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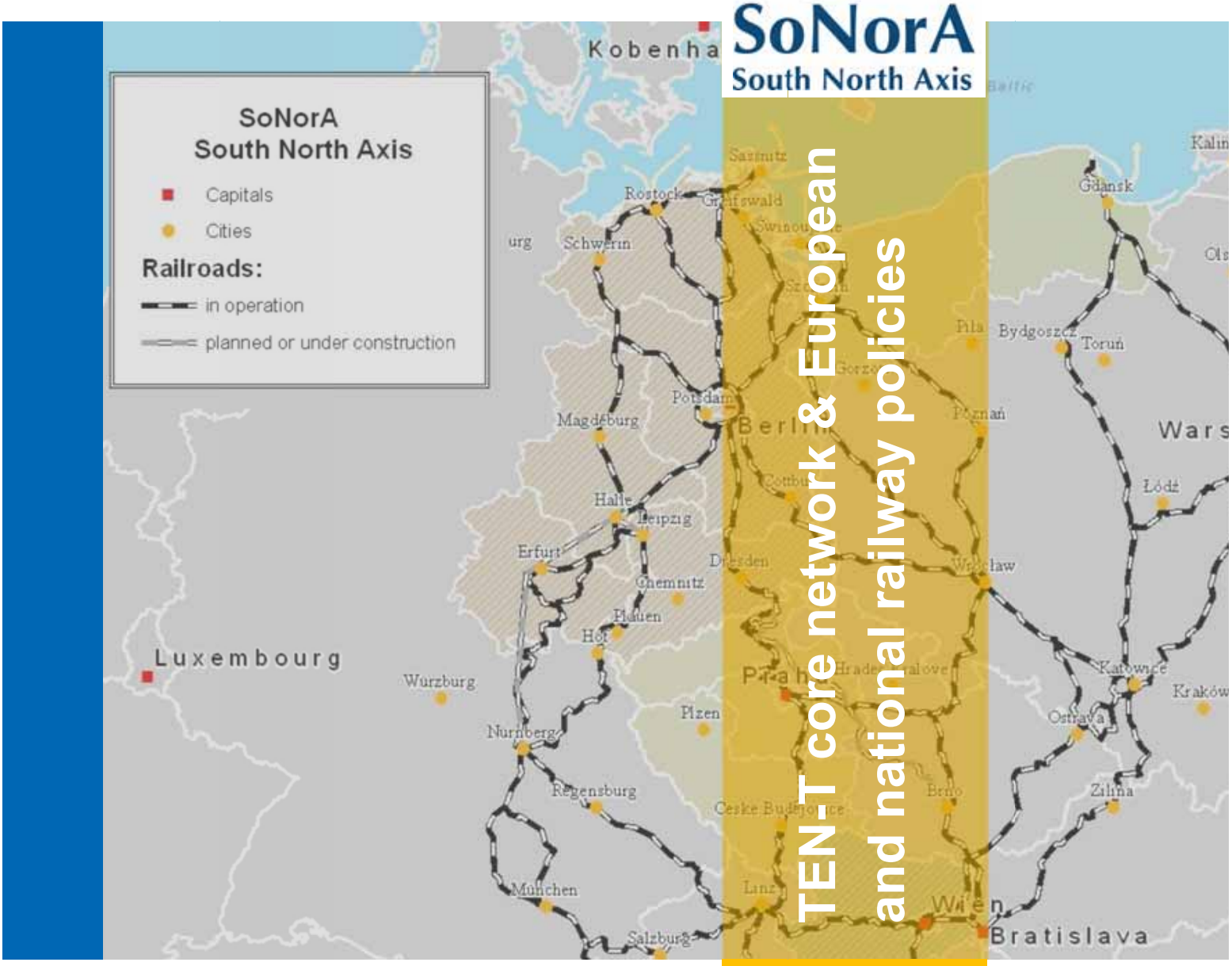
SoNorA
South North Axis



TEN-T core network & European and national railway policies

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11th of November 2009

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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 second SoNorA University Think Tank conference was held on the 16th of June 2009 in Gdynia (Poland) and was focused on 1. Transport infrastructure between the Adriatic and the Baltic Sea, 2. Transeuropean Networks of Transport in Central Europe, and 3. Simulation and modelling, forecasting and infrastructure. 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 topics of the past and future 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; Transeuropean Networks of Transport in Central Europe; Simulation and modelling, forecasting and infrastructure
3	Nov '09	Potsdam	TEN-T core network; European and national railway policies
4	Feb '10	Koper	Infrastructure and regional development; Infrastructure, transport and trade; Infrastructure and society
5	Jun '10	Erfurt	Transport in the wood-paper / solar-wind sector; Economic cooperation; Logistics services; Stimulation of value added services for transport chains

6	Oct '10	České Budějovice	Future of rail freight; Future of inland waterway 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 3rd SoNorA University Think Tank conference are:

- TEN-T core network
- European and national railway policies

Selected members of the Think Tank have written seven scientific papers on different aspects of these topics which were presented at the conference in Potsdam, Germany, on the 11th of November 2009. The authors are from the University of Gdańsk (Poland), Roskilde University (Denmark), Technical University of Berlin (Germany), Budapest University of Technology and Economics (Hungary), COWI Polska, University of Žilina (Slovak Republic) and Infrastruktur&Umwelt Professor Böhm und Partner (Germany).

The papers are dealing with the possibilities of defining and creating a Central European core network within the Transeuropean network of transport − reaching out to the South Ports in the northern Adriatic, to Denmark and the Ukraine. The case of a high-capacity southern railway link to Central Europe as well as new tools for rail freight decision support and the effects of empty container trips are presented. Furthermore, aspects of European and national railway policies − the Polish and Slovak policies in depth − are discussed in the articles.

This is the second 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.

NATIONAL VS. EUROPEAN PERSPECTIVE - RECONCILING DIVERGING AIMS IN CORE NETWORK SELECTION - EXAMPLE OF POLAND

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ABSTRACT

Development of TEN-T is aimed at improving transport infrastructure among member states of the EU. But the most important criteria for selection of priority transport axes which are subject to TEN-T policy are their usefulness in a broad sense. Particular investment within TEN-T is justifiable only if it serves also other than host countries. Thus the major problem arises. It is often the case when national aims differ from those on European level. Within TEN-T reconciliation of those sometimes contradicting plans has to be done.

In the paper an analysis of current TEN-T development criteria is given. Major TEN-T objectives and selected investments are analysed in order to answer whether they really serve common rather than national aims. On this basis it could be possible to assess areas where objectives are different or even contradictory. This analysis could be especially interesting if conducted for new member states. NMS countries have currently more investment needs than EU-15. As a result TEN-T objectives more often diverge from national policy objectives. At the same time EU level objectives cannot be disregarded as TEN-T investments are accompanied by an inflow of financial support. As NMS are in general poorer than EU-15 this is a very influential factor. On the other hand often a strategy of forcing (by exerting political pressure) EU authorities to accept NMS priority investments as TEN-T priorities is used.

In order to answer the question how to reconcile diverging aims it would be useful to look at the costs and benefits (or more general – advantages and disadvantages) caused by the infrastructure development. Therefore the question could be transformed into the problem how to reduce disadvantages (minimize costs) and strengthen advantages (maximize benefits) but not only at the EU but also at the national and regional levels. An excellent example of those problems presents the case of Poland. The country is one of the biggest in the EU and has significant needs for new infrastructure. At the same time important infrastructure objectives only partially coincide with TEN-T objectives. The analysis of selection criteria regarding those divergences gives an interesting view on the problem of reconciliation of national and European decisions regarding current and future transport policy goals.

INTRODUCTION

The Trans-European energy, transport and telecommunications networks are very often admitted as lifeblood of the EU economies. If they don't perform, competitiveness suffers. Therefore, their development is vital to Commission's agenda on growth and jobs, to realise the internal market and to strengthen economic and social cohesion. A large number of projects of common interest have benefited from financial support of the Community budget through the TEN-budget line as well as the Structural Funds, the Cohesion Fund and additionally the European Investment Bank (EIB) has also greatly contributed to the financing of these projects through loans.

The TEN-T network development should help to boost the EU's competitiveness and employment. But also, one of the criteria for the projects selection in last years has been the reduced impact on the environment. That means the priority given to those modes which are more environmentally friendly. All these aims can be summarized as:

- completion of the connections needed to facilitate transport;
- optimisation of the efficiency of existing infrastructure;
- achievement of interoperability of network components;
- integration of the environmental dimension into the network;

could be realised only through modern and innovative solutions and new technologies.

Also mid-term review of the 2001 White Paper on transport policy acknowledges the role of new information and communication technologies in ensuring that people and goods can travel safely and sustainably. Numerous schemes, including the Intelligent Transport Systems (ITSs), the European Rail Traffic Management System (ERTMS) and the European satellite navigation project GALILEO, represent effective tools for increasing safety and reducing congestion and environmental impact. Then it was recommended to include these investments into TEN-T. Therefore optimal projects meeting the above criteria are considered to be of common interest. But the question is if the realisation of these objectives would also encourage the development of regions and will meet domestic and local priorities. TEN-T network promotes international exchange of people and goods. But is it a risk that domestic and regional traffic would be neglected? Is it a threat that significantly different national objectives would suffer then? In the article authors try to answer these questions taking into consideration the evolution of TEN-T priorities and changing goals of national objectives towards transport network development on the example of Poland.

TEN-T POLICY AIMS AND EVOLUTION OF THE CONCEPT

The idea of Trans-European Networks (TEN) emerged at the end of the 1980s and it was strongly connected with the proposed integrated single market. Already in 1990 the Commission adopts first action plan on trans-European networks (transport, energy and telecommunications). Then the following important dates in TEN-T implementation can be cited [10]:

1993 TENs given legal base in Maastricht Treaty;
1994 Essen European Council endorses list of 14 TEN-T 'specific' projects, drawn up by a group chaired by then Commission Vice-President Henning Christophersen;
1995 Financial regulation for TEN-T support adopted;
1996 Adoption of TEN-T guidelines;
2001 Extension of TEN-T guidelines to port infrastructure (seaports, inland ports and intermodal terminals) adopted;
2003 A group chaired by former Commission Vice-President Karel Van Miert proposes new priority projects and calls for new means of funding;
2004 Revised guidelines and financial regulation adopted, with a list of 30 priority projects (including the original 14) and a higher maximum funding rate of 20 % in certain cases;
2005 Nomination of the first six European coordinators (TEN-T EA – Executive Agency)
2006 Establishing the TEN-T Executive Agency.

Originally the TEN-T was admitted as a necessary condition to ensure free movement of goods, persons and services through linking the EU by modern and efficient transport infrastructure. The Maastricht Treaty establishing the European Union provides a sound legal

basis for the TENs. Under the terms of Chapter XV of the Treaty (Articles 154, 155 and 156), the European Union must aim to promote the development of Trans-European Networks as a key element for the creation of the Internal Market and the reinforcement of Economic and Social Cohesion. This development includes the interconnection and interoperability of national networks as well as access to such networks.

Therefore general objectives of the trans-European transport network (TEN-T) are to [12]:

- ensure the mobility of persons and goods;
- offer users high-quality infrastructure;
- include all modes of transport;
- allow the optimal use of existing capacities;
- be interoperable in all its components;
- be economically viable;
- cover the whole territory of the Community;
- allow for its extension to the Member States of the European Free Trade Association (EFTA), the countries of Central and Eastern Europe and the Mediterranean countries.

Additionally, especially in the context of the Lisbon strategy the construction of Trans-European Networks was also treated as an important element for economic growth and the creation of employment. In order to achieve these goals it was decided to establish the executive agency in order to manage efficiently and coordinate the TENs development. The Executive Agency of TEN-T although independent is closely linked with Directorate-General Energy and Transport. While European Commission (DG TREN) defines the policy (- makes political decisions regarding the TEN-T programme; - defines strategy, objectives and priority areas of action, - takes the final financing decisions, - monitors and supervises the Agency), then TEN-T EA turns the policy into action through:

- implementing the TEN-T programme on behalf of the European Commission and under its responsibility,
- efficiently managing entire project lifecycle, including:
    - organising calls and evaluations,
    - giving support to Member States,
- preparing financing decisions,
- providing key feedback to the European Commission.

Moreover, the European Commission examined the possible synergies between the three categories of networks (transport, energy and telecommunications) along with methods of funding and potential distribution. The Commission's Communication [11] entitled "Trans-European Networks: Towards an integrated approach", highlighted the significant added-value of the combination of several infrastructures (more efficient use of space, reduced costs and environmental impact), as well as possible synergies between the three types of TENs. The Commission Communication also underlined the potential environmental benefits of integrating TENs. The list of 14 priority projects established in 1994 was extended in 2004 to take account of the accession of 10 and then 2 more new Member States to the EU. So the TEN-T comprises 30 priority projects which should be completed by 2020. Of these 30 priority projects, 18 are railway projects, 3 are mixed rail-road projects, 2 are inland waterways transport projects and one refers to motorways of the sea. High priority has therefore been given to the more environmentally friendly transport modes. A map below

presents the projects [2]. Some of these large-scale projects have already been completed, e.g the Øresund fixed link (connecting Sweden and Denmark, completed in 2000), Malpensa airport (Italy, completed in 2001) and the Betuwe railway line (linking Rotterdam to the German border, completed in 2007).

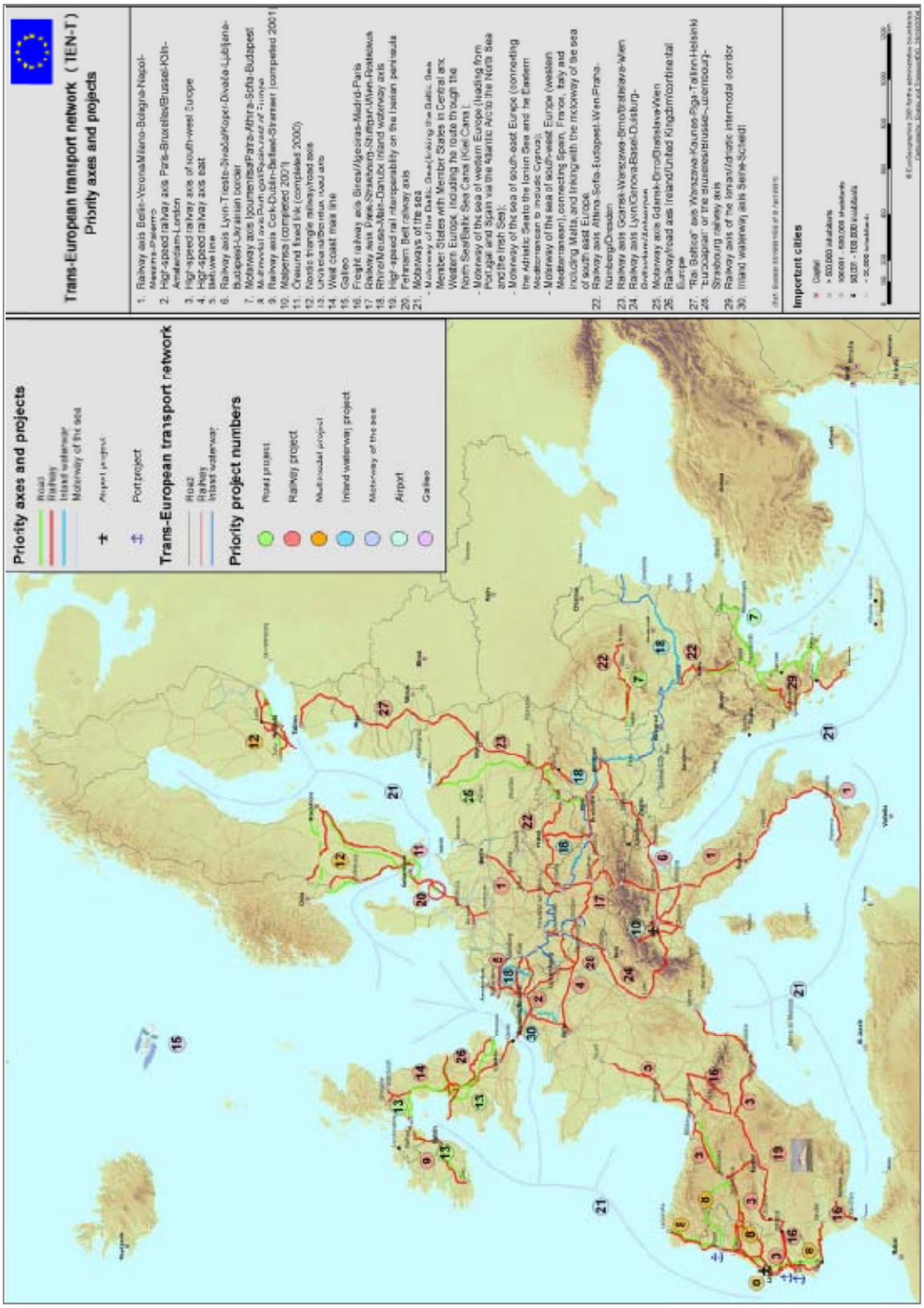

Figure 1: TEN-T priority projects [2]

As it can be noticed on the map, there are five major transnational axes:

- **Motorways of the Seas:** linking the Baltic, Barents, Atlantic (including Outermost Regions), Mediterranean, Black and the Caspian Sea areas as well as the littoral countries within the sea areas and with an extension through the Suez Canal towards the Red Sea.
- **Northern axis:** to connect the northern EU with Norway to the North and with Belarus and Russia and beyond to the East. A connection to the Barents region linking Norway through Sweden and Finland with Russia is also foreseen.
- **Central axis:** to link the centre of the EU to Ukraine and the Black Sea and through an inland waterway connection to the Caspian Sea. Connections towards Central Asia and the Caucasus are also foreseen, as well as a direct connection to the Trans-Siberian railway and a link from the Don/Volga inland waterway to the Baltic Sea.
- **South-Eastern axis:** to link the EU through the Balkans and Turkey to the Caucasus and the Caspian Sea as well as to Egypt and the Red Sea. Access links to the Balkan countries as well as connections towards Russia, Iran and Iraq and the Persian Gulf are also foreseen.
- **South-Western axis**: to connect the south-western EU with Switzerland and Morocco and beyond, including the trans-Maghrebian link connecting Morocco, Algeria and Tunisia. An extension of the trans-Maghrebian link to Egypt as well as a connection from Egypt to the South towards other African countries is also foreseen.

These five axes contribute most to promoting **international exchanges, trade and traffic**. The five axes also include some branches in regions where traffic volumes are relatively low due to current political problems. Here the aim is to enable the strengthening of regional cooperation and integration in the longer term through transport connections.

Table 1: Characteristics of the various transport networks in TEN-T

Road network: • comprises motorways and high-quality roads and will be supplemented by new or adapted links; • comprises infrastructure for traffic management and user information, based on active cooperation between traffic management systems at European, national and regional levels; • guarantees users a high, uniform and continuous level of services, comfort and safety.	**Rail network**: • comprises the high-speed network and conventional lines; • offers users a high level of quality and safety thanks to its continuity and interoperability and thanks to a harmonised command and control system.	**Inland waterway network and inland ports:** • comprises a network consisting of rivers and canals, a network consisting of branch canals, port infrastructure and efficient traffic management systems; • the technical specifications correspond at least to class IV. Ports provide the link between sea transport and other modes of transport. They provide equipment and services for passengers and goods (ferry services, etc.).
Motorways of the sea network improves existing maritime links and establishes new viable, regular and frequent links for the transport of goods between Member States. It concentrates flows of freight on sea-based logistical	**Airport network** consists of airports of common interest situated within the territory of the Community which are open to commercial air traffic and comply with certain criteria. The core of the network comprises the international and	**Combined transport network** comprises railways and inland waterways which, combined where appropriate with initial and/or terminal road haulage, permit the long-distance transport of goods between all Member States. It also

routes in such a way as to reduce road congestion and improve access to outlying and island regions and states.	Community connecting points which provide links within the Community and between the Community and the rest of the world. These connecting points are gradually being linked to the high-speed lines of the rail network. In addition, the regional components of the network facilitate to access to the core of the network or to help to open up outlying and isolated regions.	comprises installations permitting transhipment between the different networks.
Information and management network concerns coastal and port shipping services, vessel positioning systems, reporting systems for vessels transporting dangerous goods, and communication systems for distress and safety at sea.	**Air traffic control network** comprises the aviation plan (air space reserved for general aviation, aviation routes and aviation aids), the traffic management system and the air traffic control system.	**Positioning and navigation systems network** comprises the satellite positioning and navigation systems and the systems to be defined in the future European Radio Navigation Plan.

INFRASTRUCTURE DEVELOPMENT NEEDS IN POLAND

The major problem of Polish infrastructure has been identified not as insufficient network density but its age and consequent quality deterioration. This in turn reduces transport flows by congestion or slowness. In this regard as a key necessary investment development of motorways is accompanied by the rebuilding of railway lines to adapt them to higher speeds. Those types of investments should be primarily aimed at parts of network connecting major metropolitan areas in Poland. It is believed that as a result the development potential of those areas will converge and value added will be created through both competition and cooperation. Important factor in investment policy objectives given the above remarks should be the reduction of transport costs due to time savings.

The second major problem is the lack of high quality connections with other countries on land and sea borders alike. Due to its central location in Europe, Poland is a perfect transit node for trade routes from the EU to Russia, Ukraine and Belarus as well as from Scandinavia and the Baltic area to Southern Europe. From those two dimensions west-east has been perceived as more important on national level because the majority of current land based transport is dedicated to this direction – the same holds true for transit. This has the underlying reason of prevailing trade patterns of Poland – where connections with Germany and through Germany with other Western European countries together with importance of eastern export markets are dominant.

The third problem is connected to the previous ones – poor state of infrastructure results in increased number of accidents and traffic related injuries. Poland is at the top of EU if casualty rates are concerned. Thus impact on improving quality of existing infrastructure should be prioritized.

National transport development strategy results from those three problem areas. Strategy stresses necessity of supporting those investments which are viable on regional,

national and international level at the same time. TEN-T sections of infrastructure which are located in Poland fulfill those criteria. But there are similarly many other infrastructure projects outside the TEN-T network which also qualify. Thus TEN-T is not necessarily the natural choice for possible investments. What makes investments within TEN-T network really attractive from government point of view is additional funding associated with those projects. Nonetheless one must remember that during the past couple of years there was in general an excess of funds available for infrastructure. The problem in fact was not in EU support but in finding national sources and fulfilling all conditions in accordance with EU procedures. As a result we could observe in reality a mixture of actual investments – some of them within TEN-T but as many (if not more) outside of it.

Also the recent review of transport policy aims till 2013 shows this duality [6]. On the one hand strategies address the need of connecting all dispersed parts of networks into cohesive and efficient transport system, on the other local needs of city / metropolitan areas development are considered as primary objectives. Additionally it is said that the aims of national policy will be achieved by means of "TEN-T network which is instrumental in connecting Poland's transport system with EU transport system"[3], but on the other development of links on west -east axis is always preceding that of north-south direction.

Furthermore strategy identifies number of smaller goals like: inclusion of local (secondary) cities to the network, refurbishing of local roads, expenditure on life-saving equipment etc. Those relatively local investments are certainly outside TEN-T major projects scope.

In regard to air sector infrastructure it has to be noted that it is considered primarily through national needs. There is a plan to create direct regular connections between major cities in Poland. International context is considered as necessity due to incoming EURO 2012 but not due to TEN-T objectives. Obviously type of investments in airports are easy to reconcile with TEN-T policy aims as functions of airstrips, air control facilities or terminals remain the same regardless of their use in national or international services. This is also most likely the reason why in the current (2009) list of TEN-T projects accepted for TEN-T financing two out of five proposals concern airports.

In regard to maritime transport - development of ports infrastructure is stressed, which is strongly in line with general TEN-T objectives. However even here there is a strong differentiation between national and EU thinking. From TEN-T perspective for development of north-south axis Gdansk and Gdynia are primary investment areas. From Polish national perspective Szczecin is as much significant as two former ones. Szczecin has also an important international role omitted by original TEN-T concept – it could be used as reserve port for Berlin. Also it is located on the northern part of Oder waterway which helps in combining inland and maritime water modes.

INFRASTRUCTURE DEVELOPMENT IN VIEW OF CHANGING POLICY OBJECTIVES

Polish transport policy goals of recent years were set in a number of programming documents:

- SPOT (Sectoral Operation Program - Transport) 2003-2006,
- Narodowe Strategiczne Ramy Odniesienia (National Strategic Reference Framework) 2007-2013,

- Program Operacyjny Infrastruktura i Srodowisko (Operational Program – Infrastructure and Environment) 2007-13.

The first of those programs – SPOT − aimed to achieve greater degree of transport system cohesion. This aim was considered as possible only in longer perspective and not in the short timeframe of SPOT strategy, therefore adopted investments were perceived as first step towards better infrastructure and it was envisaged that they should be complemented by further investments in next programming periods.

Within SPOT following objectives were considered as primary:

- modernization of railways (to be achieved mainly by financing from Cohesion Fund),
- improved accessibility of seaports,
- modernization of national road network belonging to TEN-T,
- road safety.

It was agreed that alongside the SPOT there will be serious commitment into large infrastructure projects from Cohesion Fund within main transport corridors. For programming period 2004–2006 within TEN-T following projects were regarded as important objectives:

- achievement of better quality technical standard on railways within pan-European transport corridors,
- building of A-1, A-2 and A-4 motorways within the pan-European corridors,
- construction of expressways within pan-European corridors,
- refurbishing of those road sections within pan-European corridors on which major rebuilding is planned after 2010.

Those actions were to be additionally supported from ZPORR (Zintegrowany Program Operacyjny Rozwoju Regionalnego – Integrated Operational Program of Regional Development) which was to be used on transport network outside pan-European corridors. Especially on: 1) modernization of local (voivodship and poviat level) roads, 2) city public transport projects. This division from the start created tensions. There were parts of network which belonged to TEN-T but were also parts of local infrastructure (this was vividly visible in cities) thus creating question about financial mechanism to be used. In general city authorities were aiming at maximum utilization of funds for their own goals – and as a consequence often investments within TEN-T network were fragmented.

One important consideration should be given here. TEN-T objectives have heavily influenced planning of infrastructure development. However, the majority of investments was planned for pan-European corridors – within west-east axis while TEN-T top priority projects (from EU perspective) are concentrated on north-south axis. It is clear that objectives were chosen to fully utilize financial support, but within TEN-T network priorities were shifted from projects of primary importance from EU point of view to those of primary objectives from national policy point of view.

Another issue here is that although planning was grand the actual construction was limited. Obviously goals stated in SPOT strategy applied to longer perspective – but in further policy documents original goals were often changed to other, which at given time seemed most appropriate from national point of view. Therefore conclusion could be made that within first programming period till 2006 primacy of national – and short term goals is undisputable – although general direction of infrastructure development is influenced by TEN-T network.

It is interesting to observe how the primary infrastructure objectives shifted after adoption of later strategies – strongly influenced by EU funding – for specific types of projects as compared to early accession documents (like SPOT) and even more if compared to pre-accession policy goals.

Within TEN-T program there are 30 key projects for which financing are to be provided from EU budget. On the territory of Poland there are four of those:

- Rail axis Gdansk-Warsaw-Brno/Bratislava-Vienna,
- Motorway Gdansk-Warsaw-Brno-Vienna,
- Rail Baltica Warsaw-Kowno-Riga-Tallinn-Helsinki,
- Motorway of the sea – Baltic Sea.

In general TEN-T key objectives are located mainly on Poland's north-south axis of transport while national objectives stressed in earlier documents importance of west-east links. Only in latest documents like Infrastructure and Environment Program accents have changed to incorporate north-south axis priorities. Those documents specifically address TEN-T role in Polish transportation system as a mean to connect major economic activity centers of Poland through network of roads, motorways and railways at the same time with allowing for external connections with the rest of Europe through TEN-T. It should be noted here that those goals are to some extent contradictory. Only parts of road and rail infrastructure in Poland are considered TEN-T level networks. Moreover from those – above mentioned top level ones those could only provide direct land connections to Czech Republic and Slovakia – not primary receivers of Polish foreign trade. To maintain trade and facilitate flow of goods from national perspective, necessary investments should be oriented − as like in early post-accession years on road and rail links with Germany and with eastern countries – Ukraine and Russia.

Moreover those two types of international connections − if developed − will have differing impact on Poland's internal transport and economic relations. While north-south axis in its land component will mostly improve accessibility for only limited (southern) voivodships of Poland, west-east investments influence many more voivodships having strong impact on improving transport and flow of goods in majority of voivodships. Among priority TEN-T objectives only improved access to seaports could be considered as influential in more than one-two voivodships. Investments in ports of Gdansk and Gdynia together with motorways going to Warsaw and further will extend ports natural hinterland significantly. This thinking is however based on idea that seaports could be main hubs for trade. It is compatible with EU policy of moving transport to more ecological modes. But in case of Baltic ports trade relations conducted by sea are considered as viable only in relation with Scandinavia. Longer routs to Spain or France as preliminary studies show, are not economically competitive against road transport [1].

Quick look into the list of projects financed from TEN-T budget in Poland shows (between 2005-2008) accordingly TEN-T Executive Agency following commitments:

- 2005 feasibility study and technical studies of the GSM-R system in TEN-T rail network in Poland,
- 2007 Trans-European Satellite Navigation System (Galileo): Development and validation phase,
- 2007 SESAR (Single European Sky ATM Research) – development phase,

- 2007 Materials for environmental decision, materials for localisation decision, building design and tender documentation for the building of the S19 expressway, section Lutoryz-Barwinek,
- 2007 Design documentation, building design, tender dossier for S5 expressway, sections: Nowe Marzy-Bydgoszcz and Znin-border of Wielkopolskie voivodship and border of Kujawsko-Pomorskie voivodship-Gniezno,
- 2007 Studies on the long-term development of the International Airport Katowice in Pyrzowice,
- 2008 Feasibility Study for establishment of the Baltic FAB,
- 2008 NETLIPSE,
- 2008 Preliminary feasibility study for the task: modernisation and expansion of the Katowice railway junction,
- 2008 Comprehensive study and technical documentation of development of an International Airport Wroclaw,
- 2008 Studies on the long-term adjustment of the International Gdansk Lech Walesa Airport, a TEN-T node in the North Poland, for air transport needs.

In other words financing has been provided to only those projects which constitute core TEN-T priority objectives – other projects although still within TEN-T network were financed from other sources. Obviously there are other support programs for financing infrastructure in Poland – they offer even more funds for direct works, while TEN-T financing is heavily oriented towards studies and feasibility analysis – but selection of projects for direct TEN-T financing clearly shows where primary objectives are.

In this context it could be noted that compared to 2004-2006 programming period Polish investment aims have been tilted towards north-south axis (direction desirable from EU perspective) and that national transport policy has been (at least to some degree) influenced by TEN-T policy.

Current investments in road infrastructure of Poland for financing perspective till 2013 should be allocated to: 1) construction of 1779 km of motorways; 2) construction of 2274 km of expressways fitted for 115 kN norm; 3) construction of 54 bypasses around cities with high transit levels; 4) improving safety by rebuilding pedestrian crossings and rail crossings on national network; 5) improving transit through major cities; 6) improving maintenance of road network with aim of 75% roads in “good category” by 2013 and 10% in “sufficient category”.

To answer the question how this ambitious program fits into TEN-T priority objectives, it should be reviewed by analyzing geographical localization of planned infrastructure. Major projects within those ambitious goals mentioned in program anticipate completion of investments as given in table 2.

Table 2: Major road infrastructure investments in Poland in financial perspective 2007-13 [4]

Investment	Geographic location	Axis
A-1 motorway	Gdańsk - Toruń - Łódź - Czestochowa - Gorzyczki	N-S
A-2 motorway	Świecko - Poznań - Łódź - Warsaw;	W-E
A-4 motorway	west border- Wrocław - Katowice - Kraków - Rzeszów - east border	W-E
S-3 expressway	Szczecin - Gorzów Wielkopolski - Zielona Góra - Legnica - Lubawka	N-S
S-5 expressway	Nowe Marzy - Gniezno - Poznań - Wroclaw	W-E and N-S
S-7 expressway	Gdańsk - Elbląg - Warsaw - Kraków	N-S
S-8 expressway	Wroclaw -Warsaw - Białystok - Augustow - Budzisko (till 2015)	W-E and S-E
S-17 expressway	Warsaw - Piaski	local
S-19 expressway	Stobierna - Białystok - Barwinek	local
S-69 expressway	Bielsko-Biała - Zwardoń	local

Current investment perspective is more balanced than previous one. It envisages completion of motorways within both TEN-T axes. At the same time expressways are going to be finished – and those usually work as links being beyond TEN-T corridors but supporting TEN-T axes. Those investments are often important from both: N-S and W-E perspectives.

Rail investments in this programming period cover variety of goals: modernizations of lines, construction of lines allowing for high-speed trains, modernization of rail stations. Again a quick look at list of major projects helps to determine how well TEN-T objectives are met.

Table 3: Major rail infrastructure investments in Poland in financial perspective 2009-2012 [7]

No	**Investment**	**Location**	**Axis**
1	Modernisation of E 65	Warsaw - Gdynia	N-S
2	Modernisation of Warsaw - Lodz railway	Warsaw - Łódź	W-E
3	Warsaw airport connection	Warsaw	local
4	Modernisation of E 75	Warsaw - Białystok - Suwałki - border (Rail Baltica)	N-S
6	Modernisation of E 20	Siedlce - Terespol	N-S, W-E
7	Modernisation of E 59	Wroclaw - Poznań	W-E
8	Modernisation of E 20	Warsaw - Poznań	W-E
9	Modernisation of E 30	Zabrze - Kraków	W-E

Again a mix of objectives could be noted. Investments are located on both W-E and N-S axes. First 8 projects are co-financed from EU funds and belong to TEN-T network (and projects 1, 4 are even on European priority list for TEN-T). But there is also significant financial commitment to projects (37 investments in total for an estimated value of 3760 million PLN [9] often outside of TEN-T mainly financed from national sources or regional programs).

In regard to the Polish maritime sector – current strategy of their development addresses issues like: development of new terminals, investment in container service facilities, creation of logistic centres, and improvement of land accessibility. Investments are

financed from EU funds and national funds (and estimated at 700 million euro) [8] and apply to Gdynia, Gdańsk, Szczecin and Świnoujście. Two former ports are part of top priority N-S axis – later ones also play significant role in transport network. What is important in this strategy from TEN-T point of view is inclusion of ports into land network by accessibility improvements on one side and participation in joint TEN-T projects with Scandinavian countries (mainly Sweden) from other side. In regard to airports – objectives here are dictated by needs to extend capacity in view of incoming EURO 2012 event. But airport development strategy is mostly in line with TEN-T objectives – even some of the projects (Gdańsk Airport, Poznań Airport) are directly financed from TEN-T sources. Program of development of airports describes as primary goal strengthening of regional airports network by extension of facilities and capacity in existing regional airports and closing gaps in voivodships with smaller number of airports. Major airports should become part of common EU system (thus main financing from Cohesion Fund and national sources) and smaller serve in supportive role (here financing should be provided primarily by Regional Development Fund). The degree of cohesion with TEN-T policy could be measured by fact that currently (2007-2013) investments will be oriented on eight airports (Warsaw, Krakow, Katowice, Gdańsk, Wroclaw, Poznań, Szczecin, Rzeszów) all belonging to TEN-T network [5].

CONCLUSIONS

After accession developments in infrastructure investments have not always been in line with primary EU objectives. Generally investments were within TEN-T corridors but in most cases within those corridors choices have been made purely on national needs basis. As a result most advanced are currently projects on Poland's west-east axis which is not necessarily exactly as overall EU perspective dictates.

Major factors influencing convergence of national and TEN-T investment objectives are:

- financial support from EU funds – prioritizing TEN-T projects,
- identification of key national objectives and their successive inclusion into TEN-T network,
- better development of nationally prioritized west-east axis now than in the time of accession – consequently currently more support could be given to north-west axis,
- development of container terminals in Baltic ports,
- political pressure from the Baltic states.

Under the new policy perspective 2007-2013, accents have moved more towards north-south axis and ports development. Financial support is more likely to be awarded for key projects, also national objectives are often part of EU level network – in those cases priorities are simply the same. Additionally overspending on west-east relation as compared to north-south has made current spending levels reverse. Also recent investments in container terminals in Polish ports provide significant goods volumes for transportation in north-south axis. So far its development has been out of the list of national top investments mainly due to expected insufficient trade flows. In addition development of TEN-T priority, airports has been facilitated by vision of incoming sport events (like EURO 2012 football championship). Also continuous pressure from other Baltic States – especially in regards to Via and Rail Baltica makes postponement of those investments politically difficult. In view of

all those factors it seems that in the next decade more balanced system of transport – one that incorporates more of EU top level objectives will be created in Poland.

What is also interesting from a more general perspective of the correlation of the national and the EU priorities towards Trans-European transport network development is the meeting objectives of the interconnection and interoperability of national networks as well as access to these networks. Of course, it is already mentioned in the EU documents that Community should promote the interconnectivity, but the development of the TEN-T until now proves that it is not always the case. Additionally actual criteria of TEN-T understood as implementation of intelligent transport systems, positioning and navigation systems and new technologies would only be treated as an advantage from national perspective even if such priorities are not visible in domestic programmes in lower income countries. To huge extent the EU priorities have influenced positively the short-term, sometimes not very ambitious approach in national documents through putting stress on environmental and efficiency criteria. There should be analysed in the near future how the implementation of TEN-T would reinforce the economic and social cohesion across the continent. The positive answer would prove the reconciling diverging specific aims in core network selection.

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DENMARK - A PLUG IN THE EUROPEAN HIGH SPEED RAIL SYSTEM?

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ABSTRACT

Denmark has no official high speed rail policy. A study was made in the 1990s on the possibility of upgrading the Danish main rail track between the national economic centers to high speeds – the political conclusion was that improvements were too costly to be justifiable.

This policy continued more or less undisputed until a year ago – a national *Infrastructure Commission* did not mention high speed rail at all in their report from January 2008 – but was again taken into consideration to such a degree, that it was included in Prime Minister Fogh Rasmussens New Year speach less than a year later.

The situation now is that Denmark on one side has high speed trains to Stockholm and an ambitious Swedish high speed rail strategy with up to 320 km/h on the main lines, to the other Hamburg and Berlin increasingly connected to the Central and South European high speed network. With the building of the Fehmern Belt bridge between Germany and Denmark – to be finished in 2018 – an opportunity to combine these networks has emerged.

This opportunity can well be postponed to a very distant future if the Danish and German governments are not aware of this.

In my paper I will present the situation from technical, organisational and political points of view:

- The Fehmarn Belt agreement between Germany and Denmark and its implications for the railroad system
- The Swedish high speed rail strategy
- Missing links in an integrated high speed rail system Sweden-Denmark-Germany

From this I will evaluate what are the obstacles in Germany and Denmark towards 'unplugging the plug'.

Methodologically, the paper will be based on scrutinizing official documents, research made by the COINCO-project on the Oslo-Copenhagen-Berlin-corridor as well as analyses of the public debate. A policy analysis will be made of the Danish railroad strategy with respect to high speed trains, including economical, historical and geographical explanatory factors.

UNBALANCES IN EUROPEAN CONTAINER AND INTERMODAL TRANSPORTATION; THE CASE OF A HIGH-CAPACITY SOUTHERN RAILWAY LINK TOWARDS CENTRAL EUROPE

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ABSTRACT

As transportation is a result of human activities it is correspondingly subjected to human behaviour.

One of the main problems of humanity is disparity. This is, differences among nations, north south inequality, delocalization of production and consumption centres, regional unbalances, and trade imbalances. By globalisation, humankind has tended to consume distant products by the near and to outsource the industry overseas, which has amplified the inequality [1], has pushed forward the imbalance and has increased the transportation exercise by paying a high energetic cost. Containerisation has both, paved the way and summed up to this trend by ensuring a systematized way for trading within a safe and liable context. As a result intermodal transportation has benefited largely from globalisation becoming the most growing business in freight transportation ever.

Container ships have undergone an exacerbated enlargement during the last decades taking profit from the principle of economies of scale. This growth on vessels is motivated and brings about longer liner distances, more calling ports and extended services; in the future even larger ships are expected. However, large container carriers are openly exposed to unbalanced flows and these may affect continental trades too, being these also unbalanced. This results in the production of empty containers and the need of repositioning, a very unfruitful and undesired though necessary practise for any transportation system. The most typical example of unbalanced traffic in a macro scale proportion is the one happening between the U.S. and China, being the one between Europe and China similar both in terms of volume and imparity.

In the case of having improved south rail accesses towards Central Europe[1] many conjectures can be formulated in respect to the effects that the existing and increasing imparity of Far East trade may have on the future European container traffic, railway infrastructures' use, and ports' role. First of all the today indisputable supremacy of H-LH[2] port range and its macro hinterland will enlarge the flow of containers making their way back to be repositioned overseas. This situation can be profited by south ports and key high-capacity railway infrastructures to sustain railway landbridges towards Central Europe, Scandinavia and Ural regions. The geographical advantages of southern ports are evident but not sufficient since the hinterland characteristics, specially railway services' quality is still insufficient, nonetheless the container flows in Europe and in Central Europe may be changed (and rationalised) if junctures for transportation proliferate, namely, logistic platforms, container depots, specific quality interoperable railway services, and hinterland road connections. By this, eastern markets that nowadays, for quality reasons, prefer to be served by northern ports on a railway basis may look back and find reasonable transportation proposals at a stones' throw away.

[1] Central Europe is a macro region producing about the 25% of total GDP of EU27 and formed by South and East Germany, North Italy, Czech Republic, Slovakia, Poland, Austria, Slovenia, Slovakia and Hungary
[2] Hamburg-Le Havre Range Ports: Hamburg, Bremen, Amsterdam, Rotterdam, Antwerp, Ghent, Zeebrugge, Dunkirk and Le Havre

The paper presents an overview of container flows in America and Europe on a railway basis, examines the influence and distribution of empty container trips and finally establishes a hypothesis on container distribution, in the case of Europe, with a south port access in consonance with the objectives of SoNoRa project.

INTRODUCTION

The intermodalism in transportation is represented today in many forms and formulas. Probably the most recurrent and therefore most commonly employed is the one resulting of the combination of ocean container ship transportation with road cartages on continental legs over the hinterland. Hinterland container trains and continental-oriented intermodal trains together with container barges as well as the Short Sea Shipping transports should complete the intermodal transportation context. Container ships have undergone an exacerbated enlargement during the last decades taking profit from the principle of economies of scale. Recent publications [17] assure that change rate of ship size is little higher than that of the extension of the service so in the future even larger ships are expected.

Large container carriers have been openly exposed to unbalanced flows. The most typical example of the unbalanced traffic in a macro scale proportion is the one happening between the U.S. and China, representing the largest traffic's share on the Transpacific line.

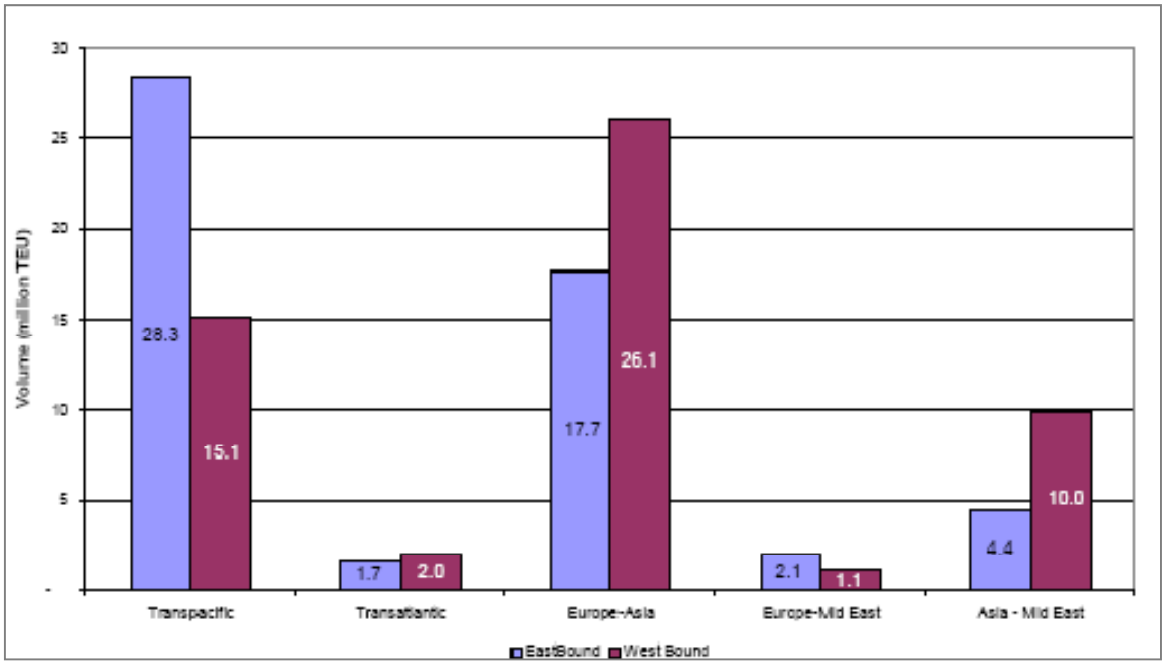

Figure 1: Trade Imbalance East-West Routes 2015 Forecast [13]

After accession developments in infrastructure investments have not always been in line with primary EU objectives. Generally investments were within TEN-T corridors but in most cases within those corridors choices have been made purely on national needs basis. As a result most advanced are currently projects on Poland's west-east axis which is not necessarily exactly as overall EU perspective dictates.

TRANSPACIFIC OCEAN CONTAINER TRANSPORTATION; TRANSATLANTIC ROUTE; UNBALANCED CONTAINER FLOWS IN NORTH AMERICA; DOUBLE STACK TRAINS AND RAILWAY LANDBRIDGES; TRANSLOADING OF CONTAINERIZED CARGO; EMPTY CONTAINERS ON SAN ANDREW VALLEY AND NEW YORK-NEW JERSEY AREA; PANAMA CANAL

Indeed, the Transpacific Line is nowadays the busiest one in the world; about 25 million TEU should have crossed the Pacific Ocean between North American west ports and Asian east coasts in 2008, which represents itself about 20% of the worldwide container traffic. In respect to the imparity, which is very manifest − about 2 to 1, double volume from Asia to America than backwards − it can be said that the Asian Crisis in 1997 triggered the unbalanced growth of trade due to financial inequities, which brought about devaluated change rate between Asian currencies and strong U.S. Dollars. This favoured outsourcing practises and created a phenomenal exportation juncture that has remained until nowadays.

By the new financial crisis starting in 2007 and affecting very well the western economies, the balance import-export has been somewhat affected too, mainly because of the credit crunch and U.S. Dollar devaluation, which has increased slightly the U.S. exportations and diminished the importations. However, the major impact of the crisis has been the reduction of transportation performance overall, estimated around 25% in containerized transportation [7] on all modes and all traffics. The unbalances though should have remained comparatively similar as before, especially on the transpacific lane.

In the past, shipping companies have mitigated the effect of imbalances and empty container problem by increasing the economies of scale, namely: 1) increase the number of called ports, 2) utilise larger vessels, 3) keep a large stock of containers, 4) build and sustain empty container depots and maritime exchange hubs, 5) develop virtual container exchange platforms, 6) allocate punctual all-empty container transports, and foremost 7) apply surcharges on containers following the strong relations in order to equilibrate monetarily the market.

In the actual moment, shipping companies are improvising solutions to withstand the crisis month-by-month; this is to survive amidst the manifest container recession trend and global trade volatility. Some measures that have been seen so far are: to anchor redundant fleet nearby Asian ports, e.g. Singapur, in order to serve potential demands as they may happen; to retain loaded and empty containers on terminals for filling up larger vessels with; to reduce the number of trips; to slow down speeds of transportation; to cancel services; and to delay orders on container ship building put some months ago.

Independently on how the market evolves, imbalances in transpacific line are likely to persist and hence shipping companies will fight desperately against them, mainly by the quickest solution, by modifying the freight rates. It has to be remembered though that because of the crisis, as well as because of the oil price adjustment, freight rates have been declining during the 2009 at values under 1000€ per FEU [3] eastbound [9][4].

The east coast of US behaves in a different way than the west coast being the differences between freight charges also very unbalanced in spite of having a slightly

[3] Forty Equivalent Unit, 40' Container

[4] In the current situation the ocean rates are showing a high volatility, even more than the stock market itself, which invalidates any engineering-scientific conclusion. The panic-euphoria situation derived of the financial crisis has an important human psychology component which analysis is out of the scope of this paper

unbalanced trade with Europe[5], the main traffic on transatlantic route. This situation can be explained mainly by three reasons:

- There is a manifest surplus of empty containers standing at the east coast of the U.S., especially on the area of New York and New Jersey, waiting to be employed for exportation or repositioned into global destinations. These empty containers are generated on one hand by an unbalanced trade on the other Atlantic lines (Africa, South America, Asia via Suez), and on the other hand as a result of the North American railway land bridges operating in west-east direction.
- The rates of utilisation of transatlantic vessels have been unsatisfactory − around 70%[6] − since the flexibility on routes and called ports is lesser than in the transpacific line and the traffic in general has diminished, which has lacerated the economies of scale typical of greater volumes.
- There are also all-water container transports from and towards China, via Panama Canal that are very unbalanced and carried out by Panamax vessels of max 4000 TEU capacity, which increases the empty container surplus and the trade imbalance of the area.

Altogether, the situation of imbalanced maritime container traffic from and to the U.S. is shown on the picture below.

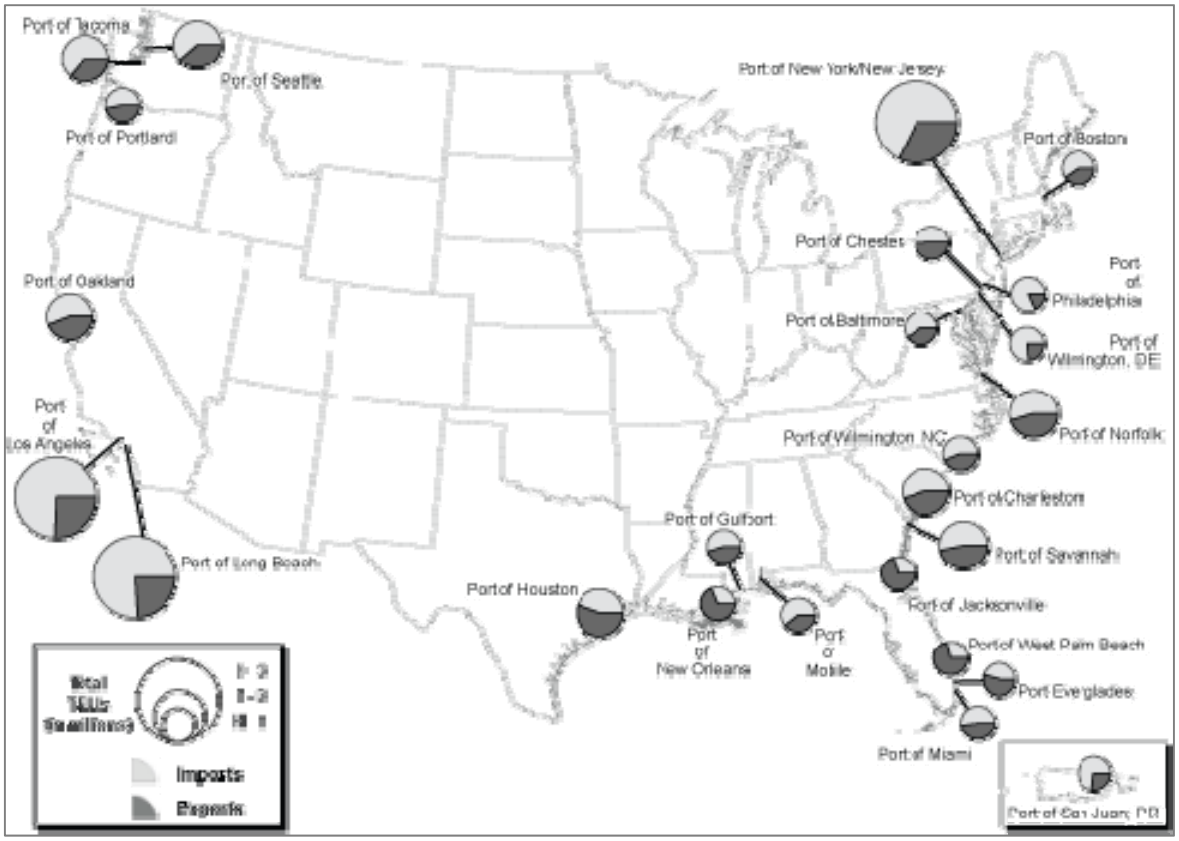

Figure 2: Top 25 Container Ports for U.S. International Maritime Freight 2008 [15]

[5] The maritime trade between US and EU should be balanced according to Eurostat 2008- but the trend export-import is very volatile since it depends very much on the Dollar-Euro fluctuation, so estimations on trade balance development should very unreliable, just as the Forex market itself

[6] [10], on the actual crisis context this loading factor could be considered even acceptable

And the main and directional intermodal flows in the U.S. representing about 20 Million of TEU of yearly transportation may look like:

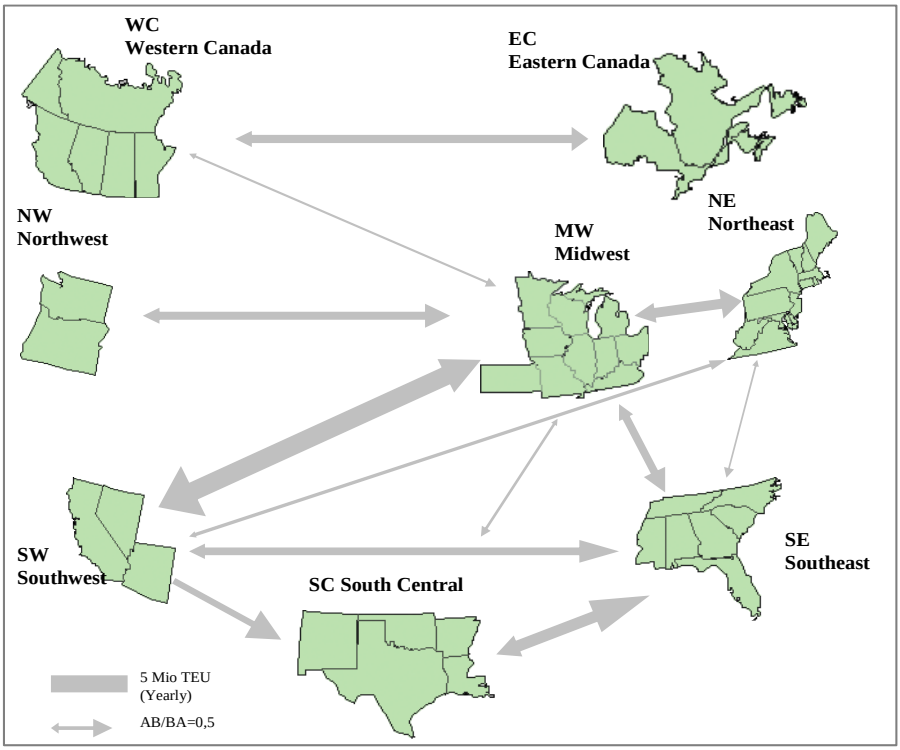

Figure 3: Main Intermodal Flows (Directional) in U.S. and Canada [5]

The regional flows in U.S. and Canada have a clear tendency to head towards East; this is mainly because of the huge import container traffic coming from China and conduced from western ports to eastern and continental locations by means of railway landbridges (mini-landbridges), mainly to: The Midwest, Texas, Florida, New York, and Quebec/Ontario/Atlantic in Canada. The main traffic flow is the one happening between California and The Midwest – e.g. L.A.→ Chicago − with about 6 Million TEU per year and both directions. In this case though, the corridor is pretty balanced because of the important outbound traffic leaving the Midwest towards California which offsets or even inverts the expectable tendency west→east. This tendency though can be clearly seen on the relation Seattle-Chicago (NW-MW), where the demand of goods coming from the Midwest is not sufficient to counterbalance the corridor, which results in an important container unbalance (COFC[7]) west→east. Conversely, the trailer traffic, understanding by this TOFC[8], is unbalanced but on the contrary direction. TOFC together with large container COFC traffic are mainly employed for intrastate traffic, which relegates ISO container of 40' and 20' for export and import. Therefore a disturb on equipment (railcars, containers and trailers) can appear as a result of having ISO containers on one direction, (west→east) and trailers and large containers on the other.

The Canadian landbridge is pretty unbalanced 1.6:1[9] and it is participated mainly by 53's[10] and ISO Containers with major share of 40ies; average weight per TEU is 8,6 metric

[7] COFC Container on Flat Car, this traffic usually employs double-stack freight railcars
[8] TOFC Trailer on Flat Car, this traffic utilizes primarily spine or skeletal freight cars and flat cars of 80' length
[9] 1,6 more volume in eastbound direction than westbound, accounts only intermodal traffic between British Columbia and Quebec-Ontario [9]
[10] 53 Feet Container is the typical American domestic container

tons. It is exploited mainly by two companies that can cover the corridor on its whole span, this is either by using their own infrastructure as the case of CN, Canadian National Railways or by having trackage rights on concrete sections on the east side (Canadian Pacific Railway). Both companies posses railway infrastructure on U.S. soil and therefore offer railway services on it, being the CN even able to reach up to New Orleans.

The different Class I Railroads[11] of the U.S. own infrastructure along and across the U.S. territory but none of them can cover the whole west-east coast corridor, therefore cooperating agreements are necessary to hand over cargo between them at interface stations, typically placed along the Mississippi River basin. These agreements lead to solid and reliable train schedules that enable average commercial speeds Door-to-Door[12] of 25 km/h [14] all over the U.S. These commercial speeds are difficult to be achieved on European intermodal services, especially if considering cross-border traffic. In doing so, only key corridors, as example DE-IT or NL-DE, can achieve interesting door to door speeds reaching up to 20 km/h. Speed on national relations in Europe can be comparable to the American ones and even beat them but logically they do not cover long distances or very important international corridors. Certainly, the interoperability still burdens, and how gravely, this very important aspect of European rail transportation. The averaged European transportation time on cross-border relations, only rail, should be around 17 km/h[13], and Door-to-Door intermodal around 18 km/h.

The rolling equipment employed for the intermodal transportation in North America is characterized mainly by the utilisation of double-stack railcars which usually are coupled indivisibly onto Jacobs-Bogies deployed under 5-unit cars, resulting in 5-Multi-Unit well cars with capacity of 27 TEU. These units are able to transport all kinds of containers, also large ones of 53 feet on the lower level, boosting the competitiveness of the intermodal transportation and palliating the effects of imbalances on American container transportation. As example, if having an unbalanced relation like the one happening between West and East Canada, imbalance 1.6:1[14], the utilisation of double-stack equipment would diminish the expected loss in respect to using single-level wagons[15]. Because:

- By using single-level equipment, double amount of wagons and locos should be necessary for producing same transportation output, and this would lead to higher fix and variable costs.
- Double-stack wagons can be repositioned westbound loaded at 60% offering furthermore some extra capacity for empty container repositioning, yet the latter practise is not preferred by railroad companies who would offer discounts to have trains fully loaded (empty wagon and container repositioning do not generate any direct revenues).

Then so by using high capacity equipment, e.g. double stack wagons, longer trains etc. economies of scale can be easily achieved and problems of unbalances mitigated.

Double stack performance on railway transportation has signified a truly revolution since late 70's, when it was introduced by Southern Pacific (today acquired by UP), being

[11] Railroad Companies having annual carrier operating revenues of $250 million or more, according to STB (Surface Transportation Board)
[12] Door-to-Door implies railway transport, transhipment onto truck and road haulage, from consignor to consignee
[13] It considers at least two international border crossings and more than 1000 km of distance, for example Rotterdam-Budapest
[14] Statistics of Intermodal Association of North America
[15] APL acknowledges cost savings of double-stack over conventional single-level COFC/TOFC cars between 20 and 25%, (including line-haul, terminal, drayage, and other cost factors) [8]

nowadays the backbone of American intermodalism. Likewise, another recently-developed concept, the transloading, has been gaining terrain as regards as the lately increased demand on larger containers.

Basically transloading consists on shifting cargo between standardized loading units. By this the cargo is deconsolidated from a smaller unit or few of them, (ISO 20's, 30's or 40's) and reconsolidated into a larger one, a 48-footer or preferably a 53-footer (or 53' trailer) for inland transportation. These units are also called U.S. domestic containers and their number and share on U.S. intermodal transportation have grown during the last decade very importantly. This practise brings about better utilisation of loading capacity and a number of advantages[16]:

- Up to 40% more capacity with approximately same hauling and handling costs

53' containers have naturally more capacity than 40'; as comparison, European 45' swap bodies have about 30% more capacity than 40' ISO Containers.

- Diminish empty container reposition

ISO maritime containers that belong to shipping companies are usually not shared with other shipping companies or with other consignors, this leads to empty repositioning. Domestic containers are more "user permeable" and therefore they run normally loaded most of the time. Furthermore the better volumetric capacity of these containers makes them more versatile when being used for different kinds of cargoes, for example grains and low-density wares.

- Port decongestion

Typically transloading processes occur in cross-docking facilities located outside the port areas. By this the maritime containers can be quickly expelled out from the port, emptied and stored up on depots outside the port until they are needed again. This relieves considerably the surface need and diminishes the intra-port transports.

- Container management

ISO Containers can be easily located and reassigned if they are not being sent into the continent. Domestic containers are fully tracked and traced by railway and road companies as well as forwarding and logistics' agents, they travel seldom empty.

- Third party logistics involvement and flexibility gain of supply chain

External logistic companies may intervene and influence the consolidation of cargo also including LCLs (less than container loads) on the same consignment with same destinations; this represents a gain in flexibility. Furthermore changes on destinations and reallocation can be done ad-hoc counteracting the instabilities of demand.

- Security gain

Containers are opened and cargo is transhipped by a third party who may report the authority if law abuses. In the future, under a more strict security context[17], the intermodal transloading should be seen as crime-free mean of transportation and therefore obtain favoured considerations from Authorities. In addition same Authorities may carry inspections during the transloading processes without delaying the transportation.

Maritime transportation elements' size has grown considerably during the last decades; likewise railway elements have grown too but at minor pace and value. North American railways have profited largely from the restrictions of Panama Canal to larger vessels, giving

[16] Review and actualization from [4]

[17] U.S. Mandates of 2007 require screening 100% of containers entering the U.S. by 2015, however this is not likely to be achieved [6]

way to railway landbridges that have competed with all-water transportations eastbound. Altogether, the broadening of the Panama Canal, to be completed by 2015, have yield many speculations in respect to how this will affect the internal intermodal transportation in North America. Surely by increasing the East Coast ports traffic with Asia, but to what extent? And what is more important, how will the internal intermodal flows be changed?

The all-water alternative in comparison to water plus railway link will be cheaper but it will take some days more, 7 to 10, therefore some traffics may be attracted by the all-water option, especially those dealing with less valuable wares. Others will stick to railway landbridges, f.i. time-sensitive cargo. (Indeed, it is not the same to import from Bangladesh an outsourced winter season clothing collection than to export soybeans from The Midwest). In any case it can be anticipated that by having more high-capacity vessels calling the East and Gulf ports (If achieving these ports enough water draft and bridge clearance for accommodating mega carriers), more empty containers will be produced on these areas as result of the unbalance. However the fact of utilizing larger vessels will still reduce the overall costs of repositioning empty containers and the railways may be relieved from this undesired practise (On that context it has to be said that repositioning empty containers is a necessary activity that is usually performed by the largest mean of transportation available, preferably by high capacity container vessels). Therefore, intermodal consignments on transloaded domestic containers are likely to continue growing, being the deep sea containers left nearby the ports for reposition or for re-use on exportation. The intermodal flows may be in someway equilibrated producing an efficiency gain on the rail-based intermodal market. A gain on COB (Container-On-Barge) transportation on the river system Mississippi should be also achieved, especially when it comes to low value containerised merchandise and repositioning of empty containers.

The intermodalism in North America is very efficient mainly because: having very long train formations up to 3 km, double stack ability, longer containers for domestic use (53') and long distances of transportation. By this unbalances in continental container transportation can be mitigated because having increased economies of scale on railway transportation. After the Panama Canal extension an increase of East and Gulf Ports container traffic is expected if they undergo important enlargement measures to be able to serve mega container carriers (>8000TEU). As a consequence, a gain on competitiveness of North American intermodal trains should be achieved as well as increase of COB on the fluvial Waterways (Mississippi) and container short sea shipping along the Gulf and East coasts.

Western railways must be even more efficient if they intend to preserve the West→East intermodal market, in so doing even more railway facilities have to be deployed, namely: ramps, interchange stations, transloading facilities, inland track infrastructure, and intermodal (or even trimodal) terminals. These works combined with an increase of overall service competence must increase the speed of transportation at the same time as guaranteeing a decrease of intermodal rates.

EUROPE

The container traffic between Europe and Asia is comparable in magnitude terms with the one on the transpacific route, yet significant differences makes it more particular:

- Europe (EU), with Germany at the forefront, is the greatest export power in the world, which generates a consistent flow of commodities outwards. These commodities are typically more valuable than for example the ones coming from Far East –except from

Korea and Japan- and therefore the transportation costs on westbound commodities weight more on the final price than on the opposite direction, which makes import from China more volatile than export from Europe. For this reason the trade imbalance, which is typically favouring the westbound relation, about 1.5 to 1, can be affected or even inverted if a sudden economic incident occurs, for instance, oil price rise, credit lack, stock market drop, etc. This can create shortage of empty containers in Europe.

- The distance is longer than in the transpacific route and therefore the incidence of the imbalance is much higher. According to Maersk's imbalance factors for tariff calculation, the westbound transportation should be triple expensive than the eastbound transportation[18].
- The intra-Europe trade flow is huge since it alone represents about 30% of the total trade flow in the world. Incidentally the ranking of overall trade flows in the world (2007) was:

1. Intra-European	30% of world trade flow	
2. Intra-Asian	14%	"
3. Intra-North American	7%	"
4. Asia→North America	5.6%	"
5. Asia→Europe	5.2%	"
6. Europe→North America	3.4%	"
7. Europe→Asia	3.2%	"
8. North America→Asia	2.6%	"
9. North America→Europe	2.4%	"

([16] Although the percentages above refer to overall cargo on all modes, the extrapolation for containerised cargo should be similar considering the extensive participation of this technique on nowadays transportation activity)

This fact yields more complexity when interpreting the different goods' corridors happening in Europe since they respond to different markets, namely: national, overseas and intra-EU, being the latter very affected by the particularities of each European country economy and trade history.

- The number of larger ports called by Euro-Asian routes is higher than on transpacific lines, as well as the feeder possibilities, which increases the number of economies participating on the corridor and leads to greater economies of scale. This improves the loading factor on container vessels and is a good argument for shipping companies wanting to enlarge vessel capacity increasingly.
- Some Asia-European lanes have also extension to east coast ports of the U.S. having therefore even more economies involved on the container trade.

According to the above exposed arguments it can be affirmed that the Europe-Asian container trade is more global oriented than the North America-Asian one, being therefore subjected to more factors and reaching major complexity.

During the last decades container vessels on this route have enlarged their volume considerably reaching capacities up to 14000 TEU[19]. These ships generate enormous economies of scale but entail important logistics disturbances when calling some ports, especially those not being well prepared for serving correctly such big vessels. In so doing

[18] Imbalance coefficient employed in the calculation of BAF (Bunker Adjustment Factor) October 2009 MAERSK

[19] Emma Maersk and her 7 sisters are the largest container ships in the world, max. estimated capacity 15.000 TEU each

important losses in respect to depreciation costs of the ships can occur because not having enough equipment or personnel available at the ports. Likewise costly overflows can appear on port facilities if containers are not rapidly expelled and dispatched to and from the docklands.

In the future, with even more super vessels on duty, the situation could derive into few regular worldwide looping lines (clockwise and counter clockwise) calling about a dozen of ports, namely three or four in Asia, one or two in the Mediterranean, two or three in European Atlantic, two on U.S. east coast and other two on the U.S. west coast, without forgetting the hub ports calls for marshalling purposes. Feeder and Short/Medium Shipping Lines should complete the offer and thereby provide service to more regional-oriented locations. The following figure depicts the container output of the most important container European ports in 2008:

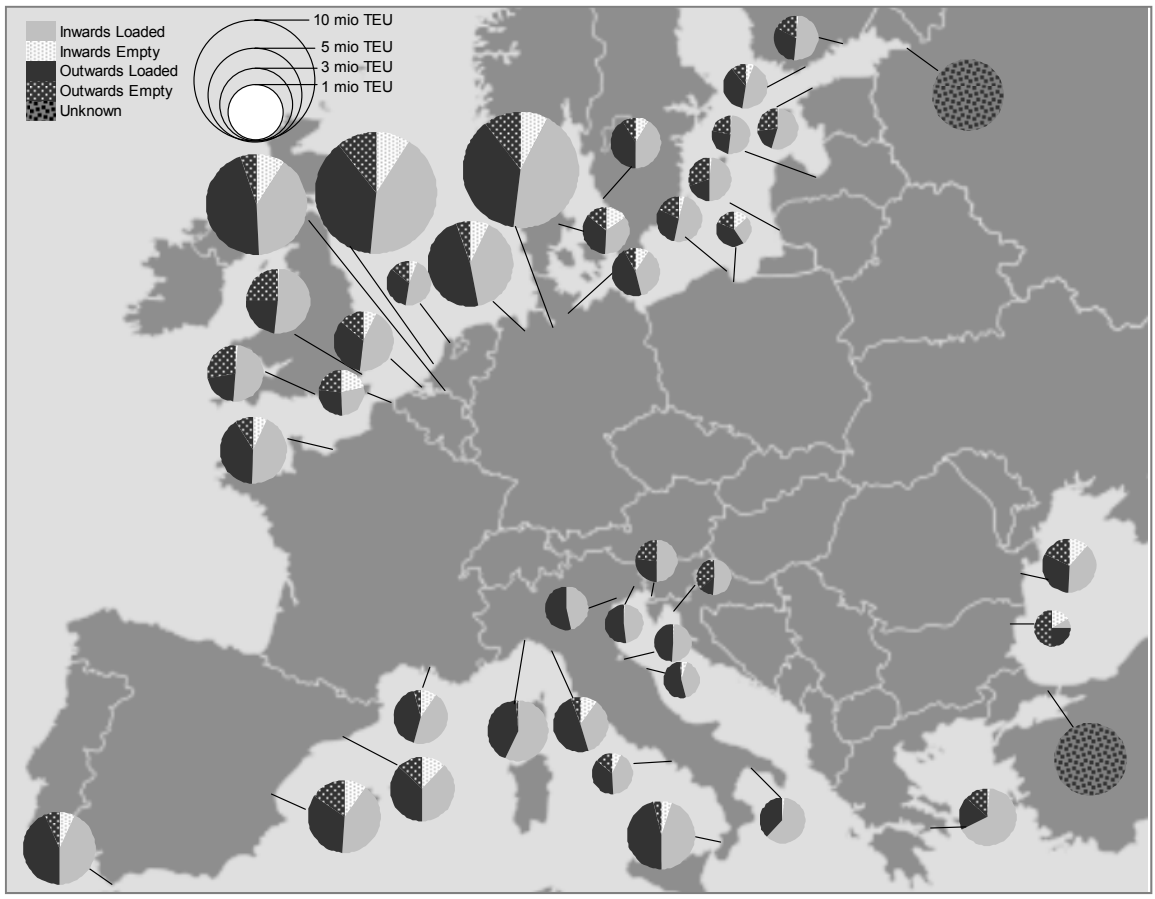

Figure 4: Top European Container Ports 2008 (Source: Own elaboration, data from Eurostat, Port of Rotterdam, and European Sea Ports Organisation (ESPO) Note: Some important ports' output has not been depicted for considering them outside of the study region (Central Europe). (**Northern + Baltic Ports:** Le Havre, Felixstowe, Dunkirk, Southampton, Zeebrugge, Antwerp, Rotterdam, Amsterdam, Bremerhaven, Hamburg, Aarhus, Lübeck, Gothenburg, Gdynia, Gdansk, Klaipeda, Riga, Tallinn, Helsinki, Kotka, Saint Petersburg. **Mediterranean + Black Sea ports:** Algeciras, Valencia Barcelona Marseille, Genoa, La Spezia, Naples, Gioia Tauro, Taranto, Ancona, Ravenna, Venezia, Trieste, Koper, Rijeka, Piraeus, Istanbul, Varna, Constanta)

Practically 60% of the European maritime container traffic is handled in northern ports, including ports of the British Isles. About 5% should be handled in Baltic ports, including Saint Petersburg, with an important empty container outwards traffic. Mediterranean and Black Sea Ports, Including Istanbul and Odessa, should make the resting 35% of container

handling in Europe. The total container handling in Europe should be around 80 million TEU per year, about 2.5 times of the U.S. container port handling.

About the hinterland penetration of containers, it can be said that the supremacy of northern ports is out of the question being the Mediterranean container ports serving more national and regional markets, or in some cases, Algeciras, Gioia Tauro and Malta, -incidentally the busiest ports in Mediterranean- relegated as mere hub performers for big ocean carriers.

The existing railway facilities and rail linkages of the container terminals give additional information of the role and importance of ports being this information collated in the table below. (Only main ports affecting Central Europe Region)

Table 1: Railway facilities and linkages [3]

Northern Ports	Rail Links & Railway Facilities 1 Poor 5 Excellent	Main Handling Equipment for Railway	Annual Volume Mio TEUS (2008)	Mediterranean Ports	Rail Links & Railway Facilities 1 Poor 5 Excellent	Main Handling Equipment for Railway	Annual Volume Mio TEUS (2008)
Rotterdam	5	Gantry Cranes	10.5	**Genoa**	3	Gantry Cranes	1.6
Hamburg	5	Gantry Cranes	9.8	**La Spezia**	2	Gantry Cranes	1.3
Antwerp	5	Gantry Cranes	8	**Marseille**	2	Straddle Carriers	1
Bremerhaven	4	Straddle Carriers	5	**Venezia**	2	Gantry Cranes	0.3
Zeebrugge	4	Gantry Cranes	1.4	**Koper**	3	Gantry Cranes	0.3
Gdyna	4	Gantry Cranes	0.5	**Trieste**	3	Reach Stackers	0.2
Amsterdam	3	Gantry Cranes	0.4	**Ravenna**	2	Gantry Cranes	0.2
Lübeck	4	Gantry Cranes	0.3	**Ancona**	2	Gantry Cranes	0.1
Szczecin	3	Reach Stackers	0.05	**Rijeka**	1	Reach Stackers	0.1

Certainly, the whole EU 27 could roughly be considered as hinterland of Le Havre-Hamburg range ports. In so doing, this hinterland is served by barges along the Rhine River and quality intermodal trains, which reliability should ensure them a continuous growth[20]. This feature is especially important for the services eastbound, namely towards: Poland, Czech Republic, Slovakia, Hungary, Slovenia, Croatia, Serbia, Bosnia-Herzegovina, Bulgaria, Romania. There, reliable timetables, safety and speed on transportation as well as sufficient complementary services for expeditors and logistics agents should make proliferate further container services on rail basis. An alternative hinterland transport from and towards southern ports is for the moment on a secondary layer. As challenge to this, some regional-oriented projects as well as interesting joint ventures have been launched with the aim of improving the quality of south-oriented railway services. As remarkable examples: SEEIS Project (South East Intermodal Service), SINGER Project (Slovenian Intermodal Gateway to European Rail), and actual services offered by intermodal companies like Alpe Adria, ICA, Adria Kombi, CEMAT Hungaria Intermodal and Kombiverkehr connecting the ports of Koper and Trieste with Central Europe.

Obviously the preference for northern ports is not solely attributable to the fact of having quality and reliable intermodal services there but as well, and very importantly, as the fact of having a regular trade performance with the involved western economies, principally

[20] Under a stable global financial situation

Germany. A quick overview of intermodal flows in Europe reveals the fact of having important flows north south with an important imbalance east-oriented as well as very critical bottlenecks[21].

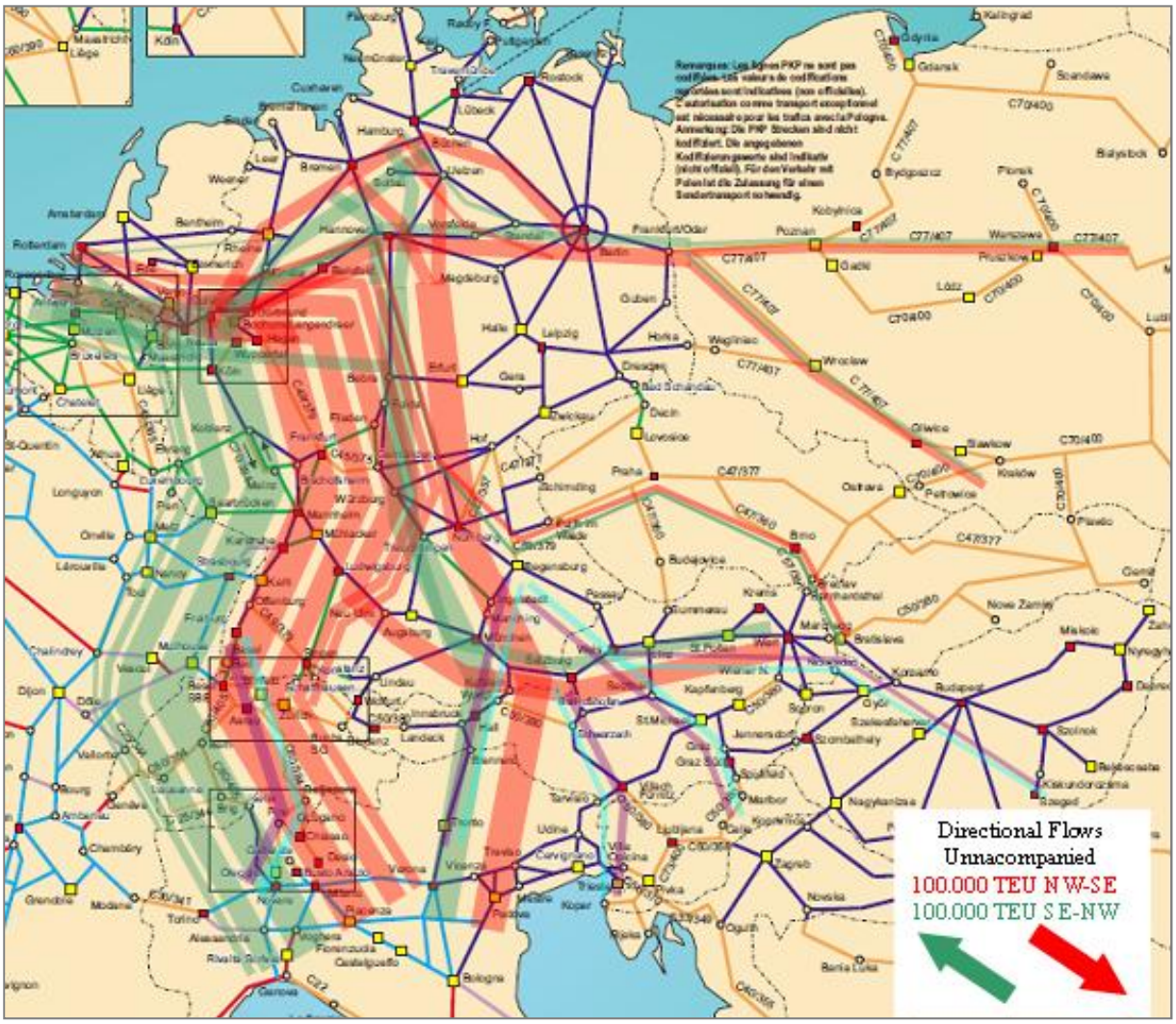

Figure 5: Main Railway Combined Transportation International Flows in Europe 2008 (TEU/Year) Top European Container Ports 2008 (Own Elaboration, Map UIRR 2007, Statistics UIRR and Eurostat 2008 (It does not include traffics with France and Spain))

About 17 million TEU[22] were transported in Europe on Railways in 2008, this amount compared to the total European container port output is not very significant, making only about 20%[23] of it. The amount is even poorer if considering that this includes continental-nature traffic[24] as well.

[21] Brenner, Antwerp, Cologne-Rhine-Main axe, Basel (Already Identified by K+P Study On Infrastructure Capacity Reserves For Combined Transport By 2015)

[22] Eurostat 2008, Includes: Be, Bg, Cz, Dk, De, Ee, Ie, Gr, Es, Fr, It, Cy, Lv, Lt, Lu, Hu, Mt, Nl, At, Pl, Pt, Ro, Si, Sk, Fi, Se, Uk, Hr, Tr and No

[23] Result of dividing 17 Mio TEU (Rail) over 80 Million TEU (Ports). In the U.S. this amount is 105%, it considers obviously continental-nature intermodal traffic

[24] The Intermodal traffic in Europe is about 50/50 split on Hinterland traffic and Continental Traffic according to UIC Agenda 2015 for Combined Transport in Europe (2008) and UIRR 2007 Statistics (2008)

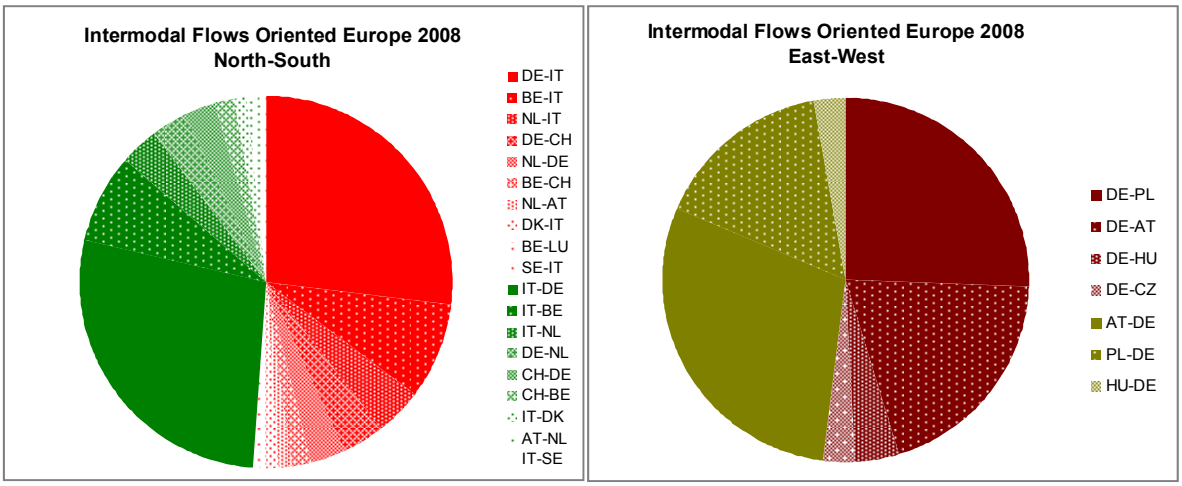

Figure 5: Unaccompanied Rail Intermodal Flows Europe 2008 (Directional) (Own elaboration, data from UIRR, Eurostat and UIC 2008-2009)

At first glance, it seems that unbalance in European intermodal rail transportation exists but it is not that dramatic, however a quick look to the low or very low averaged weight of containers on south-north lanes and especially on east-west directions reveals an important share of empty units. The flow of empty containers in northern Europe is not only originated by rail but also, and very importantly, by barge and truck. The following pictures mirror the total amount of goods transported in Europe over the different corridors, most noticeably along the Rhine River.

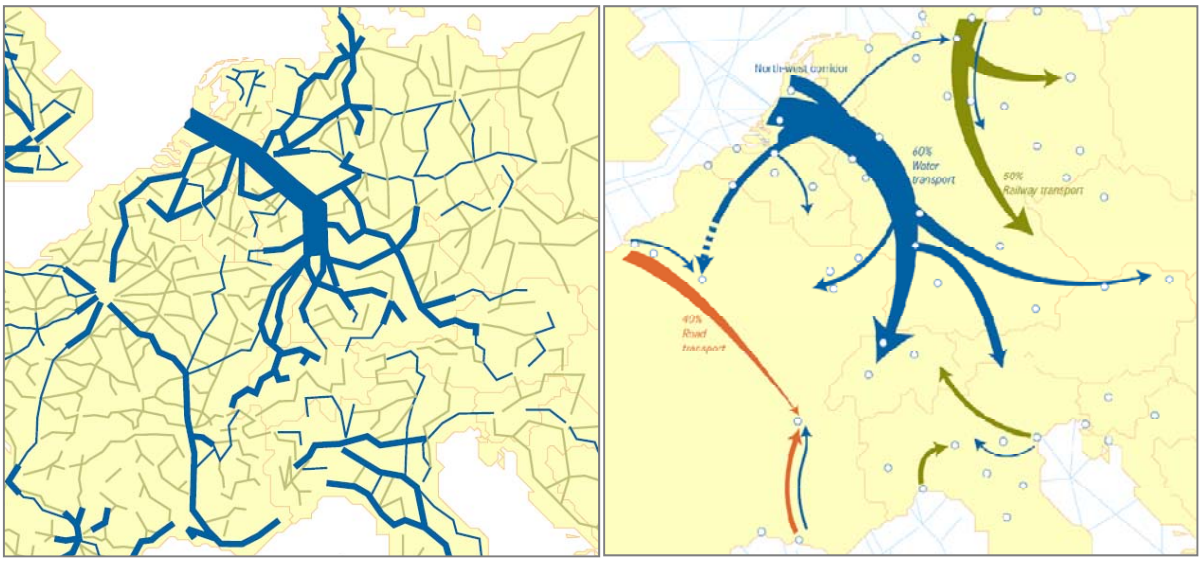

Figure 6: All Movement of Goods within Europe (all modes) (left); Main Transport Corridors in north-western Europe (right) [2]

The empty containers are preferably transported by the cheapest mean of transportation available and therefore they are transported rather by barge than by train or by truck (in that order). For example, if observing the container transportation along the Rhine corridor, it can be noticed that indeed the transport of empty containers on barge is very high, about 50%, but the amount of empties is higher on the southbound direction than on the northbound. This is explained mainly because of the huge export performance of Germany, which demands many empty containers in the inland (mainly in Rhine-Ruhr) to be filled up

with wares to export. Furthermore the trip duration for barges upriver is double than downriver[25], which brings about empty transportation on the slower lane[26] and loaded transportation on the faster.

When inland waterways are not available, the train is normally the preferred mean for repositioning empty containers. As illustrative example, it can be observed the intermodal relation between Germany and Slovenia. This relation is mainly served by CT operator Kombiverkehr in collaboration with Adria Kombi. The service is based on shuttle trains three times a week back and forth connecting Munich and Ljubljana. In a theoretical basis, this service should have a capacity of about 10.000 TEUs per year and direction[27] having an averaged weight per TEU of 12 tonnes[28]. However corresponding statistics are showing the following:

Table 2: Statistics Munich-Ljubljana [12]

Relation	TEUs/Year	Averaged weight / TEU (t)	Container Type %(20'/40')
Munich → Ljubljana	8000	14	85/15
Ljubljana → Munich	9000	3.4	73/27

This apparently indicates the very strong empty container flow towards Germany, which accounts for 80% of empty units. In so doing, loaded containers reaching Ljubljana by train and by road are coming back empty by rail to Germany where they are either re-loaded or repositioned into global destinations. The case of Slovenia-Germany can be certainly extrapolated to other regions in South-East Europe, namely Poland, Hungary, Croatia, Romania, Bulgaria, Czech Republic and Slovakia, which are relying, in major or minor grade, on Germany exportations and northern ports' hinterlands to satisfy their import necessities. Altogether it is generated a situation of empty container transportation that the author has compared it to a waste water cycle system.

[25] About 10 km/h upriver, and 20km/h downriver

[26] The costs of empty container transportation remain pretty the same in both directions. Conversely costs of loaded containers transportation should be about 40% more expensive in upriver according to the "The Inland Waterways Observatory" EU

[27] Obtained as, 500m max train, with 70TEU/Train results in about 10000 TEU per year and direction

[28] Container + Payload; This figure has been justified by the author in recent publications, namely [11]

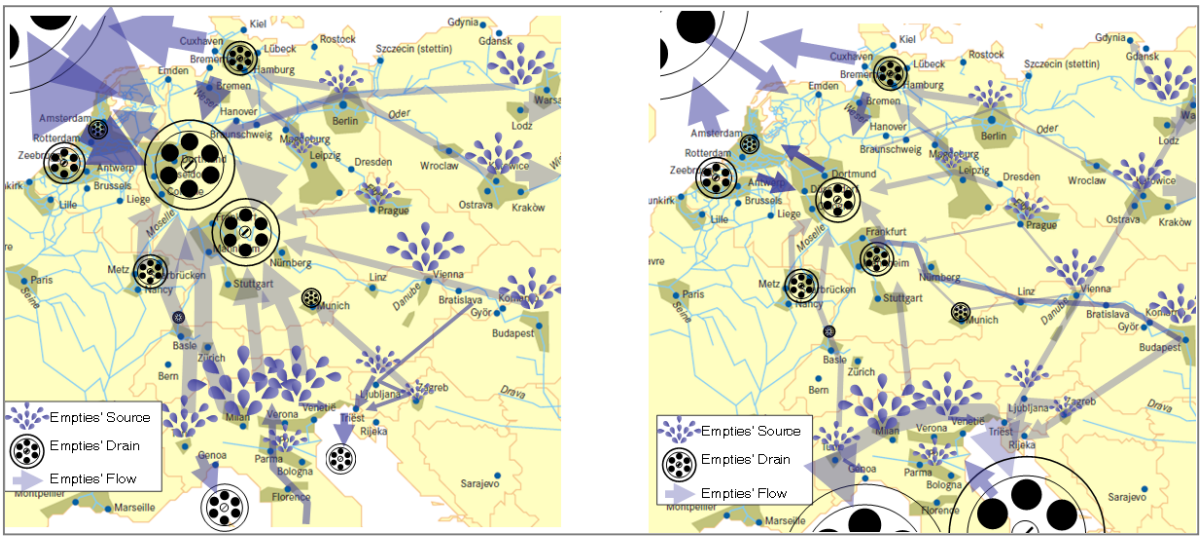

Figure 6: The Cycle of Empty Container Transportation in Europe. Actual 2009 (left); Hypothetic South Ports 20?? (right) (Own Elaboration, Map: Dutch Inland Shipping Information Agency, the size of drawings correspond approximately to volumes; the total empty container outbound on northern ports is about 3,5 million TEUs a year (and 3 million inbound empty))

In the hypothetical case of having a quality and high capacity southern rail link connecting a consistent southern port range, the empty containers would have chances for being repositioned cheaply southbound. Correspondingly, loaded containers should have more economical lanes towards Central and northern Europe, introducing important links for balancing the actual container corridors north-south and diminishing the current flows of empty containers. A significant gain on efficiency of freight trains and barges should be achieved as result of having fewer empties' transports and better balanced relations. Even an increase on the utilisation of intermodal continental units (swap bodies and semitrailers) could be achieved. Swap bodies (SB) are employed mainly on continental-oriented relations, e.g. Germany intra EU export, and travel seldom empty[29]. With transloading operations (see page 25) at ports' hinterlands SB could also intervene in maritime-nature traffics. This should bring about more flexibility in the maritime-originated supply chains, allowing third party logistics' to modify consignments' consolidation for just-in-time logistics operations. Naturally the transloading times and costs should be carefully estimated in consonance with total price of logistics and transportation overall. The use of swap bodies may increase the productivity of transportation up to 30% in respect to 40' ISO containers (see page 25) but requires balanced traffics overall to avoid empty repositioning.

For all this to happen, rail transportation must achieve a capital importance on southern areas as response to the absence of natural navigable waterways, certainly it is hard to imagine sustainable empty container repositioning on road basis. The most important connection should be linking the North of Italy, namely: Verona, Milan, Novara and Torino, (important sources of empty containers) with southern ports: Genoa, Venice, Trieste and Koper. Obviously this approach has been rightly indexed by the important Corridor 5 and TEN Priority Project N°6 yet the advancement of works and logistics' networks of the projects are suboptimal.

[29] Swap bodies are more expensive and scarcer than ISO containers, which increases their value as intermodal loading units; they are fully compatible with road transportation and more "client permeable" than maritime ISO containers.

Concurrently, and not least, north east railway connections towards Ljubljana, Praha, Silesia, Vienna, Budapest, and beyond should be progressively achieved on a rail linked "satellite hinterland" basis, inducing inland hinterlands calling south ports (especially Venice, Trieste and Koper) rather than north ones. Danube River could play an important role for absorbing unbalances on container transport by offering a cheap way for repositioning empty units. South container ports should be enlarged to accommodate the largest container vessels and be equipped with high capacity intermodal terminals; this should pave the way for consolidating their reliability and consistency as logistics platforms.

A discussion on developments in the area has been going on for a while in respect to how investments on rail infrastructures and services would induce maritime traffic and how increased maritime services would justify rail investments, leading to a vicious circle. In the meanwhile, a number of empty containers continue circulating by train on southern, eastern countries and Germany[30] estimated by the author in not less than 3 Mio TEUs per year with a growth of 10% p.a.[31] This represents more than a half milliard Euros a year[32] spent on that practise. This problem continues unsolved.

European transportation corridors are unbalanced, there is an important flow of cargo direction north-south (also south-north from Germany) and north-east, being the latter severely unbalanced. An important production and flow of empty containers is the result. The author has estimated the cost of it on 500,000,000 €/year.

Repositioning empty containers does not generate any direct revenue and therefore it is done by the cheapest-available mean of transportation (typically ranked: Container Vessel, Barge, Train, Road). Repositioning ISO containers is not very time-sensitive because they are relatively cheap and abundant, in contrast, empty swap bodies transport is rare, since they are scarce and more expensive. Transloading ISOs into swap bodies should bring about gains on flexibility of maritime-originated supply chains apart of having potential increases on the capacity of transportation in the inland legs and decrease on empty repositioning.

South European container ports' success should be a consequence of having efficient, reliable and enough capable railway services linking the Rhine Basin and Central Europe metropolitan regions. These links should primarily and principally interconnect important maritime and fluvial ports, helping to draw off the empty containers from railway transportation and increasing thereby its efficiency, this would pave the way for growth on railway transportation, too. This efficiency should be as well improved in technical-infrastructural terms, especially by increasing the interoperability of trains (e.g. interoperable locomotives), extending the allowable train length on the corridor (min. 700 m, desirable 1500 m) and homogenizing maximum axle loads to 22.5 t/axe.

The objective of project SoNorA addresses some of the theses of the present paper, yet the study, comprehension, and appraisal of unbalances on transportation and empty container transportation should be as well included as regards as the importance shown not only in continental transportation but in global container trade.

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FREIGHT TRANSPORT ON RAILWAYS: INFRASTRUCTURE DEVELOPMENT AND DECISION SUPPORT

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ABSTRACT

The first part of the paper outlines the significance of the modal shift from road to railway transport with special emphasis on the present situation in the European Communities and within that, Hungary. In the second section the state of play in goods transport is drafted citing the most characteristic data relevant to this topic in the country. The third part explains how project controlling tools can be applied for rail infrastructure development or investment, these tools create proper input data for INNOFINance introduced in the fourth part and this relation is also valid in the other direction: after the analysis, the data from the program can be used by project controlling for preparing a feasibility study. The fourth part presents the powerful decision support tool, INNOFINance developed at the Department of Transport Economics of Budapest University of Technology and Economics. This complementary tool for planning uses a large amount of input information and data gained from professional transport planning software and it can calculate the financial and economic-social feasibility of large transport investment projects. Monetised values of the different externalities can be included in the cash flows; optimistic, pessimistic or "normal" scenarios can be represented by as many project alternatives as necessary. The results of the calculation (e.g. NPV, EIRR, FIRR, ROE, ADCR, etc.) can be further analysed with the support of the MCA module. The different types of risks (construction, operation, commercial, political, etc.) can be analysed and handled by the sophisticated sensitivity analysis module of the programme. Given the frames of potential usage, it is a perfect decision support tool for railway infrastructure development. The global aim of the paper is to present how the INNOFINance decision support tool and the recently used controlling methods can be applied efficiently for realizing a more sophisticated analysis of huge rail infrastructure investment projects.

INTRODUCTION

As environmental aspects become more and more emphasized within the European Communities, so does the significance of railway transport grow. It has been for long common knowledge that since its White Book on transport policies (for the ten year period until 2010) the European Commission has been urging the greening of transport and has been stressing the importance of shifting transport from road to the environmentally friendly railways. In this period EU measures have helped finance increased and alternative infrastructure capacity and EU policy has aimed to move transport away from the most congested modes [1].

These aims were reflected in the Hungarian transport policy drafted in 2007. The Unified Transport Development Strategy pinpoints the most pressing issues by stating as its objective to keep the ratio of environment friendly sectors above the EU27 average. It acknowledges that the fast growth of road transportation of goods puts a heavy financial toll on society, threatens transport safety and causes environmental damage. An aim to achieve

is to develop environmentally friendly infrastructures, so that by means of increasing profitability, it can offer a real alternative to road transport. The increase in road transport is the consequence of the changing needs in goods transport brought about by globalization.

A further aim much in line with the European objectives is to increase the efficiency and competitiveness of the sector by increasing the ratio of combined goods transport, and by making better use of environmentally friendly alternatives. The actual situation of the division of labour in the field of goods transport results in unequal transport capacities and hinders its optimal use [2].

THE STATE OF PLAY IN GOODS TRANSPORT

The ton/km road transport average in EU27 in 2005 was approximately 73%, in Hungary it was hardly 60%. In the same year, the rail transportation of goods in EU27 (not taking into account the maritime transport) was only 16.5%, while in Hungary it was „still" 23%. On the basis of transported goods, the proportion of road haulage grew from 54% to 73%, while the proportion of rail haulage fell back from 31% to 18%. With regard to the ton/km performance the proportion of road haulage grew from 42% to 57% in 7 years, while rail haulage fell back from 33% to 24% (see Fig. 1).

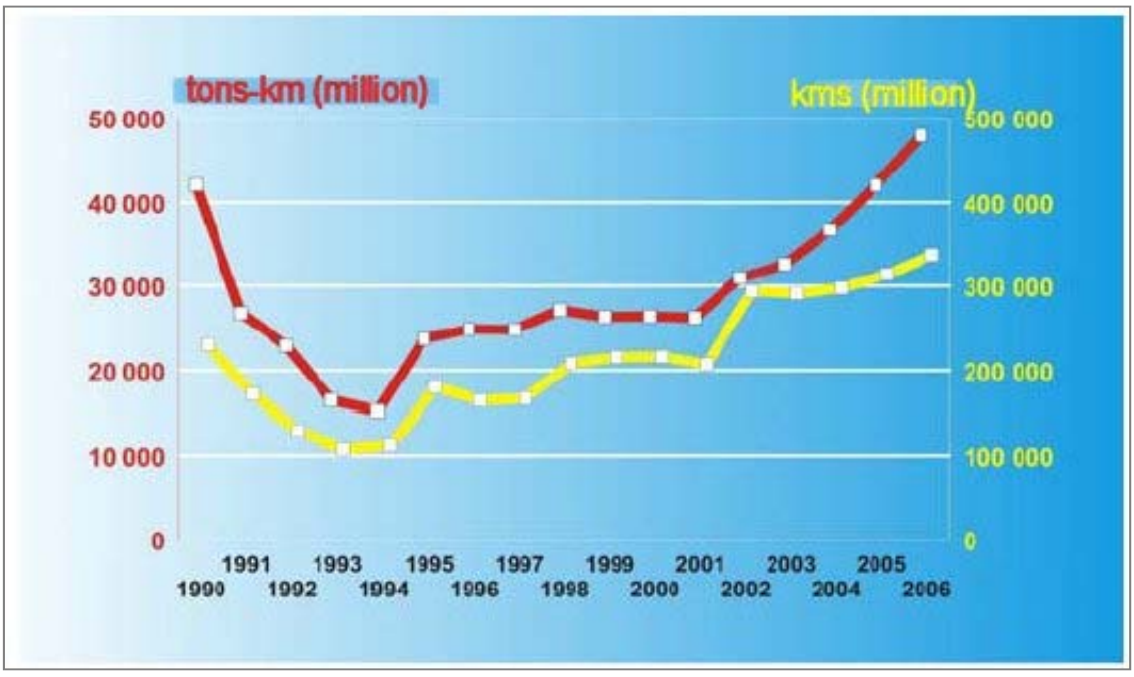


Figure 1: Evolution of goods transport performance in Hungary [2]

On the whole of the haulage market decrease in railway use is slowing down in Hungary: the third quarter in 2005 saw a decrease to 20.6% (from 23.4% for the same period in 2004) and this proportion was 18.6% for the third quarter of 2006. We can say that with EU accession, the Hungarian railway sector did not make full use of the potential offered by long range haulage opportunities resulting form the needs for distribution of goods in the EU area.

On the rail transport market, 10 new companies obtained operating licenses by the end of 2006, two out of them were actors on the purchasing side of goods transport by railway. The appearance of these companies on the market opened a new chapter in railway liberalization. The market structure improvement halted in the course of the third quarter, competition grew fiercer, and the market concentration measuring Herfindahl-Hirschmann

Index showed no improvement for the third quarter of 2006. The MÁV Zrt. owned MÁV Cargo Zrt. stills dominates the market, the new railway companies are encountering obstacles, previous customers thus take matters in hand for ensuring rail transport of their goods. All this can have a positive impact on market development.

To improve rail infrastructure profitability, an external condition to the strategic objective is to have a modern railway. With the help of EU funds in the framework of the Operational Program on Transport, the necessary infrastructure development will be achievable in the near future [2].

POTENTIAL USAGE OF PROJECT CONTROLLING FOR RAILWAY INFRASTRUCTURE INVESTMENT PROJECTS

The role of railway infrastructure developments

The European countries have recognised that the rail infrastructure has a significant role in the whole transport network. At the same time they have to face the fact that rail companies and governments could not cope with decreasing competitiveness in the last years in spite of several technical, technological and other innovations, which processes are still running. Therefore it is inevitable to analyse the rail infrastructure developments also from a controlling point of view. It requires the application of project controlling and project management with a different approach: applying corresponding adaptations for the specific characteristics of rail infrastructure development as investment projects.

The functions of project controlling (PC) and project management (PM)

First we have to define project management and the role of project controlling (PC) in huge investment projects as railway infrastructure development.

Project management (PM) is an integrated management system, which helps the innovation process and covers the whole life cycle of a project from the first phase (definition of problems, conception) to the last phase (implementation). An important feature of it is that it gives a framework for controlling methods and techniques. Figure 2 shows the regulatory circle of project management and within that the functions of PC.

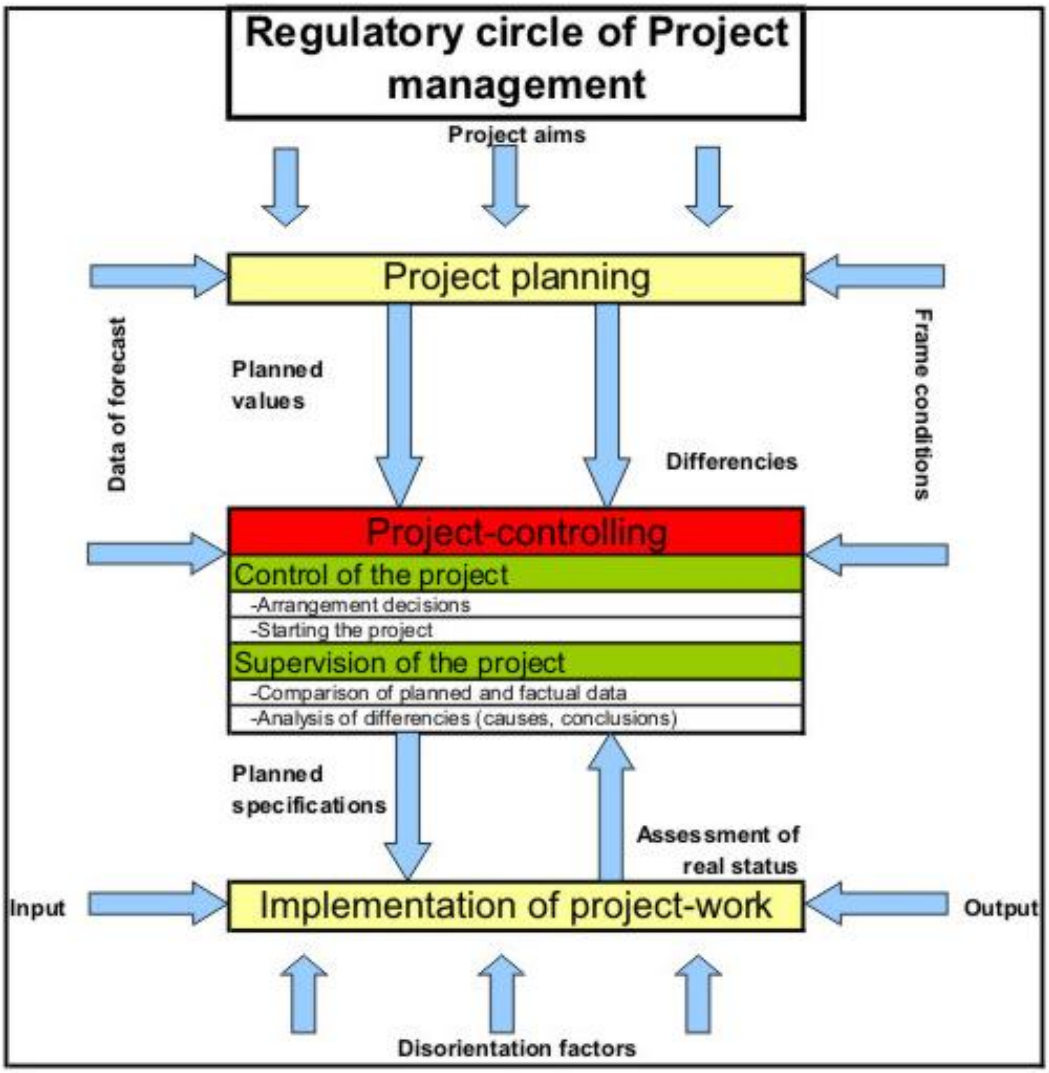


Figure 2: Regulatory circle of project management

Project controlling is about creating a securable mechanism of project controlling objectives by designing a comprehensive plan of project execution taking into account the objectives of investment, quality and time and use it for arranging the activities of project controlling during project execution. That is to say, provide practicable executing design for the top level to make a decision after surveying and analyzing the full process of executing the project.

This method has another significant characteristic as well: optimization of time and cost together. It is required to provide proper and continuous information about the process of execution, keeping data about the calculated costs and the means-consumptions during the whole planning and in each phase. To achieve these targets it is necessary to calculate the difference between planned and effective costs and to estimate the expected slippages and their costs. PC is able to discover the reasons causing the delays of deadlines and the overruns in the costs.

In the economic analysis of the projects it is essential to calculate how much time is needed to payback the invested capital, this is shown in Figure 3. Some important points are depicted in the diagram. Point 1 (turn round point) means that after the initial losses (during the project planning process) the project is realized and its operation is started. Point 2 illustrates the point of return of the invested capital. This is the relevant time period needed in

the calculations. Point 2' shows the return point calculated on the basis of cumulated cash-flow, reviewed in the next chapter [4].

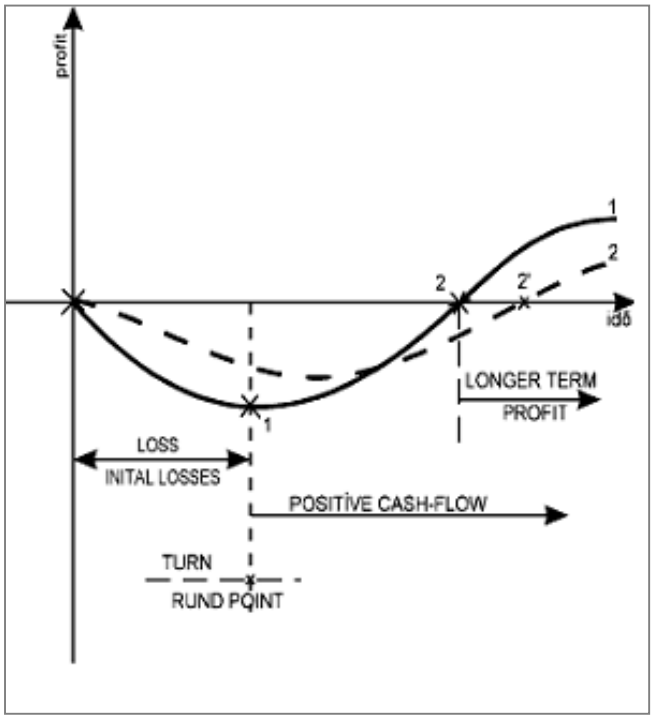


Figure 3: Return curve of the invested capital

Having outlined the most important features of PC and PM, let us see how these methods and their tasks have to be applied on an extensive example of a rail infrastructure development project.

Steps of project planning of railway infrastructure investment projects

In this chapter it will be presented how it is possible to adopt project management for a specific rail infrastructure investment example (line section Budapest - Székesfehérvár, see Appendix 1) observing the tasks of PC during the complete planning process of the project. The whole analysis is divided into seven steps. These are the followings:

- Determination of the project-aims
- Unique development of the project
- Feasibility study and analysis
- Financial analysis
- Economic analysis
- Multi-criteria analysis
- Sensitivity and risk analysis [5]

a) Determination of the project-aims

The definition of the aims of the project and the study is significant for the identification of the project. In this step we have to answer the following questions:

- Is it a new track, a new line? What is its length in km?
- Which part of the current railway network will be renewed? What is its length in km?

- Is the track a part of the Trans-European Network (TEN-T)?
- What kind of work will be realized: only maintenance, or track correction, subgrade renovation, electrification, station recruiting or complete renewal?
- What will be the impact of the investment for the economy or for the society?
- etc.

The relevant aims might be:

- Build new, alternative routes
- Increase the traffic performance of a railway track or part of the network
- Modify the transport demand (increase the share of intermodal transport)
- Decrease transport operational costs
- Supplement of missing connections
- Improve the accessibility of a peripheral region, etc.

b) Unique development of the project

After delimiting the project the next step contains two actions: clear definition of the project and laying down the financial threshold according to the regulations of the EU (1260/1999/EC, 1164/94/EC, and 1267/1999/EC).

The first task has to determine functions of the infrastructure and designate the area, which is influenced by the project (local, regional, national or Trans-European). For instance in case of a new line or track it has to be determined which cities or towns are ensured with a new connection, how many logistic centres, industrial park or factories will be connected to the railway network and how much new demand (market or non-market) will be generated in the concerned area. All the previous elements mentioned are determined by national and EU-regulations.

The accepted values of the second action are recorded in case of different EU subventions in Table 1.

Table 1: Financial threshold of different EU subventions [5]

Fund	Threshold (million €)
ERDF	50
Cohesion Fund	10
ISPA	5

c) Feasibility study and analysis

Feasibility means not only technical feasibility, but also the steps of marketing, controlling, realization and environmental analysis. In the case of rail infrastructure the following tasks have to be performed:

- Analysis of the demand
- Technical features of the new infrastructure (traffic capacity, service levels, transport security etc.)
- Analysis of the options (alternative solutions)
- Estimation of investment and operational costs

- Calculation of rail access fee

At least three options or alternatives have to be examined during the analysis:

- The no change alternative: using and maintaining the current railway track
- Minimal change alternative: using the current railway track but with track corrections and complete renewal in some cases.
- Radical change alternative (project based on alternative principle): a new railway track

Renewal and extraordinary maintenance costs of the track belong to the financial investment costs; general maintenance cost and the cost connected to charge collecting belong to the operational costs.

d) Financial analysis

The goal of the financial analysis is to calculate the proper indices of return with the help of the cash-flow forecast. These are the following: internal rate of return (IRR or financial - FRR), FRR based on investment (FRR/C), equity (FRR/K), and the financial discount rate (FNPV).

The result of the financial analysis is resumed in two cash-flow tables:

1. Return of the investment (how the investment costs are to be covered by the net incomings)
2. The second contains the calculation of return of the invested capital, national contributions (local, regional, and central), credits (according to expiration dates), the operational costs and also the incomings. (see the tables in the Appendix 2)

During the financial planning the next nine components are to be considered:

- Time horizons
- Determination of total cost (total investment cost and total operational cost)
- Incomings generated only by the project
- Residuum value of the investment
- Correction by the inflation
- Certification of the financial sustainability
- Selection of the proper discount rate
- Determination of the substantial performance indicators
- Determination of the rate of the joint-financing

The time horizon is the maximal number of the years while the mid-term or perhaps the long term influences of the project are demonstrable and equal with the economic profitable life-span. The influences mentioned previously can be the economical growth of the area, the increasing demand (traffic) on the new line or settling of new industrial parks along the new track. In practice reference time horizons are used, which is in case of infrastructure projects about 20-30 years, for the railway sector 30 years.

There are incomings which are generated by the project. It means that the infrastructure manager (IM) and the operator is different. IM is in general the state, but the operator is a railway company (freight or passenger transport). IM pays to the investor

however this charging does not reflect the total cost in all cases so this generates a financial gap.

For instance obtaining debt, fixed assets – stations, power supplying devices, trackages - belong to the residuum value of the investment.

It is practical to consider daily costs and prices because of the rising of the price index instead of using fixed rates when the correction by the inflation is need.

The financial sustainability is realized if net values of the aggregated cash-flows are positive in every year.

Discount rate is calculated by the alternative cost of the capital. In the long-term period the reference-parameter is 6% based on real values. (See Table 2.)

The substantial performance indicators are the internal financial rate of return (FRR) and net present value (NPV). (See next chapter)

The rate of joint-financing indicates how much percentage of total cost can be covered by EU subventions (Regulations 1260/1999/EC, 1264/1999/EC, and 1267/1999/EC).

Table 2: Discount factors of 6% discount rate (n: number of years)

Years	1	2	3	4	5	6	7	8	9	10
(1+6%)-n	0.943396	0.889996	0.839619	0.792094	0.747258	0.704961	0.665057	0.627412	0.591898	0.558395
Years	11	12	13	14	15	16	17	18	19	20
(1+6%)-n	0.526788	0.496969	0.468839	0.442301	0.417265	0.393646	0.371364	0.350344	0.330513	0.311805
Years	21	22	23	24	25	26	27	28	29	30
(1+6%)-n	0.294155	0.277505	0.261797	0.246979	0.232999	0.21981	0.207368	0.19563	0.184557	0.17411

e) Economic analysis

The economic analysis measures impact of the project for the affluence of the area or region proceeded the financial analysis. Due to the limits of this paper this analysis is not explained here.

f) Multi-criteria analysis

This analysis takes into account several objectives at once. Due to the limits of this paper this analysis is not explained here either.

g) Sensitivity and risk analysis

The sensitivity analysis deals with the selection of critical variables and parameters which influence the calculated FRR and NPV. Those parameters are considered which cause 1% change in FRR or a 5% change in NPV if these parameter change 1% (positively or negatively).

First these variables have to be identified (see Table 3.), then an effect-examination is to be carried out (Table 4). After that the scenario-analysis gives three alternatives (basic, pessimistic and optimistic) on the basis of the selected critical indicators (See Appendix 3). These alternatives can for instance be examined for rail access fee.

Table 3 and 4 summarize on an example the analysis described previously. The risk analysis assigns plausibility and expected values for the variables. From that the plausibility distribution of FRR and NPV can be calculated.

Table 3: Identification of critical variables

Categories	**Examples for the variables**
Model parameters	Discount rate
Price changes	Inflation rate, increasing of real incomes, energy prices, changing rail access fee
Demand	Population, demographic growth, consumption, size of traffic volume, size of rail market segments
Investment costs	Time horizon, time period of project realization, transport costs, workforce costs per hour, distance from the iron and metal factories, costs of raw materials
Operational prices	Prices of the services, staff costs per hour, prices of electricity, diesel, gas and other fuels
Quantitative parameters of the operational costs	Specific energy consumption, specific service requisition, number of workforce
Incomings	Rail access fee, other service prices (shunting, entrainment)
Quantitative parameters of incomings	Amount of services, number of users (freight operators, passengers), market penetration, productivity

Table 4: Effect-examination of the critical variables

Categories and parameters		**Flexibility**		
		High	*Doubtful*	*Low*
Model parameters	discount rate		**X**	
Price changes	inflation rate	**X**		
	real incomes		**X**	
	energy prices			**X**
	changing of rail access fee			**X**
Demand	specific consumption	**X**		
	rate of demographic growth			**X**
	size of rail traffic	**X**		
Investment costs	transport costs	**X**		

INNOFINance, the decision support tool

To help the process of carrying out such infrastructure development a complementary tool for planning, INNOFINance has been developed. Using an immense amount of input information and data gained from any professional transport planning software (like EMME2, VISUM or TRANSURS etc.) it can calculate the financial and economic-social (pre)feasibility of large size transport investment projects and as such, it is a perfect decision support tool for railway infrastructure development.

a) Aims of the development

The programme was developed with the aim to control the fulfilment of the preliminary efficiency requirements during the whole project life, to continuously re-evaluate the project to handle the consequences of the changes in the operation, the financing of the projects and the changes in the macro economy. Apart from this, the programme was also to have the potentials to analyse the refinancing possibilities of the given project, to analyse the consequences of the uncertainty during the whole project life cycle, and it was also to be able to generate and handle a large number of sensitivity analysis project cases exploring the values or ranges of the input variables, where the efficiency indicators fulfil the preliminary requirements.

b) How it works

The financial model of INNOFINance can accept or import as input macroeconomic data, data relevant to the structure of the financing sources, income forecasts, data of capital expenditures and of operation expenditures. These cover the following:

- input data of the macro-economy:
  - inflation
  - forecasts for consumer price indexes (domestic CPI and the dominant foreign one)
  - forecasts for general production price indexes (domestic and foreign)
  - forecasts for production price indexes in specific industrial sectors
  - forecasts for exchange rates for the dominant currencies
  - taxes (local taxes, income tax, VAT, etc.)
  - devaluation rate of local currency
  - depreciation
  - interest rates
  - allowances
  - social security rate
- main features of the sources
  - own sources
  - other sources (subsidies, government support, etc.)
  - type of currencies
  - indicative debt terms and conditions (domestic, international)
  - drawdown schedules
  - repayment conditions
- revenue forecasts
  - identification of possible categories of revenue

  - traffic flows
  - indexes for revenues
- data set of capital expenditures
  - identification of the different categories of occurring capital expenditures
  - forecasts for construction costs (volumes, unit costs)
  - indexes for construction costs

One can choose from a wide variety of optimization goals like for instance the maximum use of the EU sources, minimum use of the public sources, the maximum improvement of the regional accessibility, the maximum development of the potential of the regional economy, etc.

Output is calculated as data sheets and comprises of the data of the cash-flow table, profit and loss account, tax calculations, use and expenses of the sources, table of financial indices (relevant to the project owner, the financing and the public institutions). Such financial, economic indicators are for example project IRR, ROE (Return on Equity), the minimum of the several types of debt service cover ratios, volume of the sovereign guarantee, financial positions of the participants (public, private companies, organisations),cash-flow deficiency guarantee commitment.

Net present value (NPV), that is

$$NPV = \sum_{t=n}^{t=m} (1+i)^{-t} H_{x,t} - \sum_{t=n}^{t=m} (1+i)^{-t} C_{x,t} = \sum_{t=n}^{t=m} (1+i)^{-t} (H_{x,t} - C_{x,t})$$

where
- n is the beginning year of project variation x
- m is the last year of the period investigated (the time horizon)
- t is the serial number of the years (n,…-3,-2,-1,0,1,2,3…m)
- i a factor functioning as a special interest rate
- $H_{x,t}$ expected net benefit of the project variation x in year t
- $C_{x,t}$ construction, maintenance and operational costs of project variation x in year t

and internal financial rate of return (FRR), that is the rate when the NPV = 0:

$$NPV = \sum C_t \sqrt{(1+FRR)^t} = 0$$

can also be calculated by the programme.

As financial-economical indicators are often not extensive enough, an MCA (multicriteria analysis) module is included which can receive and appraise the parameters, like the compliance of the financing structure and those parameters that are not or only hardly convertible into the cash flow (e.g. impact on the environment, land use, local development).

A wide range of sensitivity analysis is also included in the program in order to make it easier to analyse the risks related to the decision. “External” parameters like macroeconomic

indices (inflation, interest rates, production and consumer price indices, foreign exchange rates) and income components (e.g. volumes of traffic, tariffs, transportation fees, etc.), just as well as „internal" changes (the changes in the execution time schedule, the subcontractors implication, the energy consumption and also their price changes, application of more innovative technologies, realisation with changed technical contents, etc.) can all be taken into account.

The project versions can be varied by the different time schedule in the construction period, the technical realization versions, the financing structures and the tolling systems. The real project costs can be processed in the model and so the effects of the over- or underestimated costs and incomes can be corrected.

Planning a new financing structure is also possible in case of the need of a refinancing process regardless whether the refinancing is made necessary by planning mistakes (e.g. over- or underestimated costs or incomes), or a favourable financing position of the project (better financing possibilities due to the decrease of the risks) [3].

Calculating financial feasibility of railway infrastructure projects

A purely financial analysis of the complete renewal of the track section Budapest – Székesfehérvár has been carried out in this study. Appendix 2.1 contains the investment costs of each work for 5 years. The operational costs, benefits of the Hungarian incumbent railway company and subsidies at local, regional, national and EU level (Appendix 2.2 and 2.3) have also been calculated for 5 years. The table of the financial sustainability shows the cash-flows within the examined period. According to Figure 3, the diagram of Appendix 2.7 illustrates the return curve of the invested capital on the basis of cumulated cash-flow. On the diagram it can be seen that the turn round point, mentioned on page 40, is in the fourth year. Of course the return point is not in the examined period just as it is usual in case of huge infrastructure projects.

The goal of the analysis is to calculate the net present value and the internal financial rate of return for the investment and for the equity as well (Appendix 2.5 and 2.6). The values of FNPV and FRR have a negative value in each case but it is normal and it does not mean that it is not worth investing in the project because the return period for such kind of project is about 30 years. Due to the limits of this paper we do not explain the analysis of 30 years here.

Results of the calculation: relevant scenarios

Three scenarios were calculated and compared: a pessimistic, a basic and an optimistic one (see Appendix 3). In the first case a real investment project is not realized, only regular maintenance and some track corrections and the reparation of the track failures are carried out. The basic scenario represents the renewal of the line including over- and underground constructions. The optimistic alternative covers a real infrastructure development which means a whole renewal of the track, building and also landscaping. The results can be seen in the tables in the appendix. In spite of the negative values of FRR it is recommended to choose the third scenario, because the return period of the other two is over 30 years which is relevant for infrastructure projects. Also the return curve of the invested capital points that after four years the project will start to rise.

RESULTS AND CONCLUSIONS

European railway network has an increasing role within the whole transport network, although the huge sweep of road transport has worsened the situation of rail transport. Thus it is inevitable that the rail infrastructure has to be developed in a different way.

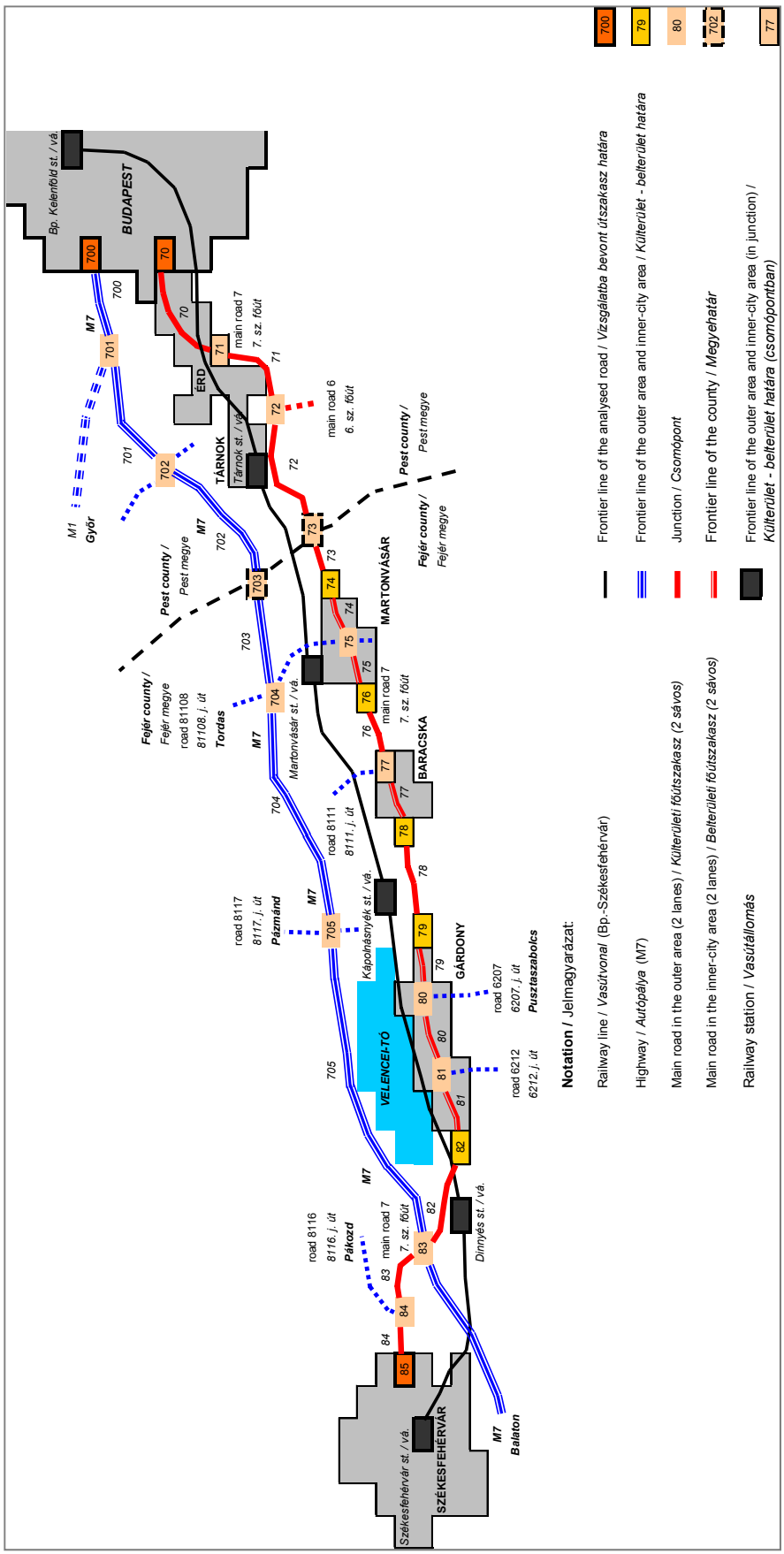
Nowadays project-controlling and project-management are successfully applied methods for managing development projects in the business world. This paper shows with the help of an example how it is possible to apply these methods for rail infrastructure developments: this example covers the line section Budapest-Székesfehérvár. All the steps of project planning and the tasks in each step were clearly defined. Due to the limits of this paper, out of the several analyses needed to control a project only the financial analysis has been explained here.

The financial analysis was calculated for 5 years considering all the costs, arising during the investment and all the planned operational costs and benefits including subsidies. This calculation is greatly supported by the INNOFINance software, developed by the Department of Transport Economics. The internal financial rate of return and the net present value of the project has been calculated with the program, these data provide a proper input for the comparison of the three alternatives.

As a conclusion it can be said that project-controlling and project-management can be suitably adapted for huge rail investment projects and the three examined scenarios of the financial analysis have shown that in the long-term it is worth investing into the total rebuilding of the track in spite of some corrections because complete renewal leads to a significant increase in freight transport in spite of the increasing access fees.

APPENDIX

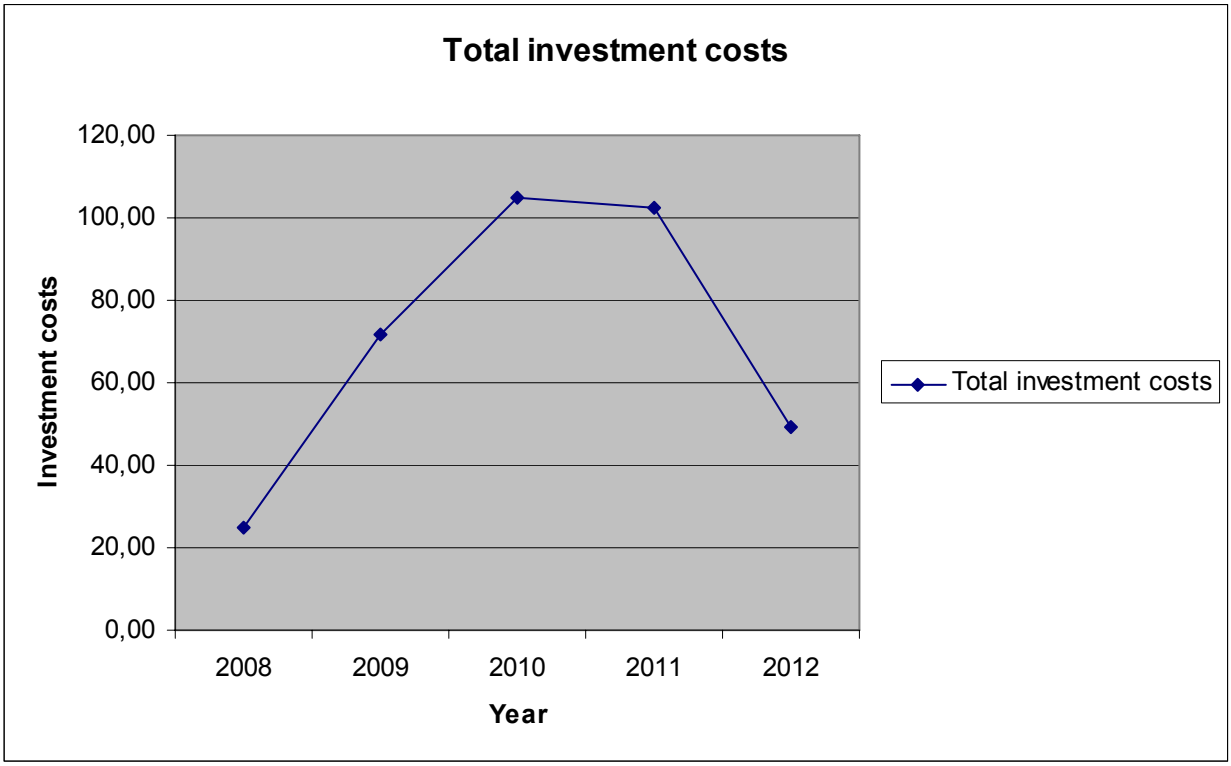
1 Network model of the line section Budapest – Székesfehérvár



2 Tables of the financial analysis

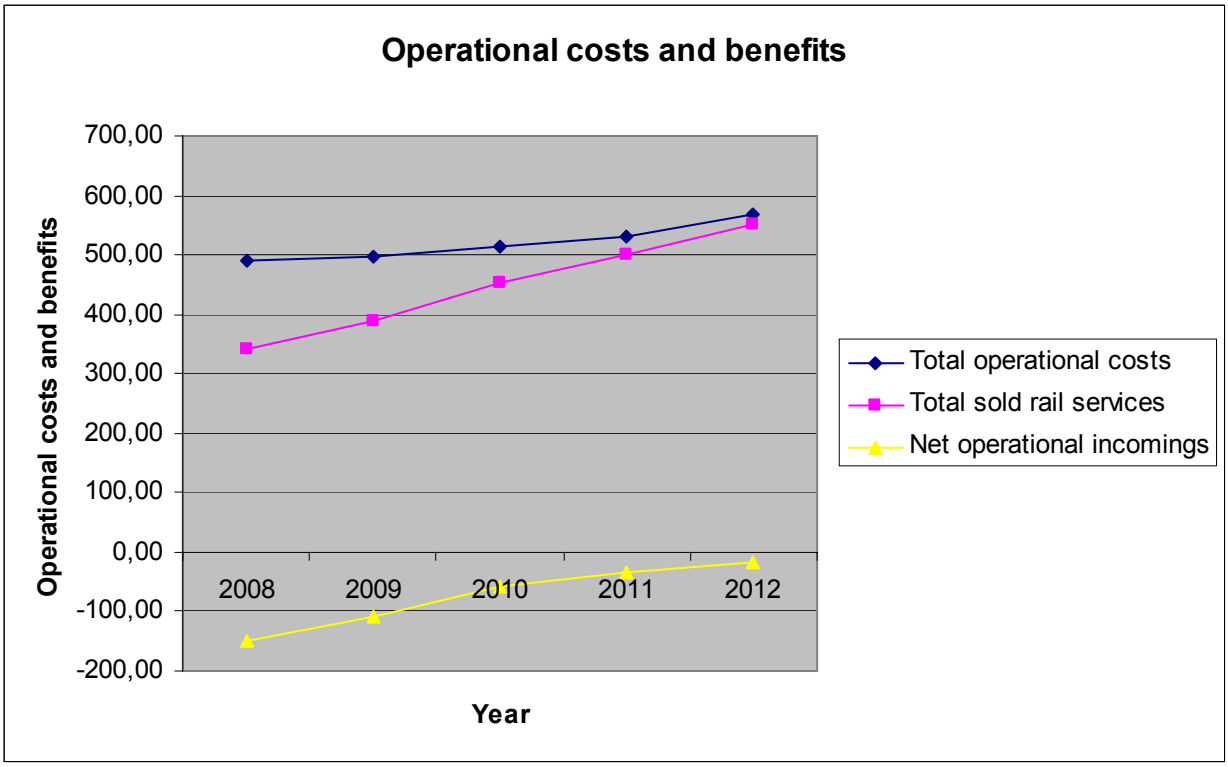
2.1 Investment costs (in million euros)

	Years					
	2008	**2009**	**2010**	**2011**	**2012**	**Total**
Land acquisition, preparations	1.99	0.00	0.00	0.00	0.00	**1.99**
Building track (including connections)	13.47	28.29	49.49	45.42	19.25	**155.92**
Road constructions	0.45	1.62	1.98	1.81	0.77	**6.63**
Overhead cable. energy supply	1.35	6.10	6.94	6.50	2.78	**23.67**
Safety equipment, telecommunication	1.07	11.77	14.68	19.56	13.59	**60.67**
Underground construction, structures	2.75	9.56	14.38	13.29	5.85	**45.83**
Overground construction (including facilities)	1.11	4.05	5.46	5.04	2.15	**17.81**
Utilities	1.61	5.81	5.98	5.40	2.27	**21.07**
Environment protection	0.36	1.59	2.73	2.62	1.14	**8.44**
Other (e.g. lab)	0.66	2.96	3.05	2.99	1.43	**11.09**
Total investment costs	**24.82**	**71.75**	**104.69**	**102.63**	**49.23**	**353.12**



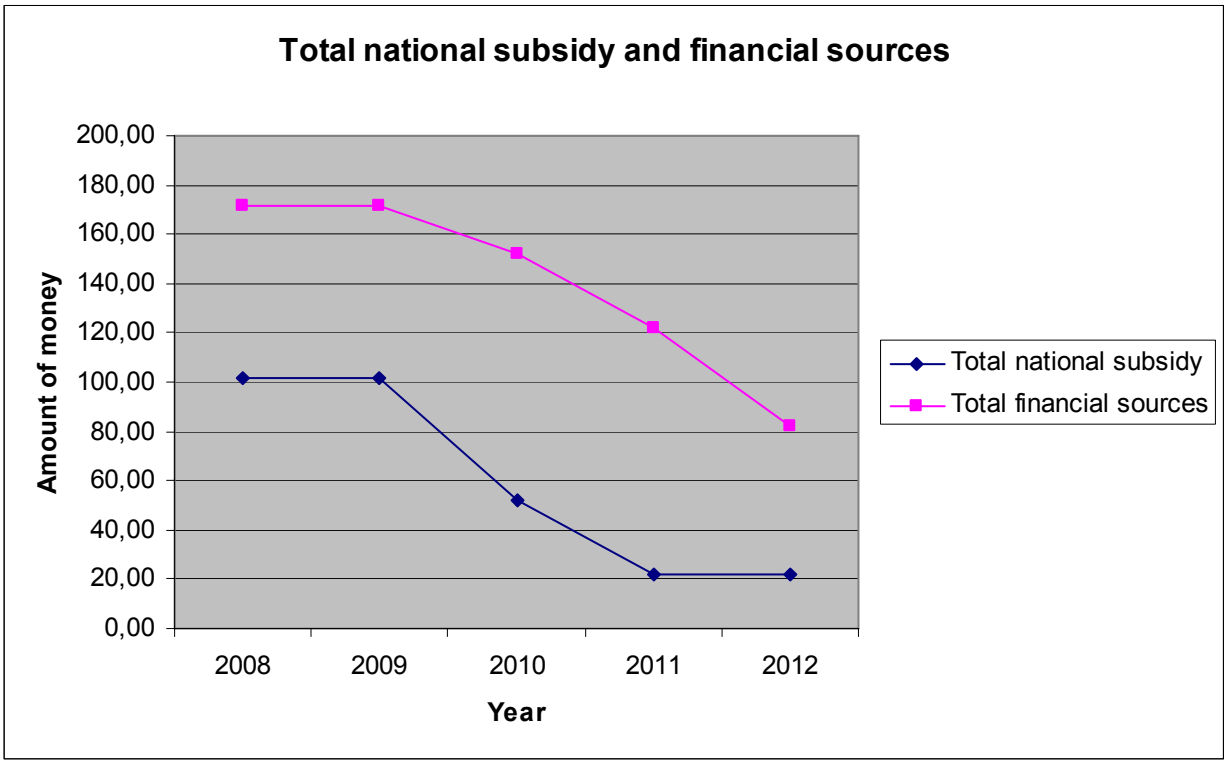
2.2 Operational costs and benefits (in million euros)

	Years					
	2008	**2009**	**2010**	**2011**	**2012**	**Total**
General cost of the company (controlling, administrative) 1a	87.52	87.96	89.64	91.20	96.81	**453.13**
General cost of the company 1b	44.10	46.10	48.23	54.29	61.14	**253.86**
General cost of the company 1c	4.66	4.91	4.94	5.70	6.10	**26.31**
General cost of the company 1d	0.80	0.84	0.85	1.14	1.62	**5.25**
Cost charged for service groups	2.77	2.64	2.72	3.84	4.78	**16.75**
Cost charged for services together	195.65	198.20	204.56	208.24	218.16	**1 024.81**
Direct costs of IM	129.94	129.24	135.41	139.48	142.58	**676.65**
Direct costs of traction and shunting	24.44	26.10	27.64	28.45	37.18	**143.81**
Total operational costs	489.88	495.99	513.99	532.34	568.37	**2 600.57**
Basic services (rail track access)	194.60	196.70	216.80	234.10	247.58	**1 089.78**
Access for the infrastructural facilities (stations)	101.38	128.20	167.30	189.64	204.10	**790.62**
Complementary services (shunting)	42.75	62.10	68.14	73.11	95.31	**341.41**
Extra services (coach examination etc.)	1.68	1.74	2.17	2.89	3.79	**12.27**
Total sold rail services	340.41	388.74	454.41	499.74	550.78	**2 234.08**
Net operational incomings	**-149.47**	**-107.25**	**-59.58**	**-32.60**	**-17.59**	**-366.49**



2.3 Financial sources (in million euros)

	Years					
	2008	**2009**	**2010**	**2011**	**2012**	**Total**
Local subsidy	0.00	0.00	0.20	0.20	0.20	**0.60**
Regional subsidy	1.50	1.50	1.80	1.80	1.80	**8.40**
State subsidy	100.00	100.00	50.00	20.00	20.00	**290.00**
Total national subsidy	101.50	101.50	52.00	22.00	22.00	**299.00**
EU subvention	50.00	50.00	100.00	100.00	60.00	**360.00**
Stocks, bonds and other financial sources	0.00	0.00	0.00	0.00	0.00	**0.00**
EIB credits	20.00	20.00	0.00	0.00	0.00	**40.00**
Other credits	0.00	0.00	0.00	0.00	0.00	**0.00**
Total financial sources	**171.50**	**171.50**	**152.00**	**122.00**	**82.00**	**699.00**



2.4 Financial sustainability (in million euros)

	Years					
	2008	**2009**	**2010**	**2011**	**2012**	**Total**
Total financial sources	171.50	171.50	152.00	122.00	82.00	**699.00**
Total rail services sold	340.41	388.74	454.41	499.74	550.78	**2 234.08**
Total incoming cash-flow	511.91	560.24	606.41	621.74	632.78	**2 933.08**
Total operational costs	489.88	495.99	513.99	532.34	568.37	**2 600.57**
Total investment costs	24.82	71.75	104.69	102.63	49.23	**353.12**
Total outcoming cash-flow	514.70	567.74	618.68	634.97	617.60	**2 953.69**
Total cash-flow	-2.79	-7.50	-12.27	-13.23	15.18	**-20.61**
Cumulated cash-flow	**-2.79**	**-10.29**	**-22.56**	**-35.79**	**-20.61**	**-20.61**

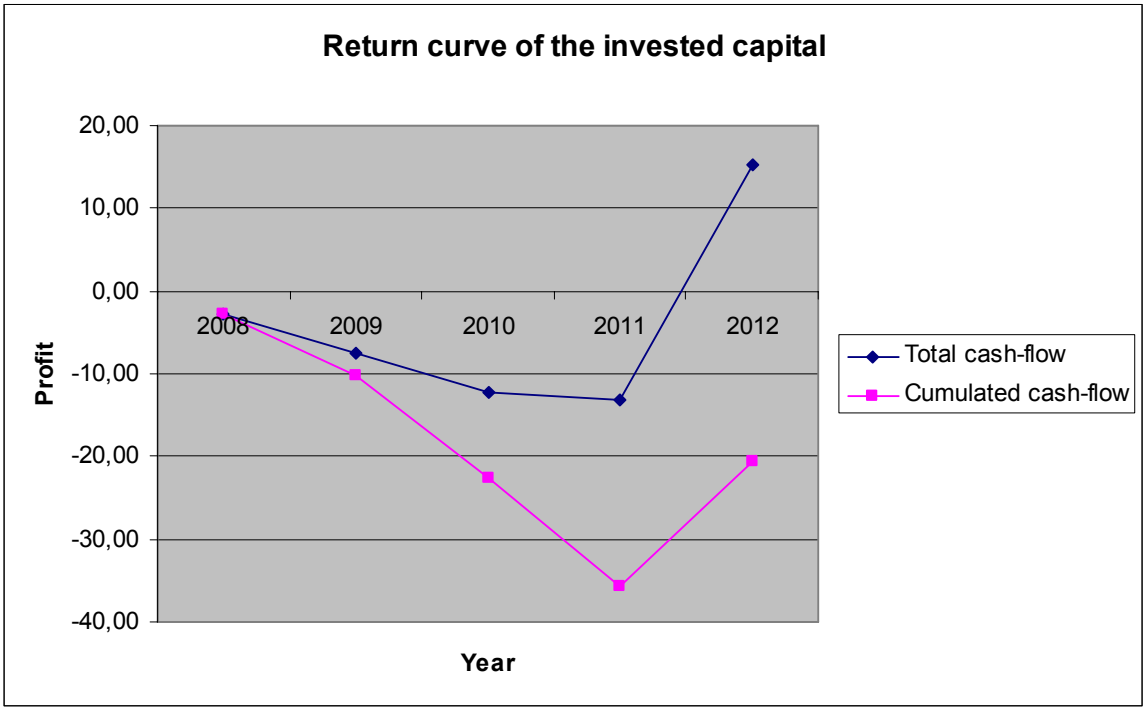
2.5 Calculation of the internal financial rate of return and net present value of the project (in million euros)

	Years					
	2008	**2009**	**2010**	**2011**	**2012**	**Total**
Total rail services sold	340.41	388.74	454.41	499.74	550.78	2 234.08
Total incomings	340.41	388.74	454.41	499.74	550.78	2 234.08
Total operational costs	489.88	495.99	513.99	532.34	568.37	2 600.57
Total invesment costs	24.82	71.75	104.69	102.63	49.23	353.12
Total outcomings	514.70	567.74	618.68	634.97	617.60	2 953.69
Net cash-flow	-174.29	-179.00	-164.27	-135.23	-66.82	-719.61
Internal financial rate of return (FRR/C)	-16.24 %					
Net present value (FNPV/C)	-618.70					

2.6 Calculation of the internal financial rate of return and net present value of the equity (in million euros)

	Years					
	2008	**2009**	**2010**	**2011**	**2012**	**Total**
Total sold rail services	340.41	388.74	454,41	499,74	550,78	2 234,08
Total incomings	340.41	388.74	454,41	499,74	550,78	2 234,08
Total operational costs	489.88	495.99	513,99	532,34	568,37	4 468,16
Total national subsidy	101.50	101.50	52,00	22,00	22,00	299,00
Total outcomings	591.38	597.49	565,99	554,34	590,37	2 899,57
Net cash-flow	-250.97	-208.75	-111,58	-54,60	-39,59	-665,49
Internal financial rate of return (FRR/K)	-12.79 %					
Net present value (FNPV/K)	-589.07					

2.7 Return curve of the invested capital



3 Comparison of the relevant scenarios

		Scenario		
		Pessimistic	Basic	Optimistic
Total investment costs	million euro	71	246	354
Traffic	million goods-tonkm/day	0.64	0.72	1.28
Access fee	euro/unit	24.6	28.42	35.6
FRR/C	%	-44.1	-23.6	-16.24
FRR/K	%	-39.7	-20.4	-12.79

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THE POLICY OF RAILWAY TRANSPORT DEVELOPMENT IN POLAND

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ABSTRACT

The current situation of railway transport in Poland has been shaped by political and economic changes which took place after the year 1989. Until this time all issues related to railway transport were carried out by the "Polish State Railways" State Enterprise (PKP). The PKP was responsible, among others, for infrastructure management, passenger and freight transport. As the enterprise was loss-making, the responsible authorities decided to reduce the liabilities and restructure the whole enterprise. The second factor influencing the decision on taking up the restructuring works was Poland's preparations to the accession to the European Union. In case of Poland's accession it was necessary to adapt Polish railway transport system to the requirements of the Community.

The actions taken at that time were, among others, following: organizational and legal restructuring, restructuring of assets and finances as well as reduction of employment. The "Polish State Railways" State Enterprise was commercialized on the basis of the Act from the year 2000. Activities covering management of infrastructure and operating activities were divided by separating from the enterprise following companies: company responsible for infrastructure and railway undertakings. Activities related to reduction of liabilities and restructuring of established at that time company (called "PKP Group") are still continuing, regardless of many repair plans and programs.

The current railway transport policy is mainly focused on further restructuring of PKP Group and on restoration of proper role of railway transport in Poland.

Unsatisfying condition of railway infrastructure which is a result of insufficient financing, speed limits which do not allow operators to provide services in accordance with customers' expectations and reduction of railway lines length is still the essential problem of railway transport in Poland.

In all documents defining polish railway transport policy it is underlined that development and modernization of infrastructure, implementation of modern railway traffic management systems and safety systems will bring growth of railway transport role. In order to increase the share of railway transports in total carriages it is necessary to modernize or purchase new rolling stock which allows ensuring the high level of provided services. In the freight transport system the intermodal transport should be developed, the strategy of logistics services through the cooperation with different modes of transport in a single logistics chain should be implemented. It is also necessary to introduce the IT systems allowing tracking and tracing of consignments and wagons. In the field of passenger transport it is necessary to adjust the railway timetable to passengers' needs, ensure the reliability of carriages and comfort of travelling.

INTRODUCTION

The railway transport system in Poland after the Second World War has been shaped by the influence of political and economic relations, transport mode preferences in the transport development process and the transport development policy.

As the exchange of the majority of goods existed within the COMECON countries, the structure of demand for transport was characterized by the dominance of bulk cargo and long

average transport distances. That is the reason why the railway transport has been developing very intensively.

The subject of PKP activity has been defined in the year 1989, on the basis of the new Act on state-owned enterprise “Polish State Railways”. The activity of company defined in the Act comprised providing services of passenger and freight transport, construction, reconstruction and maintenance of railways as well as keeping international forwarding. The General Director of PKP had a managing and representing function.

In the following years the structure of PKP has been changing. Restructuring of PKP started after the collapse of communism in Poland.

RESTRUCTURING OF “POLISH STATE RAILWAYS” UNTIL THE YEAR 2003

Legal actions

In the year 1991, after the first free elections in Poland, as a result of economy reform, there was the system transformation from the command and distributive system to the free market economy. It related to all economic fields, including transport.

The Council’s Directive of 29 July 1991 on the development of the Community's railways required, among others, separating railway infrastructure from the transportation activity, independence of the two subjects from the State, equal and undiscriminating access to the infrastructure [2]. In 1991 in connection with assimilation activities, the process of restructuring of the Polish State Railways PKP company began.

Up to that time the PKP used to be a highly centralized organization, unadapted to operate in the conditions of the free market economy and competition. The restructuring progressed in stages.

In the year 1995, the Seym (parliament) of the Republic of Poland passed a bill on amendments to the law on transport and law on the state company “Polish State Railways” in order to initiate the adaptation process of the PKP functioning to the European Union’s Directives and Regulations, establishing the PKP as the public transport enterprise that operates according to the rules of the market economy.

In the years 1996-1999 the second stage of the PKP restructuring took place. The enterprise was divided into four sectors of essential activity:

- railway infrastructure,
- passenger transportation,
- freight transportation,
- traction and maintenance services.

The next stage of restructuring began in the year 1999 and finished in 2003. During that time the Law on state enterprise “Polish State Railways” was replaced by the Law, September the 8th, 2000 on commercialization, restructuring and privatization of the “Polish State Railways” Enterprise [6]. It assumed transformation of the state-owned enterprise PKP into a joint stock company, in which the State Treasure held all stocks.

Restructuring included activities which were to change the structure of the enterprise, and they resulted in establishing the main company PKP S.A. and other transportation companies: the major company managing particular railway lines, and other companies.

Commercialization, legal and organizational restructuring

The establishment of PKP S.A. was a result of the commercialization activities in the year 2001. The company has a dominant role in the PKP Group. Among its substantial tasks are: executing of restructuring processes, managing of superfluous assets, managing of financial turnover of PKP Group companies, coordination of activities regarding to development of the PKP Group companies, preparing privatization projects for the PKP Group companies and implementation of quality management system according to the ISO standards [4].

In this way the established structure separated the transportation activity from the infrastructure management in respect with European Union Directives. Nevertheless, the infrastructure management was still held by the PKP, because the PKP PLK as the infrastructure manager still belonged to the PKP Group.

Restructuring of finances, assets and employment

In the year 1999 liabilities of the PKP amounted to 6 billion 312.3 million PLN and the next year - over 7 billion PLN.

In the years 2001-2002 actions were taken in order to replace the required obligations with the long-term obligations. The process of restructuring of the public obligations started. Shares of 1 billion PLN value were emitted for repayment of public obligations and to pay premium to the PKP PR. All commercial credits were repaid, repayment of investment credits taken by the state enterprise PKP was continued.

As a result of restructuring of the PKP assets the legal status of almost 40 % land area of the PKP was settled. A part of the properties was sold or the rights of property were transferred to the State Treasury or the local administration of communities [3].

In the years 2000-2003 the number of employees was reduced to about 37.7 thousand people. The majority of them were made redundant on severance pay rules defined by the Law on commercialization. A part of them granted railway leaves and 5800 people were granted pre-retirement benefits.

Trade Unions of PKP

Trade unions had a considerable role in the restructuring process of the PKP. In the years 1990 – 2003 many strikes took place, in which employees claimed restructuring of the PKP, pay rises, improvement of working conditions, improvement of social conditions, protection of employment positions, they protested against the scope and restructuring methods of employment, as well as the range of group dismissals.

RAILWAY TRANSPORT DEVELOPMENT POLICY AFTER 2003

Legislation

According to the planned Polish accession to the European Union and the implicated gradual opening of the Polish railway market for railway undertakings from other countries of the EU, it was necessary to adjust the Polish railway market. Beside liberalization of the railway market the substantial factor which caused urgent demand of further restructuring was introduction of regulations on public services and public finances reform, resulting in financing of regional passenger transport services by voivodeships.

In the year 2003 the new Railway Transport Act was passed [12], which defines such issues as the rules of access to the railway infrastructure, financing of regional transport services, the principles of railway infrastructure investments, the railway safety and the rules of the newly established administration unit – The President of the Office for Railway Transport.

The Office for Railway Transport (Urząd Transportu Kolejowego – UTK) was transformed from Main Railway Inspectorate on the basis of the above mentioned Law in the year 2003 and has been an independent body since then. The UTK is managed by the President, who is a national administrative body, responsible for railway transport regulation, railway transport licensing, technical supervision over the exploitation and maintenance of railway lines and railway vehicles, as well as railway traffic safety.

PKP - Further restructuring

In the year 2003 "The program of Further Restructuring and Privatization of the PKP Group Companies until the year 2006" [17] was adopted by the Council of Ministers. The program assumed continuation of restructuring in the scope of finance and assets organizing, as well as employment. It was predicted that most of actions would have been accomplished by 2006, thus according to the end of the progressive period for the railway, the rest of them will be continued in the scope of the Program. The main goal of restructuring was increasing of economic effectiveness of the PKP Group by simplification of the organizational structures and removing errors by the assumptions of the PKP State Enterprise reform from the year 2007 [13] .

In the Program provisions the scope of responsibility was divided into respective fields. Thus the State was to take over financing and responsibility for infrastructure development in the scope designated by legal regulations, the PKP PLK company was responsible for maintenance and exploitation of infrastructure and construction of railway lines, and in the responsibility field of UTK was the regulation of the Polish railway market.

A very important resolution of the mentioned program was adaptation of the service volume to the market demand and providing services by freight railway companies from PKP Group on commercial rules.

The second issue in this period was the reform of the PKP Regional Services, as the most unprofitable company in the PKP Group. The regionalization of organization and financing regional passenger services were assumed, vesting of property to municipalities, transferring the passenger transports between voivodeships to the PKP Intercity, the takeover of some local or regional railway lines by local governments. The latter ones were to decide about the volume and structure of ordered regional passenger transports and they were to establish companies for specific purposes.

In the year 2005 National Railway Fund [1] was established in the National Economy Bank (BGK). The task of the National Railway Fund was to gather financial resources for preparation and implementation of construction as well as modernization of railway lines, repairs and maintenance of railway lines, along with disposing of unnecessary lines. The funds would derive, e.g. from the income of the fuel charge, the interest of the percentage on the Fund's resources, revenues from shares in companies, transferred to the Minister of Transport by the State Treasury in order to add resources to the Fund, income from sales of shares, resources from credits or loans incurred by the National Economy Bank for the benefit of the Fund, income from bonds issued by the National Economy Bank for the benefit

of the Fund, investment of the Fund's resources in participation units of the money market funds and donations.

Other railway companies

The planned liberalization of the railway market caused the entrance of competition for the biggest freight carrier, as was the PKP Cargo S.A. This company until that time, beside the PKP LHS, which provided transportation services on wide gauge railway line, was only one freight carrier in Poland.

In the year 2003 UTK licensed 15 railway undertakings, which allowed for freight transport and provided access to traction vehicles. Yearly, the number of licenses increased. The UTK also admitted a licence for performing passenger transport. In the year 2008 there were 96 companies with licenses for railway transport [14].

DOCUMENTS DESCRIBING CURRENT RAILWAY TRANSPORT POLICY

Fundamental goals of current Polish railway transport policy are convergent with goals defined in the European Union's White Paper that are based on a sustainable development idea.

The current railway transport policy is mainly determined by two elements. The first one is the adjustment of this branch of transport to the one functioning on the European market and the second one is bad financial condition of the PKP Group Companies resulting in the poor condition of the railway infrastructure (PKP PLK) and low quality of provided transport services (passenger – PKP Regional Services and freight – PKP Cargo).

In order to improve the situation of railway transport in Poland documents have been prepared which present ways of solving the problems of the railway sector.

National Development Strategy [15]

The main document determining general frameworks of support for the benefit of different fields of economy, also railway transport, is the National Development Strategy (SRK), prepared in 2006 by the Ministry of Regional Development. The SRK assumed introduction of the market elements with taking into consideration security of social interest by the State in services, among others transport services.

It is provided for supporting the construction of the fast railway transport system integrating the Polish metropolises. Investments in the railway infrastructure will be directed firstly on disposal of bottlenecks on lines with large traffic intensity, i.e. between larger agglomerations and on reconstruction and modernization.

Heavy traffic, dangerous for people and environment, will be transferred from roads to railway. Investments in intermodal transport infrastructure will be supported, i.e. in construction and modernization of generally accessible logistic centres, container terminals on railway lines, in ports as well as the implementation of information systems enabling to monitor loads and logistic centres service.

National Strategic Reference Framework [16]

Since one of the factors which contributed to the reform process of the Polish railway transport was planned accession to the European Union a possibility of acquisition of financial resources for development and the railway maintenance from the European Union funds is relevant in the railway transportation policy.

The goals and priorities defined by the National Development Strategy are the basis for the National Strategic Reference Frameworks − the program describing the directions of support by financial resources available in the European Union budget: European Regional Development Fund, European Social Found and Cohesion Found.

In the framework of the Infrastructure and Environment Operational Program 12 basic projects and 7 reserve projects [4] have been filed.

The National Transport Policy [9]

The National Transport Policy is a document prepared in 2005 by the Ministry of Infrastructure and it defines main directions of development of all transport branches.

In the scope of railway transport the Policy highlights all activities regarding the improvement of provided services and the simultaneous increase of effectiveness.

The priorities of the Policy are following:

- Modernization of railways by extension of the scope of competition between railway operators (passenger and freight) in order to adapt this subsystem to the market needs and to preserve the role in transport service, with simultaneous improvement of effectiveness.
- Radical improvement of infrastructure conditions by cutting the access costs to the infrastructure.
- Intermodal systems development through the specification of forms of the State aid and introduction of legal and tax incentives as well as security.

The Policy describes necessary actions to be taken in the scope of infrastructure, passenger and freight transport as well as safety.

The other tasks are: infrastructure adaption to the development of interregional passenger transport with respect to more efficient railway connections between main cities in Poland, adjusting radiate lines departing from the capital city to the speed of 160-200 km/h, increasing the attractiveness and competition of regional and agglomeration transports as well as the development of international transports by the modernization of border railway lines sections.

In the scope of passenger transport, the Policy emphasizes improvement of the service quality of this transport segment by clear attribution of public tasks in particular means of transport to the range of competence and responsibility of central government and authorities of local governments. It is also important to conduct passenger railway market liberalization, further reform of regional passenger transport services, and especially the completion process of takeover the role of organizing passenger railway transports by voivodeships. It also planned to create conditions for the introduction of new railway operators to the market, the implementation of regulated competition[33], supporting the integration of railway system with other transport systems (e.g. Park & Ride systems) as well as supporting of railway transport development.

On the other hand, in the scope of the freight transport it is necessary to conduct an active international policy which would create favourable conditions for international carriages, and gradual liberalization of the freight market according to EU Directives.

[33] By multi annual contracts between voivodeships and operators.

A very important issue is to transform the capital group created around the PKP Cargo into a transport operator capable of achieving the position of one of the leaders on the national railway market and on the chosen European market segments due to the focus on the basic transport-logistic activity, the removal of redundant resources responsibility and creation of conditions for considerable reduction of the costs as well as privatization of the PKP Cargo Group and other companies after the increase of their market value.

As regards the safety improvement actions of modernizing of the infrastructure and the introduction of the modern railway management system will be taken. The regulations of the Directive 2004/49/WE will be introduced into Polish law, as well as actions will be taken by the infrastructure manager and railway operators in order to improve personal safety, both on railway stations and railway halts during the travel.

Railway Transport Strategy

The primary goal of the Polish railway strategy [13] is restoration of an appropriate role of railways in international and national transport. The document presents solutions which refer to particular elements of Polish railway transport system.

The Strategy highlights the essence of the balanced development and integration of respective sectors of economy in the field of railway transport along with the national ecological policy.

The Strategy is a plan for fulfilment of three basic goals:

1. Increase of management effectiveness in the railway sector.
2. Enhancing regular quality improvement of service for railway transport users.
3. Effectiveness of human resources management and optimization of employment.

As far as the PKP PLK is concerned it is planned that after the process of assets allocation the PKP PLK will belong only to the State Treasury, and the Company will not be an entity profit oriented to the profit maximization. The PLK will be responsible for such tasks as the maintenance of railway infrastructure in proper condition and safety, providing access to railway lines in case of pursuits, management of the railway traffic and offering additional services related to providing access to the infrastructure and railway traffic on lines as well as management of investment processes for the railway network.

It will also be considered to transfer investment processes into a separate organizational structure, and to enable the control of vehicle technical parameters of the rolling stock by its relocation done by their controllers.

In the framework of the railway investments a construction of fast railway system [11] is planned, with the considerable technical speed of maximum 300 km/h.

In the subject of railway operators it is suggested that the PKP Cargo will take the role of the national freight carrier, which is connected with the significant share of the State in the company's capital, with significant share in railway transport market as well as the participation of the State policy in the railway transport market.

The PKP Intercity is designated as a highly specialized operator, realizing fast domestic and international transports. The company is intended to be independent and market oriented. Both the PKP Cargo and the PKP Intercity are planned to be privatized.

International passenger transport and passenger transport between voivodeships which are public services in character, and unprofitable international transport connections will be still financed by the State budget.

As regards to passenger transport organization a coordination of railway schedule is planned to ensure efficient switches at railway stations for passengers.

The Master Plan for Railway Transport in Poland

The Master Plan [7] determines the expected future until 2030 of Polish railway transport. It is a strategic logistic document, which will be updated every two years. It contains comprehensive development plans of infrastructure, passenger and freight transport with consideration of three different options of execution.

The most indispensable task which should be performed in the next 2-3 years is realization of projects with a large range of influence, ensuring the greatest benefits in relation to costs, and their fast achievement.

a) Infrastructure

The condition and quality of Polish railway infrastructure both point and linear ones is insufficient, which causes the hamper of the whole railway sector development. The railway network in Poland consists of trunk lines, primary lines, secondary lines and local lines. The point infrastructure refers mainly to stations.

The Master Plan expects the following linear infrastructure:

- Reconstruction investments in significant lines. They will refer to the rail surface reconstruction which generally will be conducted as main repairs or running repairs.
- Modernization of the existing infrastructure among which are the railway lines of trans-European transport network TEN-T, i.e. rebuilding of railway junctions, especially with “bottlenecks”, development of railway layouts, building of new steering and traffic management systems.
- Construction of new “high quality” railway infrastructure – new railway sections of high speed lines between the greatest agglomerations in Poland. Reconstruction of line sections in order to compensate for the lack of lines in the railway network, construction of connections between airports and corresponding cities.

The list of investments and proposed schedule are presented in Annex 1.

With fulfilment mentioned of the above mentioned resolutions, the target railway network will have been reconstructed and restructured by 2030. The most occupied lines[34] will be adjusted to the speed of 250-300 km/h (high speed lines), accomplished by lines between agglomerations with the 200 km/h speed. The lines between agglomerations with lesser traffic intensity will be modernized up to the speed of 160 km/h. The remaining lines will be adjusted to the speed of 120 km/h or in case of smaller places to the scheduled speed which is equal with the construction speed. In case of regional lines it will be 100 km/h, 80 km/h and 60 km/h in highlands.

Since nowadays the freight transport is often realised on lines common for passenger and freight transports, it is expected to dedicate special lines, meaning their division into freight and passenger transport lines. Specialization will involve lines being a part of the TEN-T network and lines of importance for economy outside the TENT-T network.

The Master Plan also assumes electrification of several railway sections, in particular the line E75 to the border with Lithuania.

[34] Connected Warsaw with other agglomerations (Wroclaw/Poznan – Lodz – Warsaw).

Investments in the point infrastructure will include:

- Railway stations and train halts. Small and medium stations will be part of the modernization described above, whereas the largest stations will be reconstructed and developed in order to meet the integrating functions between the railway transport and other branches of transport along with the function of shopping malls.
- Investment in intermodal terminal construction. By the year 2020 there will have been 30 terminals, and, after this time, they will be modernized and developed.

Due to inappropriate steering systems and railway traffic management as compared to the present standard it is planned to invest in these systems in order to ensure high automation by the simultaneous reduction of the costs associated with it.

Telematic and satellite systems will be also used. They will allow for the optimization and transport processes control as well as information systems for passengers in railway vehicles and at the stations. It is also planned[35] to conduct the application of the European Rail Traffic Management System (ERTMS), consisting of the subsystems: the ETCS-European system Traffic Control and the GSM-R-system radio transmission.

b) Passenger transport

The system of passenger traffic in Poland is divided into four subsystems[36] :

- Between agglomerations, where traffic is carried out between big agglomerations
- Interregional – traffic between regions
- Agglomeration/urban - in a single agglomeration
- Regional – within one region.

By the year 2030, in the most optimistic option i.e. completion of all the investment tasks presented above, the increased number of passengers by about 88% is expected in relation to passengers travelling by railways in 2005, whereas the transport operations will have increase by about 220% and the largest increase will concern fast trains (pospieszny) and agglomeration/urban traffic – the number will almost double. The expected total revenue of fast passenger transport will have reached 5.3 billion passenger kilometres/year. There will be passengers' flows switching from road transport, air transport and newly generated.

The current requirements of passenger railway transport focus on travel comfort, time of the journey, safety and reliability.

Passenger preferences of transport between agglomerations indicate the importance of direct connection, time of journey as well as comfort. For passengers who use regional transport, the most important is stability of transport services. An important element is also the price for a ticket. For people who use agglomeration railway transport punctuality, frequency and directness of connections are highly important.

It is expected that urban railway transports and intercity railway transport will undergo the greatest development.

[35] The works are already in progress. [8]
[36] According to the authors of Master Plan. International passenger transport segment also exists.

c) Freight transport

The most prospective elements of the rail freight services according to the Master Plan are:

- whole train carriages for bulk cargoes like coal, aggregates, ore, petroleum products and not whole ones,
- intermodal transport - of highly processed goods,
- transcontinental transport on large distances Europe - Asia,
- single wagon loads transports[37].

The volume of rail freight transport is determined primarily by the demand resulting from the development of the economy and by the level of access charges to infrastructure. In connection with the opening of rail freight market on 1 January 2007, competition appeared in the form of private undertakings.

In order to ensure a balanced interactive development of rail freight services, railway operators should begin cooperation with other branches of transport, particularly with road transport operators and cargo operators in seaports, allowing to provide "door to door" services and to achieve synergy out of the cooperation.

It is also necessary to:

- continue further development of the intermodal transport segment by ensuring that indispensable rolling stock carry out this type of services,
- introduce changes to the systems of management of railway transport processes by implementing the ERTMS and the TAF TSI for cargo carriers.

CONCLUSIONS

Polish rail transport policy after 1989, i.e. after the change of the political system, mainly focused on the adaptation of Polish rail transport to the model of the European Union and the restructuring the unprofitable State Enterprise PKP, which was responsible for the Polish railway transport in the scope of passenger and freight traffic as well as in the fields of management and maintenance of infrastructure. The restructuring changes were carried out inconsequently, each government had another concept in this theme.

A partial success of that restructuring is separation of the infrastructure from the transport activity. It is partial, because the infrastructure manager is still a company belonging to the PKP Group, which arouses comments that its activities are not objective for the issue of ensuring non-discriminatory access to the infrastructure for the other transport operators.

According to the latest report [5] of the Supreme Chamber of Control the PKP Cargo as a national freight operator, in the course of restructuring, received properties which it should not have possessed: tracks, loading places and ramps and it limited the access to them for other transport operators.

Regional, agglomeration and some interregional passenger transport companies are currently managed by local governments as a result of acquisition of shares in the company PKP Regional Services. This acquisition resulted in new, cheap railway connections between large voivodeships cities and in the introduction of competition in this segment of Polish

[37] The Authors of The Master Plan does not expecting the development of this system.

railway passenger market. This is a very good trend as it influences improvement of service quality by operators.

Railway connections between agglomerations and other regional ones are provided by a company belonging to the PKP Group – the PKP Intercity. This company is intended to undergo privatization in 2010.

The freight railway market is still dominated by the national operator – the PKP Cargo. However, the share of new private operator is growing continually. An important issue here is to develop an interactive competition between different branches of transport, not only internal, as it is now. The introduction of railway transports in a planned logistic chain will have a significant impact on the competition offer. It will ensure the possibility of "door to door" and "just in time" goods delivery. The introduction of the IT system will play a distinctive role which will allow to monitor consignments and wagons.

An remarkable barrier to develop railways in Poland is still the remaining overgrowth of employment in companies formed from the enterprise Polish State Railways as well as mentality of employees who are afraid of a job loss or change of their occupation.

If the resolutions and the solutions included in the strategy documents are implemented, the rail system in Poland will be adjusted to the European level.

ANNEX 1

The list of investments and schedule (according to The Master Plan for Railway Transport until the year 2030)

Construction of new lines		
2007-2013	**2014-2020**	**2021-2030**
Railway connection to International Airport Okecie – new section Warszawa Służewiec –Okecie Airport	High speed lines Wroclaw/Poznan – Lodz	Construction of line Podleze – Piekielko
Railway connection Katowice - International Airport Katowice – in Pyrzowice – new line (on the section Chorzow Stary – „Katowice" Airport	New connection between CMK[38] and Cracow on the section Kozlow – Cracow Batowice.	
Construction of new sections of Metropolitan Railway in Tri-City and sections modernizations	Section Słomianka – Opoczno Poludnie between line no 25 Lodz Kaliska – Debica and CMK ensuring connection of two high speed lines: Wroclaw/Poznan – Lodz – Warsaw and modernized CMK	

[38] Central Railway Main Line

Construction of junction Pomorsko – Przylep between lines no 358 Zbaszynek – Gubin and no 273 Wroclaw – Szczecin,	Section Łąg Poludnie – Łąg Wschod between lines no 201 Nowa Wies Wielka – Gdynia Port and no 203 Tczew – Kostrzyn and being an element of freight transports route Inowrocław - Bydgoszcz Wschod – Maksymilianowo – Zajaczkowo Tczewskie	

Modernization of existing lines		
2007-2013	**2014-2020**	**2021-2030**
E65/CE65 on sections Warsaw – Gdynia (continuation of tasks from the EU budget period 2004-2006), Katowice – Zebrzydowice and Czechowice Dziedzice – Zwardon	E65 on the section Grodzisk Mazowiecki – Zawiercie (CMK) with adjusting to speed over the 200 km/h (250-300 km/h) and on the section Zawiercie - Katowice	E75 on the section Bialystok – Elk – Olecko – Suwalki
E59 Wroclaw – Poznan– Szczecin	E30 on the section Cracow - Rzeszow	CE59 on the section Wroclaw – Zielona Gora – Szczecin
Existing sections of Metropolitan Railway in Tri-City	E20 on the section Poznan – Rzepin with the bypass of Zbaszynek, as an extension of high speed lines Wroclaw/Poznan – Lodz - Warsaw, with adjusting to speed of 200 km/h	E59 on the section Szczecin Dabie – Swinoujscie
E20 on the section Warsaw – Poznan (rest works) and Siedlce - Terespol	CE20 on the section Lowicz – Skierniewice – Łuków and on the length of bypass of Poznan (Swarzedz – Poznan Gorczyn)	Section Piekielko – Nowy Sącz being extension of line Podleze – Piekielko
E30/CE30 Zgorzelec/Bielawa Dolna – Wroclaw – Katowice – Cracow oraz Rzeszow – Przemysl – Medyka	E75 on the section Tłuszcz – Białystok	Line no nr 7 on the section Lublin – Dorohusk (rest works to carry out as a suplement of performed works in the years 2014 – 2020 reconstruction investment)
E75 on sections Warszawa – Tłuszcz oraz Suwałki – boarder with z Lithuania	CE65 on the section Chorzów Batory – Tarnowskie Gory – Inowroclaw – Bydgoszcz – Tczew	Section Lodz Kaliska – Kutno – Torun – Bydgoszcz Głowna. This investment will include construction of additional track on the section Zgierz – Kutno

Connection from Katowice to Katowice Airport in Pyrzowice	CE59 on sections Kedzierzyn Kozle – Chalupki oraz Wroclaw - Mięedzylesie	Gdynia Głowna – Słupsk – Koszalin – Stargard Szczecinski
Połączenie z Krakowa do MPL „Balice" w Balicach	Line no 7 Warsaw – Dorohusk on the section Warsaw – Lublin	Section Poznan Wschod – Inowroclaw
Railway line Pruszcz Gdanski – Gdansk Port Polnocny and construction of the bridge over the Martwa Wisła river	Line no nr 25 on the section Galkowek – Opoczno with construction of junction Slomianka – Opoczno Poludnie in order to connect two high speed lines : new one Wroclaw/Poznan – Lodz – Warszawa and modernized CMK	

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NATIONAL RAILWAY POLICY IN THE SLOVAK REPUBLIC AND REGULATION OF THE TRANSPORT

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ABSTRACT

Regulated competition is an essential mean of transport efficiency and sustainable mobility. Regulated prices for access to the transport infrastructure belong to state interventions, those aim should be promotion environmentally acceptable modes. The paper describes transport policy in the Slovak Republic, their mainly specific objectives which are related with regulation of the transport. Further the paper dedicates itself to the comparison price of access to transport infrastructure in two key modes of transport in the Slovak Republic - road and rail transport and the concept of harmonized prices for the use of transport infrastructure.

INTRODUCTION

Nowadays the railway policy within the European Union aspires to harmonize and liberalize the market. European transport policy development is based on important changes. It is necessary to integrate these changes into the national transport policy in the Slovak Republic, too. These elementary aims can only be successful in the case of equal economic competition.

The necessity of regulation results from economic drivers of transport, from the objective effect of the factors which lead to a deteriorated market environment and are inseparable from transport itself. The deformed market with negative influence to the environment and high social costs for transport are a result of these factors.

The railway policy is a part of economic policy and also an instrument as induced by traffic needs on the required quality level. The conformity of railway policy aims is an essential precondition if the policy aims to become a dynamic component of economic development. Its goals also presume the connection of the traffic system in the Slovak Republic to the integrated European traffic system.

The economic competition is one of the parts of transport policy which was born from aims and principles laid down by the Rome Convention which has played a dominant role ever since. The new conception of transport liberalization was accepted during the period of creation of European Union and transformation of European Community. The political agreement about railway and combined transport support was created and also discussions were realized about tools definition, state support and regulation. It has become necessary to monitor the conditions and process of liberalization. The monitoring covers technical and economic conditions and also the European traffic market development.

TRANSPORT POLICY OF THE SLOVAK REPUBLIC

The main principle of transport policy is sustainable development arising from the support of sector balance, transport user orientation, support of equality of opportunity, effective use of land and resources, open approach and gradual transition of cost reimbursement onto its originators.

The global objective of transport policy is to secure sustainable development of mobility perceived as long-term provision for the constantly increasing transport demands of society (transportation of goods and people) in a required time and to a required quality with a simultaneous decrease of negative impacts of transport on the environment. Securing sustainable mobility requires proportional development of all modes of transport within the Slovak transport system, respecting the principles of common transport policy of EU in order to efficiently satisfy the society's transport needs.

The global objective will be achieved via the following specific objectives:

- Establish transparent and harmonized conditions for economic competition in the transport market
- Secure modernisation and development of transport infrastructure
- Secure adequate financing in transport sector
- Lower the negative impact of transport on the environment
- Improve the quality and development and services in transport
- Improve transport safety and security protection
- Support research and development in transport
- Manage the impact of transport globalisation

In the following part are presented mainly specific objectives and priorities which are related with regulated of transport.

Harmonisation of transport market conditions and introduction of user fees

Due to the necessity of securing equal conditions for competition in the transport market, the EU states have approved a target principle, according to which the transport user would bear all transport costs, i.e. objectively quantifiable costs, thus achieving the fair transport cost. Transport market harmonisation aims to gradually balance the conditions of charging for the use of rail and road infrastructure.

In the railway transport the charging system has to motivate the infrastructure manager as well as the operator to increase efficiency and quality of transport and services. Yet the system has to ensure efficient spending of public finance under the system of state aid or within compensation for the non-reimbursed external cost of other means of transport.

The directive on charging for railway transport infrastructure use will have to be gradually implemented, since the recent charging system in the Slovak Republic is not based on marginal charging but rather on the basis of total costs reduced by the level of state subsidy awarded to the infrastructure manager. This leads to high fees and makes railway transport unattractive.

In the road transport sector, the road infrastructure fee charging for every vehicles are solved by means of annual vehicle tax. Since January 1, 2010 should have been introduced the electronic toll for heavy goods vehicles (over 12 t) and coaches. The level of toll should

be proportional to the cost of construction, operation, maintenance and development of the given infrastructure, and gradually include external costs, such as congestion, cost for preventing and reducing accidents, noise, etc. in the future.

Regulated competition in passenger transport

Public passenger transport, from the point of view of society, is a public service that ensures meeting the transportation needs of the population. The amount of financial resources invested in public passenger transport expresses the level of state, local administration and municipality interest in its preservation and development due to the necessity of sustainable development, as an alternative to constantly growing individual car transport. Public service obligations should adequately reflect the requirements on public transport services executed upon order from the respective administration body (state, local administration, municipality). Efficient utilization of public resources and introduction of more attractive services need to be ensured by enabling competition between transport service providers and performance volume optimisation in the public interest.

Recently, public service obligations on bus lines up to 100 kilometres have been financed by regional administrations. The amount of allocated finance to cover public service obligations is approved by regional administrations that conclude public service contracts with the operators. In urban public transport, the public service obligations are ordered and financed by respective towns.

In railway transport, a contract is concluded on public service obligations between the state (represented by Ministry of Transport, Post and Telecommunications of SR) and ŽSR (national and regional railways), and between Ministry of Transport, Post and Telecommunications of SR and Railway Company Slovakia (transport services), where the scope of public service obligations as well as loss reimbursement are quantified for a given year.

Individual regions and towns in SR have different financial conditions as well as differentiated urbanization structures, different levels of industrialization and equipment of area, which leads to different transportation needs of their populations. It is therefore necessary to gradually implement so-called differentiated models of transport services for each area, which enable improvements in meeting the population's transportation needs via proper combination of transport serviceability by individual types of transport.

Reducing negative impacts of transport on environment

Recently, Slovakia has shown a tendency towards growth in road transport, mainly freight and individual car transport, whereas railway transport, urban-rural bus transport and urban public transport have shown a significant decrease. This unfavourable development in transport contributes to growing pressure on the environment, including residential zones, due to transport traffic noise and emission pollution. Priorities in this subject can be to divide into level of state administration central bodies and level of regional administration.

Level of state administration central bodies:

- Utilise environmentally friendly and economically more viable means of transport (rail transport, cyclist transport) in points of high intensity of main passenger transport flow by integration of transport systems (Park-and-Ride scheme etc.),

change of transport organisation and logistics, creation of multimodal change stations (bus – railway transport),
- Introduce charging for transport infrastructure based on travelled distance and gradually incorporate externalities into fees,
- Unify legislative conditions for enterprise and operation of individual means of transport in towns and regions to support establishment of integrated transport systems,
- Monitor CO2 emission in transport according to the National programme of CO2 emission reduction in transport in SR.

Level of Regional Administration:
- Implement integrated transport systems on two levels (on town grounds and on urban-rural area and urban-rural transport; on regional administration area – regional transport)
- Support the development of modern systems of public transport providing higher transport quality with full accessibility, high level of safety and minimum negative impact on environment, methodologically support establishment of integrated transport systems, including economic support to organisers, to improve management and coordination of activities among individual means of transport
- Link the systems of public passenger transport, individual car and cyclist transport (mainly Park-and-Ride and Bike-and-Ride schemes), in order to achieve time saving by reduction of congestion and negative impacts of transport in towns
- Prefer urban public transport in towns via giving way on crossroads and separate lanes for public transport, etc.
- Car use fee charging in selected exposed parts of cities

In improving the ecological aspects of transport, it is necessary to implement and develop use of alternative, renewable energy resources in transport, towards the Lisbon Strategy objectives, eliminate use of non-renewable energy resources and focus on support and development of non-motorised means of transport, such as cycling and walking.

In motorised means of transport, support implementation and application of alternative fuels, other than hydrocarbon fuels, in order to reduce dependency on oil; reduce the scope of transport performance of certain means of transport or shift the transport performance onto more energy-efficient means of transport, and thus contribute to transport CO2 emission reduction in SR.

LEGISLATION FOR TRANSPORT REGULATION

The economic competition, services in public interest and state support in the railway transport are subjects to general binding rule of law, which have been created to regulate inland transport.

Following regulations are the most important:
- Regulation (EEC) No 1017/68 of the Council of 19 July 1968 applying rules of competition to transport by rail, road and waterway, amended by Regulations No 1629/69, 1630/69, 1/2003 and 773/2004.

- Regulation (EEC) No 1191/69 of the Council of 26 June 1969 on action by Member States concerning the obligations inherent in the concept of a public service in transport by rail, road and inland waterway, amended by Regulations No 3572/90, No 1893/91, No 1370/07.
- Regulation (EEC) No 1107/70 of the Council of 4 June 1970 on the granting of aids for transport by rail, road and inland waterway, amended by Regulations No1473/78, No 1658/82, No 1100/89, No 3578/92, No 2255/96, No 543/97,No 1370/07.

Directly applied acts are among others the regulation and decisions about financial tools of the European Union – the cohesion fund and the structural funds and legislation about the trans-European network.

Besides these documents, the regulation and liberalization of the railway transport are adapted by directives, which are obligatory for member states.

Following directives are of a primary importance:

- Directive 2001/14/EC of the European Parliament and of the Council of 26 February 2001 on the allocation of railway infrastructure capacity and the levying of charges for the use of railway infrastructure and safety certification. This Directive replaces Directive 95/19/EC and covers infrastructure capacity allocation and charging.
- 1995/18 on licensing of railway enterprises.

Both directives are considered to be executive act for transformation directive 1991/440 on the Development of the Community's Railway.

European Directive 91/440 marked the start of a change in the regulations governing rail organization. This Directive required an accounting separation between operation activities and infrastructure management activities and validated the European Commission's traditional approach which made a direct link between market openness and competitiveness.

The other Directives that followed (95/18, 95/19 and the recent Directives stemming from the 2001 Transport White Book (Directives 2001/12, 13 and 14 as well as Directives 2007/58, 2007/59) endeavored progressively to lay down the network access conditions and the measures to separate rail operation, infrastructure and management which resulted in the creation of competition between European networks for companies possessing the necessary licenses.

Concrete measures, concepts and forms for regulation of the railway transport are kept to state hands.

The Slovak Republic, as a member state of EU, must accept European legislation. The national legal act, which adopted European directives into railway transport, is Act No. 164/1996 on Railroads and on amendment to Trade Licensing Act No. 455/1991 as amended by Act No. 58/1997. Regulation of railway transport was secured through the last amendment of this act, also in the institutional framework, in accordance with the directives 14/2001 and 18/95.

COMPARISON OF CHARGES TO BE PAID FOR THE USE ON ROAD AND RAILWAY INFRASTRUCTURE IN THE SLOVAK REPUBLIC

Charges to be paid for the use on railway transport infrastructure are included in the index of commodity with regulated prices. Actual prices are valid for potential haulers which have had competence to carry business in the territory of the Slovak Republic. Slovak railway network is divided into three categories. The following table is presented charges to be paid for the use on railway transport infrastructure.

Table 1: Maximum charges to be paid for the use on railway transport infrastructure [3]

Track category	Maximum prices in Euro without VAT					
	per train kilometres		per thousand gross tonne kilometres		per train	
	passenger transport	freight transport	passenger transport	freight transport	passenger transport	freight transport
1.	1.6179	9.5117	0.7532	0.7811	5.9135	47.4198
2.	1.5900	9.4838	0.6695	0.7253	5.9135	47.4198
3.	1.4227	6.5273	0.5859	0.6138	5.9135	47.4198

Today there is a discussion about the minimization charges to be paid for the use on railway transport infrastructure for freight transport. Railway transport companies should pay only variable costs whose elevation is 20 percent out of total costs of railway transport infrastructure.

Charges to be paid for the use on road transport infrastructure should have paid since January 1, 2010 by electronic toll which will change actual times model charging principle to model of charges for real kilometres. Charges of electronic toll were passed by Government Ordinance Nr. 350/2007. The following table presented these charges electronic toll which were re-counted by converse quotation.

Table 2: Charges of electronic toll in Euro/kilometre without VTA [2]

Vehicle category		EURO 0 - II		EURO III.		EURO IV, V, EEV	
		motor-way	I. category road	motor-way	I. category road	motor-way	I. category road
Cargo carriers	3,5 - 12 tonne	0.093	0.070	0.086	0.063	0.083	0.063
	12 tonne and more						
	◦ 2 axles	0.193	0.146	0.183	0.136	0.179	0.136
	◦ 3 axles	0.202	0.153	0.193	0.146	0.189	0.143
	◦ 4 axles	0.209	0.156	0.199	0.149	0.196	0.146
	◦ 5 axles	0.206	0.153	0.193	0.146	0.189	0.143
Coach	3,5 - 12 tonne	0.090	0.066	0.086	0.063	0.083	0.063
	12 tonne and more	0.186	0.139	0.176	0.133	0.173	0.110

The implementing of electronic toll should benefit the certain equality between railway and road transport. Financial resources should be used for maintenance, building and operation and also it should act as a regulative tool for the support sustainable transport.

In Figure 1 is showed the comparison of charges to be paid for the use on road and railway transport infrastructure considering the distance on the carriage of automobiles by cargo carry EURO III and train.

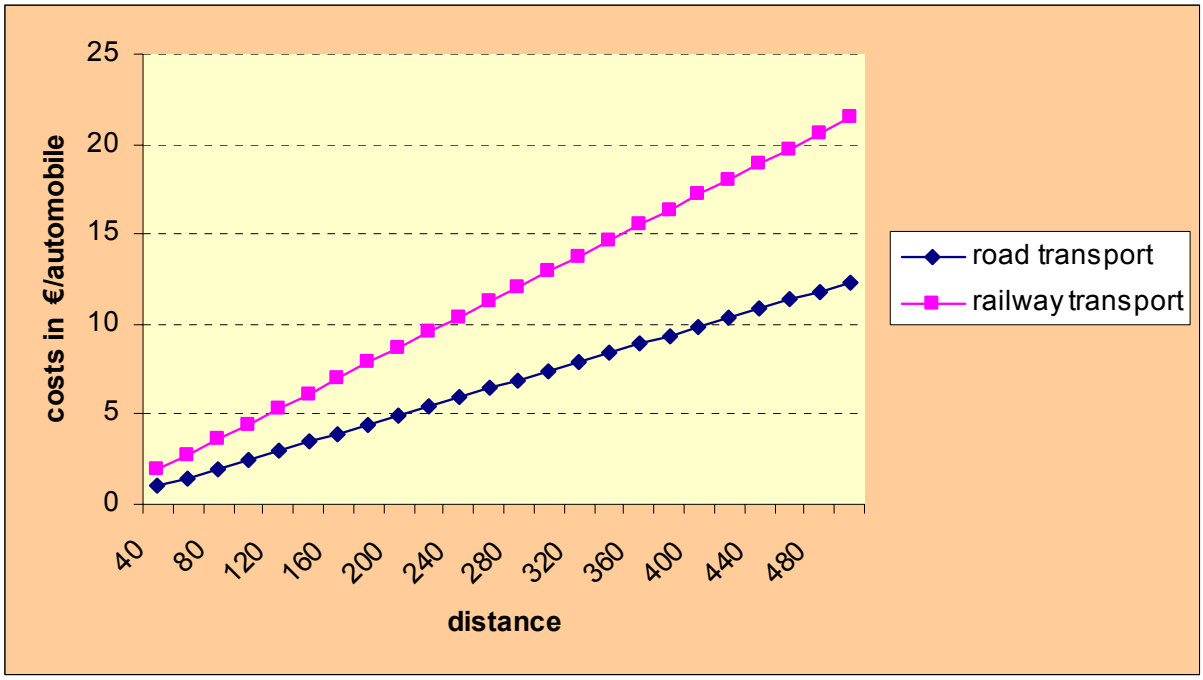

Figure 1: Cost comparison on the transport infrastructure in Euro per one automobile [1]

Actual high-level charge to be paid on railway transport infrastructure is contributing cause of the little competitiveness of railway transport compared to road transport. It is possible to make to grade harmonization charges by three alternatives – decrease of charge to be paid on railway transport infrastructure, increase of charge to be paid on road transport infrastructure or combination previous two alternatives.

RESULTS AND DISCUSSION

The transport policy in the Slovak Republic is founded on the European transport policy. Specific objectives should have ensured sustainable mobility, but some specific objectives are implemented too slowly.

The liberalized transport market requires the existence of a modern traffic system which enables large trade traffic output and a simultaneously high activity of the transport sector. The main problem in the management of railway infrastructures in the Slovak Republic is the inadequateness of the charging principles. The absence of market prices in the railway transport has a negative effect in the market of transport services. It deforms the relative prices of individual services and thus generates unbalance among the modes of transport. The road transport market share is higher in comparison with other modes of transport. This fact leads to the overcharging of road infrastructure, increases risk and accident rate and pollutes the environment.

In the course of consideration of change the charge to be paid on transport infrastructure it is necessary to take into account a fact that the increasing of charge to be paid on road transport infrastructure means delegation these costs on road haulers and eventually on the users on the first hand and on the second hand decrease of charge to be paid on railway transport infrastructure requires higher government grant.

CONCLUSIONS

Continual increase of transport mobility has caused a lot of environmental and community problems. The aim of sustainable transport is to ensure that transport systems meet the economic, social and environmental needs while minimizing their undesirable impact on the economy, society and the environment.

The negative consequences of transport are the important problem for present and future population because the load of environment of transport is elevated. Compared with other types of transport, railway transport is one of the environmentally friendly but on the other hand your performance has been decreasing all the time in comparison to road transport. It is necessary to make many kind of measures leading to sustainable transport that governments would have a transport policy that treats all modes equally, and ensures a high level of coordination between them.

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[2] Government Ordinance Nr. 350/2007

[3] Revenue Authority for Regulating Rail Nr. 545/2008

CREATION OF A "CORE LAYER" WITHIN THE TRANS-EUROPEAN TRANSPORT NETWORK (TEN-T) – THE CASE OF THE VIA REGIA AREA

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ABSTRACT

The paper investigates the development of a core network for the trans-European railway network, taking the case of the Via Regia area from East Germany via South Poland to the Ukraine and Slovakia. This area reflects the "Central axis", one of the major transnational axes identified by the High Level Group chaired by Loyola de Palacio.

Based on a rough spatial and functional analysis, the effects of the existing rail policies of the European Union and its member states on the interconnectivity of the Via Regia area are investigated. It turns out that the "comprehensive layer" of the TEN-T railway network in fact provides the priority network of rail transport on the regional level.

For the evaluation of the proposed "core layer" on European level a two-step analysis is applied, which is based on the method of deduction. In the first step, networks with high relevance for the core network are investigated: European Rail Traffic Management System (ERTMS) corridors and RailNetEurope (RNE) corridors for the freight transport sector, high-speed lines for the passenger transport sector. These policies are compared to the TEN-T priority projects and to the major transnational axes.

In the second step, missing links for freight and passenger transport are identified. Taking the example of the Via Regia area it turns out to be evident that political decisions are needed to close these gaps, and that it will be difficult to identify "neutral" criteria for the allocation of selected tracks to the core network.

As a conclusion it is proposed to clarify in the first step the effects that are expected from the dual-layer approach. If the necessary interconnectivity of the regions of the European Union is already guaranteed by the comprehensive layer, then it could be misleading to expect the same effects from the core layer as some kind of "premier league" of transport networks. Instead, the core network of the future trans-European railway network could be understood as driver for innovation and technology development, including the most difficult strategic projects of European infrastructure development.

BACKGROUND

"Via Regia" is the name generally given to the historical road connection between Paris and Kiev which, in the section between Frankfurt am Main and Wrocław, is known as the Hohe Straße (high road). Of course, many roads have been given this name over the years, however few can claim such a comparable historical continuity.

For many centuries, the Via Regia has been a corridor of European ranking with overriding economic, cultural, political and military importance. Whether as a road for marching armies, a pilgrims' way or a trading route – the Via Regia determined the lives of those within its sphere of influence. People, merchandise and information were transported along it – but also weapons and diseases. There were dangers and obstacles to be overcome and highwaymen and customs officers took their toll.

Its appearance has often changed with time – from a better path without a hard

surface, to a characteristically medieval road and finally to the rail and road connections of the Pan-European Transport Corridor III or – more recently – Central Axis. The same applies to its exact route which was influenced by economic and political changes as well as elemental events and technological developments. The features which remained constant over long periods were those which had been decreed by nature such as river crossings and mountain passes.

Today, in a time where traffic and information routes have long since begun to obey other laws, and where the nature of travel has fundamentally changed, what remains of the Via Regia is above all the idea of the cultural exchange and understanding between different nations in an opening Europe [2].

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Today, in a time where traffic and information routes have long since begun to obey other laws, and where the nature of travel has fundamentally changed, what remains of the Via Regia is above all the idea of the cultural exchange and understanding between different nations in an opening Europe [2].Taking this motivation, the Saxon State Ministry of the Interior started in 2006 the realisation of the INTERREG III B CADSES project “European Development Corridor III Via Regia” (www.edc-viaregia.eu), which lead to a jointly agreed strategy of spatial development. Since 2008, the CENTRAL EUROPE project “Via Regia Plus – Sustainable Mobility and Regional Cooperation along the Pan-European Transport Corridor III” continues the cooperation, aimed at implementation of the strategy. To reach this goal, three interventions were defined:

- Joint action for better accessibility
- Strengthening of corridor nodes – Metropolitan cooperation and institutional learning
- Activating touristical potentials – Increasing touristical accessibility

During the elaboration of the strategy of spatial development, all partners agreed that it is crucial to support sustainable modes of transport. Therefore, the focus of Via Regia Plus is the improvement of rail transport on transnational, regional and local levels. More efficient cooperation in agglomeration areas will facilitate the implementation of integrated transport

policies, and the activation of potentials for tourism shall support environmentally friendly means of transport.

INTERCONNECTIVITY OF THE VIA REGIA AREA

Following the route of the former Pan-European Transport Corridor III, the Via Regia axis connects East Germany, South Poland and the Ukraine (figure 1). As part of the "Central axis" it represents one of the major transnational axes identified by the High Level Group chaired by Loyola de Palacio, connecting the European Union with its neighbours [3].

Including regions in the Czech Republic and in Slovakia, the Via Regia area covers 21 regions with approx. 37 mln inhabitants. The largest urban centres are Berlin, Leipzig, Dresden, Wrocław, Kraków, Lviv and the Upper Silesian agglomeration with Katowice, Sosnowiec and Gliwice.

In east-west direction, the rail nodes of Berlin, Halle/Leipzig and Erfurt provide connections to Western Europe and to the North Sea, while Lviv provides connections to Eastern Europe and to the Black Sea. In north-south direction, Berlin, Wrocław, Katowice and Kraków provide connections to the Baltic Sea, to Scandinavia and to the Baltic states. Southeast Europe, the Czech Republic, Slovakia, Hungary, Austria and the Adriatic Sea are connected through Dresden, Wrocław, Opole, Katowice, Tarnów and Lviv.

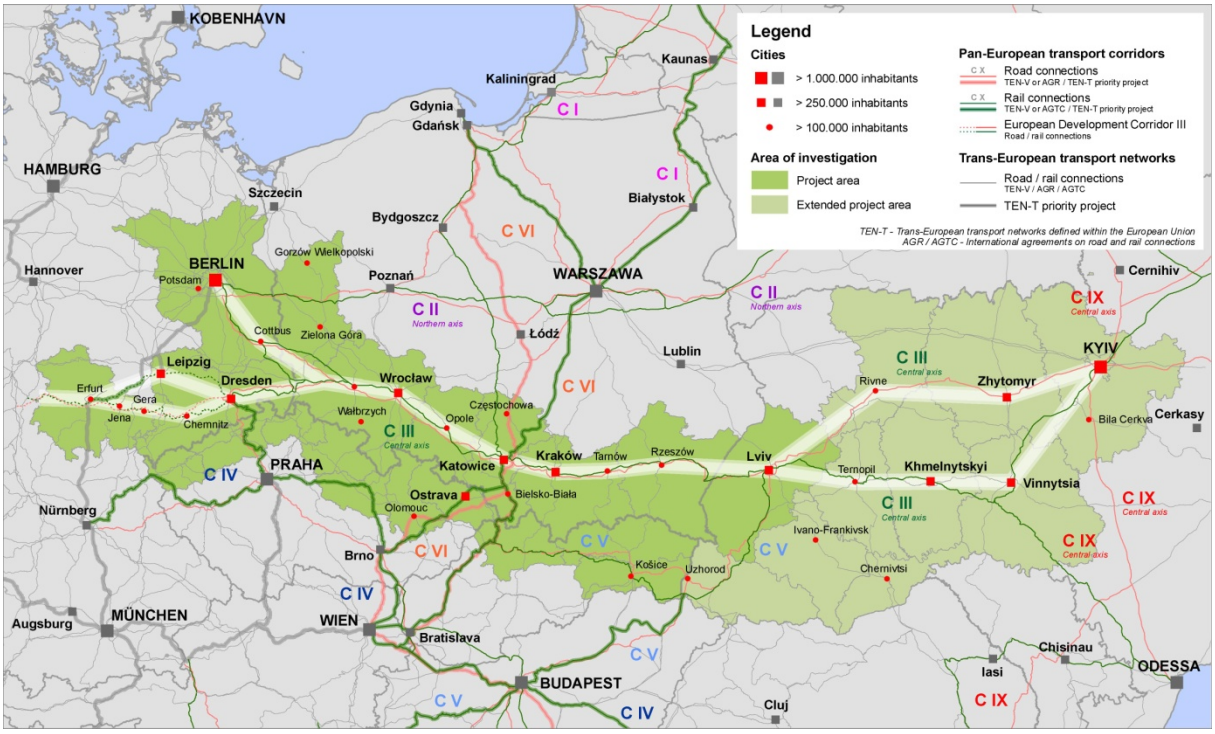

Figure 1: The Via Regia area in Central Europe [4]

Figure 2 presents the current layout of the TEN-T railway network with relevance for the Via Regia area. As the Commission states in its Green Paper on the revision of the TEN-T policy published on 04/02/2009, this "comprehensive network has been essential for fulfilling the 'access function' referred to in the Treaty" [5]. Within the Via Regia area, it connects nearly all centres with more than 100,000 inhabitants and includes the most relevant cross-border relations.

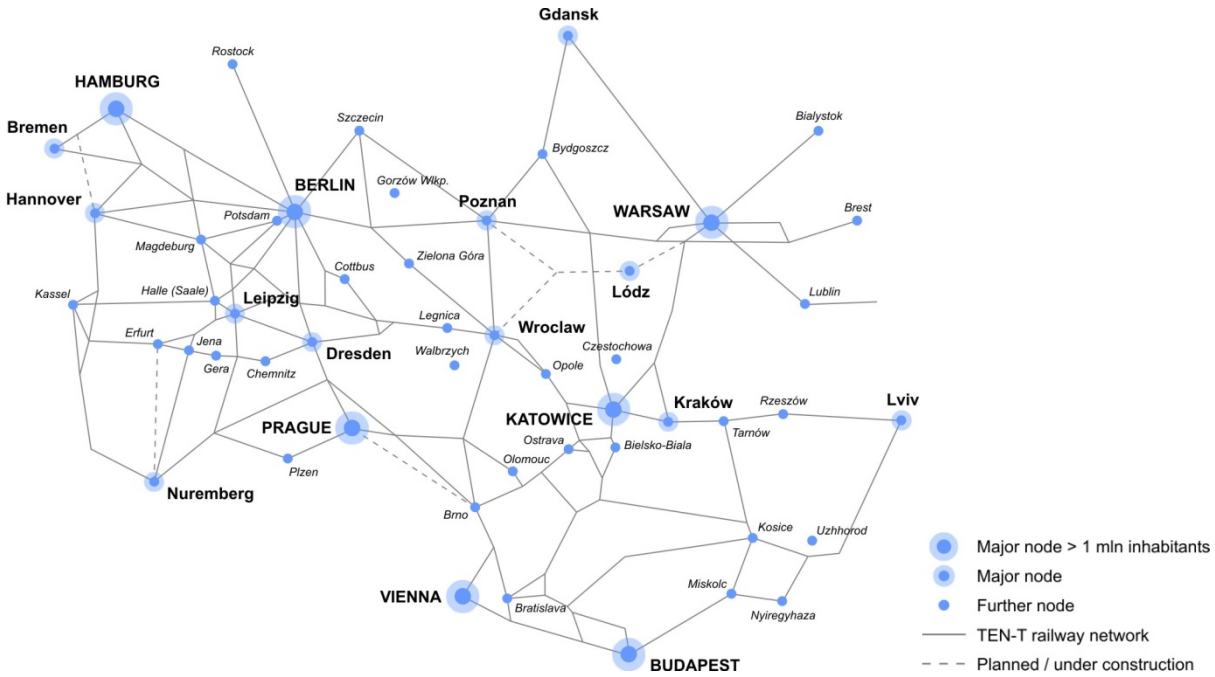

Figure 2: TEN-T railway network with relevance for the Via Regia area

Thus, from the national and the transnational point of view, the comprehensive network might be evaluated as adequate and sufficient, guaranteeing the interconnectivity of regions in the European scale. From the regional point of view, it leaves enough space to develop a regional strategy of rail transport. Within these regional strategies, the TEN-T railway network has the function of a priority network.

Figure 3 adds the current TEN-T priority projects and the major transnational axes to the comprehensive network. The Via Regia area is covered by the TEN-T priority projects no. 1, no. 22 and no. 23, which are located along north-south connections. The east-west dimension is covered by the “Central axis” in the section Dresden-Wrocław-Katowice-Lviv.

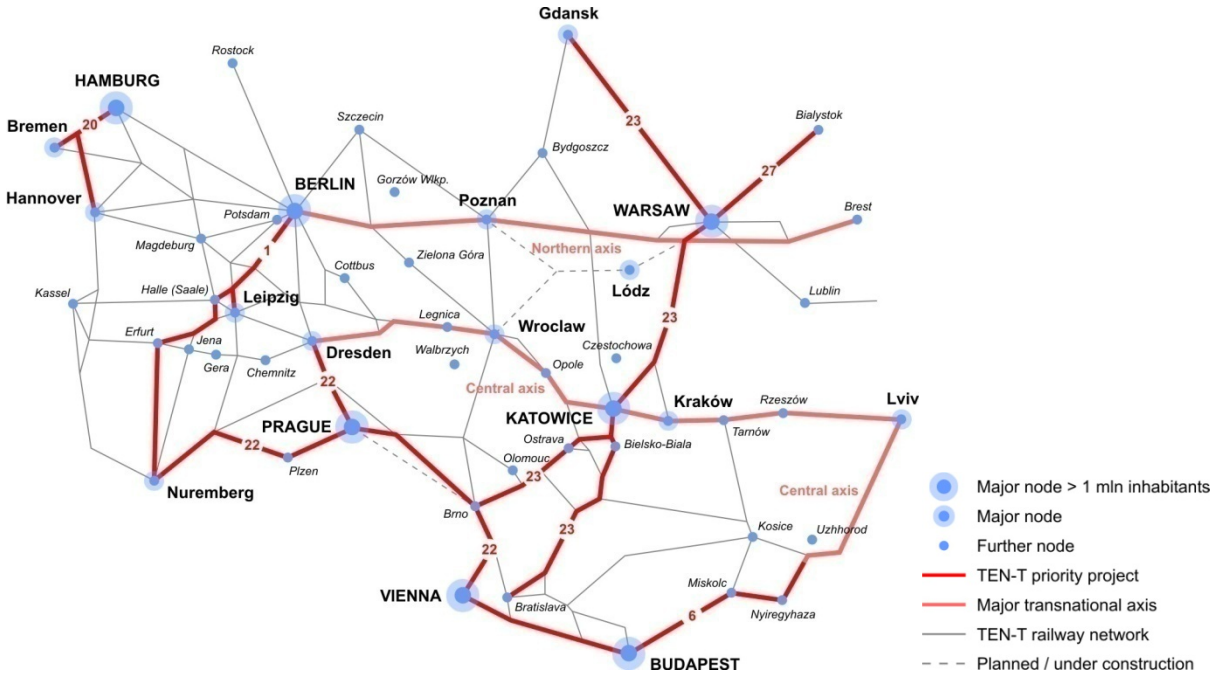

Figure 3: Priority projects and major transnational axes with relevance for the Via Regia area

It is evident that the priority projects and the major transnational axes are not sufficient to create a "core layer" within the TEN-T railway network, since relevant connections to Western Europe and to the North Sea are missing. To investigate these links, existing high-level networks for freight and passenger transport are analysed.

HIGH-LEVEL NETWORKS FOR FREIGHT AND PASSENGER TRANSPORT

In the freight transport sector, the corridors of the European Rail Traffic Management System (ERTMS) and the corridors of the RailNetEurope (RNE) define transnational high-level networks. The ERTMS corridors are technology-driven, with the European coordinator Karel Vinck supervising the implementation of this policy [6]. The RNE corridors are market-driven; currently 34 infrastructure managers from 24 European countries coordinate the long-term planning of transnational train paths with this tool [7].

Figure 4 presents the layout of both networks with regard to the Via Regia area. Both networks have a high degree of compliance with the priority projects and the major transnational axes, with the ERTMS corridors in fact being part of the RNE network. Compared to the priority projects and the major transnational axes, the following connections are added:

- Hamburg-Hannover-Kassel-Nuremberg
- Hamburg/Rostock-Berlin-Dresden
- Hanover-Magdeburg-Berlin/Legnica
- Warsaw-Lublin-Dorohusk
- Žilina-Košice-Čierna nad Tisou

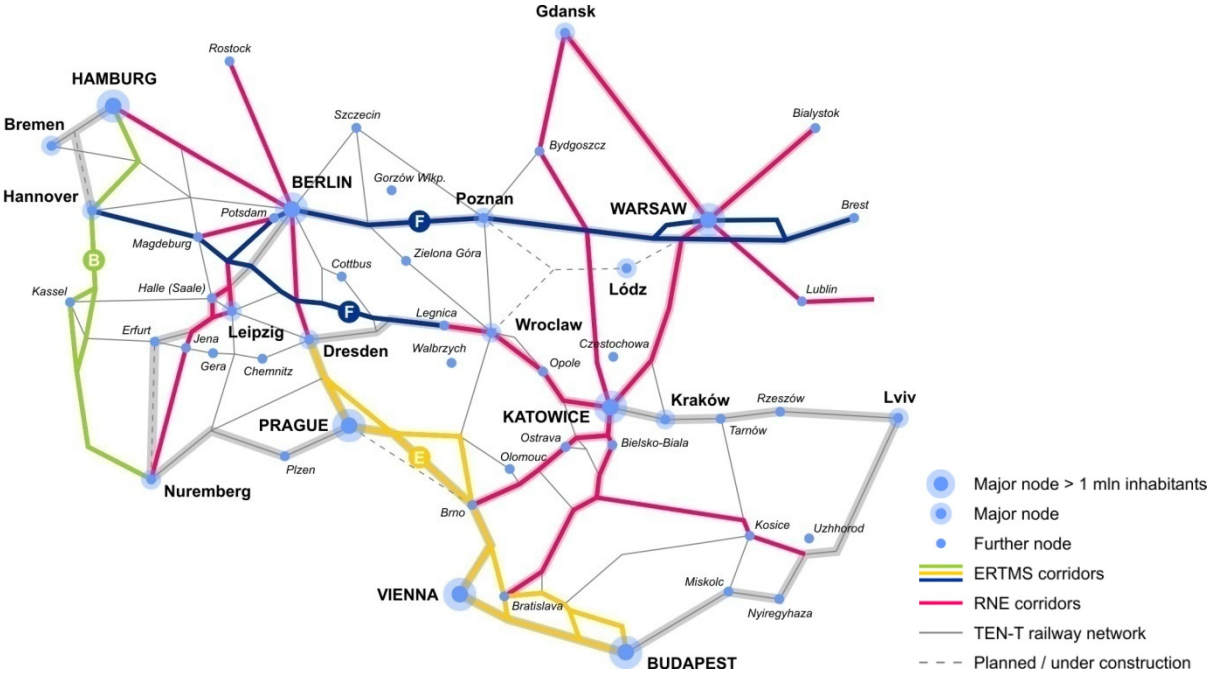

Figure 4: ERTMS corridors and RNE corridors with relevance for the Via Regia area

Furthermore, parallel connections are added along the TEN-T priority projects no. 1 (Berlin-Halle-Nuremberg), no. 22 (Ústi nad Labem-Kolín-Pardubice-Brno, Brečlav-Bratislava-Budapest) and no. 23 (Gdańsk-Bydgoszcz-Katowice), enabling the option to separate freight and passenger transport along selected connections.

Regarding passenger transport, existing and planned high-speed lines > 200 km/h might serve as indicator for high-level networks (figure 5). The nodes of Berlin, Leipzig and Nuremberg provide access to the German high-speed network. In Poland and in the Czech Republic high-speed lines are in process of investigation, covering the most relevant centres and metropolitan areas [8, 9].

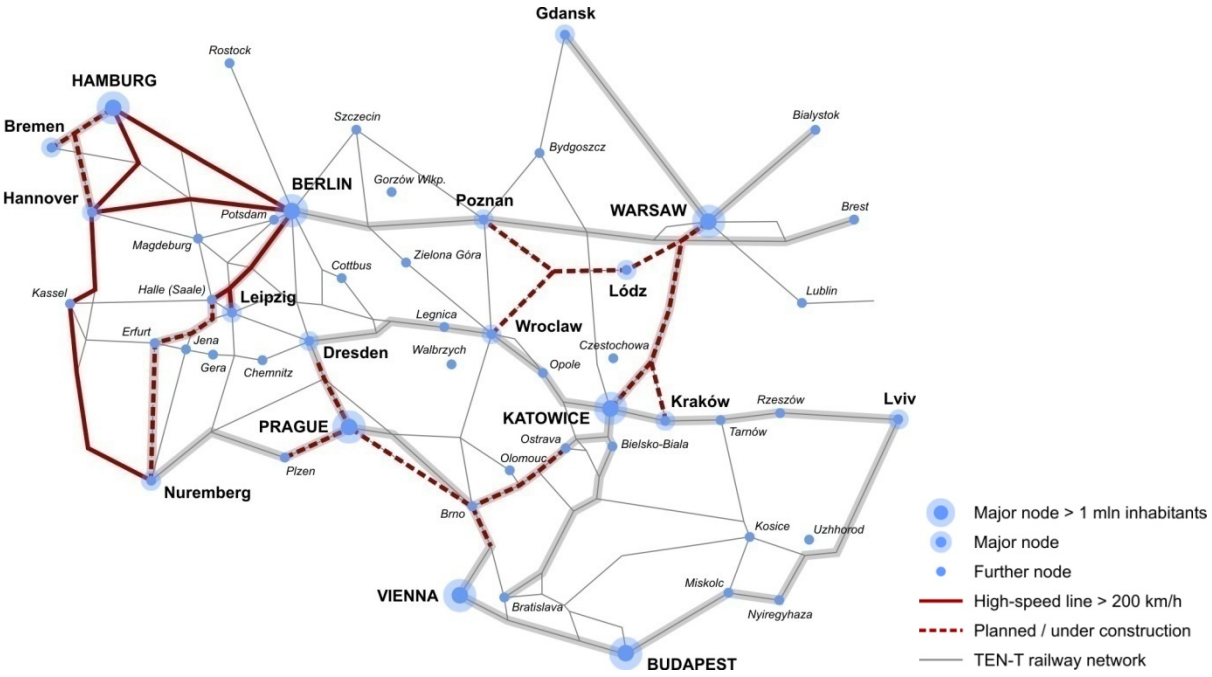

Figure 5: High-speed lines > 200 km/h with relevance for the Via Regia area [10]

MISSING LINKS: THE CASE OF THE VIA REGIA AREA

Figure 6 summarises the analysis of high-level networks for freight and passenger transport, leading to the possible layout of a core network with relevance for the Via Regia area. It includes the existing priority projects and major transnational axes, too.

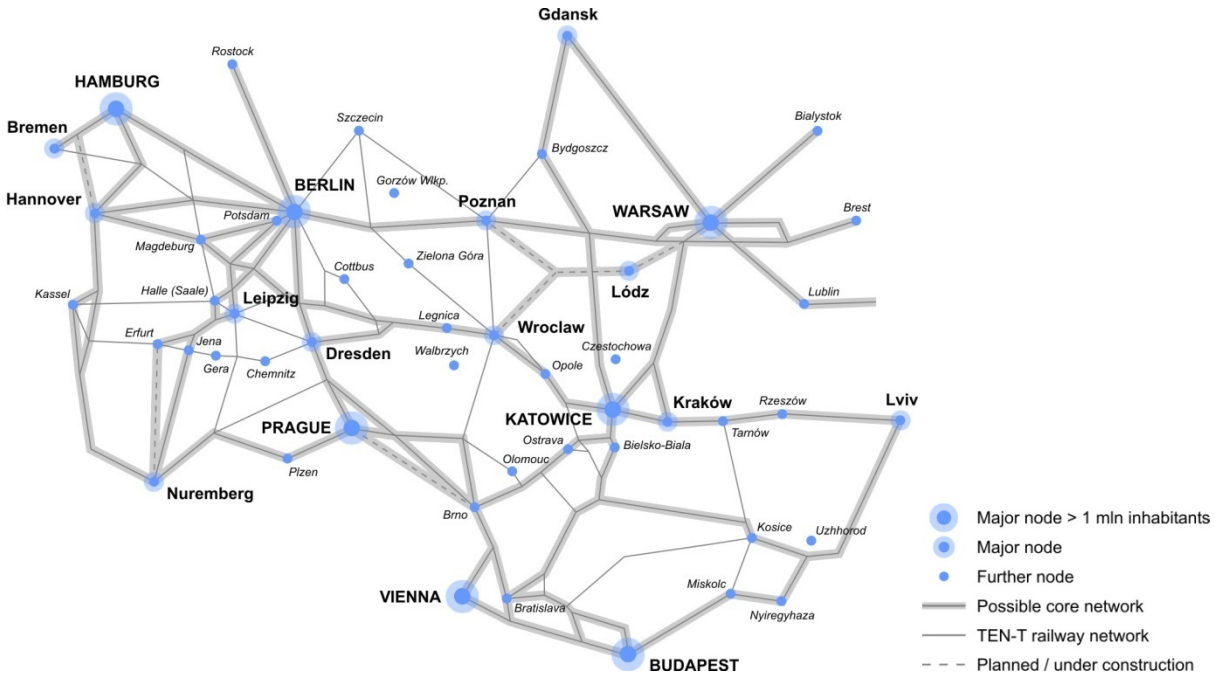

Figure 6: Possible layout of a core network with relevance for the Via Regia area

Analysing the possible layout of the core network under the aspect of interconnectivity, the following effects might be stated (figure 7):

- Connections from Dresden to Leipzig and Erfurt (no. 1) and from Wrocław to Berlin and Hamburg (no. 2) are missing. The “Central axis” seems to terminate in Dresden, and without the link to Berlin its functionality would be reduced to freight transport.
- The “core connections” between Poland, the Czech Republic and Slovakia are concentrated in the area of Katowice, limiting the cross-border capacity of the core network in this part of Central Europe. Further connections would be possible from Wrocław to Prague and Brno (no. 3) and from Tarnów to Košice and Miskolc (no. 4).

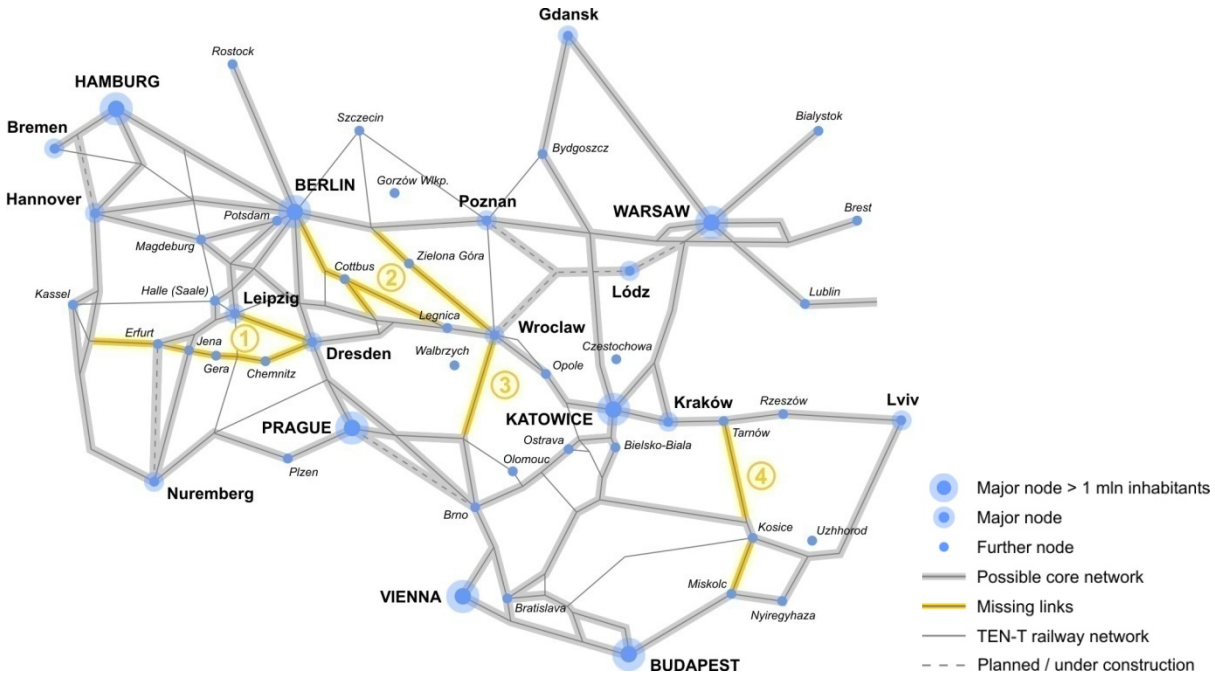

Figure 7: Missing links in the possible layout of a core network with relevance for the Via Regia area

From the technical point of view, the allocation of the links no. 1, 3 and 4 to the core network would be feasible, with clear alignments and functions:

- The line between Dresden and Leipzig is double tracked and electrified, upgrading measures are in process of realisation. The connecting line beyond Erfurt will take over the high-speed trains from Berlin to Frankfurt (Main), once the high-speed line between Halle/Leipzig and Erfurt is completed. The second line between Dresden, Chemnitz and Erfurt might serve as relief route.
- The line between Wrocław and Ústí nad Orlicí is electrified and partly double tracked. Recently the cross-border section was renewed. It is part of the Central European Transport Corridor (CETC), serves as hinterland connection for the ports of Szczecin-Świnoujście and Gdańsk-Gdynia (relief route) and increases the interconnectivity of the western parts of Poland.
- The line between Tarnów and Košice is electrified and mostly single-tracked. It increases the interconnectivity of the eastern parts of Poland, Slovakia and Hungary and provides access to Southeast Europe.

The alignment of link no. 2 is far more complicated, since Wrocław might be connected to Berlin through three different routes:

- The line to Berlin and Szczecin via Zielona Góra is electrified and double tracked, but infrastructure needs urgent renewal. It is part of the Central European Transport Corridor (CETC) and serves as hinterland connection for the port of Szczecin-Świnoujście. Berlin is connected through the heavily used line from Poznań and Warsaw (“Northern axis”).
- The line to Cottbus from Legnica to Żary, Żagań and Forst (Lausitz) is not electrified and single-tracked. Tracks are in bad condition, but recently a regional initiative has emerged to modernise the infrastructure. Currently the EuroCity “Wawel” (Hamburg-Kraków) uses this line.

- The line to Cottbus via Węgliniec/Zgorzelec is linked to the "Central axis" in Görlitz. The line from Görlitz to Cottbus is not electrified and single-tracked, and the infrastructure is in good condition. This section shall be electrified in future [11].

The line from Cottbus to Berlin is electrified and double tracked, and the upgrade of the line is currently prepared. It connects to the future Berlin Brandenburg International airport, too.

Each route is supported by different regions in Poland and Germany, and since each route requires relevant investments for upgrading measures, it would be extremely difficult to identify consensual criteria for the allocation of tracks to the core network. Here, the only solution would be a political decision, giving priority to one of the criteria concerned (e.g. the connection of the Berlin Brandenburg International airport via Cottbus or the access to the port of Szczecin-Świnoujście via Zielona Góra).

QUESTIONS – AND A PROPOSAL

The attempt to identify a possible layout of the core network through the analysis of existing high-level networks illustrates that in the case of the Via Regia area this approach might have difficult implications. There is need to answer the question, how to proceed if missing links are identified and if the alignment of routes is not possible using exclusively "neutral" criteria – in other words, if political decisions are necessary.

Therefore it should be clearly clarified which effects are expected from the dual-layer approach in the trans-European railway network. The identification of missing links was guided by the aspect of interconnectivity, but should this be the key criterion? In the effect, two levels of accessibility might emerge – "first class" in the core network, "second class" in the comprehensive network. But which kind of problems solves such an approach – real problems or problems of imagination?

And what does it mean for funding if the length of the possible core network multiplies the total length of priority projects? Funds would have to be multiplied to generate visible effects in the extended network, and still national and regional governments will keep their decisive influence on the process of infrastructure provision. On the other hand there are still enormous needs to invest in strategic projects of European infrastructure development, which rather require focused support of selected projects than large-scale support of a multitude of possible measures [12].

It is not possible to give answers to these questions from the case of the Via Regia area. But a possible solution for these dilemmas could be a different understanding of the "core layer" as driver for innovation and technology development. Taking into account the further process of liberalisation of the European railway market, there is still need to improve interoperability and to harmonise transnational investment policies. From this point of view it would be even sufficient to connect all neighbouring member states by at least one section of the core network.

If these sections include as well the most difficult strategic projects of European infrastructure development like e.g. the Brenner base tunnel, the Fehmarn Belt bridge or the Lyon-Torino link, the European added-value of such an approach would be obvious.

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