of Maritime Affairs, Warsaw, August 2003.

[16] Baltic Gateway Quick Start Programme Promoting Maritime Related Intermodal Transport in the South Baltic Sea Area. Baltic Gateway, Karlskrona, 8 June 2006.

[17] Rydzkowski W., 1998, Polish ports vs. German ports - cooperation or competition? In: Land access to sea ports. Land Access to Sea Ports, Report of the hundred and thirteenth round table on transport economics, European Conference of Ministers of Transport, Paris, 10-11 December, pp. 172-176.

[18] Strategy of seaports development till 2015. Ministry of Maritime Affairs, Warsaw, August 2003.

[19] Komornicki, T., 2008, Rozwój infrastruktury transportowej a Strategia UE dla regionu Morza Bałtyckiego (ze szczególnym uwzględnieniem priorytetów polskich). Warszawa: Instytut Geografii i Przestrzennego Zagospodarowania PAN.

[21] Strategy of seaports development till 2015. Ministry of Maritime Affairs, Warsaw, August 2003.

[22] Komornicki, T., 2008, Rozwój infrastruktury transportowej a Strategia UE dla regionu Morza Bałtyckiego (ze szczególnym uwzględnieniem priorytetów polskich). Warszawa: Instytut Geografii i Przestrzennego Zagospodarowania PAN.

[23] Baltic Gateway Quick Start Programme Promoting Maritime Related Intermodal Transport in the South Baltic Sea Area. Baltic Gateway, Karlskrona, 8 June 2006.

[24] Baltic Gateway Quick Start Programme Promoting Maritime Related Intermodal Transport in the South Baltic Sea Area. Baltic Gateway, Karlskrona, 8 June 2006. Adriatic-Baltic Landbridge, http://www.ablandbridge.eu/site/images/stories/mappa_corridoi_zoom.jpg.

[25] Komornicki, T., 2008, Rozwój infrastruktury transportowej a Strategia UE dla regionu Morza Bałtyckiego (ze szczególnym uwzględnieniem priorytetów polskich). Warszawa: Instytut Geografii i Przestrzennego Zagospodarowania PAN.

TECHNICAL CHARACTERISTICS OF THE SOUTH-NORTH PART OF MULTIMODAL CORRIDORS IN SLOVAK REPUBLIC

Jozef Gašparík, Juraj Čamaj
University of Žilina
Faculty of Operation and Economics of Transport and Communications
Department of Railway Transport
Univerzitná 8215/1, 010 26 Žilina, Slovakia
jozef.gasparik@fpedas.uniza.sk, juraj.camaj@fpedas.uniza.sk

ABSTRACT

Geographical location of Slovakia in Europe clearly confirms the importance of position multimodal corridors of Slovak Republic in the European transport infrastructure. Main international railway and road lines have a direct link to the main traffic lines in the Slovak Republic.

The road infrastructure is possible to characterize by relatively high density. In the North - South axes is mainly completely the superior infrastructure – highway line form Bratislava to Žilina.

Railway infrastructure can be characterized by relatively high density network with a relatively old technology. The technical base of railway infrastructure is not sufficiently ready for changing conditions and structure of the transport market. However the railway infrastructure capacity exceeds its current and projected performance.

The status quo on the Slovak railway network is done due to the objective factors:

- underestimate the role of the state in the financing of railway infrastructure
- low capacity for changing of the composition of the transported goods
- outstanding issues of the public and regional transport,
- non-harmonized conditions for development of transportation modes due to the transport policy
- insufficient of conditions for the adaptation of the tariff and pricing etc.

The south - north corridor represents a connection from Austria (via Marchegg respectively Kittsee), Hungary (Rajka, Komárom) with Poland over Zwardoň, respectively through the territory of the Czech Republic (Petrovice). At the Slovak infrastructure manager is it connection from Bratislava - Leopoldov - Žilina - Čadca - Skalité. That connection is in the whole length electrified and the first part was modernised to the speed of 160 km/h. After completion of the modernization of the corridor will it be a full value part of the connection Adriatic and Baltic.

INTRODUCTION

Geographical location of Slovakia in Europe confirms the importance of position multimodal corridors of Slovak Republic in the European transport infrastructure. Main international railway and road lines have a direct link to the main traffic lines in the Slovak Republic.

ROAD CORRIDOR

The road infrastructure is possible to characterize by relatively high density. In the North - South is mainly completely the superior infrastructure – highway line form Bratislava to Žilina.

Slovakia was actively represented in the Pan European conferences in Prague 1991, in Crete 1994 and in Helsinki 1997, the result of which are the Pan European multimodal transport corridors crossing the Slovak territory on routes of the defined highway network of the Slovak Republic with length of 659 km. The north-south axis consists of the following highways (D) [7]:

- D1: Bratislava – Žilina - Košice - state border SK/UA, (corridor V/A),
- D2: state border SK/CZ – Bratislava - state border SK/H, (corridor IV),
- D3: Žilina – Čadca - state border SK/P, (corridor VI),
- D4: Bratislava – state border SK/A, (corridor IV).

Slovakia in the past years actively participated in the process of definition of the TINA network (Transport Infrastructure Needs Assessment), i. e. the extension of the network of Crete/Helsinki corridors by other expressways (R) corridors. In Slovakia the two north-south corridors are involved [7]:

- Central corridor R3: Martin – Zvolen – Šahy – state border SK/H and further in direction to Budapest,
- Eastern corridor R4: from the direction of Rzeszów – state border SK/P – Vyšný Komárnik – Prešov – Košice – Milhosť – state border SK/H and further in the direction of Miskolc.

Preference of the highways construction sections on TEN corridors (D1 - D4) particularly [7]:

- in the territory of the capital of the Slovak Republic – Bratislava, all section D1 and D2, section D2 Lamačská road – Staré Grunty with the two tubes tunnel "Sitiny" of length about 1,4 km,
- on the north-south V/A corridor the sections D1 and D3 between Bratislava – Žilina,
- on the north-south VI corridor the sections between Žilina – state border SK/P and SK/CZ to 2013 (prioritly of part Čadca – state border SK/P).

As a priority No. 1 west corridor along the axis Rijeka / Trieste – Wienna - Bratislava / Szombathely - Mosonmagyarovár – state border SK/H – Bratislava – Žilina – Čadca – Skalité – state border SK/P – Zwardon – Zywiec – Bielsko-Biala – Katowice – Warszawa – Gdansk, on the territory of Slovakia will be completely to 2012. On this axis on the territory of Slovakia are three big manufacture-car factory (VW in Bratislava, Peugeot in Trnava, KIA at Žilina) and near of this corridor in Czech Republic is planed car factory (Hyundai near Ostrava). The distance between Bratislava and Wienna is 60 km only, between Bratislava and Žilina/Budapest 200 km, between Bratislava and Adriatic Sea 600 km and between Ostrava and Žilina about 90 km.

As a priority No 2 middle perspective corridor along the axis Katowice/Krakow – Martin – Žiar nad Hronom – Šahy/Štúrovo – Budapest, its the nearest international distance, on the territory of Slovakia could be new expressway in operation to 2016.

The level of fulfilment of the above priorities depends on financial capacities determined by performance of economy and on the state financial and international policy including distribution EU resources inside Slovakia among priorities of Ministries. It shows, that Ministry of Transport will have during period 2007 - 2013 in disposal approximately 1,6 billion EUR, for motorway and expressway about 1,267 of billion EUR, for 1st class roads about 0,333 billion EUR [1].

RAILWAY CORRIDOR

In the transformation process of railways was as infrastructure manager established subject Železnice Slovenskej republiky (ZSR) in terms of the recommendations of the European Union in the field of railway transport. Access to the railway infrastructure is enabled to the operators which meet legislative conditions and the access conditions to the railway infrastructure of ZSR. In this context the infrastructure manager ZSR creates the conditions for the establishment of technical interoperability European rail networks.

Railway infrastructure can be characterized by relatively high density network with a relatively old technology. The technical base of railway infrastructure is not sufficiently ready for changing conditions and structure of the transport market. However the railway infrastructure capacity exceeds its current and projected performance [2].

The status quo on the Slovak railway network is done due to the objective factors:

- underestimate the role of the state in the financing of railway infrastructure
- low capacity for changing of the composition of the transported goods
- outstanding issues of the public and regional transport
- non-harmonized conditions for development of transportation modes due to the transport policy
- insufficient of conditions for the adaptation of the tariff and pricing etc.

The south - north corridor represents a connection from Poland (direct over Zwardoń or through the territory of the Czech Republic: Petrovice – Mosty u Jablunkova - Čadca) to Hungary (Rajka, Komárom) and Austria (Kittsee, Marchegg). At the Slovak infrastructure is the connection made from lines Bratislava - Leopoldov - Žilina - Čadca – Skalité (see fig. 1). This connection is in the whole length electrified and the first part was modernised to the speed of 160 km/h (Bratislava – Nové Mesto nad Váhom cca 100 km). After completion of the modernization of the corridor will it be a full value part of the connection Adriatic and Baltic.

The current technical level of railway infrastructure and railway vehicle fleet of the states operators does not constitute sufficient conditions for the provision of quality services and to incorporation in the international transport market. Therefore was adopted by ŽSR as a development priority the investment modernization of selected tracks to the parameters according to the international agreements. This trend is supported by an effort to accelerate investments in infrastructure.

The railway lines of the north-south corridor included in the European railway network AGTC (European Agreement on Important International Combined Transport Lines and related installations).

The parameters of the existing infrastructure ZSR lines, creating the north-south corridor in the field of track profile corresponding to a loading mass of UIC-B. All ŽSR lines are able to operate vehicles up to 22.5 tonne per axle.

Overview of selected technical parameters of the corridor lines are presented in table 1. There is introduced the comparison of parameters such as maximal line speed, weight normative and length normative. These normative parameters are selected as the lowest across the whole track line for vehicle of resistance type "S". Weight normative is chosen as the minimum of weight normative on the track line (in the field with the most decisive gradient for the most powered vehicle operated by Railway company Cargo Slovakia Inc. (ZSSK CARGO). It is possible to increase this normative by adding next push locomotive.

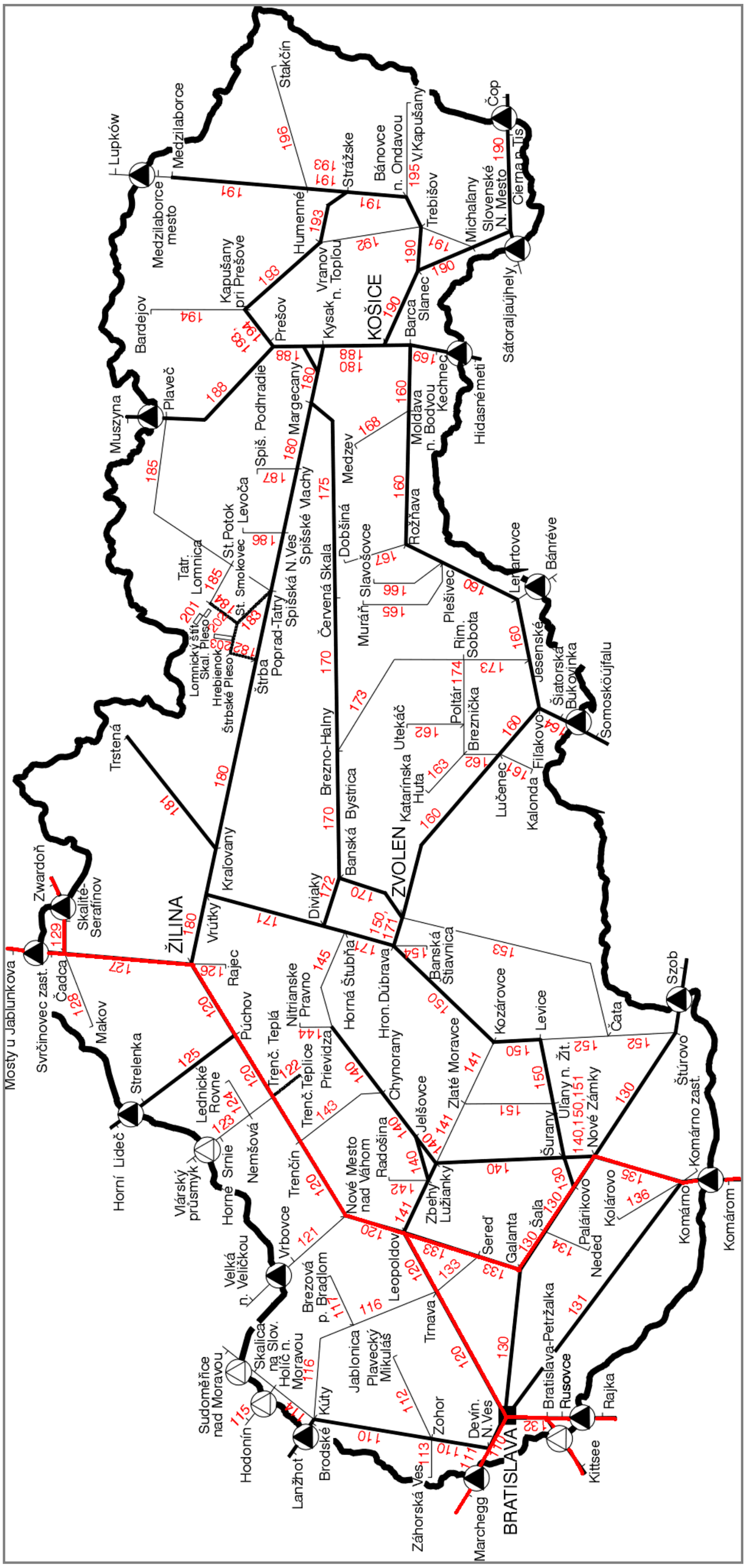


Fig. 1: Track lines of the north-south corridor in the Slovak Republic [6]

Track line capacity is indicated as the capacity of the track part with the least performance on the route according to the ZSR methodology. In the table it also showed free capacity of the line as number of free train paths. For double track lines is the capacity indicated for each track line and therefore the capacity is given in the number of trains on a direction.

From the above overview of selected parameters and the capacity of ŽSR track lines it is clear that [3]:

- main lines included in the AGTC Agreement reached on the sections with the highest gradient permitted by the applicable normative weight 1400 t,
- the length normative of 750 m under AGTC fulfilled any track,
- track line capacity and availability of free train path is fully sufficient for all lines of the north-south corridor, with the exception of lines Čadca - Skalité - Zwardoň.

COMBINED TRANSPORT

Multimodal road and also railway corridors are also suitable for combined transport. The development of railway infrastructure ŽSR is based on the basic international agreements (AGC and AGTC) [5]. In railway transport the minimum useful length of station track 600 m will be progressively prolonged on the basis of the modernization project of railway lines to reach the required length of 750 m according to the AGTC Agreement. The maximum allowable gross weight of trains on each track section will be increased to reach 1500 t.

Near the north-south corridor there are located several terminals for combined transport.

The terminal in Žilina was built in 1981 and is operated by Slovenská kombinovaná doprava Intrans, a.s. The terminal was expanding due to the automotive industry near Žilina (KIA Motors Slovakia). Its area is 1600 m^2 and the maximal capacity is more than 200 000 UTI per year. TKD has two handling track with a length of 465 m and 425 m. The terminal is transformed to the logistic centre.

The other terminals are situated in Bratislava. Container terminal in Bratislava Central freight station (Bratislava ÚNS) works from 1978 and its todays operator is Slovenská kombinovaná doprava Intrans, a. s. The whole area is 34 500 m^2. Theoretical transhipment capacity is 28 000 UTI per year. Terminal is equipped by three transhipment tracks with the useful length about 210 m. The utilization of the terminal is very low today.

More suitable location and exploatation has terminal Bratislava-Pálenisko on the river Danube. The operator is Slovenská plavba a prístavy a.s. Bratislava. The area of the terminal is 21 000 m^2. It has three transhipment tracks [4].

Tab. 1: Technical characteristics of railway lines creating the north-south axis [3]

Track line	Traction	Number of tracks	Track speed [km.h^{-1}]	Train weight limit*) [t]	Train length limit [m]	Track capacity [trains per day]	Number of free train paths [trains per day]
Zwardoň PKP – Skalité –Čadca	electrified 3 kV DC	1	60 / 50	S 2200	650 / 240	77	17
Mosty u Jalbinkova ČD - Čadca - Žilina	electrified 3 kV DC	2	120	S 2700	700	159	100
Žilina – Leopoldov - Bratislava	electrified 3 kV DC/ 25 kV AC	2	120	S 1400	650	140	67
Bratislava hl.st. – Rusovce – Rajka MÁV	electrified 25 kV DC	1 / 2	80	S 1400	650	81	37
Leopoldov – Galanta	electrified 25 kV DC	2	100	S 2000	690	163	146
Bratislava – Devínska Nová Ves - Marchegg	electrified 25 kV DC / non-electrified	2 / 1	120	S 1400	700	150/107	35/7
Bratislava – Galanta – Nové Zámky - Štúrovo	electrified 25 kV DC	2	140 / 120	S 1400	700	100	73
Nové Zámky Komárno – Komárom MÁV	electrified 25 kV DC	1	100	S 1400	620	108	54

*) for one active the most powerful locomotive used by the Slovak Cargo Railway Company (ZSSK CARGO) on the track line on the maximal gradient

CONCLUSION

Slovakia lagged in building multi-modal transport corridors among other states of Europe. A difficult geographical condition SR requires for building corridors larger investment costs. For transportation in the North - South Slovakia offers corridor No. VI Czech / Poland - Čadca - Žilina with connections to branch of the corridor No. V. direction Žilina - Bratislava - Hungary / Austria. Both lines are built as a motorway road and railway corridors.

The railway infrastructure on the north-south corridor lines is possible to characterize by the sufficient capacity. On the other hand the technical parameters and the maximal speed limit we cannot evaluate as required adequate to the European standard for corridor lines. This status is done mainly due to the low technical level and quality of technical base of railway transport and because of slow progress by its modernization.

Considering the slow progress of corridor line modernization and the geographical conditions has Slovakia worse position in a competitive environment in the transportation on the north – south axis either in rail or road transport.

REFERENCES

[1] Dolinayová, A.; Nedeliaková, E.: Komparácia cestnej a železničnej dopravy z pohľadu trvalo udržateľnej mobility. In: Eurnex-Žel 2008, 16. international symposium, University of Žilina 2008, p. 24-32, ISBN 978-80-8070-853-5

[2] Meško, P.: Proces koordinácie nákladnej dopravy ako súčasť dopravnej politiky. In: Európska únia - príležitosti pre rozvoj dopravy vo Vysokých Tatrách, international conference, University of Žilina 2008, p. 94-100, ISBN 978-80-8070-954-9

[3] Gašparík, J.: VEGA 1/0432/08 „Model deľby prepravnej práce v doprave s ohľadom na kapacitu infraštruktúry“, grant project, Faculty of Operation and Economics of Transport and Communications, University of Žilina

[4] Ližbetin, J.: Kombinovaná doprava na Slovensku a možnosti jej ďalšieho rozvoja. In: Slovakia Transport – almanach dopravy, Luxur Bratislava 2006, s. 135-139, ISSN 1335-7433-24

[5] Nedeliaková, E.: Vybrané aspekty kvalitatívnych parametrov služieb ŽSR. In: Pemer's Contacts, electronical journal, University of Pardubice, year.1, No. 3, 2006, p.59-69, ISSN 1801-674X

[6] www.zsr.sk

[7] www.telecom.gov.sk

APPLICATION POSSIBILITIES OF GENERAL EQUILIBRIUM MODELS TO ESTIMATE FREIGHT TRANSPORT DEMAND

Árpád Török, Zoltán Bokor
Budapest University of Technology and Economics
Department of Transport Economics
Hungary 1111 Budapest, Bertalan L.u.2. ,
artorok@kgazd.bme.hu, zbokor@kgazd.bme.hu

ABSTRACT

More and more reliable transport demand estimator methods can ensure us the prognostication of demand structure realignment with acceptable confidence level. Applying adequate methods we can deduce traffic flows depending on predetermined factors of the used models. General equilibrium models seem to be well applicable tools to describe inter regional good traffic flow, since those can estimate traffic based on social / economical structural data which can be prognosticated with higher efficiency and can describe spatial relations as well.

INTRODUCTION

The increase in transport demand – caused severe imbalances in Europe's transportation structure – has to make us to pay more attention to the interests of the inhabitants, users and other individual stakeholders. Congestion, pollution and extensive energy consumption have been identified as key causes for the deteriorating performance of Europe's transport systems in the Common European Transport Policy.

Against this background, it is vital to stimulate policies – based on a developed useful planning method - that can support sustainable development without sacrificing either economic growth or the freedom of movement. Sustainable policies have to be based on a comprehensive plan and have to involve different sectors and fields of competence, among which spatial planning, regional and industrial policy, public transport policy and policies concerning individual motorised transport. Restrictions on vehicle use, parking solutions, road pricing and improvement of public transport are relevant measures.

Transportation pricing, the mobility management and behavioural change of drivers in favour of public transport are key determinants for the improvement of the living conditions in Europe and the reduction of traditional problems of the area such as congestion, pollution, accidents, noise, etc.

To effectuate a uniform, consistent methodology for planning – taking into consideration the viewpoints of the land use and the transportation - we need to approach to subject with considering complex social and economic aspects. To develop a flexible, consistent, and well handleable model, - based on the existing general equilibriums models – we shall emphasize the main advantages of the hereinafter given models.

It is important to see that the nowadays applied planning methods generally focus on estimating and comparing the effects of one or two selected measures (e.g. infrastructure investments, land-use or fee-collection possibilities). In contrast to the above mentioned process the assignment of the best solution from a given set of measures seems to be more effective.

Based on this assumption we investigated the development of the optimising methods, because in this way we can extend the method not just to describe individual system components' (e.g. consumers, firms) behaviour but to estimate and compare the social effects of the changed environment (based on the investigated set of measures) and to define the optimal solution from a social point of view.

Hereby we will have the possibility to control the environment based on the available set of measures (as a part of the controlling method), the object of the individual system components (energy consumption, costs, benefits - as a part of the modelling method) and the selected social objectives (e.g. operational efficiency, summed up social costs, summed up social benefits, pollution - as a part of the controlling method).

The paper introduces the results of the authors' cooperation related to the development of new estimation models of freight transport volumes. The aim of the research is to introduce the application possibilities of general equilibrium models to estimate freight transport demand.

THE METHODOLOGY

In our polycentric model, exogenously determined amounts of several goods must be exported outside the area. These goods are produced in the examined area and are used not only for export but also as input in production of other goods and for final consumption in the investigated area.

Inputs used in the production of each goods include outputs of other goods, various kinds of labour, land and capital. The most important kind of substitution is between land and non-land inputs. The relation between land and non-land inputs determines population and employment densities and building heights. The model works with nonlinear equations, which can be solved – so the model can have an equilibrium – through a computable process.

So developed models should satisfy the requirements of general equilibrium models. A technical goal of the development process is to develop and present a fully closed computable general equilibrium model without any predetermined employment locations and in the second development step without endogenous traffic congestion. In this model, the locations of firms and consumers are interdependent and, at equilibrium, firms and consumers are dispersed everywhere within the area.

Besides paper's second goal is to solve the computable general equilibrium model in order to examine how the different developments would modify freight transfer directions, land use, or travel demand.

The equilibrium models have a compact social-economical approach that allows us to take into account the decision process of different social levels. Considering as many social interests and utility factors as possible let us maximize the reliability of our model, taking into account that the more social levels are considered the more input data is necessary to supply the model. On the basis of the so far learnt experiences, the development shall continue in the direction of dynamic modelling. The consideration of temporal changes in decision factors (affecting the traffic structure of the area) allows us to estimate the optimal control process of the environment in a more reliable way.

THE BASIC MODEL STRUCTURE

Dixit–Stiglitz and the monopolistic competition framework has had a huge influence on international trade, economic geography, economic growth and macroeconomics.

To build spatial general equilibrium models which can describe economical synergy of geographical zones, we need to be aware of the basics of monopolistic competition.

Dixit-Stiglitz monopolistic competition is grossly unrealistic, but it is tractable and flexible. We consider an economy with two sectors, agriculture and manufacturing. Each consumption and production activity takes place at a specific location. Consumers would like to maximize their utilities which for instance can be described by a constant elasticity of substitution function [1]:

$$U = \left[\int m(i)^{\rho}\, di\right]^{1/\rho},$$

where m(i) is the consumed volume of goods available in the economy, and ρ represents the intensity of the preference for variety. Besides each consumer needs to consider his budget constrain, which means that every individual consumer solve the following maximization problem:

maximize $U = \left[\int m(i)^{\rho}\, di\right]^{1/\rho}$ function

and consider $I = p_1 \cdot G_1 + p_2 \cdot G_2 + ... p_t \cdot G_t$ function, where I is the income of the investigated consumer $p_1, p_2, \ldots p_t$ are the prices of goods.

Firms aim to maximize profit according to their profit function considering the resource requirements of their production process:

maximize $\Pi = p \cdot q - \omega \cdot (F - c \cdot q) - \sum r(i) \cdot p(i)$ function (assuming only labour cost during production)

and consider $q = \prod r(i)^{\alpha_i}$ Cobb-Douglas production function,

where q is the quantity of the manufactured goods, ω is labour price F is the fix c is the marginal labour input, r is the volume of used resources p is the price of used resources α_i is the coefficient of Cobb-Douglas production function [2].

DYNAMIC MODEL

The models used at present are static, and are able to define the system optimum in one moment. If we analyse the operation of an area in a time period with a simpler model, perhaps we won't be able to get as exact estimation as with a complex one, but we can investigate the process dynamically, so it can be also calibrated according to the changing parameters of the process (beside it can be also calibrated according to the measured static data).

Another very important part of the dynamically analysed process, that after defining the static optimum of the system in one moment we can decide whether it is necessary to influence the process. After evaluating the static situation we can choose the adequate regulation type of the available strategic tools. To build the dynamic model we need to define the structure of the static model which can provide the input data of the dynamic optimization method.

The commute process can be regulated by the short term tools (e.g. traffic control system). The choice of the object of the transport (place motivation) is a defined as a medium-term process because it depends on medium-term or longer-term variables (based on habit of the population, e.g. change of the chosen recreation area influences the short term decisions as the choice of the commute-route, and depends on the long-term decisions, as choice of residence area). These choices usually can be influenced by the tools of mobility management (e.g. education – choice of the closer, but less attractive recreation centre).The long-term process includes the long-term decision process of the firms and the population as well (e.g. choice of producing and residential area can be effected by the land-use regulations). To build the described model we have to define the differing term intervals and the expected effects of the regulations (e.g. on traffic, on social cost, etc.).

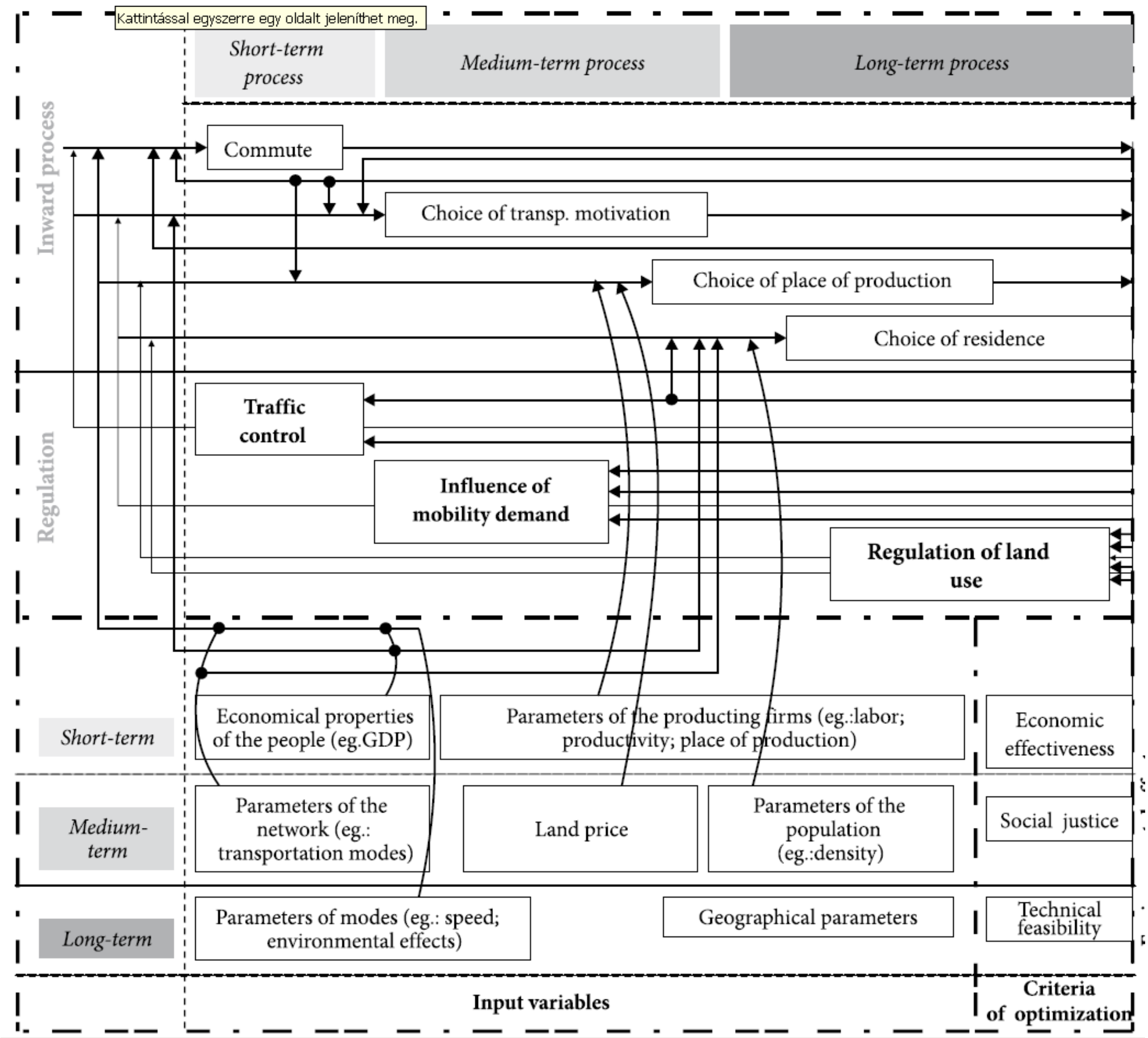


Fig. 1: A possible control model of process

MODELLING FREIGHT TRAFFIC

To use the above described method for freight traffic estimation we need to define a spatial relationship structure between regions. This way we can introduce transportation in the model.

There are many way to consider transportation in a spatial equilibrium model. The most traditional way to use iceberg cost [3], which theoretically means that the price and profit of a specific good melts like iceberg with distance.

The use of iceberg transport costs, while theoretically convenient, leads to strange results here and there. For instance, a decrease in transport costs means that less product 'melts' along the way, which has a dampening effect on demand. This leads to an underestimation of the direct effects [4].

Another possibility to implement transport into our model is to define a new sector for transportation, a so called transportation industry. It is a more complex methodological issue, but can result a more realistic model.

General equilibrium can consider freight traffic flow through the assumption, that demanded goods of final consumers and production processes are satisfied.

CONCLUSION

General equilibrium models seem to well applicable in SoNorA project, which aims to developing accessibility in South North direction, with:

- the SoNorA network real, through support for the completion of transport infrastructure,
- and improving multimodal freight logistics services,
- Developing transnational action plans for future realisations,
- Supporting new regional development opportunities, due to transport network improvements.

Since these models not only let us evaluate and compare different accessibility solutions and improvements in a pure financial point of view but let us consider other factors, which would be difficulty considerable through traditional approaches (e.g. regional development, externalities).

Although it is planned to continue the described method's numerical validation, there can be defined undeniable further advantages. Although dynamic models are much more complex than static models even so the following properties can prove us the reason, how temporal modelling ensures a higher reliability level of estimation.

1. Beyond static relations (e.g. counted traffic - estimated traffic) it is possible to consider temporal trends (e.g. verifiable trends of traffic's temporal changing).
2. It results more possibility to detect bottlenecks (more detailed temporal analysis let us identify peak times).
3. The regularities of the temporal changing of the environment let us control the process, which controllable process can be ordered toward an optimum state according to the socially accepted aspects.

Concluding the paper, the efficiency of transportation is getting more and more important because of the increasing rate of mobility demand. To plan, control and organize transportation in the most efficient way, we also need to consider the aspects of land use. To handle both of the mentioned planning areas together, we shall develop models, which are able to pay attention to all of their restrictive factors within the temporal properties as well.

REFERENCES

[1] Dixit, A. K. and Stiglitz, J. E.: 1977, Monopolistic competition and optimum product diversity, American Economic Review 67(3), 297–308.

[2] Fujita M., Krugman P. and Venables A. J.: 1999, The Spatial Economy, The MIT Press, Cambridge, Massachusetts – London, England.

[3] von Thünen, J. H.: 1842, Der isolierte Staat in Beziehung auf Landwirtschaft und National ökonomie, Gustav Fischer Verlag, Jena.

[4] Knaap, T.: 2004, Models of Economic Geography, Dynamics, Estimation and Policy Evaluation, Offsetdrukkerij Ridderprint B.V., Ridderkerk.

LIST OF AUTHORS

Dr MONIKA BĄK
University of Gdańsk, Department of Comparative Analysis of Transport Systems
monika.bak@ug.gda.pl

Dr ZOLTÁN BOKOR
Budapest University of Technology and Economics, Department of Transport Economics
zbokor@kgazd.bme.hu

Dr PRZEMYSŁAW BORKOWSKI
University of Gdańsk, Department of Comparative Analysis of Transport Systems
przemyslaw.borkowski@univ.gda.pl

Dr JURAJ ČAMAJ
University of Žilina, Faculty of Operation and Economics of Transport and Communications, Department of Railway Transport
juraj.camaj@fpedas.uniza.sk

Dr ANNA DOLINAYOVÁ
University of Žilina, Faculty of Operation and Economics of Transport and Communications, Department of Railway Transport
anna.dolinayova@fpedas.uniza.sk

Prof Dr WOLFGANG FENGLER
Technische Universität Dresden, Faculty of Transportation and Traffic Sciences, Institute of Railway Systems and Public Transport
wolfgang.fengler@tu-dresden.de

Dr JOZEF GAŠPARÍK
University of Žilina, Faculty of Operation and Economics of Transport and Communications, Department of Railway Transport
jozef.gasparik@fpedas.uniza.sk

Prof Dr MATTHIAS GATHER
University of Applied Sciences Erfurt, Transport and Spatial Planning Institute
gather@fh-erfurt.de

Dr ALEKSANDRA KOŹLAK
University of Gdańsk, Department of Comparative Analysis of Transportation Systems
a.kozlak@univ.gda.pl

ATTILA LÜTTMERDING
University of Applied Sciences Erfurt, Transport and Spatial Planning Institute
attila.luettmerding@fh-erfurt.de

Dr EVA NEDELIAKOVÁ
University of Žilina, Faculty of Operation and Economics of Transport and Communications, Department of Railway Transport
eva.nedeliakova@fpedas.uniza.sk

Dr BARBARA PAWŁOWSKA
University of Gdańsk, Department of Comparative Analysis of Transportation Systems
barpa@gnu.univ.gda.pl

ÁRPÁD TÖRÖK
Budapest University of Technology and Economics, Department of Transport Economics
artorok@kgazd.bme.hu