LOGISTIK

Herbert Sonntag (Hrsg.)

European Corridor Projects – Trends, Strategies and Practices in freight transport and logistics

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President's Preface

László Ungvári

A trademark of research and teaching at the Technical University of Applied Sciences Wildau is the close cooperation between different specialty-fields. In the book at hand you can find an example for the cooperation between logistics, European integration and regional development. This is a result of the collaboration of the Technical University Wildau with logistics and transport businesses, with Ministries and authorities on a regional, national and trans-European level and with research institutions throughout Europe. Our Research Group Transport Logistics participated in numerous European Corridor projects such as ECO4Log, Interim, SoNorA, Scandria, FLAVIA as well as numerous supporting projects and studies. This makes us an effective and capable partner for the private, as well as for the public sector. An important part of our work is based on our international network: We have 121 foreign partner-institutions in 58 countries. Our students also benefit from this approach that presents a broad cross-section of logistics throughout all involved levels starting from European politics to the very practical implementation in the industry. This is also reflected in the growing student body: From 2000 to 2011 the number of our students more than doubled from 2091 (in the winter-semester 1999/2000) to 4249 (as of October 2011), making us the largest University of Applied sciences in the state of Brandenburg. Our students can choose from 22 degree programs and six additional accompanying professional degree programs.

The contributions in this volume of our monographic series on logistics are examples for innovative ideas and developments from our partners in Europe and from us. The papers show impressively how transport in Europe can not only be made more efficient, but also greener and above all, can contribute to the process of European integration. They span the range from political framework conditions over macro-logistical analysis to concrete measures in order to foster the development of markets and businesses through more efficient processes. They also reflect the variety of approaches and the diversity of European transport relations, as well as the challenge the project of European integration presents us with.

June 2012
Yours sincerely Prof. Dr. László Ungvári
President of the Technical University of Applied Sciences Wildau

Publishers Preface

Herbert Sonntag

The monographical series of logistics at the Technical University of Applied Sciences Wildau is devoted to current topics of the Wildau Logistics Conference and to groundbreaking research projects in the field of logistics. The volume at hand – Volume 7 of this series – is concerned with a strategic European issue: The analytical work on North-South-corridors, between the Baltic region, the Black Sea region and the Adriatic coast which have been notably developed within the major EU Interreg projects SoNorA, Scandria and FLAVIA.

SoNorA supported the development of an indispensable, multimodal transport network and concentrated on the region between the southern Baltic Sea coast and the Adriatic, including Germany, Poland, the Czech Republic, Slovakia, Hungary, Austria, Italy and Slovenia. FLAVIA aims for the improvement of intermodal transport along a corridor stretching from Germany to the Black Sea and connecting to the TRACEA countries and the Middle East and Asia. It thereby addresses a region with more than 157 million inhabitants and includes three TEN-T corridors. SCANDRIA is especially concerned with the relations to Scandinavia and therefore is a logical continuation of the SoNorA project in a northern direction. All three projects were specifically designed to foster the EU integration process.

In recent years, a number of projects were brought on track by the TH Wildau, which are especially concerned with the field of intermodal transport in a European context. This includes the ECO4LOG project, in which concepts for the improvement of intermodal good transport were developed, including IT solutions. Within the INTERIM project, the TH Wildau developed an innovative routing tool for intermodal transport, which is currently being refined within the FLAVIA project. The tool has been used in numerous research projects, including SoNorA and SCANDRIA. The SoNorA project saw the development of intermodal train concepts, which were presented to numerous logistic companies, and at the transport logistics fair in Munich in 2010. Within the scope of SCANDRIA, the TH Wildau developed models for the creation of successful business concepts and was involved in the development of a strategic logistics business concept for the corridor. Some interesting results of this work are also part of this Volume.

In addition, we also received more groundbreaking works from different fields of application. I would like to thank all authors and actors for the comparatively quick editorial corrections.

No work can succeed without the organizational effort of relentless caretakers. Therefore I would like to thank especially the coordinator of my research group Dipl.-Ing. Bertram Meimbresse, together with Dipl.-Ing. Philip Michalk, the persistent organizers and sometimes firmly admonishers, on the way of bringing this volume to completion.

June 2012

Prof. Dr.-Ing. Herbert Sonntag
Transport Logistics and Director of Research Group Transport Logistics
at Technical University of Applied Sciences Wildau

Preface: Cleaner transport… without any dirty competition

Michael Cramer

Transport in the European Union is generally too cheap, only eco-friendly modes of transport are too expensive – and that is indeed politically indented! The transport sector is nowadays responsible for 30 % of all greenhouse gas emissions in the EU. All that is bad enough, however, it is even worse to know that while CO^2 emissions of the industry could be decreased by 34 %, of power generation by 17 % and of households by 14 % since 1990, the transport sector experienced a vast increase of CO^2 emissions by 29 % during the same period. Thus, the transport sector devours two or three times the CO^2 emissions savings of the other sectors, whose success was supported financially with billions of Euros of taxpayer's money.

However, the failure of becoming more sustainable is not due to the lack of competitive capacity of environmentally friendly modes of transport but rather because a number of competitive distortions exist at the expense of environment and taxpayers. Airlines, for instance are exempted from paying taxes on kerosene. Moreover, they are also excluded from VAT on international flights. Those exemptions amount to a loss of 30 billion Euros tax revenue every year. Railway operators in contrast have to pay those taxes despite the fact that CO^2 emissions in the stratosphere are indeed three to four times more harmful to the environment than on the ground.

Just imagine the European railways would also be annually provided with 30 billion Euros over a period of ten years – just like the air traffic. Most likely we would then have both, an excellent rail network system and reasonable fares. Besides, air traffic would be reduced by at least 50 %, which in turn means less pollution in terms of CO^2 but also noise emissions.

Massive distortions in competition do also exist between transport on road and rail. The EU, on the one hand, requires that a train path charge has to be collected from each train for the usage of any rail track. The price for that kind of rail toll is not capped. On the other hand, the decision whether a road toll is introduced lies with each member state and happens on a completely freely basis. Yet, the prices for road tolls are quite limited and mostly affect trucks over 12 tons on motorways only.

These conditions indeed cause the transferring of traffic – yet certainly to the wrong direction though. Switzerland sets a laudable example and shows us how to do it correctly. The Swiss introduced a »heavy goods vehicle tax« (HVT), which in fact is a road toll almost four times higher than in Germany. This toll is imposed on all vehicles of more than 3.5 tons, regardless which road they use. Due to this comprehensive approach, large trucks are not merely exchanged against smaller ones and freight traffic is not shifted from motorways to country roads.

Both common phenomena we can observe in Germany. At the same time, the costs for consumers increased by only 0.5 %. Environmental protection could not be achieved any cheaper.

The European Union urgently needs to create fairer conditions for intermodal competition. That can only be achieved through the calculation of the genuine costs and the full internalization of external costs. In order to achieve this goal, the European Parliament asked the Commission in its report on the White Paper on Transport in late 2011 to submit concrete proposals for legislation by 2014.

Especially rail transport, as one of the most environmental friendly modes of transport, is suffering further disadvantages. Rail traffic in the EU is even nowadays still regulated by 25 national safety authorities. Surely this is a result of both, the historical burden but also the nationalistic mindset of many railway companies. Consequently, differences in national regulatory and safety still obstruct cross-border traffic, due to both, the different national command and control as well as different energy supply systems.

Although the EU adopted the principle of »cross acceptance« already in 2009 – stating that any *locomotive licensed* in one member state may be used in another, as long as there are no objections in terms of security – the implementation and realisation of this principle is still a long way off.

Yet, access to rail infrastructure and secondary facilities, as for instance marshalling yards, is still under the responsibility of the national infrastructure managers, who on their part are mainly associated with the respective leading rail companies. Both, the conditions for accessing infrastructure as well as track prices are decided freely by each infrastructure manager; accordingly the conditions for rail traffic differ widely among the EU member states. Moreover, as access charges are still primarily determined by state railway companies, any future price developments are hardly predictable for private competitors.

The following example shows how arbitrary this system works: The costs for the new central station in Berlin have tripled from initially expected 700 million DM to one billion Euros. However, those costs are not financed by passengers of the ICE trains but rather by passengers using commuter and regional trains which stop frequently at the central station. This is due to the fact that also short-distance trains have to pay all stations fees and track prices.

Transport on road, in contrast, is harmonised and regulated in a fairly transparent way across Europe. Trucks can drive without any problem from Tallinn to Lisbon and do not face any added administrative burden. Going the same drive on rail, on the contrary, requires at least two changes of trains, because of different track gauge widths.

On top of those technical and administrative problems, there also exist severe conflicts between passenger and freight transport in many member states. Trains transporting passengers in Germany, for instance, are usually given priority over freightliners. This is due to the fact that rail infrastructure was primarily built for fast passenger transport, while freight transport has been neglected over the years. As a consequence, the average speed of a long-distance truck transport in Germany results in about 65 km/h, while an intermodal freight train on only reaches speed of about 36 km/h in average, which certainly causes a competitive disadvantage for freight trains.

One of the striking examples of misinvestment was the German railway reform in 1994, in the course of which about 40 billion Euros of taxpayer's money were invested in long-distance rail infrastructures. Since then, however, passenger numbers in this segment decreased by 20 %. While less and less passengers decide to travel long-distances by train, their share in regional rail transport – a segment which was totally neglected during that reform – increased by 50 %.

Also in recent years we can observe the waste of billions of Euros, as for instance in Stuttgart, where an underground train station was built with a new rail line connecting Stuttgart and Ulm. The costs for this mega project amount to more than 7 billion Euros. The project was initiated not at last because the existing rail connection is unsuitable for freight transports due to its sharp bend at the so called »Geislinger Steige«. However, also the new line will face this problem and no solution is foreseen. The costs for that new line amount to 3 billion Euros. The added value to passenger transport will be marginal, as 70 % of all passengers embark and disembark in Stuttgart. Due to low track charges, this route will probably never become profitable.

The situation in regard to the EU's main freight corridor from Rotterdam to Genoa is quite different. In 1996, the neighbouring countries committed to the development of this corridor by signing the Treaty of Lugano. In the course of this, Switzerland completed the Lötschberg tunnel in 2007, the Gotthard tunnel has been dug and will be operational in 2016. In Germany, in contrast, we do not even have the necessary building regulations in order to realise the four-track expansion of the Rhine-line between Karlsruhe and Basel. Moreover, the federal government in Offenburg and the Deutsche Bahn AG refuse building a tunnel through the city for freight traffic. Instead, they intend to construct an eleven meter high noise barrier. It is indeed no surprise that residents of that area are resisting, especially if we consider that the Berlin wall in comparison had a height of »only« 3.60 meters.

Experiences show, however, that yet existing building law and regulations do not necessarily lead to actual construction works. The federal budget 2012 foresees 19 million Euros for the expansion of the Rhine-line. The expected costs amount to four billion Euros though. If this budget was kept, we would need another 200 years until the corridor section Karlsruhe-Basel would finally be finished.

Although the decision to create a Single European Railway Area has been already taken in 2001, we are still miles away from its implementation. Many railway companies are still national bodies, focussing rather on national needs and issues than on trans-border transport. This self-focus is clearly obstructive and impedimental for the Single European Railway Area.

In the recent revision of the first railway package, the so-called »recast«, the Council and the European Parliament decided to warrant EU-wide access to the entire rail infrastructure, including off-site facilities. Moreover, the institutions agreed upon the establishment of independent, regulatory bodies, which shall have the necessary organisational capacity in terms of human and material resources for quick and efficient decision making in order to prevent any discrimination. It was furthermore decided, that funds foreseen for the infrastructure development should not be used for the acquisition of unloved competitors or other road freight transport companies.

Moreover, an improved cooperation between national security and regulatory authorities with the European Railway Agency (ERA) is indispensable for further harmonisation of licensing and safety regulations. Thereby it is evident that we need to shift certain tasks from national to European level in order to prevent both, chaos but also duplication of work. It is equally important for infrastructure operators to maximize rail traffic on the existing rail networks. In case of increased demand, it shall be up to the infrastructure operator to decide whether the infrastructure needs to be further developed or if rather better organisation and planning would already help to solve the shortage.

Priority should, however, be given to the six freight corridors adopted already in 2010 by the Member States of the EU. Especially there we need to introduce and develop the European rail control and signalling systems. The focus needs thereby be particularly on the cross-border sections. Yet, over twenty years after the launch of the Trans-european traffic nets (TEN-T), the European railway network appears like a rag rug. It is surely no coincidence that most of the existing gaps are located exactly at boarder sections. This, however, contravenes blatantly the declared objectives of European transport policy in order to overcome intra-European borders.

In conclusion, it needs to be said that traffic in the EU needs to be avoided wherever and whenever possible. Existing transport has to be shifted from polluting to more environmentally friendly modes and the overall efficiency needs to be improved at all levels. Instead of extremely expensive and time-consuming large-scale projects, infrastructure development should rather focus on numerous smaller and more efficient measures with real added value for both, the environment and Europe.

»Act smart« is better than »think big«! This simple formula can help us to improve mobility and stop climate change, in order to ensure a more healthy life and to keep our planet for our children and their children.

Michael Cramer, July 2012
Member of the European Parliament and spokesperson for transport political matters of the Green Party in the European Parliament (originally drafted in German)

The SuperGreen project and green corridor benchmarking

George Panagakos, Harilaos Psaraftis, Atle Minsaas, Indrek Ilves, Ilkka Salanne

Abstract

»Green corridors« in freight transportation is a concept introduced in 2007 by the »Freight Transport Logistics Action Plan« of the European Commission. It pursues a corridor approach in developing integrated, efficient and environmentally friendly transportation of freight between major hubs and by relative long distances. The National Technical University of Athens leads the EU-financed SuperGreen project, which aims at assisting the Commission in defining green corridors through the use of Key Performance Indicators (KPIs). A set of 9 European corridors have been selected by the project, based on their green characteristics or their greening potential, in order to be used as testing ground for the KPIs and the related benchmarking methodology. The paper presents the project's preliminary results, namely (a) corridor selection, (b) benchmarking methodology and KPIs, and (c) corridor benchmarking results.

1 Introduction

What is really a Green Corridor? In a strict sense, a precise definition of the term is still elusive, and in fact one of the most important contributions of ongoing research would be to develop an explicit and workable definition of the term. Still, one can mention a couple of high-level definitions:

According to EU (2007), which introduced this concept, »*... transport corridors are marked by a concentration of freight traffic between major hubs and by relatively long distances of transport. Industry will be encouraged along these corridors to rely on co-modality and on advanced technology in order to accommodate rising traffic volumes, while promoting environmental sustainability and energy efficiency. Green transport corridors will ... be equipped with adequate transhipment facilities at strategic locations ... and with supply points initially for bio-fuels and, later, for other forms of green propulsion. Green corridors could be used to experiment with environmentally-friendly, innovative transport units, and with advanced Intelligent Transport Systems (ITS) applications... Fair and non-discriminatory access to corridors and transhipment facilities should be ensured in accordance with the rules of the Treaty.*«

According to the Swedish Logistics Forum (Tetraplan 2011), »*Green Corridors aim at reducing environmental and climate impact while increasing safety and efficiency. Characteristics of a green corridor include:*

- *sustainable logistics solutions with documented reductions of environmental and climate impact, high safety, high quality and strong efficiency,*
- *integrated logistics concepts with optimal utilisation of all transport modes, so called co-modality,*
- *harmonised regulations with openness for all actors,*
- *a concentration of national and international freight traffic on relatively long transport routes,*
- *efficient and strategically placed transhipment points, as well as an adapted, supportive infrastructure, and*
- *a platform for development and demonstration of innovative logistics solutions, including information systems, collaborative models and technology.«*

The EU-financed SuperGreen project[1] aims at assisting the European Commission in further defining green corridors through a corridor benchmarking exercise using Key Performance Indicators (KPIs). The purpose of this paper is to present the methodology and the set of KPIs as they have been applied in benchmarking a set of selected corridors.

2 The SuperGreen project

SuperGreen is a Coordination and Support Action, in the context of the European Commission's 7th Framework Programme of Research and Technological Development. The objectives of the SuperGreen project concern supporting the development of sustainable transport networks by fulfilling requirements covering environmental, technical, economical, social and spatial planning aspects. This will be achieved by:

- giving overall support and recommendations on green corridors to EU's Freight Transport Logistics Action Plan,
- conducting a programme of networking activities between stakeholders (public and private),
- providing a schematic for overall benchmarking of green corridors based on selected KPIs,
- delivering policy recommendations at a European level for the further development of green corridors, and
- providing the Commission with recommendations concerning new calls for R&D proposals to support development of green corridors.

The project involves 22 partners from 13 European countries. They include transport, logistics and infrastructure operators, shippers, environmental organisations and authorities responsible for social and spatial planning, consultants, academia and R&D institutions. Altogether, they have committed to mobilise

1 http://www.supergreenproject.eu

resources of more than € 3 million, with the European Commission contributing on the order of € 2.6 million. The timetable of the project is January 2010 to January 2013.

Project work is organised in 7 work packages. The most relevant one to this paper is the package concerning corridor benchmarking. It involves: the selection of corridors; definition of the benchmarking methodology and indicators; identification of changes in the operational and regulatory environment that may enhance or hamper green corridor development; the actual corridor benchmarking; and definition of areas for improvement. It is noted that the benchmarking of corridors in relation to green technologies and smart Information and Communication Technology (ICT) applications comprises the subject of different work packages and will not be covered here.

3 Corridor selection

An initial list of 60 potential corridors was compiled on the basis of the TEN-T priority projects, the Pan European Transport Network and proposals made by the project's industrial partners. After two consolidation rounds, the number of candidate corridors was reduced to 30. A survey was carried out to gather information on these 30 corridors. Based on the information gathered and criteria like corridor length, population affected, freight volume, types of goods and multimodality, number and seriousness of bottlenecks, geographical preconditions, transport and information technology used, and assessment of the supply chain management, a pre-selection of 15 corridors was made. A geographic and modal balance was ensured among these pre-selected corridors. The aim at this stage was to select the ones with the highest »greening potential« rate.

Further information was collected on these 15 pre-selected corridors and a deeper analysis was performed taking into consideration land use aspects like the percentage of corridor surface comprising urban and environmentally sensitive areas. The analysis resulted to a recommendation of 9 corridors for final selection, which was presented to a stakeholder workshop especially arranged for this purpose. In line with comments received during the workshop, the selected corridors were modified by adding segments that exhibit advanced »greening« characteristics.

In addition to being geography- and mode-wise balanced, the resulting set of corridors comprises a mix of environmentally advanced ones on one hand, and those exhibiting a high »greening potential« on the other, thus constituting a suitable field for testing the benchmarking methodology and KPIs.

It should be made clear that the selection of these corridors was made only for the purposes of the SuperGreen project and by no means has this implied any direct or indirect endorsement, either by the SuperGreen consortium or by the European Commission, of these corridors vis-à-vis any other corridor, with respect to any criteria, environmental, economic, or other. More details on SuperGreen corridor selection can be found at Salanne et al. (2010).

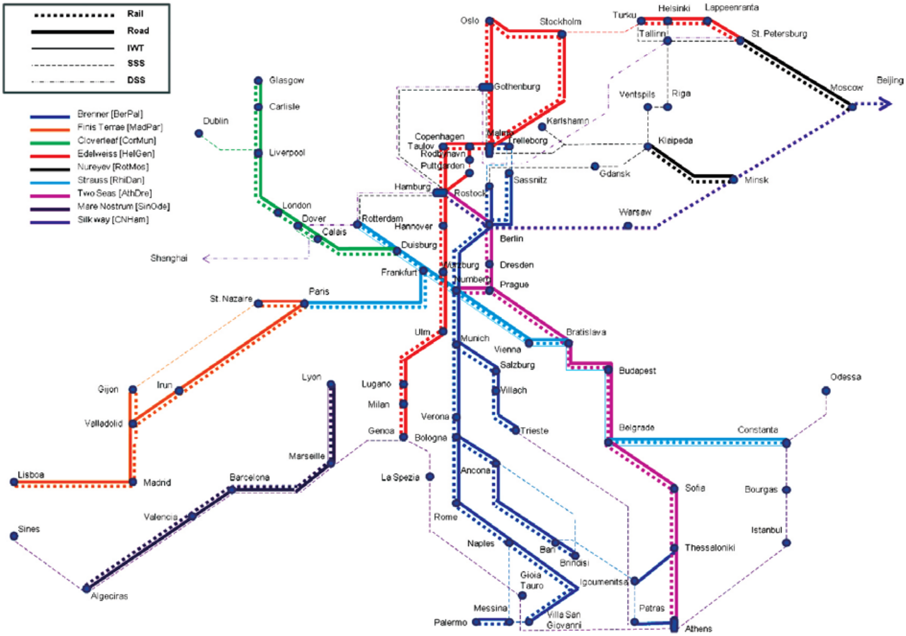

Figure 1: The SuperGreen corridors in metro format

4 Benchmarking methodology and KPIs

No corridor benchmarking exercise was identified in the literature. The closest case concerns benchmarking of transport chains and was studied by the BE Logic project (Kramer et al. 2009). Based on this experience, the project developed a methodology that consisted of decomposing the corridor under examination into transport chains, benchmarking these chains using a set of KPIs, and then aggregating the chain-level KPIs to corridor-level ones using proper weights for the averaging.

The initial set of KPIs resulted from a process that included the compilation of a gross list of performance indicators, their categorisation into different groups and their filtering during detailed discussions. These KPIs, grouped in five areas (efficiency, service quality, environmental sustainability, infra-structural sufficiency, and social issues), are presented in Table 1 below along with their respective definition.

With the aim of soliciting feedback, the methodology and initial set of KPIs were presented in three events: two regional stakeholder workshops and a meeting of the project's Advisory Committee. The general consensus was that the methodology was in broad terms acceptable and that the KPIs proposed by the project cover all basic facets of the problem. However, there was also a general sense that KPIs as proposed were too ambitious and there was a need to simplify them so that the set be useful. In that sense, reducing the set of KPIs to a more manageable one was considered as a desirable outcome.

KPIs	Units
Efficiency	
Absolute cost	€/tonne
Relative cost	€/tonne-km
Service quality	
Transport time	hours
Reliability (time precision)	% of shipments delivered on time (within acceptable window)
Frequency of service	Number of services per week
ICT applications – cargo tracking, availability – cargo tracking, integration & functionality – other ICT services, availability – other ICT services, integration & functionality	graded scale (1-5) graded scale (1-5) graded scale (1-5) graded scale (1-5) graded scale (1-5)
Cargo security	Number of incidents per total number of shipments
Cargo safety	Number of incidents per total number of shipments
Environmental sustainability (*)	
CO_2-eq	g/tonne-km
SO_2	g/1000 tonne-km
NOx	g/1000 tonne-km
PM_{10}	g/1000 tonne-km
Infrastructural sufficiency	
Congestion	average delay (hours) per tonne-km
Bottlenecks – geography – infrastructure capacity – infrastructure condition – administration	graded scale (1-5) based on list of bottlenecks per category, accompanied by list of projects aiming at their removal/mitigation
Social issues	
Corridor land use – urban areas – sensitive areas	 % of buffer zone (**) covered by urban areas % of buffer zone (**) covered by environmentally sensitive areas
Traffic safety	sum of fatalities and serious injuries per year per million tonne-km
Noise	% of corridor length above 50/55 dB
(*) well-to-wheel approach (**) shaped by a radius of 20 km around the median line of the corridor	

Table 1: Initial set of KPIs

Following an internal round of KPI screening, a revised set was presented to a third regional SuperGreen workshop, organised in Malmö, Sweden and hosted by the Swedish Transport Administration. The aim was to set a basis for collaboration with the numerous green corridor initiatives in the Baltic region and take advantage of an audience directly or indirectly exposed to the green corridor concept. The KPI set that resulted from this process is the one of Table 2 below. This set was reaffirmed at the fourth regional stakeholder workshop of the project in Sines, Portugal.

KPIs	Units
Relative cost	€/tonne-km
Transport time (or speed)	hours (or km/h)
Reliability (time precision)	% of shipments delivered on time (within acceptable window)
Frequency of service	Number of services per year
CO_2-eq	g/tonne-km
SO_x	g/tonne-km

Table 2: Revised set of KPIs

5 Benchmarking results

The Brenner corridor, extending from Malmö (SE) to Palermo (IT) with branches from Salzburg (AT) to Trieste (IT) through the Tauern axis, and from Bologna (IT) to Athens/Thessaloniki (GR) through the Italian and Greek Adriatic ports, was selected to be examined first as a pilot case for testing the methodology. The following steps were followed:

- the Brenner pass (Munich – Verona) was selected as the corridor's critical segment;
- the cargo flows along this critical segment were located in literature;
- a small number (15) of typical transport chains concerning typical cargoes were identified;
- detailed information concerning these transport chains (type of vehicles used, load factors, etc.) was collected from studies and interviews with transport service providers; and
- the selected KPIs were evaluated for each one of these transport chains (emissions were estimated through the EcoTransIT World web based tool).

The chains examined for the Brenner corridor and the corresponding KPI values are presented in Table 3 below.

Transport chain identity				Key Performance Indicators (KPIs)										
No	Origin-Destination	Mode	Annual vol. (t)	Cost (€/tkm)	Time (h)	Reliab. (%)	Freq. (no/year)	ICT (%)	Security (%)	Safety (%)	Emissions (g/tkm)			
											CO2-eq	NOx	SOx	PM10
1	Verona-Naples	Train	61.000	-	12	92	260	100	0	0	17.61	0.02	0.09	0.006
2	Verona-Nurnberg	Train	500.000	0.80	9	50	260	100	0	0	14.87	0.01	0.05	0.004
3	Verona-Nurnberg	Train	2.700.000	0.05	9	100	572	100	0	0	14.87	0.01	0.05	0.004
4	Verona-Berlin	Road	1.100	0.07	25	50	2600	0	0	0	71.86	0.51	0.08	0.013
5	Rome-Nurnberg	Road	32.000	0.05	48	80	104	100	0	0	62.08	0.47	0.07	0.013
6	Rome-Palermo	SSS	1.500	0.04	24	100	52	100	0	0	16.99	0.25	0.12	0.018
7	Verona-Trelleborg	Intermodal	13.000	0.04	50	98.8	624	100	0.5	2	10.62	0.01	0.02	0.002
8	Bari-Athens	Intermodal	10.000	0.04	72-96	95	52	100	<0.5	0	27.28	0.18	0.08	0.008
9	Bari-Thessaloniki	Intermodal	3.000	0.03	72-96	95	26	100	<0.5	0	42.11	0.29	0.10	0.011
10	Trieste-Munich	Train	81.000	-	12	85	416	100	1	1	12.53	0.01	0.04	0.003
11	Trieste-Salzburg	Train	652.500	-	8	90	208	100	1	1	9.49	0.01	0.05	0.003
12	Trieste-Villach	Train	135.600	-	4	95	364	100	1	1	16.36	0.02	0.09	0.006
13	Berlin-Thessaloniki	Intermodal	437	0.09	76	99	104	0	<1	1	27.11	0.19	0.06	0.006
14	Bari-Berlin	Road	24.000	0.05	72	99	1040	100	0	0	46.51	0.11	0.05	0.004
15	Bari-Athens	Intermodal	8.500	0.05	24	99	520	100	0	0	25.41	0.25	0.14	0.024

Table 3: The Brenner corridor chains

Two levels of aggregation were foreseen in the initial methodology. The first one concerned the estimation of one set of KPI values for each and every segment of the corridor by aggregating all flows that involve the relevant segment. Weighted averages would be used for this aggregation. The respective transport work (tonne-km), cargo volumes (tonnes) or other flow characteristics (e.g. number of consignments) were to be used as weights depending on the definition of each KPI. However, the reliability of such an estimate was questioned due to the fact that:

- the sample was very thin (for some segments there was only one observation) and the resulting figure would have limited statistical value if any;
- not all of the chains reflected the entire door-to-door transport as needed to ensure comparability; some of them covered only terminal-to-terminal operations; and
- most data was collected through interviews and reflected personal assessments without strict validation.

It was, thus, decided to express corridor benchmarks as ranges of values that resulted from the transport chain data, i.e. minimum and maximum values of all transport chain level KPIs. Table 4 below summarises the KPI values of the Brenner corridor presented by transport mode.

	Intermodal	Road	Rail	SSS
CO2 (g/tkm)	10.62-42.11	46.51-71.86	9.49-17.61	16.99
SOx (g/tkm)	0.02-0.14	0.050.080	0.04-0.09	0.05-0.12
Cost (€/tkm)	0.028-0.092	0.05-0.06	0.05-0.80	0.04-0.05
Av. speed (km/h)	9-41	19-40	44-98	23
Reliability (%)	95-99	25-99	60-95	100
Frequency (no/ year)	26-624	52-2600	208-572	52-520

Table 4: KPI values for the Brenner corridor

The most important conclusion of this exercise is the width of the range within which some KPI values fluctuate. Even after taking into consideration the drawbacks mentioned above, one would expect more concise estimates.

The second level of aggregation initially foreseen concerned an overall corridor (or corridor segment) rating, that would combine all KPIs into a single numerical value through the use of relative weights assigned to each KPI. The rationale for such a rating was to cope with interactions between different KPI groups, as is for example the case where measures introduced to improve performance in relation to one area might have adverse effects on another. However, this approach was later considered as an unnecessary complication on the grounds that:

- the weights needed for such calculation very much depend on the user (different users will propose different weights),
- it is a political issue best left for policy makers to decide and hence one that we should avoid,
- weights, if assigned, might lead to wrong interpretations,
- weights change over time (e.g. social issues might become more significant in the future), and
- weights would not reflect country specific characteristics of transport operations.

The issue was discussed extensively in a SuperGreen workshop organised in Naples, Italy and a decision was reached to exclude such attempt from the methodology. The decision was later confirmed by the project's Advisory Committee.

The methodology, as it resulted from the pilot exercise, was applied for benchmarking five other corridors (Cloverleaf, Nureyev, Strauss, Mare Nostrum and Silk Way). Lack of data combined with time and resource restrictions did not permit the examination of the remaining three corridors (Finis Terrae, Two Seas and Edelweiss). The results are summarised in Table 5 below.

Corridor name	Mode of transport	CO2 (g/tkm)	SOx (g/tkm)	Cost (€/tkm)	Average speed (km/h)	Reliability %	Frequency x times/year
Brenner	*Intermodal*	10.62-42.11	0.020-0.140	0.03-0.09	9-41	95-99	26-624
	Road	46.51-71.86	0.050-0.080	0.05-0.06	19-40	25-99	52-2600
	Rail	9.49-17.61	0.040-0.090	0.05-0.80	44-98	60-95	208-572
	SSS	16.99	0.050-0.120	0.04-0.05	23	100	52-520
Cloverleaf	*Road*	68.81	0.091	0.06	40-60	80-90	4680
	Rail	13.14-18.46	0.014-0.021	0.05-0.09	45-65	90-98	156-364
Nureyev	*Intermodal*	13.43-33.36	0.030-0.150	0.10-0.18	13-42	80-90	156-360
	SSS	5.65-15.60	0.070-0.140	0.05-0.06	15-28	90-99	52-360
Strauss	*IWT*	9.86-22.80	0.013-0.031	0.02-0.44	-	-	-
Mare Nostrum	*SSS*	6.44-27.26	0.092-0.400	0.003-0.200	17	90-95	52-416
	DSS	15.22	0.22	-	-	-	-
Silk Way	*Rail*	41.00	-	0.05	26	-	-
	DSS	12.50	-	0.004	20-23	-	-

Table 5: Benchmarking results (all corridors)

It is important to note that the results of Table 5 are achieved using the EcoTransIT World web emission calculator and self-reported figures from interviewees and literature review. As such, they are only indicative. Using other tools and methods might have led to different results. The accuracy problem identified in the Brenner corridor is confirmed.

6 Conclusions

The work thus far performed under the SuperGreen project leads to the following conclusions:

- Corridor benchmarking is possible but we need to standardise the measurement and allocation of emissions if we want to develop operational KPIs used for benchmarking purposes.
- Data collection proves to be a serious problem. Relevant obligations imposed by the corridor management might be a solution. Automated ICT applications, able to provide cargo flow data without causing physical disruptions of vehicle flows or other administrative bottlenecks, can be of particular importance.
- Aggregating chain-level KPIs to a single set of corridor- or segment-level ones is possible provided that an adequate sample of transport chains is examined under the same conditions. Otherwise, the use of value ranges is suggested.
- Aggregating corridor-level KPIs to an overall corridor rating should be omitted because:
  - There are problems associated with the weights needed for such calculation.
  - It is a political issue best left for policy makers to decide.

Work on this project is ongoing and is scheduled to continue in the foreseeable future. What is not included here will be reported in future publications and on the project's web site (www.supergreenproject.eu). In view of important policy implications and of the need of the policy makers to be able to evaluate alternatives in an effective way, methods and tools specifically designed to tackle such problems seem more required than ever. It is hoped that work such as the one described herein will help toward that goal.

Acknowledgements

As already mentioned above, the work reported herein was supported in part from EU project SuperGreen (grant agreement TREN/FP7TR/233573/ »SUPER-GREEN«). The assistance of Rein Jüriado and Fleur Breuillin, both Project Officers at the European Commission (DG-MOVE), for their technical and administrative support and for their advice in general is gratefully acknowledged. We are also thankful to (alphabetically) Sergio Barbarino, Niklas Bengtsson, Bianca Byring, Chara Georgopoulou, Even Ambros Holte, Christopher Pålsson, Konrad Pütz, Sanni Rönkkö, Anders Sjöbris, Andrea Schön, Panos Tsilingiris, Aud Marit Wahl, the members of the project's Advisory Committee and numerous other individuals, perhaps too many to mention by name, for their help.

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The Swedish Green Corridor Initiative – history, current situation and thoughts about the future

Rikard Engström

Abstract

Green corridors aim at strengthening the logistics industry's competitiveness and create sustainable solutions. Green corridors will enable large-scale and long-term transport solutions through sufficient and attractive infrastructure and supportive regulatory framework. Green corridors are, of course, to a large extent about the green, environmental, perspective. However, the concept does not foresee the other parts of the concept of sustainability such as the need for an economic rationale motivating the corridor and the operations within the corridor. In 2010 the Swedish Maritime Administration, Trafikverket (the Swedish Transport Administration) and VINNOVA received a governmental commission to strengthen the work of green corridors.

This paper describes the concept of green corridors, its fundamental ideas and the way forward. Focus is on the Swedish initiative within green corridors. The work carried out in Sweden has been one of the key drivers for developing the idea of green corridors. The paper takes the reader from the very beginning through the current work and into some thoughts and plans for the future.

1 Introduction

There is a challenge for the logistics sector and the society to achieve long-term sustainability since transports are a part of the problem but also a part of the solution. One way of accepting the challenge is to develop trans-national transportation corridors. Such corridors would increase competitiveness and contribute to a sustainable Europe.

Green corridors is a European Commission initiative aiming at strengthening the logistics industry´s competitiveness and create sustainable solutions. Green corridors will enable large-scale and long-term transport solutions through sufficient and attractive infrastructure and supportive regulatory framework. The concept is not mode-specific neither is it devoted only to intermodal solutions. It is important to develop green corridors for a number of reasons. Among these we find environmental reasons (emissions, noise etc), competitiveness of the manufacturing industry, better use of money spent on infrastructure, and to cope with the expected increasing freight movement across Europe and globally.

The basic idea behind the green corridor concept is to provide a more sustainable transport solution based on economies of scale in infrastructure as well as operations. The infrastructure should be characterized by using innovative solutions and demonstrate/test new techniques and ideas that will result in greener transport solutions. Using the vocabulary from the field of logistics time and place utility is of highest importance. The attractiveness of the infrastructure and the offered services must be high to strengthen its relative importance. The benefits for the operators and transport buyers will be safer, more reliable transports and the benefits to the society will be greener and more cost efficient building and maintenance of the infrastructural resources.

2 History

Green corridors as a concept stem from an initiative of the European Commission (in Freight Transport Logistics Action Plan (FTLAP), 2007). According to the FTLAP green corridors will »reflect an integrated transport concept where short sea shipping, rail, inland waterways and road complement each other to enable the choice of environmentally friendly transport«. The plan also stresses the importance of »adequate transhipment facilities at strategic locations« and supply points for bio-fuels. The EU has continued to support the concept of green corridors both through financial means (funding projects) and through other forms of encouragements to speed up the shift towards greener and more efficient logistic solutions.

Green corridors should enable large-scale and long-term transport solutions through a sufficient and attractive infrastructure combined with a supportive regulatory framework.

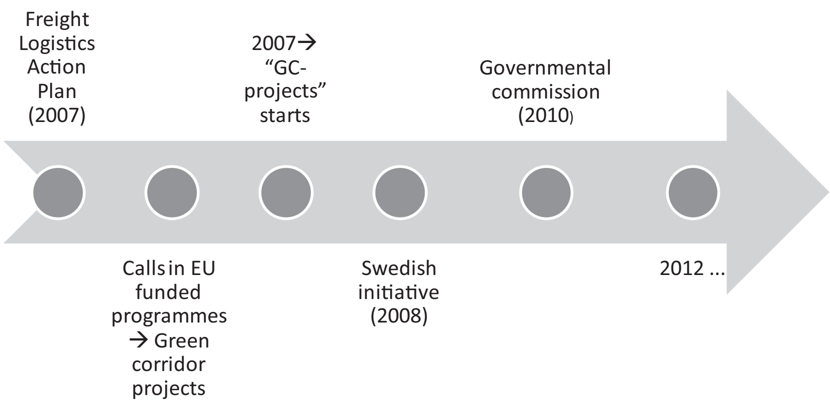

Figure 1: The Green corridor development

One essential pillar in green corridors is the concept of co-modality. The concept was introduced in the mid-term review of the EU white paper Time to Decide. It was defined as: »the efficient use of different modes on their own and in combination will result in an optimal and sustainable utilisation of resources«. The concept of co-modality is important to the green corridors in order to stress the fact that the logistic solution chosen by the market can, and should, be a decision made by the shippers/forwarders etc. In the green corridors the consequences of the choice can be clearer. Since the wealth of the society depends on freight transports and we in the foreseeable future will need all four transport modes it is important to stimulate that a green development occurs for uni- as well as multimodal freight transport solutions. The concept of co-modality has been and still is very important when it comes to green corridors. The concept takes us one step further to be able to focus on the consequences of the transport/logistics systems and not focus on either modal or intermodal issues. Co-modality gives room for improvements and demands in an intermodal as well as in a unimodal set up. This concept thus take us beyond the »old« thinking were transport modes often were described as competitors and forming a new thinking where the consequences of the transport movement is put in focus. This »new« way of thinking focuses the time and place utility created by the transport solution as well as the negative consequences for individuals as well as the society as a whole. Put simply, the consequences of the transport movement matters not the modes as such!

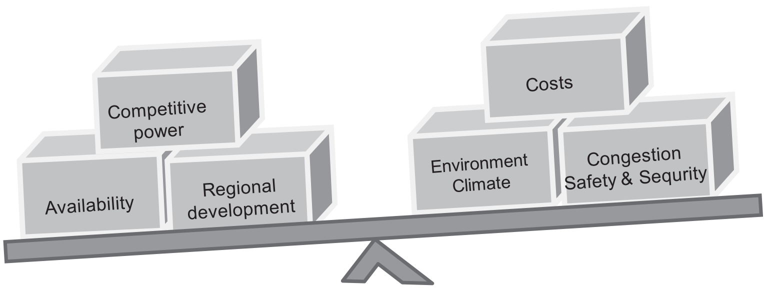

Figure 2: The Effects Seesaw

Another essential pillar of the green corridors is the understanding that transportation, as being a major sub-function of logistics, creates time and place utility of goods. Some underlying phenomena make this time and place utility possible. Among these we find aspects such as the infrastructure, the information system, the efficiency of the transport mode and the load carriers but also the demands of the customers and the terminal function.

3 Current

In parallel with the Swedish National Initiative to Green Corridors (in short the Swedish Initiative), which will be further described below, several other projects, some financed from the EU and others with national funding, were started in 2008/2009. One of the most influential and largest (regarding ambition as well as number of partners representing different countries) projects was the »Supergreen[1]«. The aim of Supergreen is to »promote the development of European freight logistics in an environmentally friendly manner«. The project is multimodal and has a broad European coverage. The abbreviation Supergreen stands for Supporting EU's Freight Transport Logistics Action Plan on Green Corridors Issues. It is a broad and ambitious project looking into a wide range of green corridor-relevant issues. The project takes on a holistic approach to create »win-win« solutions for parties involved in the corridors. Supergreen will evaluate a series of corridors throughout Europe

The number of projects that in one way or the other relate to the concept of green corridors is huge. The reason is, to a large extent, that the concept of green corridor cover environmental and economic perspectives – areas which most »modern« projects have been focusing their efforts for many years (before »inventing« the green corridor concept). However, some large and influential projects dealing with green corridors in one way or the other, besides the Swedish Initiative, are:

- Batco[2] - the »*main objective is the sustainable and harmonised advancement of the Baltic-Adriatic transport axis and its competitiveness*«.
- East West Transport Corridor II – aiming at developing »*efficient, safe and environmentally friendly handling of the increasing amount of goods going east-west in the south Baltic region*«
- NECL II[3] – »*aims to develop and promote the east-west Midnordic Green Transport Corridor as a cost-effective and environmentally friendly transport route*«
- Scandria[4] - focusing on developing a green and innovative transport corridor from Scandinavia to the Adriatic Sea.
- SoNorA[5] - aims at developing accessibility in the South-North direction
- TransBaltic[6] - focus on the Baltic Sea Region and aims to »*provide regional level incentives for the creation of a comprehensive multimodal transport system*«.
- Transitects[7] – focuses mainly on the railway and intermodal traffic in the Alpine corridors

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1 www.supergreenproject.org. Date 2011-05-31.
2 http://www.baltic-adriatic.eu/ Date 2011-05-31.
3 http://www.midnordictc.net/ Date 2011-06-01
4 http://www.scandriaproject.eu/ Date 2011-05-31.
5 http://www.sonoraproject.eu/ Date 2011-05-31
6 http://www.transbaltic.eu/ Date 2011-06-01
7 http://www.transitects.org/ Date 2011-06-01

- Öresund EcoMobility[8] - aims to increase knowledge and innovation within climate friendly transport in the Öresund region.

The list could, of course, be extended further. However, it does neither claim to be complete nor to bring forward the »most important« projects. In the list above no unimodal projects are listed. However, this does not mean that unimodal projects could not be green corridor projects. In Sweden there are several such projects that could be classified as green corridor projects. Two of them, both dealing only with road freight issues, are a) Green freight road corridors (a project involving Volvo, Scania and Trafikverket) and b) KNEG (Climate Neutral Freight Transportation) in which a large number of companies, researchers, organisations and public authorities have joined forces to work towards a shared goal: to reduce the climate impact of goods transport on Swedish roads (www.kneg.org).

3.1. The Swedish National Initiative

The Swedish initiative began as a response to the EU Commissions idea presented in the Freight Logistic Action Plan in 2007. In 2008 the Swedish initiative started to work more operative using working groups in different fields.

In the beginning of the Swedish initiative a broad group of people started to discuss the phenomena and what the core of the concept was. This group consisted of people representing the Ministry of Enterprise, Energy and Communications, the administrations, the industry/shippers, academics, and the transport industry including terminal owners etc. Two of the most avid supporters for the concept were Stefan Back (then representing the Swedish International Freight Association) and Jerker Sjögren (then representing the Ministry of Enterprise, Energy and Communications). Around them a core group of about 30 persons representing were active. The broad collaboration between different type of actors involved in the logistic chain (and the presumptions for the function of the logistic chain) has been, and still is, one of the strengths in the initiative. Trafikverket was one of the most active partners during the early years 2008-2010.

3.2. Description of the concept

Neither the term »green« nor the term »corridor« is simple to define. This is also clear when looking at different green corridor projects and initiatives in Europe One consequence of the fact that there is no simple and clear definition is that there is a huge spread in different projects characterizing themselves, or being characterized by others, as green corridor projects.

In Sweden this lack of common understanding of the concept was intensively discussed in during the first year of the initiative. Therefore, one of the most important activities carried out in the beginning was to describe the concept to

8 http://www.oresund.org/ 2011-04-30

set the playground. After discussing different alternatives it was decided that a green corridor is characterized by:

- sustainable logistics solutions with documented reductions of environmental and climate impact, high safety, high quality and strong efficiency,
- integrated logistics concepts with optimal utilization of all transport modes, so called co-modality,
- harmonised regulations with openness for all actors,
- a concentration of national and international freight traffic on relatively long transport routes,
- efficient and strategically placed trans-shipment points, as well as an adapted, supportive infrastructure, and
- a platform for development and demonstration of innovative logistics solutions, including information systems, collaborative models and technology.

This description of the green corridor concept has later on been widely accepted among projects dealing with green corridors, representatives of the European commission, and among politicians in just a few years. One recent initiative to describe and develop the field was taken by the project Interreg-project East West Transport Corridor. In short the report concluded that there seem to be a broad approval of the Swedish definition of the concept.

Another important area in forming the Swedish initiative was the mapping and description of 30-40 national and international projects and initiatives that took place. This mapping was, even though it could be characterized as »quick and dirty« a first step towards a deeper understanding of the concepts of green corridors.

3.3. The Governmental Commission

In 2010 the Swedish Government decided to take the initiative one step further giving the commission to Trafikverket (the Swedish Transport Administration), the Swedish Maritime Administration, and VINNOVA (the Swedish Governmental Agency for Innovation Systems). This commission, running until 2012, took the Swedish initiative into a second phase. The commission states that the three administrations mainly should provide administrative support in the form of secretarial tasks for the development of green corridors. The administrations are also supposed to actively participate in working groups; interact with stakeholders, organizations, businesses and others in strengthen the work of green corridors. Furthermore, the administrations should assist the Ministry of Enterprise, Energy and Communications in developing green corridors in a national as well as an international context.

The activities within the Swedish initiative is influenced by the trinity of technology, corridors and business models – all supported by policies and regulations. This is described in the figure below. The idea is that green corridors projects/initiatives could be divided into three main categories that interact and complement each other. These categories promote the view of logistics/transports as a system of integrated services and properties aiming at increased efficiency and a reducing negative ecologic impact. A project can be composed of a mix of the different project categories or one specific project category.

The three parts are:

Corridors (links and nodes): A corridor project is a geographic sub-corridor of the defined main European Green corridors or a corridor that support those. It is based on the needs of an efficient transport infrastructure, both in a physical and/or communicative aspect. A corridor project promotes collaboration between transport modes and optimal use of respective transport mode, including transport nodes (hubs, cross docks etc). It can be both a national and cross-border corridor.

Transport techniques: Projects related to transport techniques encompass features and properties of various types of equipment used in transport operation. The main focus is on the different transport modes, transport/load units and transfer/reloading of goods between different modes. Examples are techniques related to trucks, trailers, railway engines, rail wagons, ships, port handling, containers, packaging, cranes, stackers etc.

Transport/logistics solutions: Refers to complete solutions which integrate different partners and stakeholders who mutually form a business case promoting efficiency and decreased ecologic impact.

It is in general terms a complete freight logistic/transport setup that fulfil a product owner delivery demand and is often connected with a new business model.

The underlying and **supporting policies and regulations** are important in order to take the green corridors from theory to reality.

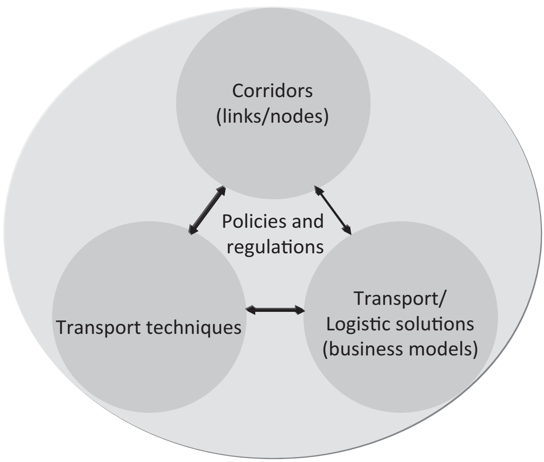

Figure 3: The three pillars and the underlying field of policies and regulations

Recently, Trafikverket has launched a Freight Transport Strategy. This document clearly points out the importance of working with the green corridor area and the concept of co-modality. The strategy is built up around the challenges identified by the STA.

To be able to take the concept of green corridors from being a good idea towards having a real impact on the infrastructure and the operations the Swedish initiative focuses mainly on two freight transport corridors. These are the corridor stretching from Oslo to Rotterdam and the second goes between Narvik and Neaples. The efforts are, for practical reasons, concentrated on the former corridor. Furthermore, main focus is on the parts of the corridors that are on Swedish soil, simply because of the fact that this part of the corridor is where we are most likely to have a direct influence.

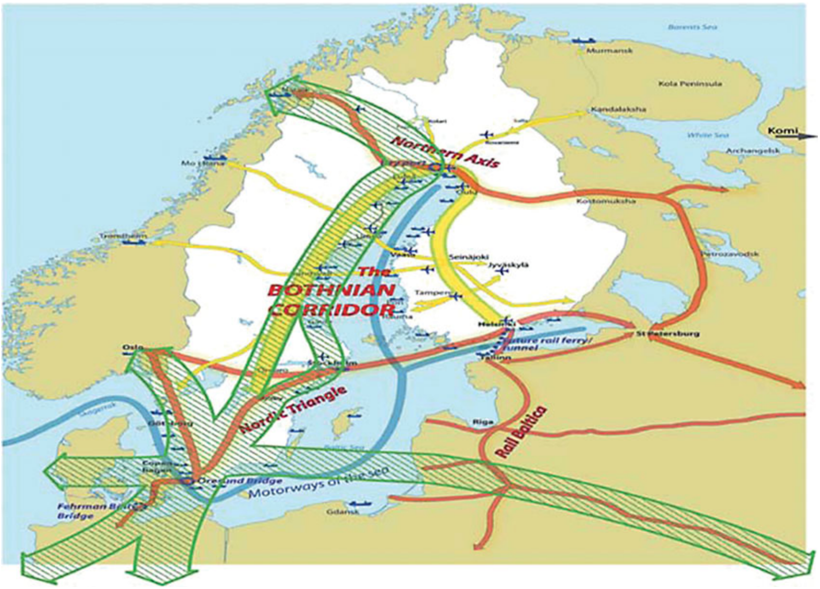

Figure 4: Main Swedish corridors

It must be understood that many projects, demonstrations etc. of different kinds take place outside of the specified green corridors (as described by, for instance, the Swedish Initiative or Supergreen). Development, wherever it occurs, applicable to green corridor idea should, of course, be used to move towards greener and greener logistic solutions in the whole network. For this reason the Swedish Initiative has high ambitions to follow and cooperate with other corridors/initiatives in order to develop the field of green corridor together. Then we might reach our common goal of implemented, efficient, and sustainable co-modal corridors, links, and networks with green characteristics!

4 Future

The recently published White Paper »Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system« (2011), which currently is circulated for comments/considerations, only mentions green corridors as a facilitator for modal shift. However, the paper says that »*The EU needs specially developed freight corridors optimized in terms of energy use and emissions, minimizing environmental impacts, but also attractive for their reliability, limited congestion and low operating and administrative costs.*» Multimodal freight corridors are more in focus in the paper which seems to have dropped the concept of co-modality.

To take the green corridors from a vision to reality we work intensively in a so called triple-helix setting with developing the corridors from an operational as well as from an infrastructure perspective. The work is especially intensive within Sweden but also in an international context.

To make the concept of green corridors more down to earth we are currently focusing three areas. These are:

- Demonstration day – on September the 22th we are planning a demonstration day in Gothenburg. F focus will be on projects that are close to the market. This will help us spreading information about what is being done and to speed up the development. The ambition is that the demonstration day will be a tradition so that we will arrange one similar day in 2012. The idea then is to make it international since many initiatives related to green corridors end in 2012.
- Criteria manual – in an earlier report we described criteria for green corridors. Focus there was on energy, CO2, SOx, and NOx. The manual aim to be the next step describing how to measure these criteria. This is done using case studies and the manual, which will be ready in September 2011, will consist of 6-8 such cases. In the cases real transport chains will be described focusing on »complex« chains, i.e. chains involving terminals or different modes used in combination.
- Mapping of projects – to know what has been done, what is being done and where the »white spots« are from a knowledge perspective an earlier mapping of green corridor relevant projects is now being updated and broadened and deepened. Today the mapping consists of about 150 projects related to green corridors.

Many ongoing initiatives and projects regarding green corridors end in 2012. Among those we find, for instance, Super Green, Scandria, EWTCII, TransBaltic, and the Swedish green corridor governmental commission. The fact that so many important projects end during the same year gives a unique platform and an important knowledge base to draw future national and international strategies on. There is a common challenge for us to collaborate internationally but also across disciplines to use this opportunity to take the concept from words to actions with real results.

Looking beyond 2012, when the Swedish Initiative as well as many other GC-projects has come to an end, we are positive that a lot of development must continue to form greener logistics. This calls for long-term challenges in the field of green corridors/networks/logistics that must be dealt with in areas such as regulations, techniques, behaviour and building/maintaining infrastructure. Sweden is likely to keep having high ambitions in this field.

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The European rail freight corridors – Mission of the regulatory bodies

Jessika Schwecke, Wolfgang Groß

Abstract

Following a lengthy legislative procedure Regulation (EC) 913/2010 concerning a European rail network for competitive freight (referred to in the following as the Regulation) came into force on 9 November 2010. The intention of the EU Commission is that the new Regulation will strengthen cooperation between infrastructure managers and in this way contribute to the construction of a sustainable and environmentally friendly system of transport. The Regulation deals with the establishment of nine international corridors and fundamental organisational rules concerning investment planning, capacity and traffic management. It is the task of the national regulatory bodies which hold responsibility for specific network sections covered by the freight corridor to ensure non-discriminatory access to international rail services and to ensure efficient coordination among themselves on the basis of the Regulation. The first corridors must be established by 10 November 2013; these will include Corridor 1 from the Netherlands/Belgium, Germany, Switzerland and Italy.

The tasks and fields of action of the regulatory bodies are discussed in the following. The discussion outlines the role of the Independent Regulators' Group – Rail (IRG-Rail), cooperation between independent regulatory bodies on the creation of the requisite administrative structures and the declarations which have already been made by IRG members on the basis of the position paper issued by the IRG-Rail Working group rail freight corridors on 28/29 November 2011.[1]

1 The role of IRG-Rail

The memorandum of understanding establishing the »Independent Regulators' Group – Rail« (IRG-Rail) was signed by 15 national regulatory bodies in The Hague on 9 June 2011. IRG-Rail provides a platform for the exchange of information between regulators and is intended to ensure consistent application of the European regulatory framework. Close cooperation between national rail regulatory bodies is an important step towards the creation of a single, competitive internal market. The IRG regards strong, independent and effective regulation as essential for the non-discriminatory treatment of all parties. Regulation plays an essential role in promoting competition by effectively combating anticompetitive

1 IRG-Rail Position Paper Rail Freight Corridors, http://irg-rail.eu/public-documents/2011/

conduct and the abuse of a dominant market position. Functioning competition ensures that services meet high standards of efficiency and quality.

In the first year of this Group, the Chairperson of IRG-Rail was the President of the Bundesnetzagentur, the Vice-Chairperson was from the ORR, the British regulatory authority. Other regulatory bodies have since joined the Group.

At the present time, membership of IRG-Rail consists of the national rail regulatory bodies in Denmark, Germany, Estonia, France, Finland, United Kingdom, Macedonia, Croatia, Latvia, Luxembourg, Netherlands, Norway, Austria, Sweden, Slovenia, Switzerland and Hungary. The objective of the newly established Group is to promote sustainable and effective competition in the European rail sector and to safeguard the interests of passengers and freight customers. Close cooperation will also ensure a common approach to the European regulatory framework for railways.

One aspect of the work of IRG-Rail will focus on developing a common approach to the establishment of international freight corridors. A working group coordinated by the Bundesnetzagentur has been set up for this purpose. The working group will identify organisational issues and agree on rules which will ensure close cooperation under Article 20 of the Regulation. Members implement the measures nationally after having reached agreement in the IRG plenary. Other regulatory bodies are also entitled to adopt these proposals themselves and to contribute to cooperation in the corridors accordingly.

Figure 1: These are the Heads of the Regulatory Bodies founding IRG-Rail on 9 June 2011 in The Hague (Source: Bundesnetzagentur Bonn)

2 Cooperation between regulatory bodies

2.1 Responsibilities

a. Infrastructure managers

The national regulatory authorities initially continue to be responsible as previously for monitoring the activities of their national infrastructure managers (IM) in the freight corridors even after the Regulation has been implemented. This monitoring work will be undertaken in accordance with existing national law and Article 20 of the Regulation. IRG members have agreed to work closely together in this matter to ensure equivalent and non-discriminatory access to railway lines and service facilities.

b. One-stop shop

The Regulation envisages the creation of a new body for each freight corridor to facilitate requests for infrastructure capacities: this is the one-stop shop (OSS), Article 13 of the Regulation. This body will accept train path applications as part of its path allocation functions for the respective freight corridor and decide which of the authorised applicants are allocated a train path. This decision is then notified to the affected IMs which will respond by processing the path rejections and enter into contractual arrangements with the authorised applicant which has been favoured in the decision taken by the OSS.

The OSS must perform its work in a transparent and non-discriminatory manner. In the process it is subject to the control of all the regulatory bodies for the corridor, Article 13(5) of the Regulation. It is immaterial in which country the OSS which is responsible for the freight corridor has its head office. Where more than one body is responsible, IRG members have agreed that it would be appropriate if only one of the responsible bodies issues a decision to the OSS in the event of a dispute. IRG members will quickly evaluate criteria in this context which allows such action to be taken in compliance with national legislation.

2.2 Key monitoring activities

a. IM/OSS

Definition of train paths

Under Article 14(3) of the Regulation the IMs must agree international pre-arranged train paths and publish these 11 months before the working timetable changes. Train paths are defined according to the need for capacity identified by the management board (in which the infrastructure managers are represented, Article 8(2) of the Regulation) evaluated on the basis of the transport market studies stipulated in Article 9(3) of the Regulation (which are also commissioned by the IMs).

The *immutable* definition of pre-arranged train paths by the IM is a completely new feature in the allocation of train paths. To date Directive 2001/14/EC has worked on the premise of »open access«. This is based on the assumption that the allocation of railway infrastructure capacity is initiated by the party with access entitlements, i.e. by making an application to use railway infrastructure. Parties with access entitlements use the application to describe their wishes in terms of arrival and departure locations, time slots and rolling stock. Pre-arranged international train paths which, under Article 15 of Directive 2001/14/EC, have always been made cooperatively with the IMs could also be changed as part of the timetabling process under Article 18(2) of Directive 2001/14/EC.

IRG members believe that this is a source of considerable potential discrimination given that capacity requirements are determined and assessed by the IMs and that the definition of train paths includes timetabling, route-related and operational components which may favour or discriminate against railway undertakings (RUs). This also includes the slots in service facilities (terminals, ports, marshalling yards, etc.) linked to the train paths. IRG members will monitor the establishment of bindingly pre-arranged train paths on the basis of Article 20 of the Regulation and the stipulations of Directive 2001/14/EC and will ensure that they are implemented in a non-discriminatory manner.

Allocation process

Regulatory bodies may also need to take action in several areas in relation to the allocation of pre-arranged train paths.

Firstly, the OSS may violate the legal rules if it either fails to meet its obligations under Article 13 of the Regulation, such as the duty to make freely available a register of applications, or to comply with the correct allocation decision based on the rules concerning assignment of capacities. Transparent rules must be defined concerning the decisions which must be taken by the OSS.

Secondly, the IMs may not properly handle applications which cannot be approved by the OSS.

Against the background of these initially identified potential legal violations in the construction and allocation of train paths on the freight corridors IRG members have agreed to draw up detailed rules on cooperation in the Working group rail freight corridors which will enable decisions to be taken quickly and all the relevant regulation bodies to be involved.

b. Conditions of use of the freight corridor

Article 18 of the Regulation deals with the conditions of use of the freight corridor. In the view of the IRG members the Regulation does not mean that a European or interstate institution will issue »conditions of use for the freight corridor«.

The document which must be published by the management board under Article 18 of the Regulation will merely summarize the conditions of use (network statement and service facilities statement) issued by national operators. This does not alter the legal character of national network statements and they therefore continue to be subject to the control of the responsible national regulatory bodies.

c. Cooperation between IMs

With regard to the need to pre-arrange train paths for international freight services, IMs must also coordinate access to service facilities (Article 14(9) of the Regulation). This calls for close coordination between infrastructure managers and terminals, ports and other service facility operators. On the one hand, service facilities must be defined and made known in the corridors and, on the other hand, transparent rules must be established on how pre-arranged train paths and slots are coordinated in the different service facilities. IRG members will also give considerable attention to this issue and review the regulations of the participating infrastructure managers and service facility operators.

2.3 Traffic management

There are numerous factors which may interrupt rail traffic which are the result of external or internal events. The IM's operation control centres are responsible for issuing the necessary operational instructions in response to frequent deviations from planned operations. IRG members find that the dispatching decisions made by these control centres are based on different national regulations. In Germany the regulations on dispatching were revised and supplementary regulations agreed on the initiative of the Bundesnetzagentur several years ago. The Bundesnetzagentur takes the view that these are important regulations with regard to access to the network. Many railway undertakings have confirmed to the Bundesnetzagentur in the past that non-discriminatory and transparent regulations for the dispatching of their trains are important in relation to delays and interruptions to train operations.

In the view of IRG members it would be a sensible step forward to harmonize the different national traffic management regulations. In any case IRG members will continue monitoring to ensure that the rules are, as a minimum, not defined in a discriminatory manner.

2.4 Works

Article 12 of the Regulation addresses »works« on the infrastructure on routes in the corridor. The Article stipulates that the management board (representing the IMs, Article 8(2) of the Regulation) must coordinate its schedule for the carrying out of all the works on the infrastructure in an appropriate manner and timeframe. The IRG regulatory bodies take the view that the IMs in the corridor must present a coordinated plan to inform the railway undertakings as early as possible about works which will lead to capacities being restricted and trains delayed. This information must contain all the operational data which is relevant for the RUs, including in particular the times at which trains are due to arrive at the destination station. This information must enable the RUs to plan their resources (personnel, wagons, locomotives, other technical and operating resources) accordingly and to inform their customers in good time. Contracts which have already been agreed must be fulfilled and the IMs are responsible for coordinating and communicating changes in the timetable.

2.5 Making the corridors operational

The annex of the Regulation lists the dates by which each of the corridors will be established. A key issue is the time at which the IMs publish the pre-arranged train paths and offer them to the RUs. IRG members take the view that this should happen as soon as possible, in any case no later than in January 2014 for the changes to the working timetable in December 2014 within the new OSS-structure. IRG members believe that the following measures are needed and must be implemented in order to establish the corridor in November 2013:

- Preparation of an implementation plan with the details mentioned in the Regulation
- Setting up of the OSS (for each corridor)
- Preparation of a market study
- Publication of information on the conditions of use for the freight corridor
- Development and publication of agreed rules on the handling of requests and the allocation procedure for train paths by the OSS.

2.6 Outlook

IRG members have agreed to work out the details for close cooperation on all the issues relating to the corridor very swiftly. The focus of future activities will be on the following fields:

- Publication of the pre-arranged train paths
- Publication of the market study
- Establishment of the corridor – OSS
- Complaints management by the regulation bodies
- Cooperation between regulatory bodies
- Conditions for the use of the corridors, including rules on traffic management and works
- IM quality management.

IRG members are aiming to meet the stipulations and objectives of the Regulation by acting in concert in terms of availabilities and transparent processes and in this way to strengthen the competitiveness of international rail freight traffic.

Existing transport barriers for intermodal transportation between Central Europe and Southeast Europe – a holistic survey

Gerald J. Achauer, Christian W. Flotzinger

Abstract
The potential of co-modality within the Central- and Southeast European region is not used sufficiently. Shifting from road to rail and/or inland waterway is hindered by a number of existing bottlenecks and barriers. These barriers to overcome represent an interdisciplinary and complex field of different problems. The aim of this research work is the identification, categorization and classification of all relevant and critical barriers. The identified barriers should serve as a basis for deriving and formulation of measurements. The results show need for improvement in all corresponding fields of problems. To secure the competitiveness of intermodal transport solutions all stakeholders have to emphasize and focus on the identified barriers. Without solving the identified problems intermodal transport will not be considered as an efficient and competitive transport product in future.

1 Introduction

Several internal and external traffic-related changes in the decision structures of the goods traffic substantially affected the modal split in the past decades. These changes can be categorized as structural, logistics, integration and interface effect and are the main factors for the disproportional development of the modes (Aberle, 2002). The ability of innovation as well as flexibility are reasons for the domination of road transport. In this context the mode-specific system characteristics are of extreme importance (Pfohl, 1996). The system properties of truck transports in particular matches today's requirements of the shipping and receiving economy. The interactional effect of the different influencing variables yields clear market advantages for road transport. Unsurprisingly, in Europe 73% of the goods is transported by truck (Eurostat, 2008). Without any effective counteractive measures this development which is primarily disadvantageous for the carriers rail and inland waterway, will dominate the future progress as well.

On a close examination there is a wide difference between the actual development and the political guidelines and objectives regarding the Modal-shift and the share of rail transport. One of the key transport policy objectives of the European Commission reads as follows:

»Shifts to more environmentally friendly modes must be achieved where appropriate, especially on long distance… At the same time each transport mode must be optimized. All modes must become more environmentally friendly, safe and energy efficient. Finally, co-modality, i.e. the efficient use of different modes on their own and in combination, will result in an optimal and sustainable utilization of resources«

(EU-Commission, 2006).

Despite the combined efforts of the decision makers in the EU and the expected considerable growth rates of goods traffic in the upcoming decades, from the present perspective the railway and the vessel will not gain a significant share of the modal split, but will more likely stagnate at today's level or lose even more ground (BMVBS, 2007).

In order to obtain sustainable modal shift movements in favour of multimodal transport processes, new fundamental solutions are required. In short, innovative and market-oriented services are needed (Aberle, 2005). The classic transport from A to B can rarely satisfy the needs of the present economy. Apart from the basic services of transport, value added services (e.g. information services) are also necessary. To satisfy the needs of the customer new market-driven products and comprehensive logistic solutions have to be created and offered. Therefore integrated product solutions like the inclusion of first and last mile concepts are of prime importance (Berndt, 2001). Multimodal transport has a lot of unused potential and is a/the competitive service to the truck. Additionally, multimodality is a substantial criterion in terms of transport decisions (Buehler, 2006). Multimodal transportation is a complex procedure, in which all the components should be seamlessly linked and efficiently coordinated. Disparities in economic development, transport policies, infrastructure across nations and modes of transport make the integration of multimodal processes a challenging task for all parties involved. This paper focuses on the potentials and competitiveness of bimodal transport solutions. The intelligent combination of road, rail and vessel makes it possible for goods to be transferred in the most careful and efficient way. However, as mentioned above, too often multimodal services are unable to compete in daily transport business.

The most important group of barriers can be categorized into:

- Technical/interoperability barriers
- Cultural/linguistic barriers
- Transport barriers
- Infrastructure barriers
- Administrative/legal barriers
- Safety/security barriers
- Trade barriers

Therefore the aim of this paper is to identify, analyse and rank the most important barriers hindering multimodal transport solutions regarding their level of relevance, time horizon and the level of responsibility in order to support the competitiveness of intermodal cross-border solutions in future. The developed ranking lists should provide the basis for the definition of measures to overcome the obstacles within the next decade.

2 Trade barriers for intermodal transportation – Relevance for Europe

In general the identification of critical barriers may lead to better accessibility, economic development and higher competitiveness. Moreover transport corridors offer a variety of economic opportunities for Central Europe such as access to markets and increased potential for logistics functions. Therefore an analysis of the critical barriers along the corridor is the starting point for the development of measures and highlights the key factors for both private and public stakeholders to put emphasis on those problems which have to be solved.

Thus its designated output is the categorization and ranking of the different barriers within the FLAVIA corridor as well as the Black Sea and TRACECA region. The developed categorization and ranking list serves as the main information for further analysis and research to overcome these barriers and as a consequence to improve intermodal transportation and the carriers rail and inland waterway (IWW). Last but not least the findings contribute to more responsible use and better preservation of Central and Southeast Europe's environment.

3 Approach and methodology

The research work deals with the categorization and ranking of the most important barriers hindering intermodal transport operations to be competitive and attractive. The first step to develop the main groups of barriers was realized within an expert workshop with participants from shippers, transport operators, public institutions and science. Within the discussion process the following main groups and the corresponding specific types of barriers were identified:

- Technical/interoperability barriers
  Within this barrier the following types were identified: (1) track gauge, (2) train electricity systems, (3) competitiveness compared to truck (rail), (4) competitiveness compared to truck (IWW), (5) lack of innovation (rail), (6) lack of innovation (IWW) and (7) realisation of ERMTS (rail)

- Cultural/linguistic barriers
  The identified sub-groups within this barrier are (1) communication in English, (2) service orientation of staff, (3) reachability/availability of staff and (4) education level of staff
- Transport barriers
  The defined transport parameters are: (1) transport capacity rail, (2) transport quality rail, (3) transport capacity IWW, (4) transport quality IWW, (5) waiting time at borders, (6) waiting time at terminals, (7) missing liner services (rail) and (8) missing liner services (IWW)
- Infrastructure barriers
  The infrastructure types are: (1) capacity of rail infrastructure, (2) extension level of rail network and (3) general terminal capacities
- Administrative/legal barriers
  Administrative/legal barriers consist of: (1) corruption/mismanagement, (2) regulatory actions/acts, (3) customs clearance, (4) organizational effort/organizational aspects, (5) licenses (rail, IWW) and (6) missing regulations
- Safety/security barriers
  The identified sub-groups within this barrier are: (1) general transport safety, (2) accidents regarding damage of goods (rail, IWW, intermodal), (3) theft of goods and (4) loss of goods
- Trade barriers
  Within this barrier the following types were identified: (1) import customs tolls, (2) export customs tolls, (3) export restrictions, (4) lack of quality requirements and (5) exchange rate risks

For the identification of the main barriers an interview survey was conducted within seven FLAVIA countries. The analysis is based on a total of 77 interviews within the involved FLAVIA countries. Including interview partners from four institutions: Chamber of commerce, production or distribution company, transport operators and transport executors. The 77 interviews were combined by 35 from Germany, 10 from Austria, 12 from Romania, 6 from the Czech Republic, 5 from Poland, 5 from Slovakia and 4 from Hungary. The interview partners ranked in a first step the different types of barriers between 0 = no barrier and 5 = high barrier. The partner provided the results of the country specific evaluation. In the next step the evaluated barriers were categorized by high, medium and low importance as well as time dependence and responsibility. As a result three different levels have been developed:

1. High (≥ 3):
   Barriers evaluated ≥ 3 are considered as *critical* which means that these barriers have the highest priority to be solved. Ignoring and consequently not solving those means intermodal transportation cannot be implemented on a competitive level and is therefore not attractive for the relevant industry as well as logistic service providers.
2. Medium (1,51 - 2,99):
   Barriers evaluated between 1,51 - 2,99 are considered as serious which means that these barriers have to be solved consequently and mandatory as those barriers are relevant for the realization of competitive intermodal liner services in daily transport business.
3. Low (≤ 1,5)
   Barriers evaluated ≤ 1,5 are considered as important to secure the sustainability and the attractiveness of (already existing) intermodal transport solutions.

After this categorization the barriers are also classified into short, medium and long term horizons to provide a timeline of implementation of improvements for the corresponding private and public stakeholders. Last-mentioned stakeholders are the third classification criteria to show the responsibility for overcoming the barriers.

3.1 Overview of evaluation scheme list

- Level of relevance (based on average numbers)
  High (≥ 3), Medium (1,51 - 2,99), Low (≤ 1,5)
- Time horizon
  Short (1 - 3 years), Medium (3 - 7 years), Long (> 7 years)
- Level of responsibility
  Private sector: IND – Industry, SER – Service
  Public sector: FED – Federal States (regional), NAT – Country based (national), EU – (transnational/cross-border)

4 Findings

This chapter shows the results of the conducted interviews and includes only high and medium ranked barriers. As described in the methodology approach the low ranked barriers have also to be considered as they are important to strengthen the long term attractiveness of intermodal transport. Nevertheless within this paper we focus only on the significant barriers.

4.1 Barriers to overcome in and among the FLAVIA-countries

#	Type of barrier	Name of barrier	Level of relevance	Time horizon	Level of responsibility
1	Technical/ interoperability	Competitiveness compared to truck (rail)	Medium 2.23	Medium	IND;SER FED;NAT;EU
2	Technical/ interoperability	Lack of innovation (rail)	Medium 2.20	Medium	IND;SER FED;NAT;EU
3	Cultural/linguistic	Service orientation of staff	Medium 1.82	Short	IND;SER
4	Cultural/linguistic	Reachability/availability of staff	Medium 1.81	Short	IND;SER
5	Cultural/linguistic	Communication in English	Medium 1.79	Short	IND;SER FED;NAT;EU
6	Transport barriers	Transport quality rail	Medium 1.72	Short	SER NAT;EU
7	Technical/ interoperability	Lack of innovation (IWW)	Medium 1.66	Medium	IND;SER FED;NAT;EU
8	Technical/ interoperability	Competitiveness compared to truck (IWW)	Medium 1.65	Medium	IND;SER FED;NAT;EU
9.a	Infrastructure barriers	Capacity of rail infrastructure	Medium 1.61	Long	FED;NAT;EU
9.b	Transport barriers	Missing liner services (IWW)	Medium 1.61	Short	IND;SER
10.a	Transport barriers	Transport capacity rail	Medium 1.57	Short	SER
10.b	Infrastructure barriers	Extension level of rail network	Medium 1.57	Long	FED;NAT;EU
11	Safety/security	Theft of goods	Medium 1.53	Short	SER FED;NAT;EU
12.a	Administrative/legal	Organizational effort/ aspects	Medium 1.52	Short	IND;SER FED;NAT;EU
12.b	Technical/ interoperability	Realization of ERMTS (rail)	Medium 1.52	Medium-Long	SER FED;NAT;EU

The most obvious finding for the FLAVIA corridor is the fact that based on the average values of all interviews no barriers considered to be critical can be identified. This leads to the conclusion that if we talk about intermodal transportation within the FLAVIA corridor a sufficient basic level is already established which provides an acceptable framework for competitive intermodal solutions. Therefore stakeholders have to focus on the listed medium barriers in the first run. Especially technical/interoperability (5 barriers), cultural/linguistic (3) as well as transport barriers (3) are evaluated as serious and have to be emphasized in the future. In particular improving the competitiveness, innovation potential and quality of rail as well as a higher service orientation and availability of staff supported by better English skills are mentioned as the most important barriers to overcome within the corridor. Also IWW barriers like lack of innovation, competitiveness and missing liner services are medium evaluated problems which should be in focus of the responsible stakeholders. Another important field to be considered is the extension and improvement of rail infrastructure and capacity.

4.2 Barriers to overcome TRACECA and Black Sea countries

#	Type of barrier	Name of barrier	Level of relevance	Time horizon	Level of responsibility
1	Transport barriers	Transport quality rail	High 3.30	Medium	SER NAT;EU
2	Administrative/legal	Corruption and mismanagement	High 3.23	Medium	IND;SER FED;NAT;EU
3	Administrative/legal	Organizational effort/aspects	High 3.21	Medium	IND;SER FED;NAT;EU
4	Administrative/legal	Licences (rail, IWW)	High 3.20	Medium	FED;NAT;EU
5	Safety/security	Theft of goods	High 3.15	Short	SER FED;NAT;EU
6	Administrative/legal	Customs clearance	High 3.14	Medium	NAT;EU
7	Technical/ interoperability	Lack of innovation (rail)	High 3.13	Medium	IND;SER FED;NAT;EU
8	Transport barriers	Waiting time at borders	High 3.12	Medium	FED;NAT;EU
9	Trade barriers	Exchange rate risks	High 3.07	Long	NAT;EU
10	Technical/ interoperability	Realization of ERMTS (rail)	High 3.05	Long	SER FED;NAT;EU
11	Safety/security	General transport safety	High 3.01	Medium	SER FED;NAT;EU

Due to the different political, economical and social situation between the European Union and the Black Sea/TRACECA region the findings are totally different. The following barriers can be classified as critical: administrative/legal (corruption and mismanagement, organizational efforts/aspects, licenses, costumes clearance), transport barriers (transport quality rail, waiting time at borders), safety/security (theft of goods, general transport safety) and technical/interoperability (lack of innovation rail, realization of ERMTS). Especially administrative/legal problems are seen by the interview partners as one of the critical key barriers.

Therefore it is important for the involved country on the one hand to strengthen their efforts to combat against corruption and mismanagement and on the other hand to improve and simplify the organizational frameworks, granting of licenses and the procedures of costumes clearance in harmony with the European legislations. The critically evaluated barriers considering the carrier rail are transport quality, lack of innovation, realization of ERMTS and generally waiting time at borders highlight the urgent need for improvement. Additionally theft of goods and general transport safety are still big obstacles which hinder intermodal transportation between the European and Asian economic regions.

The not mentioned barriers in this paper are evaluated as medium and low. Therefore these barriers have also to be considered in line with the critical ones. Stakeholders have to be aware that it is not enough to focus only on the critical problems. To secure a sustainable development in this region the implementation of the medium barriers has to be guaranteed. If this implementation is not realized a sufficient sustainable framework for competitive intermodal transport solutions cannot be established.

4.3 EU countries – cross-border analysis

The main finding of the cross-border specific results between the FLAVIA countries shows that intermodal transport processes with Romania have the highest level for improvement. This room for improvement includes all surveyed fields. Hence the improvement is of that high importance as on the one hand the elementary »gate« between the European Union and the Black Sea/TRACECA Region and on the other hand to support the intermodal transport within European Union, especially between Central and Southeast Europe. Nevertheless, also the countries Poland, Slovakia and Czech Republic show room for improvement especially in the field of intermodal rail transport.

5 Conclusions

The results show that within the FLAVIA corridor intermodal transportation is already well established. Therefore no critical barriers could be identified. Nevertheless the classified medium and low barriers need to be improved to strengthen attractiveness and guarantee a sustainable development. On a cross-border view an emphasis on Romania has to be taken as the results show in nearly every field a lot of potentials for improvement.

The most obvious finding for the FLAVIA corridor is the fact that based on the average values of all interviews no barriers considered to be critical can be identified. Therefore stakeholders have to focus on the listed medium barriers in the first run. Especially technical/interoperability (5 barriers), cultural/linguistic (3) as well as transport barriers (3) are evaluated as serious and have to be emphasized in the future. In particular improving the competitiveness (2.23), lack of innovation (2.20) and quality (1.72) of rail as well as a higher service orientation (1.82) and reachability/availability (1.81) of staff supported by better English skills (1.79) are mentioned as the most important barriers to overcome within the corridor.

Totally different results were identified considering intermodal transportation operations between the European Union and Black Sea/TRACECA region. Findings highlight over ten critical barriers to overcome. All of the other problems have been classified as medium barriers and show the additional improvement potentials to realize future intermodal transport flows. 11 barriers are classified as critical: transport quality rail (3.30), corruption and mismanagement (3.23), organizational efforts/aspects (3.21), licenses (3.20), theft of goods (3.15), costumes clearance (3.14), lack of innovation rail (3.13), waiting time at borders

(3.12), exchange rate risks (3.07), realization of ERMTS (3.05) and general transport safety (3.01).

The next step within this ongoing research is to develop measurements and solutions to overcome the identified barriers. Involved institutions have to emphasize in the first step those barriers with high/medium impact and short term realization potential. For successful implementation all relevant market players have to be considered as only holistic solutions lead into successful changes.

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Future transport infrastructure scenarios – The experience of SoNorA project.

Roberto Garino, Lauro Boggione

1 Introduction

The Output O3.2.5 – »Future transport infrastructure scenarios: 2020 and 2030«, in the context of the Project SoNorA Central Europe Program 2007-2013, is part of the work package three devoted to the optimization of transport flows.

This particular elaboration was required to represent the present and future scenarios of road-rail infrastructure and transport flows in Central Europe. A huge area with high density of infrastructures and increasing mobility trends where different national infrastructure networks and development expectations are confronted and associated into one over national representation which represents a substantial part of the Sonora added value. It is a matter of fact that one of the most interesting features of the Interreg projects is represented by the capability of producing interpretations/representations of the European territory that cannot be provided by the EU with a top down procedure but may be elaborated by the relevant territorial actors associated into the project with the idea of contributing to increase their knowledge with a bottom up approach.

Trends in transport flows must be considered as normal increase effect following economy development, but sharing them into the over national road-rail network – with thousands of links – to make decision makers understand how and where they will impact on the infrastructure network is a much more complicated matter. But this is the matter assisting decision makers in their investment policies, and this was the ambition of Sonora project to contribute to profiling one possible future over national transport policy between the Baltic and the Adriatic considering all the intermediate and interlocked regions and cities whose cooperative development trends are among the most ambitious goals of the EU.

The infrastructure scenarios are not the only ones needed to produce the appropriate background for decision making, since managing intermodality and logistics is the other face of problem solving, but the interaction among the two does at least provide a good clarification before action.

2 Methodology for defining Future Scenarios

The future scenarios developed by the SoNorA project are mainly based on the methodology defined and implemented for the AB Landbridge project and its results. In particular, on the basis of the data from the former project, which refer to the year 2007 as the base scenario and to the years 2010 and 2020 as future scenarios, it has been possible not only to reconstruct the infrastructural model for both road and rail transport, but also to calculate the annual growth rates for transport demand.

The SoNorA scenarios are defined at 2020 and 2030. Initially both of them should have been built on national priority plans, but from the revision of the national plans too few infrastructures were seen to have been planned for 2030.

Therefore, it was decided to define a scenario at 2020 for both the supply and demand side, while building a scenario at 2030 concerning only the growth of demand (in order to test how the infrastructures planned at 2020 will bear a foreseen demand growth). A total of 100 Projects for the road network and 71 Projects for the rail network were inserted.

2.1 Demand side

With the aim of creating the future demand matrix for 2020 and 2030 scenarios, we started from the O/D matrix 2009, calibrated on a present day scenario.

As far as the road network demand side is concerned, average growth rates per nation were applied to the 2009 O/D matrix. The AB Landbridge growth rates were used for the year 2020, and the same trend applied for the year 2030. In particular, in the AB Landbridge methodology, O/D relationships were divided in two main categories:

relations inside each country (i.e. from each Austrian NUTS3 to all the other NUTS3 belonging to Austria) which are function of:

GDP trend (%GDP);

Modal shift trend (%MS);

Population trend (%P).

relations between countries (i.e. from each German NUTS3 to all the Austrian NUTS3) which are function of:

Import/Export trend (%I/E);

Modal shift trend of the origin country (%MS);

Population trend of the origin country (%P).

The procedure used for the road network was also applied for the rail network, with the difference that the growth rates concern passengers and freight trains per link.

2.1.1 Road transport

As already mentioned, the methodology developed for the AB Landbridge project was used for road transport demand estimation. In particular, the 2009 O/D matrix calibrated according to the previous outputs of the project was used in order to estimate the transport demand for the years 2020 and 2030. The same annual growth rates defined in the AB Landbridge were applied in the absence of different and more up to date information.

O\D	AT	CZ	DE	IT	PL	SI	SK	NORTH	SOUTH	WEST	EAST	TOTAL
AT	13%	8%	5%	5%	8%	8%	8%	5%	8%	5%	8%	**9%**
CZ	7%	24%	7%	7%	10%	10%	10%	8%	10%	7%	10%	**18%**
DE	2%	5%	9%	2%	5%	5%	5%	3%	5%	2%	5%	**8%**
IT	5%	8%	5%	12%	8%	8%	8%	5%	8%	5%	8%	**11%**
PL	15%	18%	15%	15%	37%	18%	18%	15%	18%	15%	18%	**30%**
SI	12%	15%	12%	12%	15%	22%	0%	12%	15%	12%	15%	**15%**
SK	7%	10%	7%	7%	10%	0%	24%	7%	10%	7%	10%	**12%**
NORTH	5%	8%	5%	5%	8%	8%	8%	12%	8%	5%	10%	**9%**
SOUTH	7%	10%	7%	7%	10%	10%	10%	7%	19%	7%	10%	**10%**
WEST	5%	8%	5%	5%	8%	8%	8%	5%	8%	11%	8%	**8%**
EAST	7%	10%	7%	7%	10%	10%	10%	9%	10%	7%	17%	**12%**
TOTAL	**9%**	**18%**	**8%**	**11%**	**29%**	**11%**	**12%**	**9%**	**13%**	**7%**	**13%**	**11%**

Table 1: Road Transport Demand – Variation 2009-2020 [%];
Source: TRENCO's elaborations, 2009

O\D	AT	CZ	DE	IT	PL	SI	SK	NORTH	SOUTH	WEST	EAST	TOTAL
AT	25%	16%	11%	11%	16%	16%	16%	11%	16%	11%	16%	**17%**
CZ	13%	42%	13%	13%	19%	19%	19%	15%	19%	13%	19%	**33%**
DE	5%	11%	16%	5%	11%	11%	11%	5%	11%	5%	11%	**15%**
IT	9%	15%	9%	22%	15%	15%	15%	10%	15%	9%	15%	**20%**
PL	27%	32%	27%	27%	61%	32%	32%	28%	32%	27%	32%	**52%**
SI	22%	28%	22%	22%	28%	40%	0%	22%	28%	22%	28%	**27%**
SK	13%	19%	13%	13%	19%	0%	42%	14%	19%	13%	19%	**24%**
NORTH	9%	15%	10%	9%	16%	15%	15%	22%	15%	9%	18%	**18%**
SOUTH	13%	19%	13%	13%	19%	19%	19%	14%	34%	13%	19%	**20%**
WEST	9%	15%	9%	9%	15%	15%	15%	10%	15%	21%	15%	**15%**
EAST	13%	19%	13%	13%	19%	19%	19%	18%	19%	13%	31%	**22%**
TOTAL	**17%**	**34%**	**16%**	**21%**	**50%**	**22%**	**24%**	**17%**	**25%**	**14%**	**25%**	**21%**

Table 2: Road Transport Demand – Variation 2009-2030 [%];
Source: TRENCO's elaborations, 2009

The previous tables1 and 2 illustrate the variation among the countries in the SoNorA Model Area (Austria, Czech Republic, Germany, Italy, Poland, Slovenia, Slovak Republic) and the four aggregate foreign areas (North, South, West and East).

As can be seen from the above tables, the greatest variations in demand are foreseen for the Eastern countries, in particular Poland and the Czech Republic, and in general, internal demand is greater than external demand. This occurs in both the 2020 scenario and the subsequent 2030 scenario.

2.1.2 Rail transport

Rail transport demand was also estimated using the methodology developed for the AB Landbridge project. The procedure used envisages the differentiation of growth rates for passenger and freight trains per nation and per rail link. Moreover, as regards the 2030 scenario, the methodology envisages the automatic correction of the estimated values if the growth rates exceed the real capacity of the rail link.

2.2 Supply side

As mentioned above, the future scenarios regarding transport supply were implemented on the basis of data deriving from other outputs of SoNorA project, which on the basis of the analysis of National Plans further revised by the Project Partnership, define the road and rail infrastructures to be analysed by the SoNorA project.

The analysis have shown, as can be seen in the table 3 which totals represent the number of projects per scenario and transport mode, that almost all the infrastructure projects should be completed by the year 2020. Therefore, in agreement with the Project Partnership, it was decided to consider only projects up to the year 2020 for the supply side.

2.2.1 Road transport

The table 4 summarises the road transport infrastructure projects envisaged until the year 2020, listed according to road type and country. As can be seen, the most important projects, in terms of km of road network modified, are to be carried out in Poland, (almost 1.200 km) and in Italy, (almost 1.000 km). If, on the other hand, we consider values as referred to the existing road network, the greatest projects are concentrated in the East, in particular in Slovak Republic (34 % of the road network to be modified), the Czech Republic (21 %) and Poland (16 %).

Country	Road		Rail	
	2020	2030	2020	2030
Austria	24	1	18	5
Czech Republic	11	1	9	0
Germany	13	0	10	0
Croatia	0	0	1	0
Hungary	0	0	2	0
Italy	25	2	6	1
Poland	15	0	15	0
Slovenia	8	0	4	0
Total	96	4	65	6

Table 3: Number of infrastructure projects in National Investment Plans; Source: TRENCO's elaborations, 2010

In order to better illustrate the above, the following figure 1 shows the localization of the projects by road type, as listed in the map legend:

- New motorway 3 or 4 lanes;
- New motorway 2 lanes;
- New primary state road.

Figure 1: Road network Measures (year 2020); Source: TRENCO's elaborations, 2009

Figure 2: Rail network Measures (year 2020); Source: TRENCO's elaborations, 2010

COUNTRY	Motorway (km)	Expressway (km)	State road (km)	Total (km)	% on Total network
AUSTRIA	341	-	-	341	5.9%
CZECH REPUBLIC	708	-	190	898	20.8%
GERMANY	338	2	-	340	1.5%
ITALY	947	-	14	961	8.4%
POLAND	1,170	693	-	1,863	16.1%
SLOVENIA	91	53	-	144	8.4%
SLOVAK REPUBLIC	331	422	-	753	34.1%
SONORA MODEL AREA	**3,925**	**1,162**	**97**	**5,184**	**8.9%**

Table 4: New and Upgraded Road infrastructures – 2020;
Source: TRENCO's elaborations, 2009

2.2.2 Rail transport

The table 5 and figure 2 illustrates the infrastructural projects for rail transport up until the year 2020, both as regards the creation of new infrastructures and the upgrading of existent railway lines, by type of infrastructure and by country. As can be seen, the majority of the projects concern the upgrading of the capacity of the railway lines through the construction of new rail links to support the existing traditional railway lines and through the renewal of the latter (e.g. »line modernization«: traction, control systems, tracks, etc.).

COUNTRY	New Lines (km)	Upgraded 4 lines (km)	Upgraded 2 lines (km)	Electrification (km)	Line modernization (km)	Total (km)	% on Total network
AUSTRIA	118	186	320	-	361	984	35.2%
CZECH REPUBLIC	-	88	270	-	588	946	37.3%
GERMANY	213	198	67	-	910	1,387	10.6%
ITALY	-	510	32	-	32	574	13.0%
POLAND	93	-	179	-	3,605	3,876	58.2%
SLOVENIA	-	-	81	-	263	344	30.3%
SLOVAK REPUBLIC	-	30	-	-	6	36	2.2%
SONORA MODEL AREA	**424**	**1,012**	**947**	**-**	**5,764**	**8,147**	**25.3%**

Table 5: New and Upgraded Rail infrastructures – 2020; Source: TRENCO's elaborations, 2010

In particular, the majority of projects concerns the quadruplication of the tracks (2 out of 3) and are mainly concentrated in Italy, Germany and Austria. In Poland projects regards the modernization of the existing network in order to comply with other European countries.

The following figure 2 gives a more detailed picture of the planned infrastructures showing the geographical location and the subdivision according to type of project:

- New railway network;
- Upgrade to 4 tracks;
- Upgrade to 2 tracks;
- Electrification;
- Line modernization.

3 Results

This section illustrates the main results of the simulations carried out for the 2020 and the 2030 scenarios, both in terms of road and rail transport. As already mentioned, the 2020 results are the effect of the modifications of both the demand side and the supply side, while the 2030 scenario is the result solely of demand side variations.

3.1 Road transport

The tables 6 and 7 summarize the results of the road transport simulations, and list the most significant indicators, both in absolute terms and as a variation between the year 2009 and the reference scenario: the average speed for the distance covered, the average saturation rate (relation between flow and capacity), percentage of critical road network (i.e. the kms of road network in which flow exceeds capacity by 90 %) and the overall kms covered. These data have been disaggregated by country included in the SoNorA project.

Analyzing the 2020 results, it is evident that there has been an overall improvement in transport circulation in the SoNorA Model Area, as shown by the almost 3 % increase in the average speed over distance covered, the reduction of approx. 6 % in average congestion levels, and by the over 10 % reduction of the critical network. These effects are mostly concentrated in the Eastern area, in particular in Slovak Republic, Poland and Czech Republic, (in this order) where the greatest infrastructural works in terms of km of road network modified over existing road network have been carried out.

On the other hand, the most critical situations are to be found in Italy and Germany, where evidently the planned infrastructural works are insufficient to counterbalance the expected growth in transport demand. This phenomenon is also shown in the next map 3, which illustrates the network saturation rate envisaged in the SoNorA Model Area for the year 2020. In fact, the darker colours indicating higher congestion values are to be found between Milan and Verona in Italy and in the west and north of Germany.

COUNTRY	Average speed (km/h)		Average Saturation rate (F/C)		% Critical network (F/C > 0.9)		Vehicle*km [Million]	
	2020	% 2009-2020	2020	% 2009-2020	2020	% 2009-2020	2020	% 2009-2020
AUSTRIA	82	3.5%	41%	-2%	11.2%	7%	125	11%
CZECH REPUBLIC	87	10.6%	28%	-19%	3.1%	55%	64	16%
GERMANY	90	-0.8%	48%	4%	12.8%	20%	794	6%
ITALY	79	5.2%	49%	-5%	12.8%	-19%	299	11%
POLAND	77	8.2%	38%	-19%	3.2%	-63%	182	30%
SLOVENIA	79	2.3%	33%	-9%	6.6%	-11%	29	4%
SLOVAK REPUBLIC	84	10.3%	16%	-58%	0.0%	-100%	25	27%
SONORA MODEL AREA	**84**	**2.8%**	**43%**	**-6%**	**9.4%**	**-10%**	**1,517**	**11%**
TOTAL	**86**	**9.9%**	**41%**	**7%**	**8.9%**	**0%**	**1,947**	**10%**

Table 6: Road Transport – 2020 main results [Variation %];
Source: TRENCO's elaborations, 2009

COUNTRY	Average speed (km/h)		Average Saturation rate (F/C)		% Critical network (F/C > 0.9)		Vehicle*km [Million]	
	2030	% 2009-2030	2030	% 2009-2030	2030	% 2009-2030	2030	% 2009-2030
AUSTRIA	81	1.2%	46%	11%	14.9%	42%	136	21%
CZECH REPUBLIC	86	8.8%	33%	-5%	6.3%	220%	74	35%
GERMANY	88	-3.3%	52%	14%	16.1%	51%	855	15%
ITALY	76	2.1%	55%	7%	16.8%	6%	332	24%
POLAND	71	0.8%	53%	13%	11.4%	32%	244	75%
SLOVENIA	78	1.0%	36%	0%	7.5%	1%	31	14%
SLOVAK REPUBLIC	83	9.3%	19%	-51%	0.2%	-97%	29	49%
SONORA MODEL AREA	**81**	**-0.2%**	**49%**	**8%**	**13.6%**	**30%**	**1,703**	**24%**
TOTAL	**84**	**7.2%**	**46%**	**22%**	**12.3%**	**37%**	**2,172**	**22%**

Table 7: Road Transport – 2030 main results [Variation %];
Source: TRENCO's elaborations, 2009

The previous table 7, elaborated using the same procedure used for the year 2020, shows the abovementioned indicators for the 2030 scenario. Overall, as compared to the previous scenario, the SoNorA Model Area does not show improvements, on the contrary there is an increase in congestion, as can be seen by the increase in both the average rate of congestion and in the critical areas of network. The only areas which still show benefits are Slovak Republic and Czech Republic, while the countries with the worst traffic circulation conditions are still Italy and Germany.

This result is comprehensible if we consider that for the year 2030, infrastructural supply has remained unchanged, while the overall kms covered have increased by 24 % in comparison to 2009.

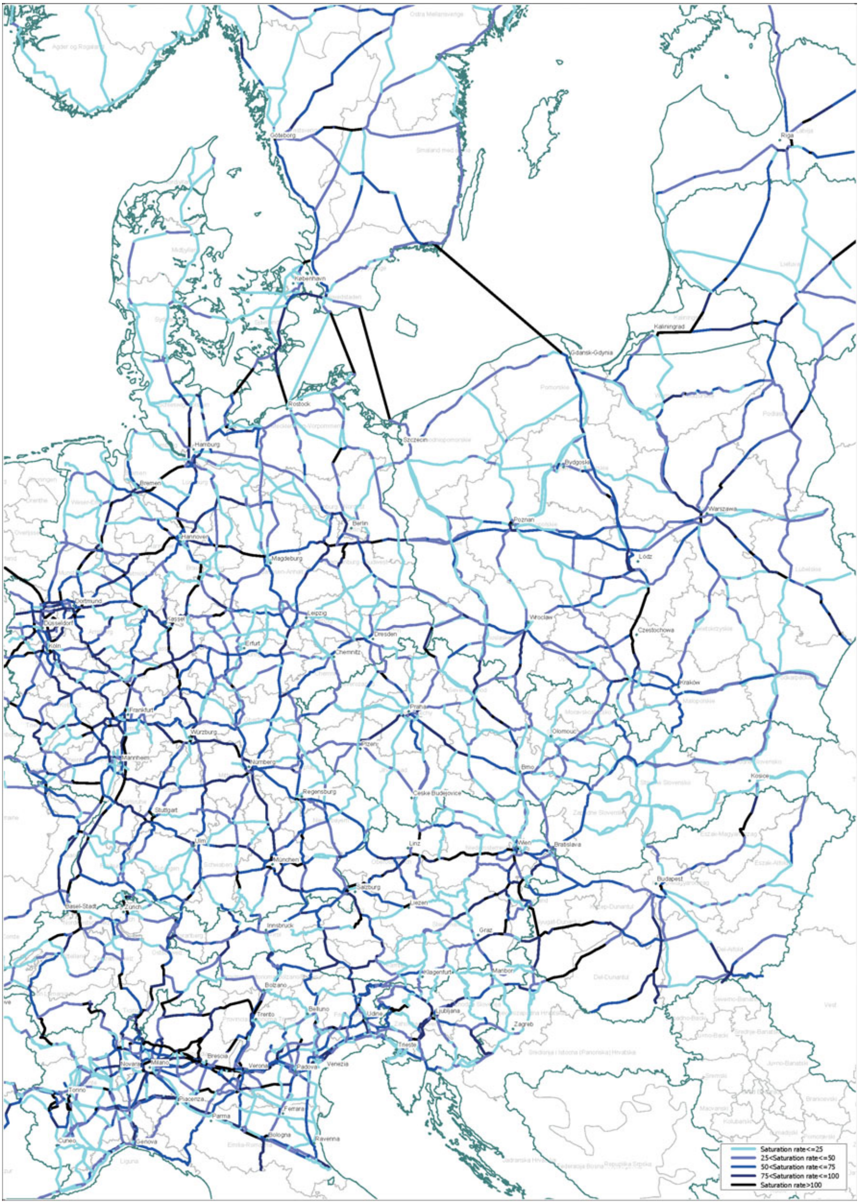

Figure 3: Road network – Saturation Rate (year 2020); Source: TRENCO's elaborations, 2009

3.2 Rail transport

The analyses for rail transport, illustrated in this section, were carried out using the same procedure used for the road transport analyses. The tables 8 and 9 describe the main results, using a number of indicators, both in absolute terms and as variations in comparison to the the current scenario (2009): passenger and goods trains, average saturation rate (relation between the overall number of trains in circulation and the capacity of the railway) and the percentage of the network in critical conditions (when the overall number of trains circulating exceeds 90 % of the line capacity). In this case too, the data were disaggregated according to the countries belonging to area included in the the SoNorA project.

The year 2020 scenario shows an increase in the overall number of trains, the majority being goods trains, which increase by 28 % for the SoNorA Model Area as compared to passenger trains. Overall, despite the fact that the infrastructures envisaged for 2020 become operative, there is an increase in the average saturation rate (5 %) and in the percentage of critical rail links (about 30 %) as compared to the current situation.

These values are above average specially for Slovenia and Slovak Republic, which as shown in the tables above have invested less in rail transport infrastructures, in order to promote the construction of new roads so as to guarantee users a private transport infrastructure at European levels.

The abovementioned results are illustrated in the figure 4 which shows the network saturation rate.

The figure 5 and the table 9 show the indicators for rail transport relative to the 2030 scenario. In this case the situation is more critical than that for the year 2020, due to the fact that despite the expected growth in transport demand no upgrading of the infrastructural network has been envisaged. In fact, the values reported show that approx. 20 % of the SoNorA Model Area rail network is saturated (Flow/Capacity > 90 %) and for some countries (Austria, Czech Republic and Slovenia) this value is closer to 50 %, while it exceeds 50 % in Slovak Republic.

Overall, a growth of approx. 14 % has been estimated for passenger trains, especially in the western countries (Austria, Italy, Slovenia and Germany), while the growth rate for goods trains is estimated at over 60 % and is mainly concentrated in the eastern area (Slovak Republic, Poland and the Czech Republic).

From 2020 to 2030 it is expected that lack of new infrastructure will gain the average saturation rate increasing (19 %) and the share of critical level condition of the network much more than from 2009 to 2020.

Figure 4: Rail network – Saturation Rate (year 2020); Source: TRENCO's elaborations, 2010

Figure 5: Rail network – Saturation Rate (year 2030); Source: TRENCO's elaborations, 2010

COUNTRY	Passenger Trains (Trains per day)		Freight Trains (Trains per day)		Average Saturation rate (F/C)		% Critical network (F/C > 0.9)	
	2020	% 2009-2020	2020	% 2009-2020	2020	% 2009-2020	2020	% 2009-2020
AUSTRIA	7,598	33%	5,916	9%	68%	-1%	19%	29%
CZECH REPUBLIC	8,637	-1%	7,859	39%	66%	1%	23%	36%
GERMANY	36,996	9%	16,148	21%	58%	7%	6%	6%
ITALY	10,666	9%	6,661	19%	56%	4%	8%	25%
POLAND	5,743	2%	6,248	56%	36%	-7%	1%	-61%
SLOVENIA	2,936	8%	2,589	34%	64%	12%	19%	76%
SLOVAK REPUBLIC	2,307	6%	3,137	67%	71%	33%	17%	124%
SONORA MODEL AREA	**74,883**	**9%**	**48,558**	**28%**	**57%**	**5%**	**9%**	**30%**
TOTAL	**108,635**	**9%**	**71,182**	**29%**	**59%**	**8%**	**11%**	**47%**

Table 8: Rail Transport – 2020 main results; Source: TRENCO's elaborations, 2010

COUNTRY	Passenger Trains (Trains per day)		Freight Trains (Trains per day)		Average Saturation rate (F/C)		% Critical network (F/C > 0.9)	
	2030	% 2009-2030	2030	% 2009-2030	2030	% 2009-2030	2030	% 2009-2030
AUSTRIA	8,896	56%	6,293	16%	77%	12%	41%	186%
CZECH REPUBLIC	8,349	-4%	10,633	88%	75%	16%	45%	167%
GERMANY	38,634	13%	18,547	39%	62%	15%	11%	87%
ITALY	11,406	16%	7,935	42%	62%	17%	16%	145%
POLAND	5,599	-1%	9,367	133%	44%	17%	2%	-10%
SLOVENIA	3,119	14%	3,464	79%	77%	35%	40%	279%
SLOVAK REPUBLIC	2,184	0%	4,679	149%	87%	64%	64%	745%
SONORA MODEL AREA	**78,187**	**14%**	**60,919**	**61%**	**65%**	**19%**	**19%**	**178%**
TOTAL	**114,452**	**15%**	**89,982**	**63%**	**68%**	**24%**	**26%**	**238%**

Table 9: Rail Transport – 2030 main results; Source: TRENCO's elaborations, 2010

4 Conclusions

Activities of action 3.2.5 – Future Transport scenarios regarded the definition of the future transport scenarios of SoNorA project and the assessment of the road and rail network for 2020 and 2030.

For that concerns the road network, at 2020 the simulation results show a clear improvement of vehicles circulation status that appears evident both in terms of an increase of the average speed and the reduction of critical situations on the networks. On the other hand, at 2030 the expected increase in the demand, with a marginal adjustment of the supply compared to 2020, induces an increase of critical situations with respect to the current situation.

Regarding the rail network, planned investment appears to be not sufficient to allocate the expected increase of the demand. In fact, compared to the present day situation, criticalities are expected to increase already in 2020 and are going to worsen in 2030.

Missing intermodal liner services between Central and Southeast Europe

Conrad Schmidt, Bertram Meimbresse, Mihaela Popa

Abstract
In this paper the authors present some considerations related to needed rail liner services in the FLAVIA corridor. The FLAVIA corridor (full project name: Freight and Logistics Advancement in Central/South-East Europe – Validation of trade and transport processes, Implementation of improvement actions, Application of co-coordinated structures) is a cooperation corridor between Central Europe and Southeast Europe. After a short history of the rail liner service concept and a brief current situation of railway status across partner's countries, the methodology used and the main results of a survey are outlined. Finally, several liner services in relation with three main rail hubs (Prague, Vienna and Budapest) are proposed, based on the reported needs of the intermodal transport stakeholders and users.
FLAVIA is supported by the European Regional Development Fund, is carried out by 14 partners from 7 European countries, and is coordinated by the TUAS Wildau.

1 Introduction

Today, scheduled freight transports which ensure a reliable and continuous transport between two activity locations are offered by various logistics providers worldwide. These so called »liner services« are a result of an almost 150 year development. They are an essential part of the present transcontinental transport chains. Liner services are offered for rail, maritime and inland waterway transport. The term »liner service« has been developed during the 19th century and has its origin by the trans-continental sea shipping. The first connections were established in the course of the usage of the steam technology and the telegraph network. The first relations operated between the colonies in Asia, Africa as well as America and the mother countries in Europe. At this time a lot of ship-owners and trade companies were founded and benefited from this development (Jahns, Schüffler, 2008). Mostly, raw materials were transported to the mother country. The colonies received in return fabricated goods.

In the middle of the 20th century new tendencies emerged. The maritime transport of general cargo became more and more inefficient due to the long-lasting loading and unloading procedures. In 1956, the US-American Malcolm McLean constructed a standardized load-unit. The containers enabled the transport of various goods whereas just one transshipment procedure had to be applied. The advantage of the container was a simpler and faster transshipment at the ports as well as a safe and secure transport – hence, a reduction of transport costs (Levinson, 2006).

The invention of the container stood for a dynamic development within the next decades, called »container revolution«. Already one year after, a first liner service was established along the east and west American coast and to the oversea US-states Puerto Rico and Hawaii. As a logical consequence, liner services between North America and the German North Sea ports were established in 1966 (bremenports, 2006). Especially since 1990 maritime container transport increased drastically. Currently more than 180 mill dead weight tons maritime container shipping capacity exists. This implies that the European ports invested consequently in the port infrastructure to cope with the constantly growing container flows. The general cargo ships were replaced more and more.

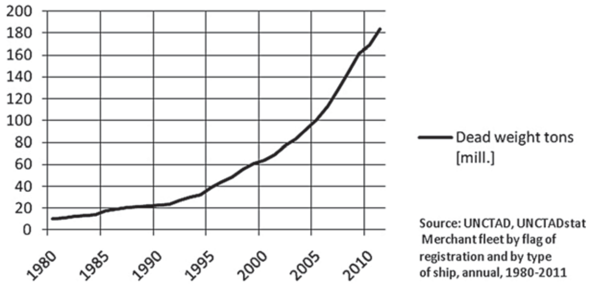

Figure 1: Development of world container shipping capacity (source: UNCTAD, 2011)

Obviously, the next step within the transport chain has to be considered now – the distribution of the containers along the hinterland. Due to the large amounts of containers which have to be transported to their destinations the rail transport played an important role and used its system advantages compared to the road transport (Brinkmann, 2005).

In the late 1960's the company foundation of Kombiverkehr and Transfracht in Germany created a new business model comparable with the maritime container shipping. Both companies specialized on container hinterland transports using fixed relations. As today, the main transshipment points were the seaports. The incoming containers were transshipped to the railway or inland waterway and were transported to the destination points (directly to the customer or to inland container terminals). First rail liner services were established on seaport hinterland relations. But the coverage of these liner services is mostly restricted to the main hinterland corridors like the river Rhine, the corridor Hamburg-Munich-Italy and some shuttles to Prague, Budapest or Warsaw-Russia. Intercontinental and southbound liner services are currently underdeveloped. The paper will examine the potential for such services basing on a survey among logistics market actors and the implications for future planning of intermodal networks between Central Europe and Southeast Europe.

2 Background of the paper

The term »rail liner service« (RLS) or »freightliner« was firstly introduced by Richard Beeching in the 1960's as a train carrying intermodal containers. Generally, this train operates between two or more terminals. During this decade various relations were established across Great Britain connecting the economical centers and seaports (Hardy, 1989). This network of fixed relations was adopted by other transport companies in Western Europe. The aspect that the relations were scheduled made these services reliable and predictable.

Before 1990, every European country had its full authority on the national railways, considering all components: rail infrastructure, rolling stock and technologies/operational management in a monopolistic manner; hence, the liner service were often used and easier planned; in the Eastern countries, having centralized and totalitarian economy, railways were intensive used by decree. The advantages were obvious, and the most of the liner services were set up for the largest category of freight, affine to rail. Even intermodal rail liner services were intensive used during the last decades of the XX century (Tanasuica, 2011).

After 1990, the large-scale economically and politically reshaping process for the most of the Eastern European countries, accessing to the European Community, imposed a new vision for the rail transport: using a single European interoperable railway network. The consequences, bad and good, are very well known and debated (Roseanu, 2009). The worst consequences, for almost all Eastern countries with railway network, were the capital scarcity for railway infrastructure maintenance and, an unfair regulatory frame for the rail-road competition.

There is an obvious »double speed« of railway transport in Europe for rail liner services, and, especial, for intermodal ones. However, new tendencies are obvious: consolidation of the private rail undertakings at national level and/or, as international organizations; requirements for an increasing quality of services for transport (shortening of total time for delivery, larger cargo, cost cutting etc.) pressing to the national authority for railway transport support; setting the adequate hub-and-spokes network of intermodal terminals across Europe. Furthermore, a consolidation of cooperative/alliances structures for transport purpose and its management is needed.

From the operational point of view, the RLS can be divided into two groups. On the one hand there are direct connections (block trains) and on the other hand there are shuttle train connections. A direct connection is an unmatched relation which operates in only one direction. The challenge here is the empty container handling. To operate the service empty containers have to be always provided at the departure point. Shuttle train connections by contrast avoid this problem. The transport flow is matching and hence, the transport flow coheres. This implies the following characteristics summarized in table 1 (Vrenken, 2005; Schwarz, 2006).

	Shuttle train	Block train
advantages	Low transport costs Simple production of the service High reliability Fixed container wagons without shunting	extra stops attract additional cargo optimized loading capacity of the train
disadvantages	Rigidity of the service Relatively small catchment areas Continuous high transport demand needed Risk of unused capacities	Additional stops mean longer transit times and increase costs (e.g. staff) More stops imply the risk of delays Increased shunting efforts

Table 1: Comparison of a shuttle train and a conventional block train

Irrespective the RLS group in the table above, the most important disadvantage or risk is the need of high and continuum transport demand addressing to the service. Where a continuous and high transport demand is existing, a high reliability of shuttle trains in terms of revenue is assured as well as additional stops for additional cargo are no longer needed. Operational alliances or cooperation among shippers and/or users may support the RLS reliability and optimisation of the loading capacity, especially in cases of smaller cargo volumes or lesser frequency. There are a lot of different types of cooperation in logistics and transportation which may be adequately used for the aim of RLS strengthening, as well as the theoretical models for a better selection according to the RLS specificity (Child & Faulkner, 1998). Overall, the operation of a successful RLS requires: a continuously high transport demand, sufficient and interoperable infrastructure capacities, a reliable and public schedule and price transparency.

Over the years the RLS became an essential part of the intermodal transport chain, especially in Western Europe and several intercontinental best practices may be revealed. In the Czech Republic for instance METRANS operated its first intermodal connection to Hamburg and Bremen in 1992 i.e. 1993. Similar developments followed in Poland and Hungary with the foundation of the POLZUG Intermodal GmbH and Hungarokombi. Initial relations were established between Hamburg/Bremen and Warsaw/Budapest-Sopron in 1992. Other companies like PCC intermodal or CSKD Intrans have entered the market and offer especially sea port hinterland connections to the North Sea range or the Adriatic Sea.

Company	Analysed RLS	Share of RLS with at least one seaport as start or destination
CSKD Intrans	8	100 %
GYSEV CARGO	14	0 %
Hungaria Intermodal	8	13 %
Metrans	22	59 %
PCC Intermodal	18	94 %
Polzug	50	100 %
Sum/Average	120	79 %

Table 2: Comparison of selected intermodal operators and their share of seaport RLS; Source: own evaluation of time tables

The described developments implicated an extension and modernization of the inland container terminals. Good examples are the terminals in Budapest (BILK), Prague (Uhrineves), Poznan and Constanta South Container Terminal. Nevertheless, there are still potentials for additional intermodal connections. This applies mainly for continental relations in west/east direction. But also still underdeveloped transport markets like in Romania need a functioning RLS network in addition to the existing port-hinterland relations. Figure 2 shows schematically a fictive RLS network for transnational freight chains.

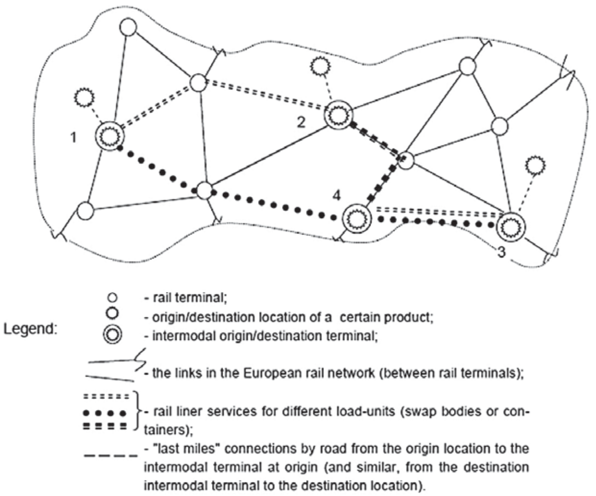

Figure 2: Schematic picture of a RLS network (source: Popa, 2011)

3 Missing liner services in the FLAVIA corridor

3.1 Current situation in the FLAVIA corridor

The described conditions on the East European transport market reflect the following figures. As already mentioned, the offer of liner services still has great potentials. Countries like Germany or Austria possess 10 to 15 liner services per EUR 1 billion turn-over in the national transport sector. On the other hand, Slovakia, Romania and the Czech Republic have only 1.1, 1.2 and 2.8 liner services per EUR 1 billion transport turn-over, respectively. The intermodal transport market can therefore be said to be clearly underdeveloped in Central and Eastern Europe compared to the western market (Intermodal yearbook 2011).

Current tendencies also show the need for new services (Table 3). Over the last years the transported TEUS declined in several eastern countries, e.g. in Hungary, Poland and Romania. Furthermore, the transport volumes are relatively low compared to the country seize (e.g. Slovakia and Poland).

Country		Transport volume in TEU		Percentage change	
	2005	2007	2009	2009/2007	2009/2005
Austria	361.200	551.870	468.210	-15.2 %	+29.6 %
Czech Republic	66.450	76.00	98.370	+29.4 %	+48.0 %
Germany	1.903.000	2.699.000	2.554.000	-5.4 %	+34.2 %
Hungary	23.560	15.320	2.990	-80.5 %	-87.3 %
Poland	153.000	80.100	70.800	-11,6 %	-53,7 %
Romania	217.000	247.500	131.690	-46,8 %	-39,3 %
Slovakia	2.920	5.560	8.060	+45,0 %	+176,0 %

Table 3: Domestic intermodal transport in the FLAVIA countries (source: UIC, 2010)

In summary, the eastern transport market is exposed in a negative feedback – declining intermodal transport volumes on the one hand and missing RLS on the other hand.

3.2 Methodology

Within the INTERREG IV B project FLAVIA the situation mainly between Central and East Europe has been investigated. For that reason market actors have been interviewed by the FLAVIA project partners. The needed information has been gathered via an online survey and personal on spot interviews. The target group consists of transport operators, shippers, scientific institutions and public authorities. The main part of the questionnaire comprises country maps in which the interviewees could indicate missing RLS in their opinion. With the help of a coordinate system the interviewee could indicate easily the origin and destination of the connection. Besides the national maps, a corridor map was provided in which the participants could name missing transnational liner services. These answers are the basis for the following evaluations.

3.3 Evaluation of the questionnaires

At first, all answers were checked and sorted with the help of a validity test. Therefore, a list of criteria has been prepared. Not until then the connection has been incorporated as a missing RLS. The following assumptions had to be fulfilled to apply as a current missing RLS:

- The route is longer than 300 km.
- The origin and the destination are intermodal terminals OR the origin and destination point are economical clusters.
- On the indicated connection still no liner service is running.

The selection procedure reveals a quantity of 20 missing transnational liner services within the FLAVIA corridor. The quality and quantity of the responses have to be considered, too. It has to be mentioned that the responses vary among the partners. Most of the answers come from Romania. This might prove the need for such services among the Romanian interviewees and hence for the Romanian transport market. A relatively large number of similar answers were registered in a country where a relatively large number of persons filled out the survey. This similarity represents a proper qualitative indicator of the survey (Popa, 2011). The responses from Germany are compared to the asked audience relatively low. This might correlate with the already well developed RLS network. A relatively high number of responds come from Czech Republic, also a sign for future potentials.

4 Discussion of the results

After evaluating the responses according to the described procedure, the indicated RLS have been depicted in a corridor map (Figure 3). A detailed list of the connections can be found in the annex (Table 4).

Taking a closer look at the map statements about the direction, quantity and origin/destination of the routes can be made:

- The majority of the connections run in a west/east direction.
- Most of the origin/destination points are economical clusters. This explains the requirement of a sufficient high transport demand.
- More than half of the connections are sea port hinterland relations. Especially, Constanta and Gdansk by far Rostock and Hamburg are the most indicated sea ports.
- The sea port hinterland routes concentrate on the eastern countries. This applies mainly for the route Constanta – Budapest where a large bundling effect is recognizable.
- Most of the routes operate on existing TEN-T axis. This applies for the TEN-T axis 22 (Dresden – Budapest – Constanta) and the TEN-T axis 23 (Gdansk – Ostrava – Vienna).

5 Conclusions

The current situation of the intermodal transport reveals two circumstances which hinder its development. On the one hand, in large countries like Poland, Romania and by far Hungary the intermodal transport volumes decreased within the last years and on the other hand the offers of RLS are not wide-spread. The establishment of new RLS might stimulate the transport market. New offers might lead to increasing volumes.

The result of the survey shows that there are development potentials on the East European transport market. It also proves the need for such services. Nevertheless, a logical RLS network has to be developed which ensures a marketable offer for the transport operators. Taking the survey results as a basis a hub-and-spoke approach might be suitable. The following connections come into question:

1. Hamburg/Bremen, DE – Prague, CZ
2. Gdansk, PL – Prague, CZ
3. Munich, DE – Vienna, AT – Budapest, HU
4. Prague, CZ – Vienna, AT – Budapest, HU
5. Budapest, HU – Constanta Harbour, RO

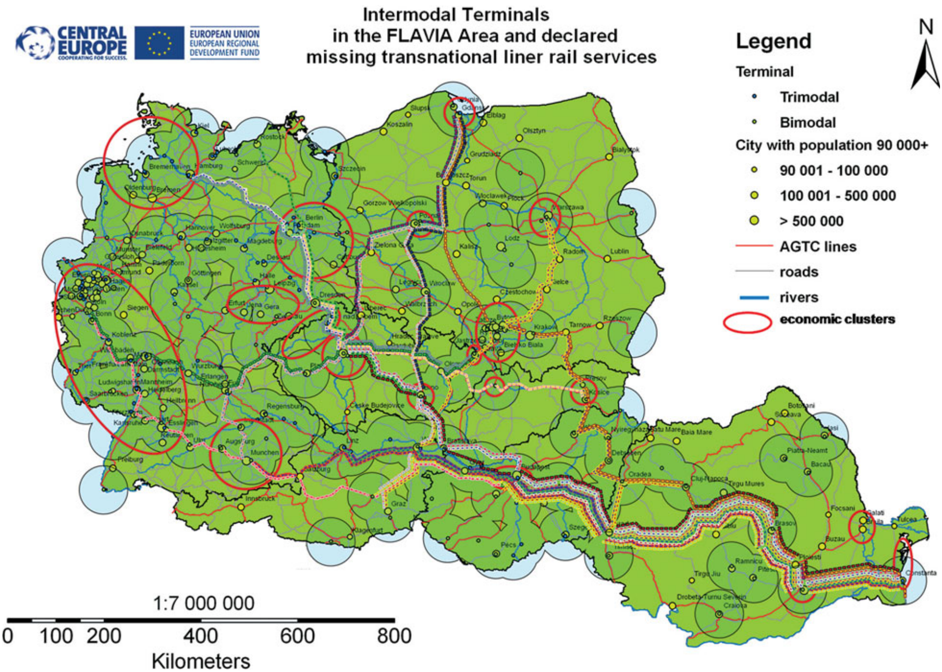

Figure 3: Missing transnational RLS in the FLAVIA corridor (source: Popa, 2011)

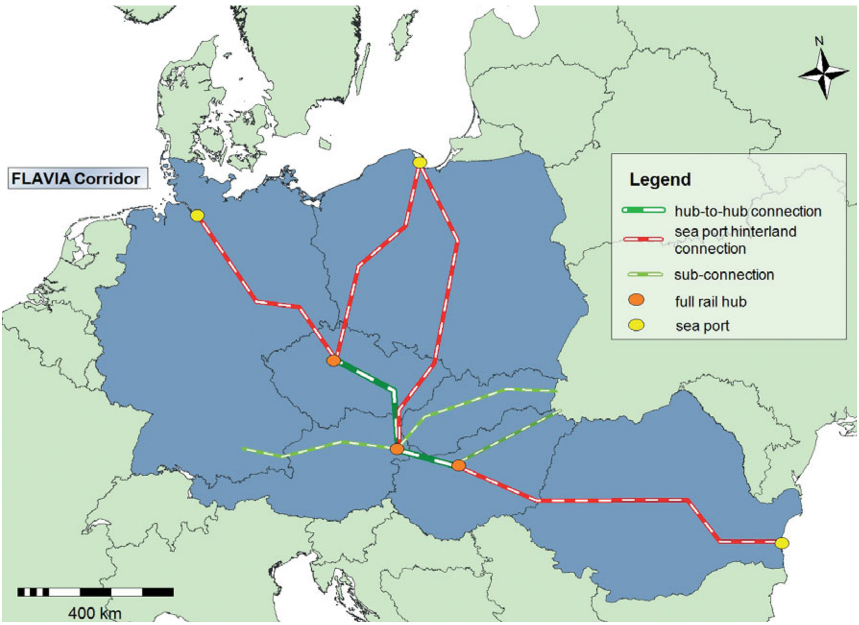

Figure 4: Hub-and-Spoke network within the FLAVIA corridor (source: own depiction)

All routes have in common that they operate between economical clusters i.e. important sea ports. So, the requirement of continuously high transport demands is met. The selected routes extrapolate the corridor on its main routes (TEN-T axis 22 and 23). This in turn ensures a rail infrastructure with a high quality and hence a high capacity. Looking closely on the selected routes they consist of three sea port hinterland connections (1, 2 and 5), one main relation (4) and possible sub-branches (3). This implies that Prague, Vienna and Budapest are possible locations for large rail hubs. All three locations might bundle transport flows in a Central-Southeast direction. Exploiting the bundling effect might be one solution. Taking into account that operating a RLS needs high investments it might be more economical to operate a few main connections using the advantages of economies of scale. Figure 4 below summarizes the considerations of a hub-and-spoke system within the corridor.

6 Outlook

The results of the survey show that there is a need for action. The considered area has development potentials for the intermodal transport in the future, in particular the establishment of new RLS. The markets in the Caucasian region, Russia and Asia are growing continuously. Especially, the rich raw material deposits will get more important for the European economies within the next decades. For that reason, it is essential to possess a transport network which can handle the incoming and outgoing goods. So firstly, the East European transport market has to cope with the existing problems.

The project FLAVIA intends to improve and to promote the intermodal transport among the market actors along the corridor. Currently, the corridor struggles with technical, organizational and administrational bottlenecks which have to be removed. For example, time-consuming border crossings or an inadequate infrastructure hinders the exchange of goods, especially by rail. The system advantages of the rail are obvious, mainly operating on sea port hinterland relations with continuously high demands. FLAVIA will identify the most hindering obstacles and address them to policy decision makers. Without the support of the public authorities the railway will continue to lose ground in comparison to the road.

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Annex

No	FROM	Via	TO	Symbol
1.	Constanta	Bucuresti, Curtici	Budapesta	
2.	Constanta	Curtici, Gyor	Hamburg	
3.	Bucharest	Episcopia Bihorului, Kosice	Varszawa	
4.	Arad	Curtici	Wels	
5.	CONSTANTA	CURTICI	LAMBACH	
6.	Bucuresti	Curtici	Budapest	
7.	Constanta	Curtici	Munchen	
8.	Constanta	Curtici	Praga	
9.	Mangalia	Kosice	Gdańsk	
10.	Poznań	Brno	Graz	
11.	Munchen	Praha	Gdańsk	
12.	Bonn	Graz	Budapest	
13.	Berlin	Praha	Kosice	
14.	Ostrava	Bad Schandau	Duisburg	
15.	Ostrava	Chalupki	Brest	
16.	Brno	Bad Schandau	Rostock	
17.	Warszawa	Prerov	Graz	
18.	Prague	-	Gdansk/Gdyna	
19.	Prague	-	Konstanta	
20.	Brno	-	Gdansk	

Table 4: Missing RLS in the FLAVIA corridor – detailed connections

Developing Intermodal Markets in the European Corridor Context

Philip Michalk

Abstract
Intermodal train concepts are a logical and obvious measure to meet most corridor project targets, such as the development of sustainable transport services and economical growth of the involved regions. They can serve as a guideline for market actors, showing what is possible and which potentials lay in a given corridor. These concepts also are an important action to involve market players. The study highlights the most important development steps for such a concept and demonstrates them on a concrete example.

1 Introduction

Most corridor projects aim at creating »green corridors« while also fostering economic development along the corridor. This calls for an improvement of transport services in the economical, as well as in the ecological dimension. An obvious and logical solution to this problem lies in the employment of rail transport.

The economy of scales of rail transport leads to a more economical transport, while the energy efficiency of trains also leads to lower greenhouse emissions and savings in energy consumption. Lower transport costs can decrease overall production costs of companies in the region, as the costs for importing and exporting goods decrease. It can be assumed that an improved accessibility in terms of transport costs and transport time improves regions chances for economical growth. This makes a region more attractive for investments by companies, thereby serving the demand for an improved economic development.

Rail transport also serves another need of numerous European regions: The quickly growing demand for freight transport leads to an accelerated growth of freight road transport. The German Federal Ministry of Transport (BMVBS 2010) has forecasted a growth of long-haul freight road transport performance until 2025 of 84 %.

However, railway networks can by far not provide a similar areal cover. A solution to this problem can be provided by intermodal transport: Standardized load units, such as standard shipping containers, swap-bodies or trailers can be easily and economically transshipped from truck to train, thereby combining the good areal coverage of road transport in pre- and post-carriage with the economical and environmental advantages of rail transport.

2 Intermodal production concepts

Michalk and Meimbresse (2012) described different intermodal train concepts and their attributes in regard to geographical demand patterns and economical deliberations.

In general simpler productions concepts are less costly, but draw their load from a smaller number of relations, thus increasing the load factor risk (compare Figure 29).

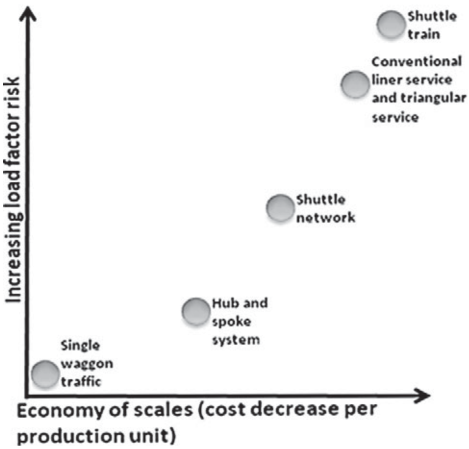

Figure 29: Economy of scales vs. load factor risk of different rail transport production concepts. (Source: Michalk, Meimbresse 2012)

The most simple production concept is a *shuttle train*. This concept connects two terminals without any intermediate stops. Shuttle trains are therefore highly efficient and the risk for disturbances within the production process is small. There is a distinctive trend going towards the utilization of shuttle trains instead of more complicated liner services. Larger operators usually interconnect these trains through hubs. For example HUPAC Intermodal SA, exclusively operates shuttle trains on its German inland connections (compare train schedule under www.hupac.ch). However such a concept requires a high enough demand between the two connected regions.

If the demand between two points is not high enough, further demand sources need to be found. These sources can exhibit different geographic arrangements. Different scattered demand sources in one region would imply a *y-train* or *antenna train*. Demand sources scattered more or less along a line (such as in a corridor) could imply a *liner service*. An asymmetric transport demand between two points could be served with a *triangular service*, were a third point would be connected in order to provide load for a trip back.

Another option would be the connection to an existing hub system. This could be a promising approach, if several of the potential destinations are already connected via a hub. In that case it would be sufficient to connect the region that shall be fostered with the hub.

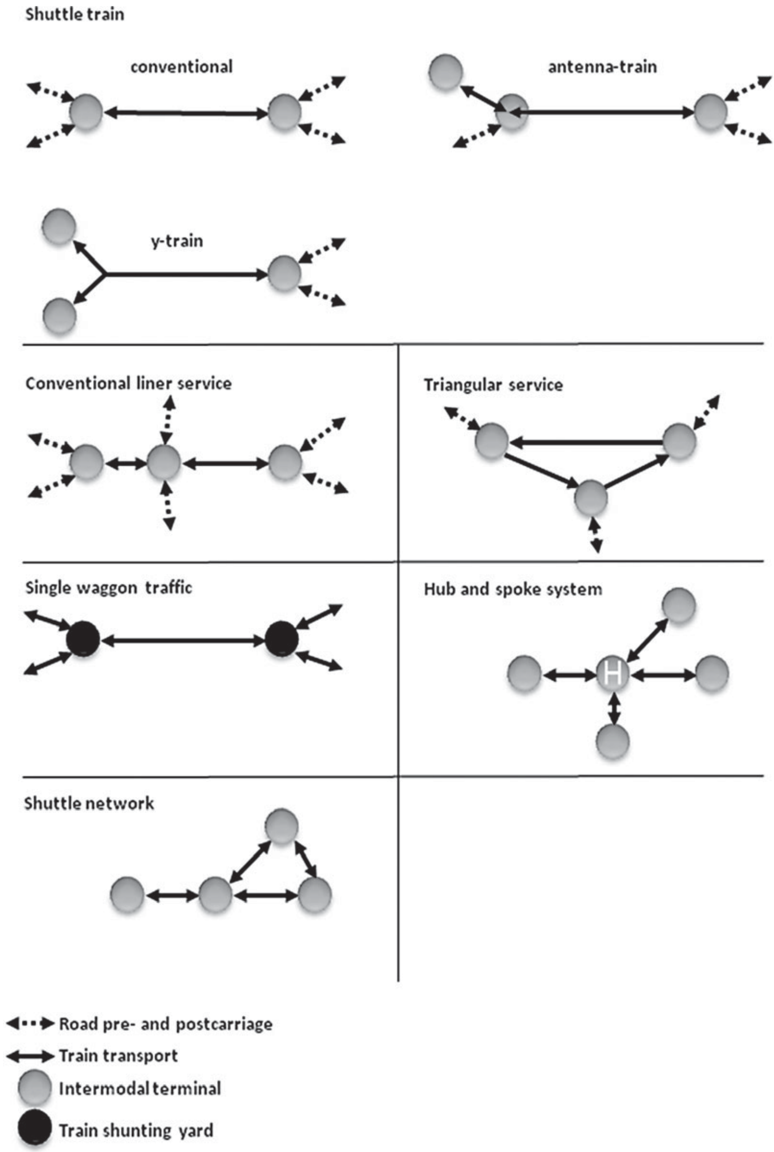

Figure 30: Different intermodal production concepts (Source: Michalk, Meimbresse 2012)

The chapter at hand is concerned with the question how to connect a certain region with one or more other regions. When a service shall be designed to connect a certain point, the number of destinations can be first narrowed down by considering a reasonable distance for the connections. As the main competition to an intermodal train can be found in road transport, a first step would be to find a distance from which on a train has a distinctive competitive edge – or is at least not impaired in terms of transport time towards road transport. Given the fact that a truck driver is allowed to drive a maximum of 9 hours per day, before taking an obligatory break of 11 hours in most of Europe and at an assumed average speed of 75 km/h (which seems realistic for a highway trip), a truck would have an optimal range of (9 hours x 75 km/h =) 675 km. Distances of more than 675 km would take considerably more time for a truck, as the driver would be obliged to take a break of nearly half a day. At an average speed of 60 km/h of a truck, intermodal transport is advantageous at a distance of already 540 km. Other authors conclude from statistical data that intermodal rail transport is not competitive below a distance of 300 km, but that it can be competitive at distance beyond 300 km (Clausen, Eiband 2010). So it can be assumed, that intermodal transport can be competitive from a distance of 300 km on, but that a distance from 600 to 700 km is clearly favorable.

In a next step connectable regions in a relevant distance could be narrowed down further by analyzing the economic-geographic features around terminals beyond the given minimum distance. The road-side catchment area of an inland container terminal can be assumed to have a radius of about 100 km (compare for example Hohl 2008 or INFOlog 2010). Using a gravitational model the most attractive point-to-point relations can be found, by feeding the model with the necessary economic data from the catchment areas of the concerned terminals. In a next step, promising relations could be further investigated for their actual demand potential. For example: In the Europeans Unions SoNorA project a demand analyses showed potential for transports from Regensburg to Ljubljana. Further analyses showed that a number of 3rd and 4th tier suppliers for the automotive industry were located in the catchment area of the Ljubljana terminal and that a number of automotive fabrication sited existed in Regensburg (compare Behnke, Michalk 2010). Such findings can be used to specifically aim at certain shippers as customers for the future train service.

A third step should contain surveys at companies in the region that shall be developed by the project, as well as in the catchment areas of terminals that have appeared to yield promising connections (compare Figure 31).

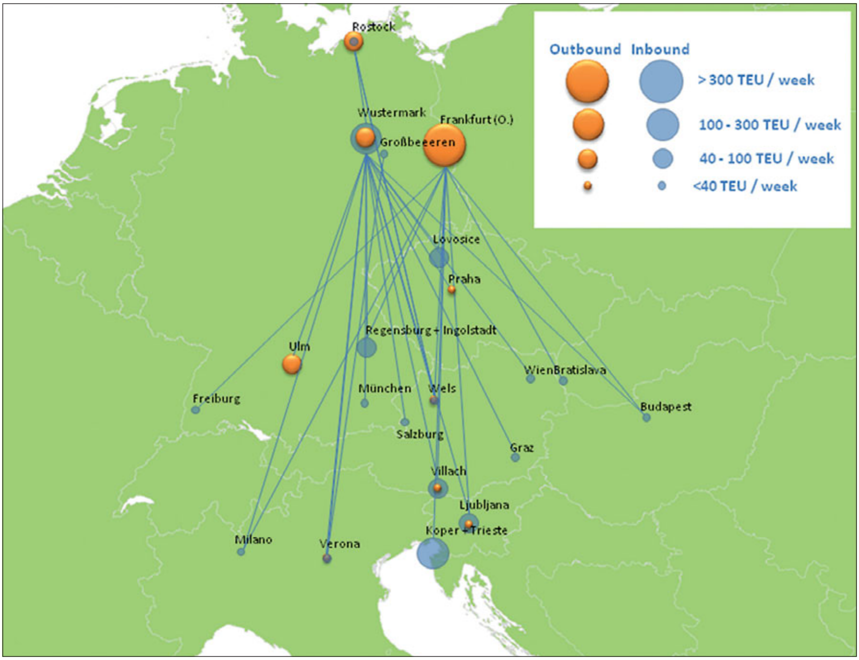

Figure 31: Intermodal transport potentials ascertained within the SCANDRIA and SoNorA projects. (Source: Michalk 2011)

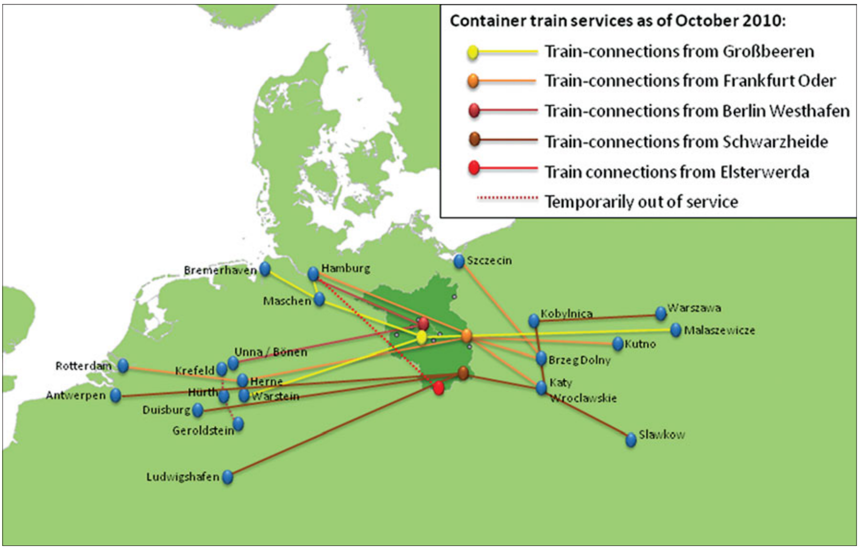

Figure 32: Intermodal train connections, connecting the Berlin-´Brandenburg region as of October 2010. (Source: Michalk 2011).

3 Practical application

Numerous intermodal train services exist that run from the Berlin-Brandenburg region in an east-west direction (compare Figure 32). No intermodal services however exist in a north south direction. This allows for the assumption, that implementing intermodal train services in a north-south direction from the Berlin-Brandenburg region would benefit the region, as these services would substitute a large number of truck tours, thereby relieving the road network and reducing the volume of emitted pollutants and greenhouse gases. If the intermodal services would be less expensive than conventional truck service, they also would improve the attractiveness of the region as an industrial location, as companies located in Berlin and Brandenburg would have lower transport costs in a northern or southern direction.

It was already argued, that an intermodal train would have the biggest advantage towards road transport on distances between 500 and 700 km. Ulm in Southern Germany is located in a rail-distance of about 665 km from the Terminal Wustermark near Berlin. The road distance amounts to about 610 km. A train running at an average speed of 40 km/h would need 16.5 hours for the trip. If it is assumed, that pre- and post-carriage and transshipment would accumulate to an additional 3 hours, the transport of an intermodal transport unit would take 19.5 hours. A truck (including all obligatory driver breaks) would need about 21 hours at an average speed of 60 km/h. The average truck speed was determined by calculating with different speeds for different road types. As shown in Figure 31, the relation Berlin-Ulm has some promising potentials that were ascertained through surveys, commissioned by the Joint Spatial Planning Department Berlin-Brandenburg.

Four departures per day in each direction could be realized with two trainsets, as shown in the schedule-graphic in Figure 33. Each train would depart at 18:00 h in Ulm, respectively Wustermark and would arrive at 10:37 h the next day, at its respective destination.

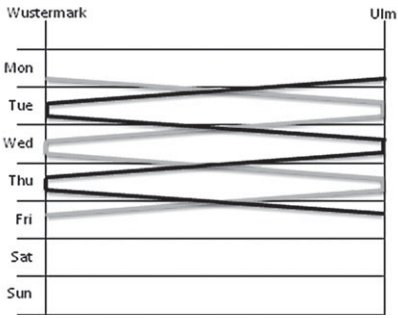

Figure 33: Schedule for two trains (one black, one grey) for a regular intermodal service between Berlin (Wustermark) and Ulm. (Own depiction)

It was assumed that the train would be 600 m long (thereby utilizing the maximum possible train length as dictated by the infrastructure) and composed of a Bombardier TRAXX F140 AC1(a common locomotive for freight train traction in Germany) and 29 Sgns 691 wagons (60´ intermodal wagons), giving the train a capacity of 87 TEU.

Model calculations showed, that a roundtrip between Berlin (Wustermark) and Ulm would cost 33,615 €. At a load factor of 80 % one train would carry 70 TEU per trip, translating to transport costs of 240,11 € per TEU and trip.

Pre- and post-carriage (over a distance of 50 km each) by truck and the transshipment process can be calculated (again through a calculation model) to amount to 80.39 € per TEU. So the costs for the transport of one 20´unit would amount to 320.50 € between Berlin and Ulm. A model calculation showed, that transporting the same amount of freight by pure road transport would cause operational costs of 388.64 €, thus the intermodal solution is clearly more cost-efficient.

CO_2 emissions of the train can be calculated to amount to about 11,504 kg per trip. Additional CO_2 emissions for pre- and post-carriage and transshipment accumulate to about 118 kg per TEU. The CO_2 emissions per TEU of the transport chain can therefore be calculated to amount to:

CO_{tS} = 282 kg. In contrast, the emission per TEU of one truck would amount to 610 kg.

	Intermodal	Road
Transport time:	19.5 hours	21 hours
Transport cost per TEU:	320.50 €	388.64 €
CO_2 emission per TEU	282 kg	610 kg

Table 11: Comparison of key values between an intermodal transport chain and road transport between Berlin (Wustermark) and Ulm.

4 Conclusions

Intermodal train concepts can be a superior transport solution to road transport in terms of economy and transport time but also in aspects of sustainability. However, not every transport relation is suitable to be developed with an intermodal train. Careful considerations and thorough studies are necessary in order to create a transport chain that uses the potentials of intermodal railway systems to a maximum and thereby provides a transport solution that fills the gap where road transport is a sub-optimal solution. However, regions that pursue the development of intermodal trains in the right way can greatly benefit from the economic, environmental and social effects of intermodal connections. The example of the Berlin (Wustermark) – Ulm connection highlighted the potentials: Transport time decrease of 8 %, transport operation costs decrease of 18 % and a CO_2

emissions decrease of 54 % would greatly improve the economical and environmental aspects of transport on this relation. Also, one train would substitute 35 trucks (at a load factor of 80 %), thereby relieving the road system substantially.

Also, such concepts can be an important foundation in order to involve market players, and thus complete the triple-helix approach. They make a project and its value public for market actors. They can serve as a guideline for market actors to show what is possible and how certain solutions could work.

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INIS – Intermodal Node Information System for the Rail Baltica Growth Corridor (RBGC)

Mareen Winter, Martin Heiland, Grit Kämmerer

Abstract

The transport within the Rail Baltica corridor is dominated by truck. By using an information system shifting of freight transport from road to rail can be supported. The Ministry of Infrastructure and Agriculture Brandenburg (MIL) in Germany published an internet portal enabling a search for transshipment points in Brandenburg, developed by IPG. The so-called internet based »Intermodal Node Information System – INIS« offers users in economy, politics and administration a comprehensive overview of the access to the railway system via transshipment points. Within the EU-Project »Rail Baltica Growth Corridor« the existing intermodal node information system is going to be extended to the area of Rail Baltica in Germany, Poland, Lithuania, Latvia, Estonia and Finland.

1 Introduction

Traffic from the Baltic States (Estonia, Latvia and Lithuania) is mainly coming on the road to Germany. The number of trucks grows from Finland in direction to Germany. In 2008 more than 2 million trucks transported goods between Germany and Poland (EuroStat 2008). Figure 1 shows the good traffic by road between Germany and Finland, Estonia, Latvia, Lithuania and Poland.

An alternative is given by rail transport. Reasons why the truck is preferred are the lower price and the flexibility. Furthermore the border crossing restrains the rail traffic, because of a higher organizational effort and interoperability problems, e.g. different gauges. In Germany and Poland the European gauge system is used, while in the Baltic States and Finland the Russian gauge is utilized. That means that wagons, the transport unit, axles or bogies have to be changed at the Polish-Lithuanian border. Nevertheless the Rail Baltica region has crowded roads and free railway capacities. With support of the European project »Rail Baltica Growth Corridor« (RBGC) the accessibility within this region shall be improved. In addition an instrument to support the shifting of freight transport from road to rail will be developed.

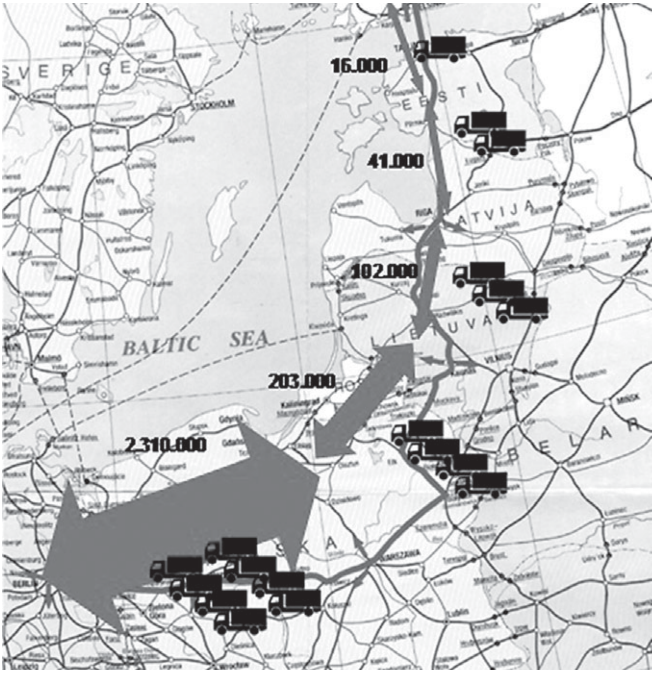


Figure 1: Number of trucks between Germany and related countries (IPG based on EuroState 2008)

2 Existing INIS

The Ministry of Infrastructure and Agriculture Brandenburg (MIL) published an internet portal as instrument enabling to search for transshipment points in Brandenburg, developed by IPG. The system is called »INIS – Intermodal Node Information System« and »Güterverkehrsstellen-Informationssystem« in German. In 2007 it was developed as database that is available as internet portal. It was updated in 2008/09 and in 2011 an update has been made again.

At the moment it includes information about the five public terminals for intermodal transport in Brandenburg and about 278 main- and branch rail sidings (= transshipment points), whereof 216 are operated. INIS will be basis for the development within RBGC. The system is available at http://www.gleisanschluss-brandenburg.de, the next parts give an overview of the existing tool functions.

The internet based intermodal node information system offers users in economy, politics and administration a comprehensive overview of the access to the railway system via transshipment points in Brandenburg. Important goals of the system are:

- Strengthening of rail freight traffic
- Presentation of access points to the railway system and
- Provision of detailed information for the individual transshipment points
- Marketing instrument for regions

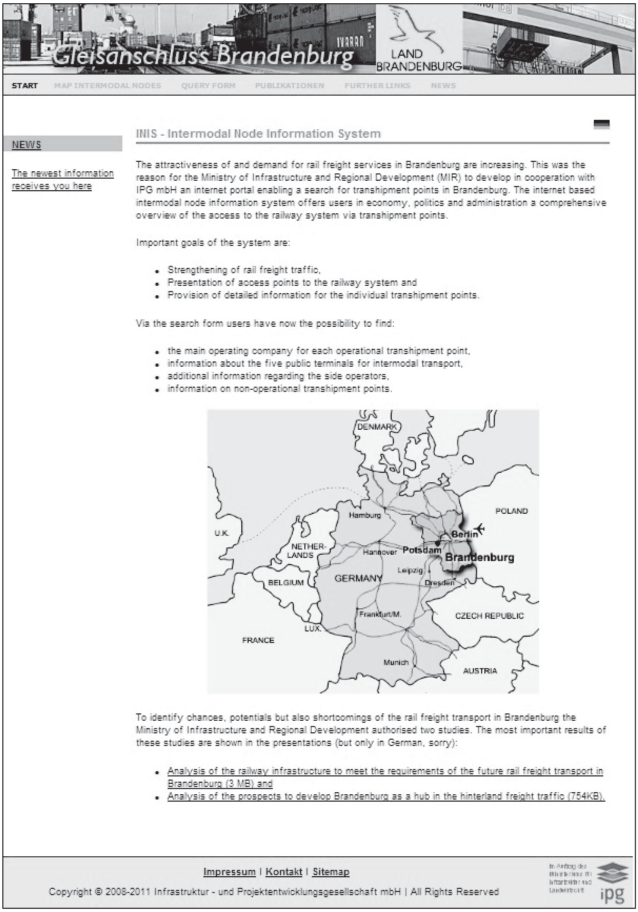


Figure 2: Welcome Homepage of INIS

While using INIS you can find the main operating companies for each operational transshipment point in Brandenburg. The user gets infrastructure information about all »active« sides but also about the non-operational transshipment points. The reason is that the included non-operational transshipment points can be reactivated quickly and so the chance of an economic operation is increased and the risk of deconstruction can be reduced. The map supports the user to search for certain transshipment points.

2.1 Maps

The system is supported by maps. Since December 2011 the »Brandenburg Viewer« is included in the system. An overview map of Brandenburg shows all freight villages, container terminals, ports, railway lines, motorways and inland waterways. Topographical maps, orthophotos but also additional themes like information about districts/cadastral parcels or local subdistricts are provided with a zoom function up to a scale of 1:1.500 and furthermore an ongoing updating.

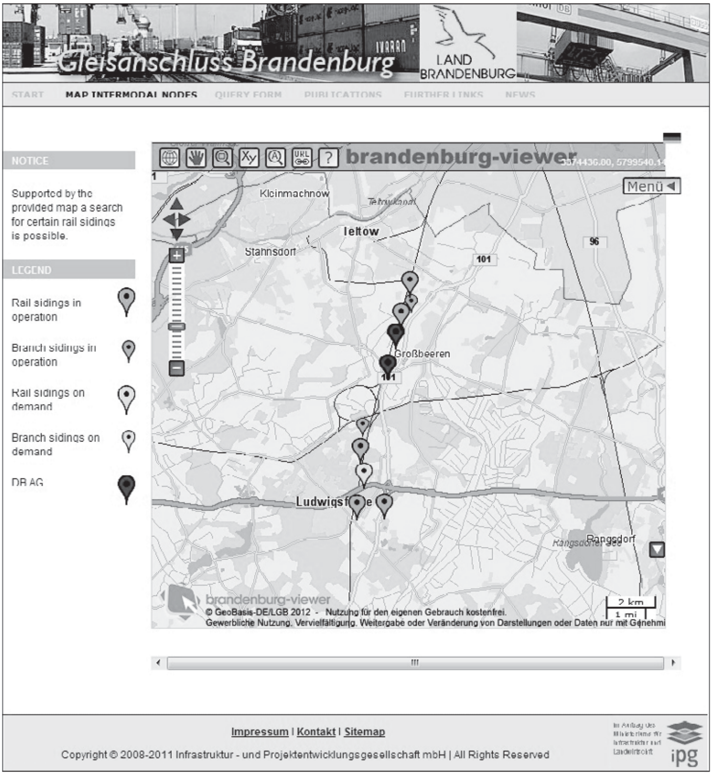
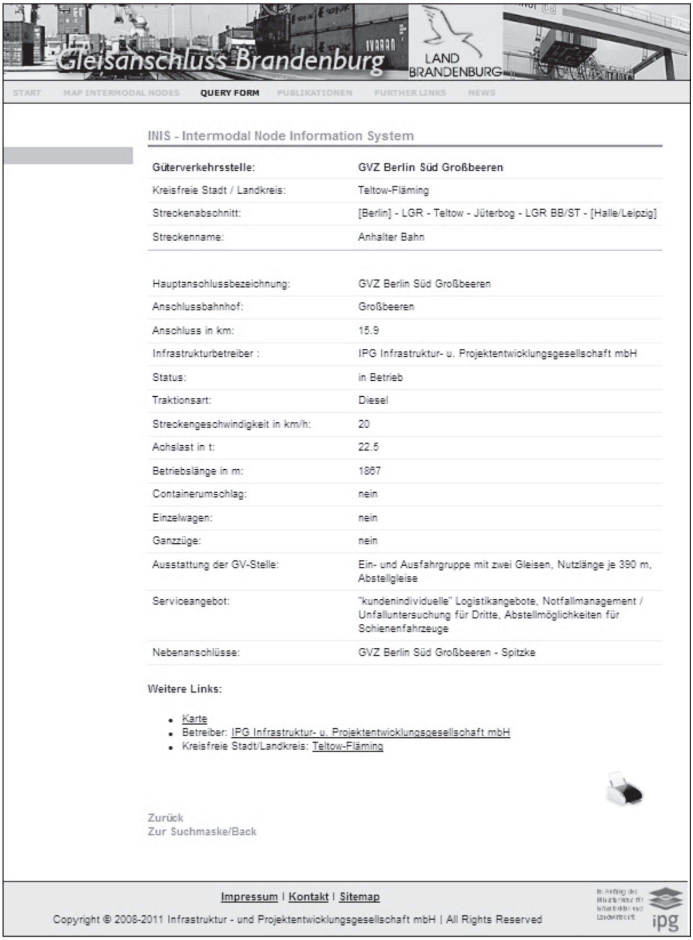


Figure 3: Brandenburg-Viewer included in the INIS-System

2.2 Details of transshipment points

A detailed fact sheet is provided to every transshipment point. It shows spatial information, like name of the region, the next railway station and name of the track. Technical information relevant for the carrier like axle load, traction and length of tracks are listed. Furthermore information is given about the handling of block trains, single wagons and/or container transshipment is provided. Specific services of the railway siding, e.g. loading tracks/platforms, marshalling, lightening are further listed. Through the status the user finds out if the transshipment point is in operation or currently not operated. Furthermore a link to a map, to the operator and the regional administration is included. A full English version is currently worked out.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INIS - Intermodal Node Information System

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Kreisfreie Stadt / Landkreis:	Teltow-Fläming
Streckenabschnitt:	[Berlin] - LGR - Teltow - Jüterbog - LGR BB/ST - [Halle/Leipzig]
Streckenname:	Anhalter Bahn

Hauptanschlussbezeichnung:	GVZ Berlin Süd Großbeeren
Anschlussbahnhof:	Großbeeren
Anschluss in km:	15.9
Infrastrukturbetreiber :	IPG Infrastruktur- u. Projektentwicklungsgesellschaft mbH
Status:	in Betrieb
Traktionsart:	Diesel
Streckengeschwindigkeit in km/h:	20
Achslast in t:	22.5
Betriebslänge in m:	1867
Containerumschlag:	nein
Einzelwagen:	nein
Ganzzüge:	nein
Ausstattung der GV-Stelle:	Ein- und Ausfahrgruppe mit zwei Gleisen, Nutzlänge je 390 m, Abstellgleise
Serviceangebot:	"kundenindividuelle" Logistikangebote, Notfallmanagement / Unfalluntersuchung für Dritte, Abstellmöglichkeiten für Schienenfahrzeuge
Nebenanschlüsse:	GVZ Berlin Süd Großbeeren - Spitzke

Weitere Links:

- Karte
- Betreiber: IPG Infrastruktur- u. Projektentwicklungsgesellschaft mbH
- Kreisfreie Stadt/Landkreis: Teltow-Fläming

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ipg

Figure 4: Details of a transshipment point

2.3 Query form

The query form gives the user the possibility to search for certain transshipment points. It is possible to search with following parameters:

- Location/region
- Name of the railway siding
- Required profile: traction, allowed axle load, operation of full trans, single wagons, container transshipment, services

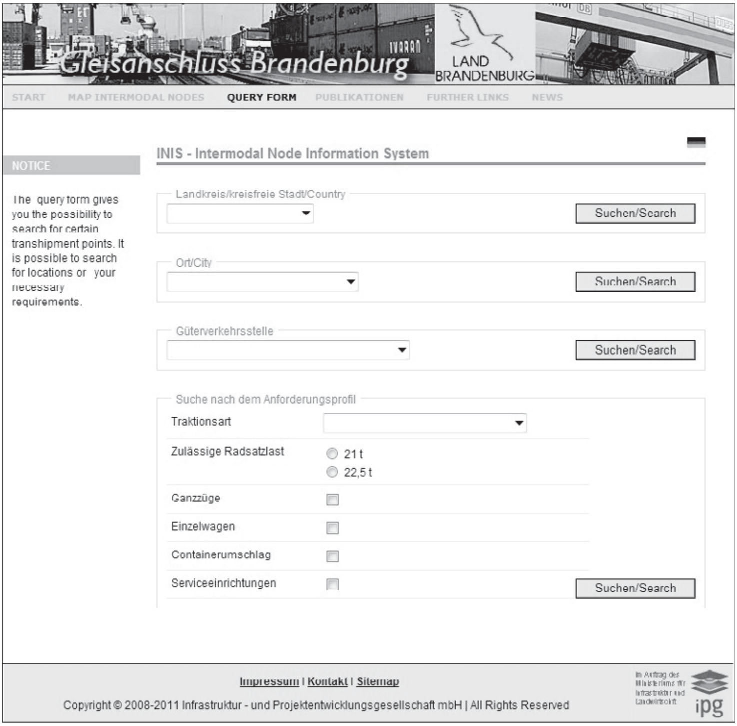

Figure 5: Query form

3 Prospective INIS

3.1 European project Rail Baltica Growth Corridor (RBGC)

Rail Baltica Growth Corridor (RBGC) aims to improve the competitiveness and accessibility of cities and regions in the Eastern Baltic Sea Region through increased interaction and cooperation. RBGC is an INTERREG IV B project of the European Union with a total budget of 3.6 MEUR. It runs 36 month from 09/2010 till 09/2013 with the City of Helsinki as Lead Partner. Within this project 21 partners from Germany, Poland, Lithuania, Latvia, Estonia and Finland are working together on the modernisation and revitalisation of the railway transport between Berlin – Poznan – Warsaw – Kaunas – Riga – Tallinn – Helsinki.

RBGC conduct a Logistics Pilot under guidance of Vilnius Gediminas Technical University. It strives to improve interoperability and cooperation of the logistics centers along Rail Baltica in order to increase its competitiveness from the viewpoint of global freight flows. The city of Ludwigsfelde, which is directly involved in the project as a project partner, works also actively at the Logistics

Pilot. Ludwigsfelde is an established industrial and business location in the South of Berlin close to the Freight village Berlin South Grossbeeren, which occurs as associated partner in RBGC. The previously presented INIS-system shall be the basis of the logistics pilot. The idea is to develop the today's content further on and to strengthen the function as marketing instrument including e.g. the presentation of the logistics centres by fact sheets. INIS is developed by IPG Infrastruktur- und Projektentwicklungsgesellschaft mbH that supports the city of Ludwigsfelde with their investigations in RBGC.

3.2 Development

Idea is to extend the existing INIS in the corridor. As first step the »marketing homepage-market« of logistics centres will be evaluated in each involved country to avoid the doubling of similar systems. For each country of RGBC INIS shall be developed, if there is not a comparable system – if systems are already available a cooperation and connection of the homepages is planned. The most important transshipment points and logistics centres along Rail Baltica have to be identified. In the next step a questionnaire will be developed and the data relevant for INIS will be evaluated. The information will be saved in an English database and published at one homepage also available in English. Other languages of the involved partner countries are discussed. The transshipment points and logistics centres will be displayed in maps or regional systems to support the clearness.

On behalf of the MIL the system of Brandenburg is getting updated currently and parallel in project-context of RBGC details of the development of the international INIS are analyzed. Besides the extension to Rail Baltica region the enlargement to Berlin and the other German federal states are planned, too. Furthermore the waterways and ports of Brandenburg will also be added.

3.3 Opportunities

As an example of INIS a Polish logistics service supplier can search for multimodal terminals to transport goods from Germany to Finland. With the INIS tool information about transshipment points located in Germany, Poland, Lithuania, Latvia, Estonia and Finland are available for partners and stakeholders worldwide. Connected to the information about the transshipment points are information about the logistics and/or industrial surrounding business area. Existing transport infrastructures, settled companies (e.g. logistics services) but also information regarding available sites (sizes, media connection, financial support, restrictions) and contact data will be presented. Aim is to increase the transparency of the logistics centre market in the corridor and their global economic strengthening and finally also to shift freight from road to rail. The existing rail traffic can be stabilised and existing side tracks can be saved and utilised. As consequence operators can possibly motivate to present costumer-friendly offer.

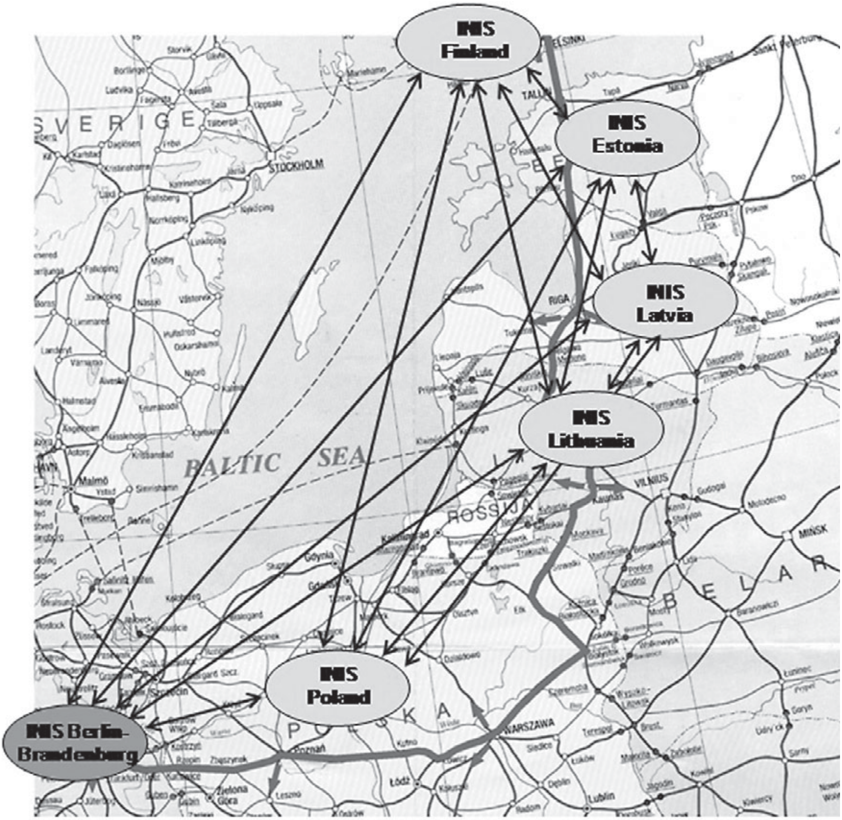

Figure 6: Connection of the prospective INIS

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Information and Communication Technology innovations as a hinge between the private sector and the corridor at the example of strategic settlements

Michael Wickert

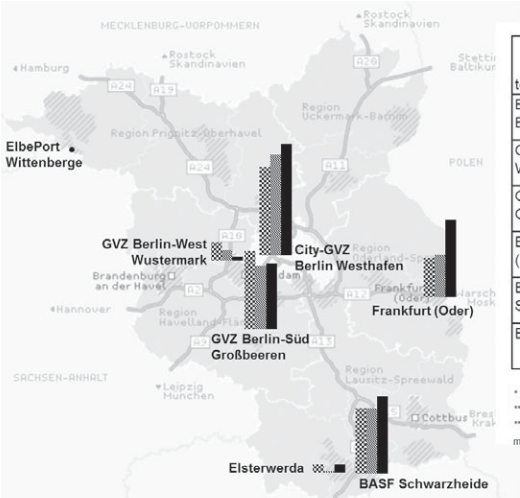
Abstract

There are several reasons why the container transport in the hinterland of seaport container terminals – in corridors – has to become more efficient. A better physical infrastructure is only one step to reach this goal. Another indispensible step is the expansion of Information and Communication Technology (ICT). »Strategic settlement«, an ICT-tool in development, is one example for the innovative work which is needed to get the private sector becoming part of the corridor. With this tool information about intermodal transport and possible transport chains are presented attractive and especially for user's needs.

1 Introduction/Seaport hinterland traffic in Berlin-Brandenburg

In September 2009 the second innovation summit of Berlin-Brandenburg with focus on the knowledge transfer between science and business took place. As a result of the new innovations strategy five future-fields were defined. One of them was the field of traffic system technology with its flagship project »Berlin-Brandenburg as a hub in the seaport hinterland traffic« (INNO-SHV).

The increasing container transport quantity leads to a new problem. In the past the bottle neck was the container terminal in the seaport itself, but now more and more the smaller transshipment points in the seaport hinterland are going to become the bottle neck. Because of the short time it needs nowadays to unload all container from a vessel with a well-developed physical and technological infrastructure in the container terminals and because of the rising costs for storing container in seaport container terminals the infrastructure in the hinterland has to become more efficient. The transshipment points are going to reach their capacity maximum in the next few years, if no sustainable solutions will be found. The crane-expansion in the BEHALA container terminal Berlin-Westhafen in 2011 and the development of physical infrastructure in the KV-Terminal Frankfurt (Oder) are very important to handle the increasing container hinterland transports. The following figure shows the increase of the local container transport quantity in Berlin-Brandenburg from 2008 to 2010.



terminal / year	2008 TEU LU	2009 TEU LU	2010 TEU LU
BEHALA City-GVZ Berlin Westhafen**	74.061 o. A.	83.768 65.000	93.400 62.300
GVZ Berlin West – Wustermark***	15.200 15.200	7.802 7.802	3.700 3.700
GVZ Berlin Süd – Großbeeren***	66.000 44.000	53.370 35.580	55.509 37.000
ETTC – Frankfurt (Oder)***	32.000 26.400*	35.950 30.558	65.000 45.000
BASF Schwarzheide***	55.000 50.000	55.246 50.224	65.000 60.000
Elsterwerda***	6.600 6.000	1.000 1.000	7.000 7.000

* estimation
** source: BEHALA
*** source: IPG Potsdam
map by MIL Brandenburg

Figure 1: container transport quantity in Berlin-Brandenburg 2008 - 2010

The aim of a better integration into the increasing seaport traffic can only be reached by redirection of existing transports and breaking them to become part of the transport chain. By offering value added services concerning these foremost containerized goods, the region will get not only added value, but future-safe jobs. This kind of strengthening of the Berlin-Brandenburg seaport hinterland traffic is done through the development and implementation of innovative ICT and business concepts. One of these innovative ICT-tools is named »strategic settlements«.

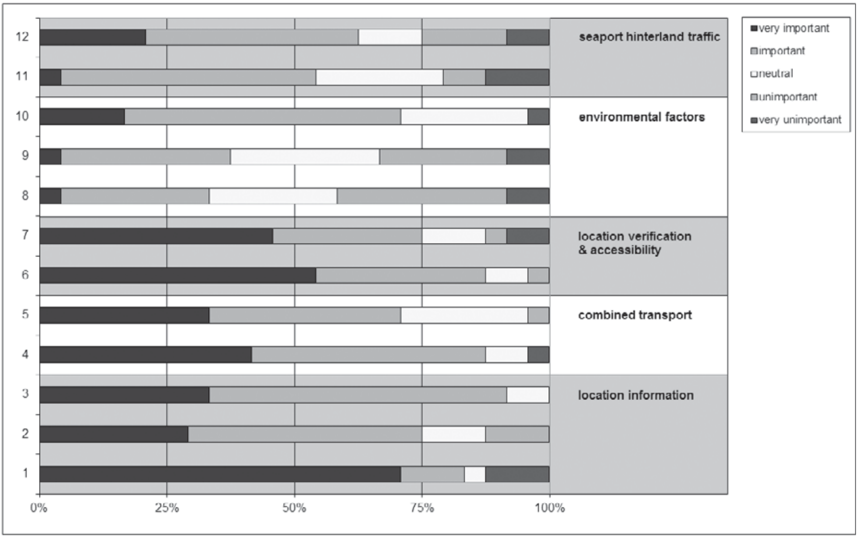
2 State of the art in settlement technology

How do other regions handle the settlement of companies and do they present special information about the intermodal transport possibilities? – After surfing the world wide web for many times concerning the management of settlements the answer is: normally the marketing of a region is based on a non-animated website with textual information like »10 reasons for ...«, »facts and figures« or »commercial areas«. Sometimes you will find static maps which underline the facts.

Seen from the eyes of a professional decision maker the most of the websites are looking to simple and do not show the attractiveness of the region. For example background information about the possibilities of intermodal transport in the region are hard to find, because there are only a few or even no information are available. As a shipper you are not as interested in the kind of cranes which are installed as in the transport costs, the kilometers and the time it will take you to get your resources or products from the seaport terminal to your location or other way round. To proof this thesis the following survey was done.

2.1 Survey: Which information are the most important for potential settlers in the context of seaport hinterland traffic?

In July/August 2011 the link for the online survey was sent to 180 professional decision-makers who are standing in association to combined transport. With 24 complete responses the participation was just over 13%. Please take a look on the results in Figure 2. Another survey on this topic which was done by Ernst&Young in 2007 with 201 participants led to similar results. So the 24 responses are meaningful enough to decide which functions have to be realized.



1: industrial areas and distance to the next transshipment point for combined transport
2: regional promotion possibilities
3: labour market information
4: information about regional transshipment points
5: companies involved in combined transport
6: reachability analysis (customer, transshipment points)
7: transport chain optimization (eco, cost, distance)
8: research & development / science
9: leisure infrastructure
10: potential partner-companies
11: seaport news
12: information about seaport hinterland projects

Figure 2: survey-results (August 2011)

The information about industrial areas and the distance to the next transshipment point for combined transport are most important. Information about research & development/science and leisure infrastructure are only for less than the half of the participants of importance.

The presentation of free and available settlement locations in industry areas, possible regional financial promotions, locations for science/research and development or the labour market situation are only a few examples for the functions which are important to be implemented. Additionally information about the project INNO-SHV itself will be shown on the website.

3 ICT-tool »strategic settlements« as an example

The European polticians have shown their understanding for the importance of ICT tools in logistics: »Under the Freight and Logistics Action Plan, a number of actions are introduced to expand the role of logistics in the rationalisation of transport and the reduction of its environmental impact. Specific measures under the Intelligent Transport Systems (ITS) Action Plan focus on the deployment of ITS to promote modal shift, notably on transport corridors for freight« (Commission of the European Communities, 2009). But ICT tools can do more than only reducing the negative impact of transport to the environment. They can help as useful hinges to bring the private sector and the transport corridors together. How they can do it is explained within the following example.

The following figure shows the connections between settlements and the actors, infrastructure, technologies, knowledge and environment. If someone is interested in settling into a logistics cluster, he wants to have much information in all parts of this multimodal corridor.

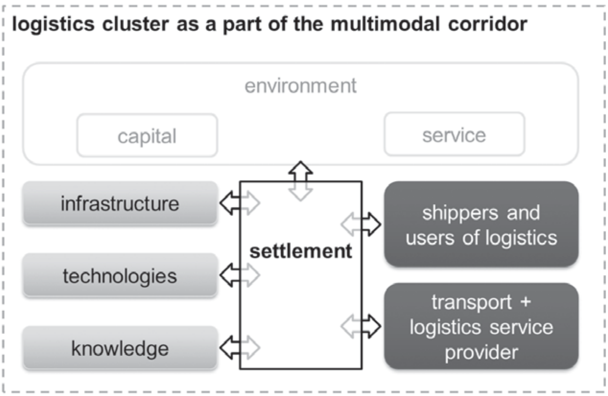


Figure 3: settlement in the context of a logistics cluster (see also Raschke, 2009)

3.1 Idea behind the ICT-tool »strategic settlements«

The main idea of the ICT-tool was to create a website that allows foreign and domestic companies with association to seaport hinterland traffic to inform themselves about cheap alternatives of transportation, storage and above all transhipment. The following objectives will be achieved through user-friendly presentation of information:

- Increasing the attractiveness of the region Berlin-Brandenburg for strategic settlements towards seaport-associated logistics,
- Transparency of transshipment and modal split possibilities and conditions will help to get transports from road onto railway or inland waterways.

The knowledge and the experiences of the research group transport logistics at the Technical University of Applied Science Wildau concerning web-based technologies in the container transport optimization are building the basis of this work package. The result will be an interactive website with specific and innovative information and communication technologies for all who are interested in using an intermodal transport chain or who are already part of a combined transport network.

3.2 Timeline

The project INNO-SHV started in January 2011 and will end in December 2012. The development of the ICT-tool strategic settlement will last these two years and is divided into several smaller parts:

In a first step the users needs and the already existing tools for strategic settlements where analyzed by an online survey and interviews of settlement-professionals. The second step was to combine the needs into a draft of a website. This draft was again discussed with professionals and summarized in a requirement list. The next step was the announcement of programming such a website and right now, after clarification of specifications, the realization takes part. At the end of June 2012 a first version will be available for internal tests.

3.3 Information about regional intermodal transshipment points and carriers

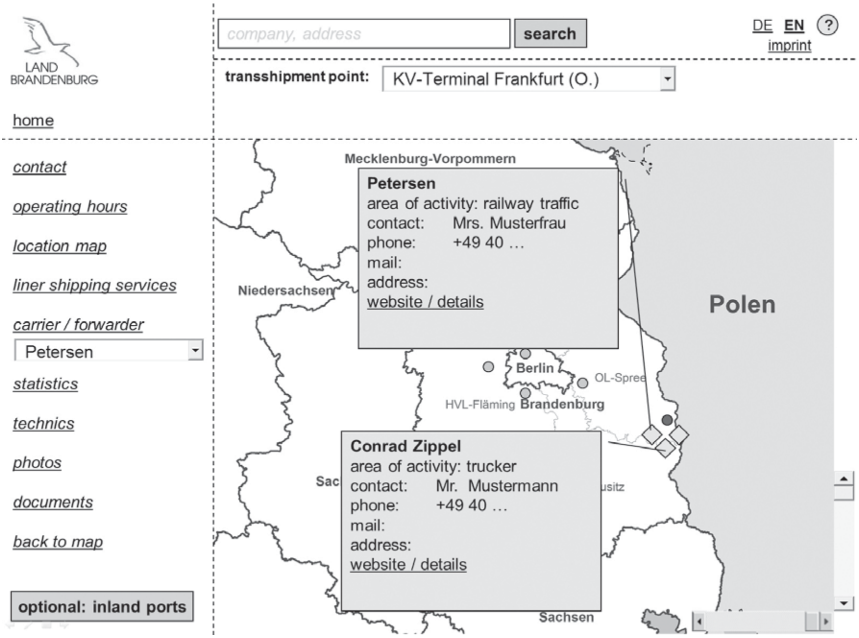
Within the ICT pilot various partial solutions are implemented to help the potential settlers in the context of pre-selection and decision making. For many manufacturers it is usually determined before the foundation of a new factory location, that there will be a large amount of traffic relating to maritime transport. Therefore, the settlers have to inform themselves about issues of transportation of raw materials, semi-finished and finished products toward or away from the new location at least as important as the issues about personal and property areas or immovables.

For many companies it does not worthwhile to build their own railway siding because of the low usage cycles, so that the following question becomes more and more important: *Which container transshipment points exist in the region of my potential new location?* If the decision has been made in favour of a special intermodal terminal, other questions are following:

- *Who is the operator of the transshipment point, which carriers and operators act here as well?*
- *Are there regular train connections to the seaports in existence, so that individual containers can be transported at a reasonable price?*

- *At what times of day containers can be picked up/delivered?*
- *What kind of requirements/conditions do actors have to meet?*

Furthermore, transshipment points may be a bit hidden in the commercial area or have special site-specific characteristics which are of interest to actors. Therefore location maps, photos or documents should be presented on the website to inform the actors updated daily. For answering all these questions, existing information will be bundled together with new additional information. The presentation should be in accordance with the following map based design.



Legend: grey diamonds – carrier/forwarder; grey dots – transshipment points;
dark dot – selected transshipment point
Figure 4: draft of website-layout/information about transshipment points and carrier/forwarder

3.4 Intermodal (container-)transport optimization

Another module of the ICT-tool enables the optimization of an intermodal transport chain. The intermodal transport chain can be analysed for the transport from a selected regional commercial area to given seaport terminals. This is much more than a simple routing tool, since the calculation is based on all modes of transport and various optimization methods. These optimization methods are:

- shortest way,
- shortest time,
- lowest costs and
- lowest CO2 emissions (green logistics).

Other optimization methods are being developed.
An already implemented sub function is the calculation of accessibility with a given maximum of km, time, Euro or carbon dioxide emissions. In addition to the optimization methods the amount of transported containers and the capacities of the modals (train, inland ship, truck) can be specified. Due to the stored data for the calculation, which are not currently updated daily, the results are obtained as a recommendation for the implementation of intermodal transport, but no firm offer.

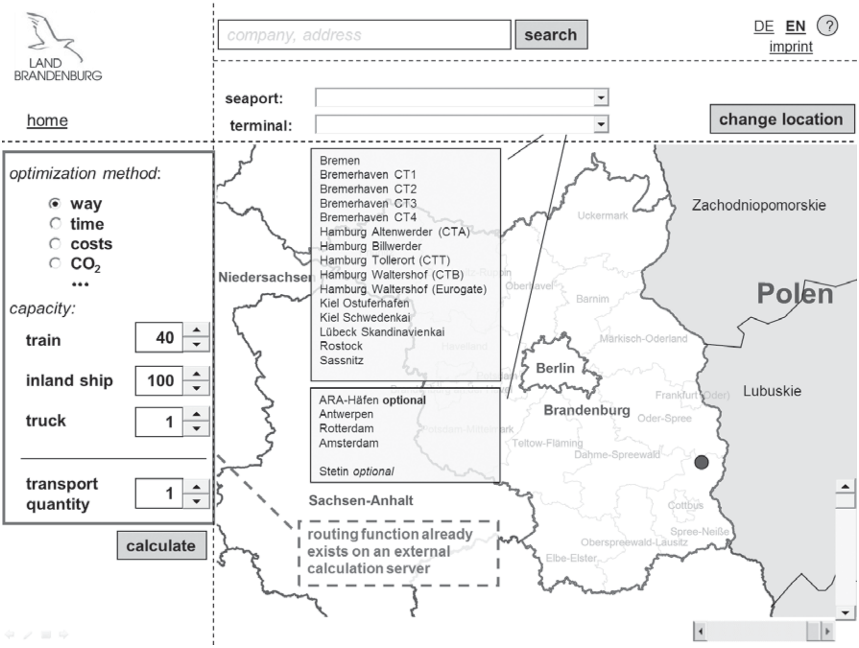


Figure 5: draft of website layout/container transport optimization

The operating mechanisms of the optimization

After opening the optimization function on the website, the user has first to select a regional commercial area where he wants to settle his production. In the second step he enters the shipment quantity and the seaport where he wants to send to or receive from. In this step he has to choose the optimization mode too. By pressing the button »calculate« the entered data will be automatically sent to the calculation server. On this server the optimization is calculated and the results will be sent back to the website for presentation on the map or as a table.

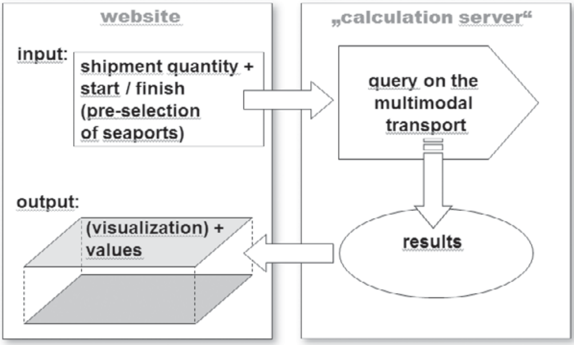


Figure 6: interaction principle of website and calculation server

4 Prospect

The ZukunftsAgentur Brandenburg GmbH (ZAB) gives a large amount of textual information for potential settlers on its website www.zab-brandenburg.de, but still not as a dynamic and animated visualization. This is why another important aspect of the ICT-tool strategic settlements is the visualization of already given information.

In parallel, a regional web-presentation-tool is developed by the ZAB, which later retrieves/catches the information from various sources and is intended to represent a single map with different layers and information fields. After finishing the development of this tool the strategic settlements-tool should be integrated into this web-map as one layer.

In the future, there are various extensions of the functions, such as expansion of the transshipment points to inland ports, complementing the optimization methods by including additional items such as bulk and liquid cargo to, adding logistics properties to commercial areas as well as longterm goal the region-specific and cross –border representation (specifically Polish voivodships).

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Planning and Development of Freight Villages – Example Freight Village Berlin South Großbeeren

Grit Kämmerer, Rüdiger Hage

Abstract

The Freight Village Berlin South Großbeeren (FV GB) wrote a success story as a logistics node in the German capital region. Today 66 companies and more than 5,000 employees are located at the FV. Großbeeren is the largest and strongest logistics development in eastern Germany. The important position of the FV has been verified in 2010 when the FV reached a »TOP 10« score at a European examination. Regarding the German examination, both led by the DGG (Association of German Freight Villages), the FV scored a third place just behind the GVZ Bremen and GVZ Nuremberg. A logistics settlement success is based on a complex planning and development process but of course constantly influenced by economic development.

1 Introduction

Because of its location at the intersection of major European transport axes the capital region has developed into one of the important logistics regions in Europe during the last two decades. With the new airport BER the region will be pushed additionally as an interesting company settlement location.

In this context the Freight Village (FV) Berlin South Großbeeren shows a decisive position as the largest and strongest logistics development in eastern Germany. Furthermore the FV reached a »TOP 10« score determined by a European examination in 2010.

The FV covers a gross area of 260 ha, 150 ha are available as settlement area for companies. The high difference off the area sizes can be explained especially by green- and compensation areas. Today 66 companies are located in the FV and more than 5,00 employees can be counted. Just 10 % of the settlement area is still available. Logistics companies such as Schenker Logistics, Rhenus, Gefco and Fiege and distribution centers of large retailers such as Rewe/Penny, Lidl and Aldi are represented.

The road infrastructure of the FV includes two connection points to the four-lane highway 101 which leads to the ring highway BAB 10 in short distance. The rail network is connected to the high-speed rail »Anhalter Bahn«. The transhipment terminal operated by the DUSS mbH is source and destination of national, European and Asian traffic – connections with the ports of Hamburg, Bremerhaven and Rotterdam as well as with Poland and Russia make the FV to an important transhipment point in the region.

Because of the high occupancy degree of about 90% currently an extension of the FV area of 65 ha is planned.

2 The Freight Village Philosophy

2.1 Definition and goals

The German word for freight villages »GVZ – Güterverkehrszentrum« means translated word by word »freight transport centre« which explains the meaning, targets and goals (Figure 1) very well:

»A freight village is a traffic trade area where transport service companies and transport supplementary service companies with different orientation are settled (transportation, forwarding agency, services, warehousing, logistics service, telecommunications) and which is connected to at least two transport modes. Freight centers of rail and post also can be included. Freight villages include a transhipment terminal for rail/road or waterway/road/rail which generally is accessible (central GVZ).« (Nobel, quotation of German state-/Federal states, p. 52, 2004)

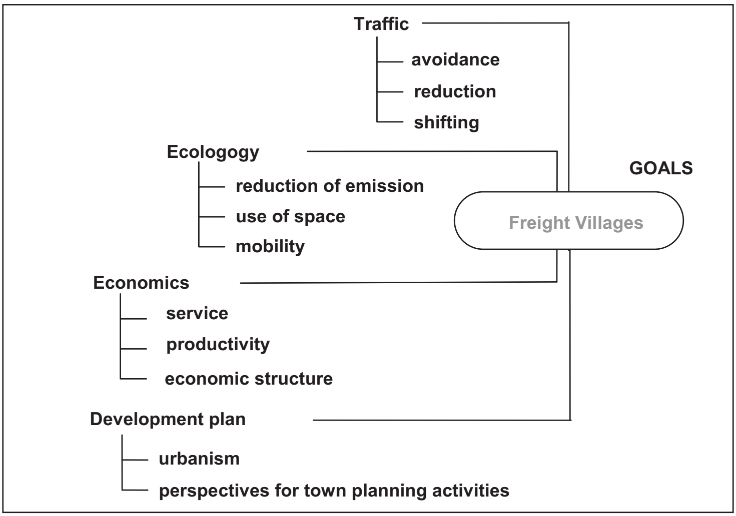

Figure 1: Goals of Freight Villages; DGG (2007)

2.2 Assessment criteria for Freight Village locations

To broaden and back up the given definition and to give an overview of first steps planning a FV Figure 2 gives an overview of assessment criteria which are shortly explained following.

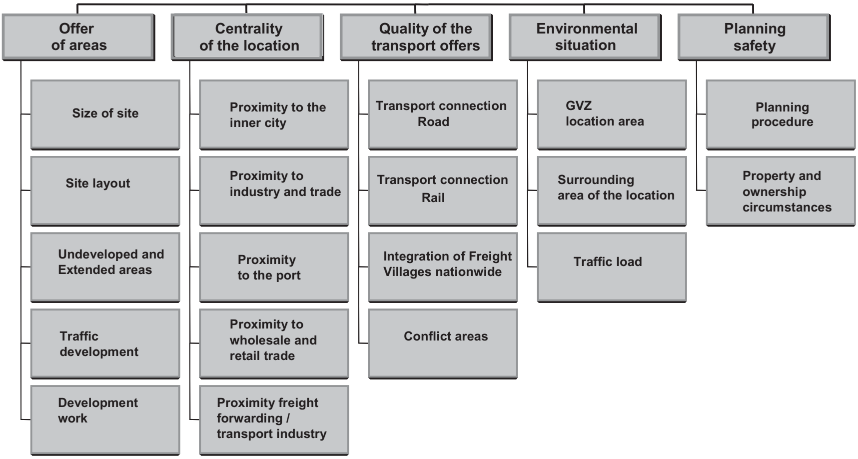

Figure 2: GVZ assessment criteria; IPG

2.2.1 Offer of areas

The *size of the site* or more specific net settlement area is of high importance because of possible synergies between settled companies, the establishment of service providers at the location and the profitability of investments in transport connections. The FV erected to date in Germany cover areas between 15 ha (Göttingen) and 400 ha (Emsland). The net settlement area vary between a few ha (e.g. Lübeck) and several km² (e.g. Bremen). The average settlement area is approx. 100 ha.

The *site layout* and relief should allow square properties (from 1 to 3 ha) and rectangular properties (from 3 ha).

In the first planning phase of a FV an *extension area* should be included in the development concept.

With the early creation of the necessary building law for the extension area the possibility is given to react fast regarding the market demand. As a task of the developing unit, the market has to be watched and a quick reaction on time is necessary to build the infrastructure on time and meet the demand of the companies.

The *transport development* has to be separated into an internal development and the integration into the local and national road and rail network. Regarding the internal road planning process the main traffic with heavy goods vehicles should be in mind when planning the curve radiuses, roundabouts, traffic light controls and lanes. Parking spots for employees and for heavy goods vehicles have to be included in the planning process.

Regarding the connection by rail it has to be taken into account that the delivery of wagons can mostly only be realised profitably by at least half-train length (350 m). The development as of today shows that often even full-train lengths are required (700 m) which counts for transhipment terminals and also for unloading sidings. Furthermore the freight village railway infrastructure should be planned and/or constructed including settlement areas which have the possibility to use also rail as transport mode.

Some FV are directly connected to a port (e.g. FV Berlin West Wustermark). The proximity to a port is particularly important for companies, which deal with import/export and tranship large quantities of containers. The transhipment systems of a port can also be of significance for motor vehicle logistics.

The *development work* means the connection of the FV area and also the sites to electricity, gas, telecommunications and water which are significant for the amount of the development costs. Aspects which have to be considered furthermore are ground water, foundation soil and old contamination circumstances, weapon contamination and archaeological locations.

2.2.2 Centrality of the location

The *proximity to the inner city* (time and distance) is important on the hand because of the daily way for the employees to the company and on the other hand for the economic side regarding the transport distance to the delivery market. Due to the wage structures the employees are often dependent on local public transport. Aim should be the integration into the existing network because particularly in the phase of initial settlement there are not enough passengers in order to establish profitable local public transport. The customary working hours in the logistics industry aggravate this problem even more.

The *Proximity to industry, (transport) trade, services and freight forwarding* is of main importance keeping the distance to the delivery locations small in order to minimise the risk of recourse claims through delays in delivery and ensuing loss of production. The settlement at a FV gives the advantage of short ways to partners and services (e.g. FV GB – rent, sell, repair of heavy goods vehicles).

2.2.3 Quality of the transport offers

A FV should preferably be connected to the local and national *road network* with four lanes as impediments between goods traffic and motorised individual traffic (MIV). Reflecting the aspect of pollution through immission the transport routes should be located in distance from urban settlements.

The existence of a *rail* link is welcomed by the investors in general. Even if only a small number of the companies use the rail connections (like in the Berlin FV), the possibility to change the transport mode is generally assessed as positive. In addition, the distance to the nearest marshalling yard is of significance for determining the delivery costs in single wagon traffic. The situation is similar with the provision of a *transhipment terminal* for the intermodal transport. Especially because of the in most cases insufficient volumes for the single companies to maintain train connections under their own administration, the road is used in general. The freight bundling is an important task and also a great benefit of a FV network which lays above all in the concentration of large goods quantities in long distance traffic. These can, if they occur in sufficient quantities for a destination, be used for generating own train connections.

2.2.4 Environmental situation

The establishment of a FV is a substantial intervention into the protected assets ground, water, air, fauna and flora. In order to avoid conflicts with national or European environmental law a location is needed which if possible is not of too high ecological significance. Under ecological aspects conversion areas or derelict industrial land are highly suitable for a follow-up use. Particularly the latter frequently already have favourable infrastructural pre-requisites. An example is the FV Berlin East Freienbrink, which was erected on the area of a former military supply depot.

Residential locations should be at a minimum distance, which corresponds with the distance of newly built main roads to housing development due to the immission (FV: noise, exhaust gases).

Road links are of interest in accordance with the actual Modal Split in goods traffic but also public traffic. The vehicle fleets of the logisticians are concentrated on the transportation routes during the traffic peaks in the early morning hours and – at a lower level – in the evening hours, through which they increase the burden through commuter traffic.

2.2.5 Planning safety

Planning safety is of major importance due to short planning and realisation times. In most cases the companies which are looking for a new site are frequently not located in the region and necessary procedures and administration flows are thus not always known. Therefore, coordinated administration flows are beneficial to accelerate the procedures. Preferably there will also be a central contact in the administration or at the business promotion company. The approval procedures should not take more than 2–3 months.

The number of *owners* concerned is important when choosing the location. Under certain circumstances long-winded land acquisition proceedings may be necessary if owners are not willing to sell (IPG, p. 9 ff, 2006).

3 Logistics and Freight Villages in Berlin-Brandenburg

With more than 180,000 employees in the logistics industry, Berlin-Brandenburg has developed to the second most important logistics regions in Germany (BNP Paribas Real Estate, 2010).

The strength of Berlin-Brandenburg as logistics region includes:

- the location as logistics node central located between Western, Easter, Northern and Southern Europe
- a large local sales market with six million inhabitants in the capital region
- a transport infrastructure of high quality
- efficient freight villages with high attractiveness for settlements
- connection between business and research possible because of highly developed university landscape

Four Freight Villages are located in Brandenburg. Three close to Berlin connected Freight Villages, besides Großbeeren, -Berlin West Wustermark and -Berlin East Freienbrink (Figure 3) and one located close to the Polish border the Euro Transport & Trade Centre (ETTC) in Frankfurt (O).

The »Integrated Goods Traffic Concept Berlin-Brandenburg« (2005) includes the following various components:

- *in Brandenburg:* the Freight Villages (GVZ) Wustermark, Großbeeren and Freienbrink – to bundle the main transport streams to more environmentally friendly transport modes like rail and waterway and to avoid truck trips by intelligent bundling of delivery tours possible because of logistics company settlements close to Berlin
- *in Berlin:* goods traffic sub-centres (GVS) – Transhipment point close to consignees in order to simplify the logistics of regular and extensive deliveries to fixed destinations. The picked load is distributed form rail or water via road (currently established City GVZ Berlin – Westhafen)
  (IPG, p. 15, 2006)

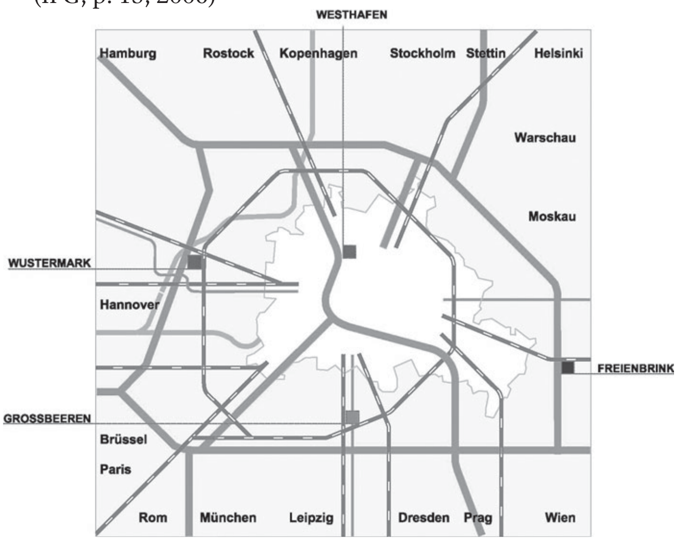

Figure 3: Location of the Freight Villages in the German Capital Region; IPG (basic source: Jörg Wiesemann)

The FVs Berlin cover (in 2011) a total area of 616 ha and 373.2 ha net settlement area. 74 % are sold whereof Großbeeren shows the highest marketing rate with almost 90 %. Wustermark and Freienbrink are close together situated with 64 % and 62 % marketing rate. 112 companies and more than 8,000 jobs could be secured at the FV.

Location	FV Berlin West Wustermark	FV Berlin South Großbeeren	FV Berlin East Freienbrink	FV Total
Size of area (approx. in ha)				
gross	226	260	130	**616**
Net settlement areas	113.1	150	96	
Net settlement area in total	127.2	150	96	**373.2**
Degree of development				
Developed/marketable area in ha	127.2	150	96	**373.2**
Net settlement area in %	100 %	100 %	100 %	**100 %**
Marketing status				
Number of investors	26	47 + *19 (leasing)*	20	**112**
Sold area in ha	81.2	134	59.6	**274.8**
Net settlement area in %	64 %	89 %	62 %	**74 %**
Jobs				
Secured	2,500	5,000	1,170	**8,170**
Forecast until final expansion	3,000	5,000	2,000	**10,000**
Ready for construction	**immediately**	**immediately**	**immediately**	

Table 1: Freight Villages Berlin – Data; IPG (2011)

4 The Freight Village Berlin South Großbeeren

4.1 Overview

The FV covers a gross area of 260 ha whereof 150 ha are settlement areas for companies and the differences can be explained especially by green- and compensation areas. Today 66 companies are located in the FV and more than 4,500 employees can be counted and just 10 % of the settlement area is still available (status 09/2011) (location of FV GB cp. Figure 4.)

Logistics companies such as Schenker Logistics, Rhenus, Gefco and Fiege and distribution centers of large retailers such as Rewe/Penny, Lidl and Aldi are represented. Furthermore the DUSS company with the transhipment terminal. Also a railway oriented company is the Spitzke SE located at the FV which uses the advantages of the railway connection of the freight village.

One big advantage for logistics companies which settle in FV is the close connection to logistics oriented services. In FV GB following services are available:

- Aral AG gas station with a car washing facility
- RENAULT and DAF Trucks are operating an all-brand repair workshop and truck dealership with a truck washing facility (DAF),

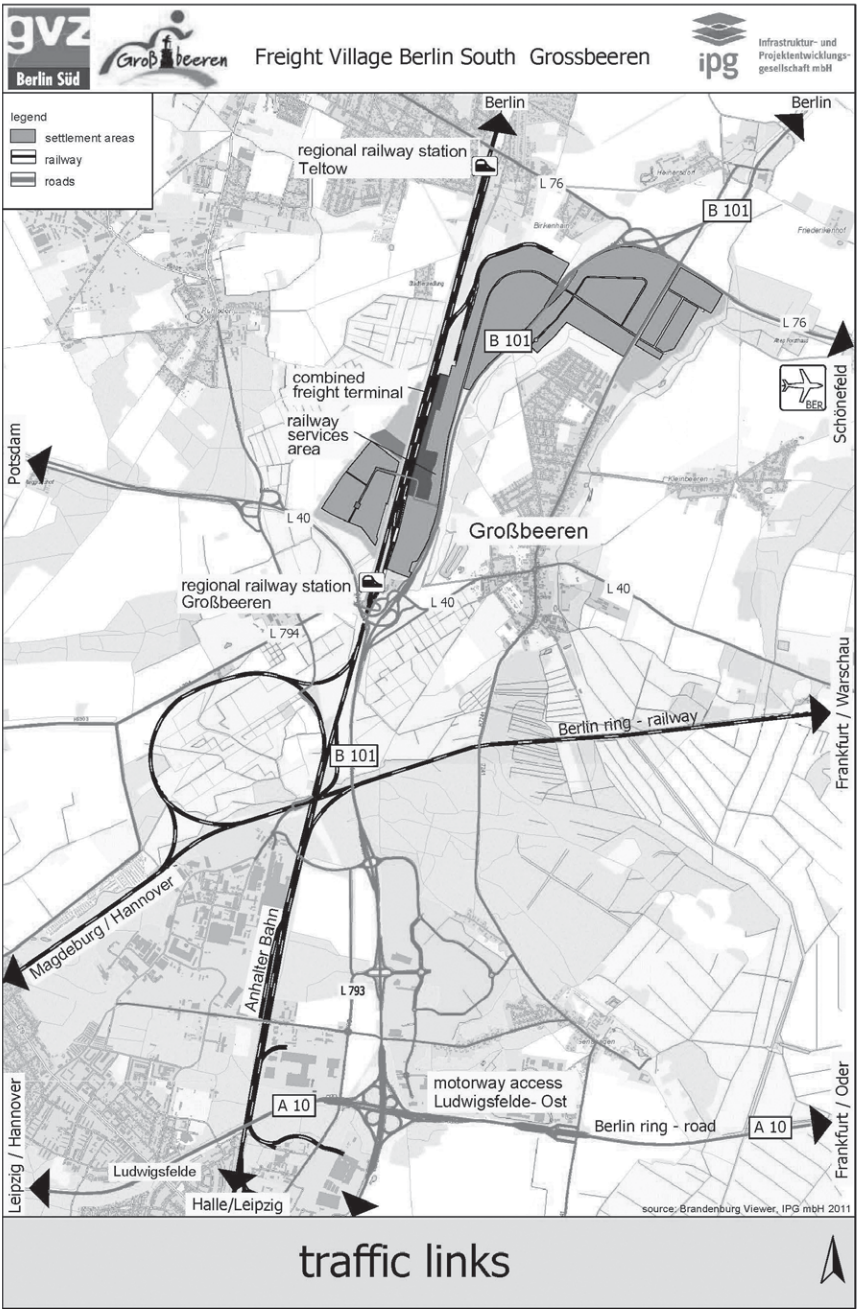

Figure 4: Traffic links; IPG (2012)

- TIP-CTR are offering transport equipment (trailer skips, etc.) for rent and sell,
- Flötgen sells, rents and maintains fork lifts
- Thermo King: installation and maintenance of transport colling device, 24 h services
- Pneuhage: tire service and assembly
- Steinkühler: internal tank cleaning

Additional services for example the rental of lifting platforms, commercial cleaning and landscape gardening is also offered. The range of service facilities will be continually expanded connected to local conditions.

The IPG working as fiduciary company for the municipality Großbeeren is responsible for following points visualised in Figure 5.

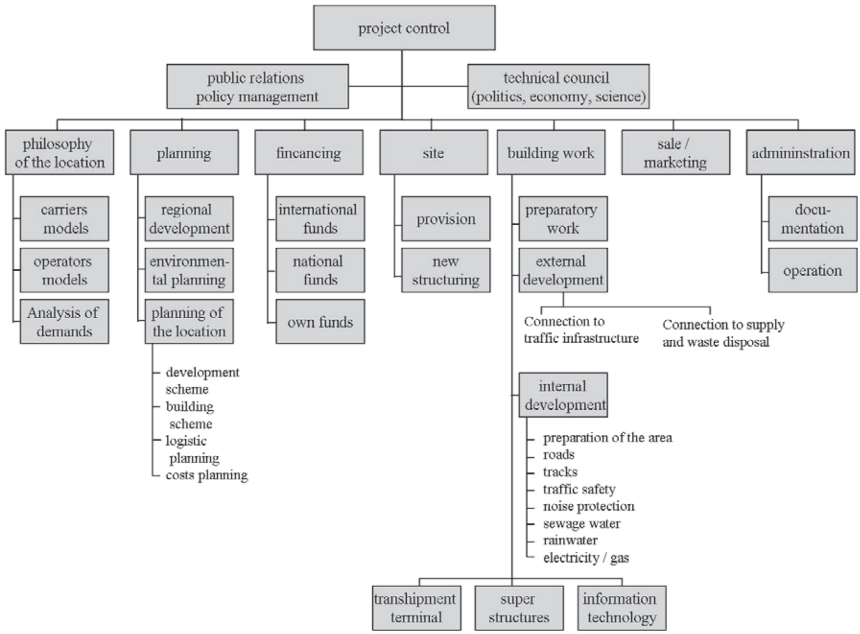

Figure 5: Project Structure – Tasks; IPG

Because of the ongoing planning and realization process of the FV expansion, (4.2) the sale/marketing process and the operation as railway infrastructure company of the FV tracks (4.3.2) almost all listed points are still relevant today, after 15 years of FV development.

4.2 Settlement development

As a first step in 1991 an examination »freight traffic analysis of greater Berlin« has been arranged wherein 30 locations have been analyzed, resulting in the 3 FV locations which had been identified. Following in 1991 in Berlin and in 1992 in Brandenburg governmental resolutions have been decided as basis for the development of the three Berlin surrounding FV. The LEG mbH i.L. started to plan and develop the three FV. Since 2003 the IPG develops the FV.

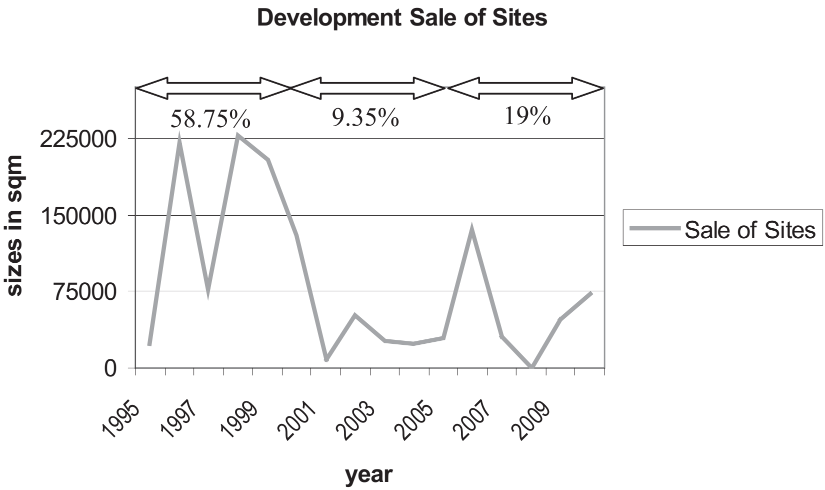

Figure 6: Development Sale of Sites, 1995 – 2010; IPG (2011)

In 1995 the first settlement in GB could be stated with the logistics company Rieck which moved from Berlin to Großbeeren. During the first five years already almost 59 % of the settlement area has been sold. From 2001 till 2010 further 28.35 % of the area has been sold (Figure 6). Today only smaller sites are still available which very often don't meet the »big« logistics companies' requirements. The smaller sites are planned and provided for logistics services and further services companies.

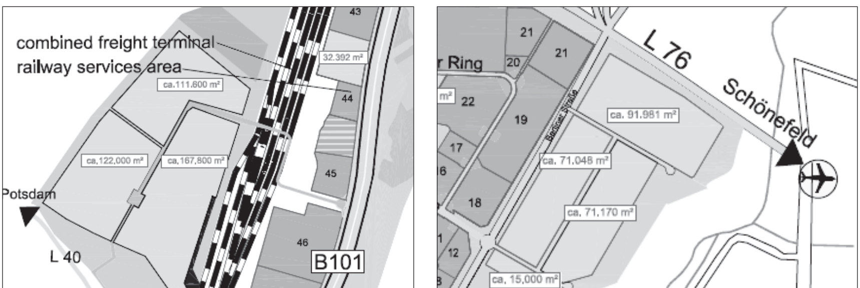

Figure 7: Expansions »Lilograben« (left), »Anhalter Bahn« (right); IPG (2011)

Regarding the still high request for sites, the municipality Großbeeren decided to expand the FV. 60 ha will be developed.

The first expansion area »Lilograben« will be available during the first half of 2012.

The second expansion »Anhalter Bahn« will be connected with all media and infrastructure and so available in the end of 2013.

Figure 8: Development of FV GB from 1998 to 2008

4.3 Infrastructure and Transport

Regarding the definition of Freight Villages at least two transport modes have to be connected with the Freight Village. The FV GB is connected by road, rail and also air. The location and connection of freight villages to transport infrastructure has to be defined as backbone and plays a decisive role for the success of a freight village.

4.3.1 Road

Two junctions to the national highway B 101 expanded to four lanes are connected to the FV GB. The B 101 is also the direct connection to the motorway ring road in 5 km distance and to Berlin also in 5 km distance. In addition to this there are connections to the state roads L 40 to Potsdam and L 76 to the new Berlin-Brandenburg airport. Berlin can be reached after 5 km and Potsdam after 15 km by road.

4.3.2 Rail

The railway plays an important role in the FV GB concept. The FV GB comprises a direct connection with the main route of the railway in direction south (Halle/Leipzig-Nuremberg/Munich) and the Berliner Aussenring (Berlin Outer Railway Ring). Two decisive rail connections have to be mentioned for the FV. On the one hand the FV connection operated by the IPG as railway infrastructure company with 2 km track length. The infrastructure gives the companies of the FV the possibility to connect their site with a track, like the companies Spitzke SE and Rhenus today.

4.3.3 Air

The new Berlin-Brandenburg Airport will go into operation in June 2012. Because of the close distance (15 km) between the FV and the new airport the FV can be counted as surrounding area of the airport.

4.3.4 Combined Transport

A terminal was put into operation by Deutsche Bahn AG on the site of the FV in 1998 already. The extension of the terminal was completed in October 2006. There are now 2 transhipment tracks available with a length of respectively 700 m and 2 tracks with a length of 350 m. The terminal has two gantry cranes with a capacity of 100,000 loading units/year for transshipment. In 2011 61,000 TEU had been shifted at the terminal which was the highest container volume in Brandenburg. The facility is operated by the railway company subsidiary DUSS mbH. The Albatros Express of Transfracht currently runs with block trains between the FV and the seaports of Hamburg, Bremen and Bremerhaven on four days a week. The Eastwind of Trans Eurasia Logistics (TEL) runs 3-5 times a week in direction CIS depending on the volume. Further relations are a train to and from Giengen in the South of Germany also operated by TEL and the Warstein-Express which delivers beverages for the capital region once a week and is operated by WLE.

DB Intermodal operates a Container Service Center for Transfracht on a surface area of 1.4 ha.

Figure 9: DUSS Terminal Großbeeren; IPG (2011)

5 Green Future Prospect

The ecological development and strengthening of the freight village plays a growing role. The combined transport, short ways between companies which are settled and the planned concentrated political wanted settlement instead of wild company spreading are facts which already speak for the ecological way of the FV. But of course there are lots of potentials. A first step has been made by the municipality. Investors are getting a financial support for the installation of photovoltaic on their new buildings. As first company the real estate developer ALCARO made use of it in 2011. Furthermore the Siemens AG and IPG supported by the municipality Großbeeren made a first basic analysis regarding the public and private use of energy at the FV GB in 2011. Besides the public consumption (e.g. streetlight), 9 companies out of 66 have been included in the first analysis to get an overview. The nine chosen companies reflect a picture of the FV average because of their different businesses (forwarding, logistics services, food product logistics, combined transport, railway logistics, real estate development company, railway industry/railway logistics) First energy saving potentials have been identified. As next, a more detailed analysis will follow and reducing steps including concretized actions will be defined.

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The analysis of present state and future developments of intermodal terminals in Slovakia

Romana Hricová

Abstract

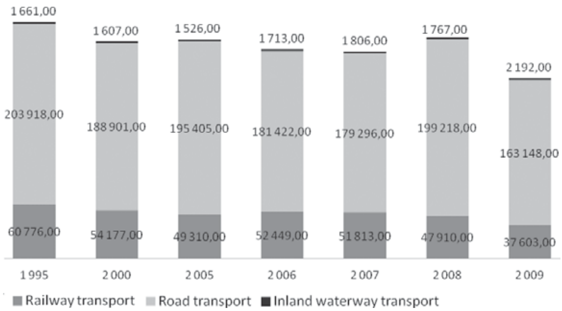
The paper at hand contributes to the discussion in the area of intermodal terminals in Slovakia. It analyses the present state of terminals with respect to the FLAVIA corridor needs, including the specification of operating terminals, and provides proposals of measures for a possible future increase of the transport flow via selected terminals. It presents an analysis of externalities not included into individual kinds of freight transport and proposes changes to the existing state in order to promote an increase of intermodal transport at the expense of pure road transport. The paper also contributes to the public discussion onto the actual government priorities in the area of investments into modernization of existing intermodal infrastructure and building the new public Intermodal terminals. It estimates the future development scenarios of intermodal terminals in Slovakia.

1 Introduction

Intermodal transport in Europe is a topical and important problem, since it is the preferred way to reach sustainable transport with potential to decrease negative environmental, social, and economic impacts of freight transport significantly. The important parts of intermodal transport development are intermodal terminals that should be carefully planned in each country to cover all its industrial and urban territories and thus enable efficient and sustainable transport. Some issues of intermodal terminals in Slovakia are solved in the scope of the FLAVIA project. The FLAVIA project intends to improve intermodal cargo flows instead of building new infrastructure. The paper contributes to the discussion of intermodal transport problems in Slovakia with respect to available and already planned infrastructure. The FLAVIA project contributes to strengthening territorial cohesion, promoting internal integration, establishing different national and trans-national alliances regions, transport and terminal operators in Central European region.

2 Modal split in Slovakia

The modal split development from 1995 to 2009 in Slovakia is shown in Figures 2.1 and 2.2 [2].



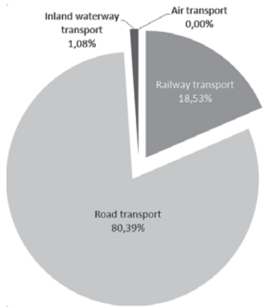


Figure 2.1: Modal split – 1995-2009 (thous.tonnes) [2]; Figure 2.2: Modal split – 2009 (%) [2]

As can be seen from the Figures, the ratio of railway and inland waterway transport is relatively low, and thus it is desirable to promote the transfer of freight transport from road to rails. Inland waterways in Slovakia includes only the Danube section in Slovakian territory and, up to this time, do not play an important role in Slovakian freight transport.

3 Current problems of freight transport in Slovakia and existing infrastructure

The present state of intermodal infrastructure in Slovakia including all facilities also with those out of AGTC network [1] is shown in Figure in Attachment 1 of this paper. The freight transport volume in Slovakia, as clear in Figure 2.1, is oscillating around the level of 230000 thousand tons per year depending on the actual state of economic activity in the country. From several reasons, the road freight transport is dominating more than it is desired by public and government. This section should briefly describe the actual problems of individual modes of freight transport, especially road and rails.

3.1 Road freight transport

Road freight transport is dominating in Slovakia up to this time. After political and economical changes related to transfer from a centrally planned economy to a market oriented, the sector of private road freight operators was fast growing especially thanks to its flexibility, decreased ability of state-owned rail companies to compete in the new economic conditions, and also thanks to unequal pricing for the use of transport infrastructure, which was for a long time more advantageous for road than rail transport [4]. From 1.1.2010, the toll system of pricing for road freight transport was introduced. It immediately caused strikes of some operators accompanied by blocking some roads and political activities influencing elections in 2010. This proved, that any change in the sector pricing in very politically sensitive, and thus inhibits the reforming freight transport towards more efficient and green. The present situation in pricing is still more advantageous for road transport. Current tolls are shown in Table 1, and the map of priced infrastructure is shown in the map in Attachment 3 of this paper.

Road class			Motorways/ Expressways			1st class		
Vehicle category			Emission class			Emission class		
			EURO 0-II	EURO III	EURO IV,V,EEV	EURO 0-II	EURO III	EURO IV,V,EEV
Lorries	3,5t – 12t		0.093 €	0.086 €	0.083 €	0.070 €	0.063 €	0.063 €
	12t and more	2 axles	0.193 €	0.183 €	0.179 €	0.146 €	0.136 €	0,136 €
		3 axles	0.202 €	0.193 €	0.189 €	0.153 €	0.146 €	0,143 €
		4 axles	0.209 €	0.199 €	0.196 €	0.156 €	0.149 €	0,146 €
		5 axles	0.206 €	0.193 €	0.189 €	0.153 €	0.146 €	0,143 €
Busses	3,5t – 12t		0.060 €	0.050 €	0.030 €	0.040 €	0.030 €	0.020 €
	12t and more		0.110 €	0.100 €	0.060 €	0.080 €	0.070 €	0.040 €

Table 1: Toll rates for the use of specified sections of motorways/ expressways/ 1st class roads [3]

The problems related to road transport in Slovakia are typical as for other post soviet countries and are such as still not finished infrastructure of motorways and expressways; obsoleteness and bad quality of 1st class roads; insufficient capacity of existing road s, and bottlenecks in some nodes (such as near Žilina); safety issues; some operators are bypassing tolled sections of roads via parallel roads of 2nd and 3rd class, thus damaging infrastructure very quickly; insufficient sources for investments into infrastructure; public protests against heavy lorries due to noise, damage of houses through vibrations and accidents in some critical urban and transit areas, etc. The responsible government and regional authorities are aware of all this problems and are preparing corrective measure, but the process is very politically sensitive.

3.2 Rail freight transport

The market share of rail freight transport is oscillating at about 20% of the total freight transport market. According to [7] railway infrastructure is insufficiently used, much extended, and obsolete (with exception of modernized corridor tracks) with gradually degrading parameters (speeds, axle loads), not accommodated to modern European rolling stocks (problem of electromagnetic compatibility), and thus limiting modernization of rolling stocks of operators; investments are concentrated only on corridor projects with resignation of infrastructure manager to modernize others; state-owned rail companies proved to show low effort to optimize from inside. All three state-owned railway companies are running revitalization programmes, and do not have finances for large investments. According to [5], the sector client structure of rail freight transport is as shown in Figure 3.1. According to surveys performed within the scope of FLAVIA, into existing and potential industrial clients of rail and intermodal freight transport, the customers of rail freight transport can be divided into several groups such as: satisfied with railways services; partially or not satisfied, but do not have other choice than use railways; not very satisfied, but prefer railways due to company´s philosophy; not satisfied with railways and thus are preferring roads; the rail freight transport is not appropriate for them due to some reasons (low transported quantities, JIT or JIS production, etc.). The customer structure shown in Figure 3.1 and the FLAVIA surveys show that there is commercially significant market space for increase the ration of rail and intermodal freight transport market-share depending on own activities of operators and also on government policies.

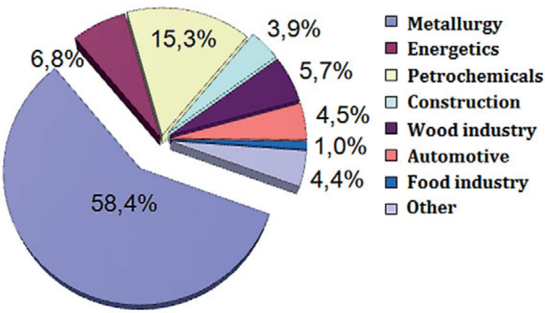


Figure 3.1: Rail freight transport customer structure in Slovakia [5]

3.3 Inland waterway transport

Inland waterway freight transport in Slovakia has limited importance, since only the Danube waterway part of corridor VII, AGN E80 is navigable. From three Slovakian public ports on Danube (Bratislava, Komárno, Štúrovo), only the one Bratislava is commercially attractive at the present time. There are also plans to enable navigability on river the Váh (AGN, E81) up to Žilina, and then connect Danube with th Oder by a canal, but these plans have existed for a long time and if they will ever be realized, it is not even a middle-term question.

3.4 Existing and planned intermodal terminals

Nowadays, a total of eight intermodal terminals are operating in Slovakia, concretely port Bratislava Pálenisko (SPaP, a.s. Bratislava – SPAP), Bratislava UNS (SKD Intrans, a.s. – SKD), Košice (SKD Intrans, a.s.), Žilina (SKD Intrans, a.s.), Dobrá (TransContainer Slovakia, a.s. – TCS), Dunajská Streda (Metrans (Danubia), a.s. – MDS), Košice – Veľká Ida (Metrans (Danubia) a.s.) and Sládkovičovo (Green Logistics Slovakia – GLS). All operating terminals are owned by private companies and partly opened for public. Volume of transshipment, technical equipments and modes of transport are shown in Table 2.

Terminal (ownership)	Transhipment (real Tons/ITU)	Technical equipment	Modes of transport
Dunajská Streda (MDS)	802178/64847	2 rail gantry cranes, 36t, 7 reachstackers 5x10t, 2x45t	road/rail 9 rails (650 m, 629 m, 727 m, 2x655 m, 4x550m)
Bratislava port Pálenisko (SPAP)	221980/22040	5 rail gantry cranes, 2x16t, 2x20t a 36/32t 2 reachstackers, LUNA 45t, 1 stationary RoRo ramp	water/rail/road 2 rails (150 m, 300 m)
Žilina (SKD)	196225/16600	2 reachstackers, Kalmar 35t 1 sidehandler KLAUS 26t	road/rail 1 rail (425 m), 1 rail (470 m)
Sládkovičovo (GLS)	133900/6905	2 reachstackers LUNA 45t, 1 gantry rail crane 40t	road/rail 2 rails 400 m
Bratislava UNS (SKD)	59887/2114	Rail gantry crane UN32, 32t 1 reachstacker Kalmar, 35t 2 reachstackers Komatsu, 2,5t, 2t	road/rail 3 rails 240m
Košice (SKD)	13044/282	2 tired gantry cranes, 19t, 12t 2 reachstackers, 35t	road/rail 2 rails (2x180 m)
Dobrá (TCS)	12835/1406	2 rail gantry cranes, 50t 1 reachstacker LUNA 45t	road/rail & rail/rail (SG/BG) 8 rails (SG 570m, 595m/735m, 684m) (BG 593m, 588m, 812m, 802m)
Košice – Veľká Ida (MDS)		2 reachstackers PPM Terex, 45t 1 reachstacker PPM, 7t	road/rail 2 rails (2x 300 m)

Table 2: Intermodal terminals in Slovakia [1]

The existing network of intermodal terminals in Slovakia is technically and technologically obsolete, does not meet basic parameters defined by the AGTC, and the terminals are non-public, therefore they are unable to provide services required by the actual transport market [6]. To promote the intermodal transport in Slovakia, the government plans to build and operate public intermodal terminals in Bratislava, Žilina, Košice, Leopoldov and Zvolen, that will provide services on a non-discriminatory principle. Their intended exploitation with respect to existing and planned industrial parks and agglomerations is shown in map in Attachment 2 of this paper [2].

3.5 Externalities in main modes of freight transport in Slovakia

As can be seen in the modal split shown in Figure 2.2, the main decisive modes of freight transport are roads and rails. As calculated by [4], the road transport has still an advantage in relation to pricing with respect to real costs that it causes. The results of financial externalities calculation are shown in Table 3, and indicate that the electric traction is closest to real costs. By full including the external costs into price for infrastructure use, the modal split will have different and more desirable parameters from the view of society.

Territory		Heavy lorries	Rail freight transport	
			Electric traction	Diesel traction
Inside urban space	Day	3,04 €	0,29 €	1,4 €
	Night	3,55 €	0,66 €	1,77 €
Outside urban space	Day	1,66 €	0,31 €	1,24 €
	Night	1,74 €	0,39 €	1,32 €

Table 3: Average external costs of road and rail freight transport in €/tkm [4]

4 Opportunities for intermodal transport increase

As evident from Figure 4.1, the volume of intermodal freight transport in Slovakia continuously grows, with exception of 2009, when the whole economy faced the downturn caused by world economic crisis.

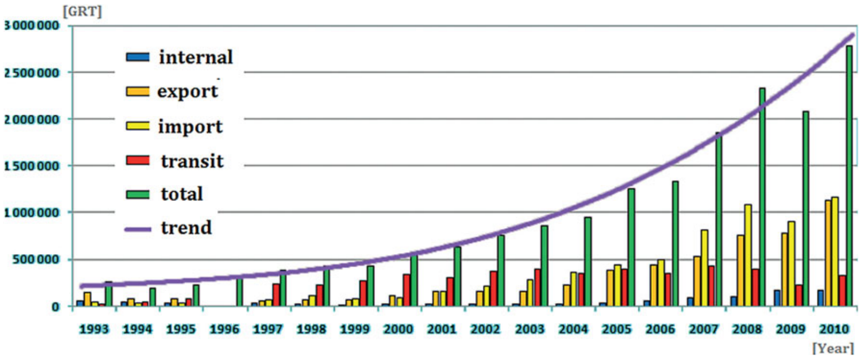


Figure 4.1: Intermodal freight transport volume/time in Slovakia [1]

The increase could be faster in case of optimal conditions for intermodal transport development. The opportunities can be divided into short-term, middle-term and long-term and the key factor is the success of railways in increasing its market share ratio, especially in transit segment of the market.

4.1 Long-term opportunities

Long-term opportunities are identified such as new infrastructural project into railway and inland waterway infrastructure; finishing full network of motorways and expressways; finishing the full intended network of public intermodal terminals; pricing for infrastructure use including all externalities, and applying tolls on personal transport. Each of these opportunities also have some critical points such as insufficient profitability and low available sources of investments (infrastructural projects), political risks (pricing changes), and political risks and technical problems (applying tolls on personal transport depends on the Galileo GNSS project).

4.2 Middle-term opportunities

Middle-term opportunities are identified mainly in the railways infrastructure modernization, which depend on measures to increase the profitability of infrastructure manager and obtaining larger financing support from European funds and the Slovakian government. The main running and planned middle-term investments are performed into corridors IV, V and VI, according to needs of European community. An even more important measure from a middle term view is the planned privatization of national rail freight operator ZSSK Cargo Slovakia, a.s. It seems to be a key factor on the way to increased profitability of infrastructural manager ŽSR, since it should bring a strategic rail freight partner, which will increase transit via Slovakia. Until 30.4.2011, ZSSK Cargo Slovakia, a.s has owed to the infrastructure manager ŽSR approximately 100 mil.€, which should be paid before an entrance of a private owner and will enable ŽSR to speed-up the infrastructure modernization. Strategic partner (up to this time, Russian and Czech freight railway state-owned companies have shown a preliminary interest to attend the privatization tender, which should be declared until first half of 2012) and will help to modernize rolling stocks operating on Slovakian railways. Therefore, the preliminary declared priority of privatization ZSSK Cargo Slovakia, a.s is not the highest price, but a guarantee of transit increase. Modernization of rolling stocks is limited by infrastructure, and is running more slowly as it could. All these measures, if successful, will help the competitiveness of rails in comparison with roads. Some middle-term opportunities can also be seen in the planned government changes of toll system for road transport, but full details are not known up to this time.

4.3 Short-term opportunities

Short term opportunities are closely related to revitalization program of state-owned railway companies and to the activities of their management. Infrastructure pricing changes with effort to increase the competitiveness of rails and reach higher utilization are illustrated in Figures 4.2, 4.3 and 4.4 [5].

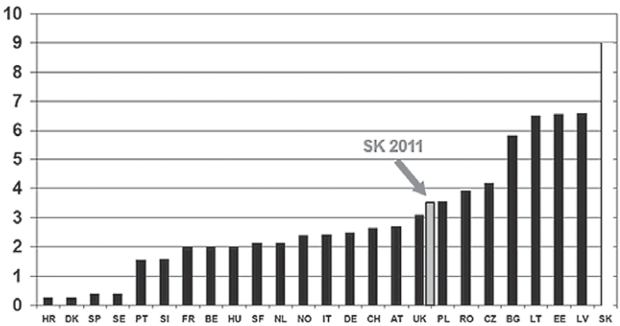


Figure 4.2: Rail use fee, EU 2008 – black, SK 2008 – white, 2011 – grey; train 960grt (€/vlkm) [5]

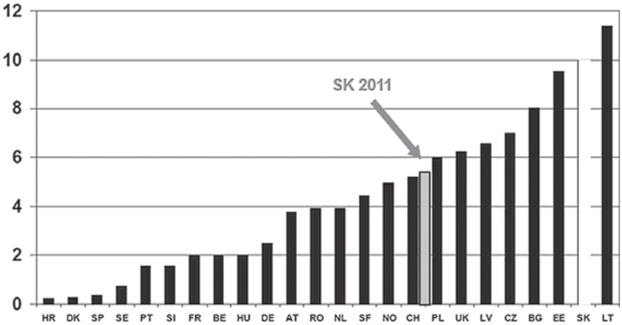


Figure 4.3: Rail use fee, EU 2008 – black, SK 2008 – white, 2011 – grey; train 2000grt (€/vlkm) [5]

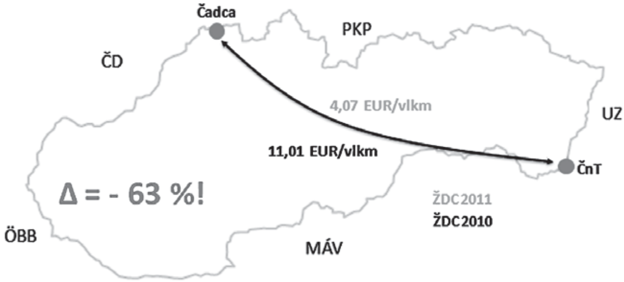


Figure 4.4: Price change between 2010/2011 [5]

The policy of a rail infrastructure fee decrease has already proven to be successful, since the transported volume is increasing. Also, the number of registered or in-application process of private operators to service in Slovakia has increased from about 26 in 2010 to 35 in 2011, which is a promising development in relation to competitiveness and flexibility of provided services. Also the volume of freight transit increases, the impact of price measures on transit is shown in Figure 4.4. Other important short-term opportunities are related to flexibility and customer-oriented ordering of infrastructure capacities from its manager. The improvement is clearly seen in the growth of assigned ad-hoc trains in freight transport, which was 349 trains in 2005, 3631 trains in 2009 and 6537 trains in 2010 [5].

5 Government priorities related to intermodal infrastructure development

The need to develop intermodal transport infrastructure results from the commitments of the SR to upgrade railway tracks and related structures including intermodal terminals on main Pan-European transport corridors arising from the AGTC on the most important routes of international combined transport and corresponding structures [6].

5.1 Government priorities related to intermodal terminals

Number and localisation of basic network of public terminals of intermodal transport was performed from the requirement to cover maximum territory of SR with terminal services; from the transport potential of intermodal transport terminals based on elaborated studies; from the location of transport networks of major railway lines and road communications in Slovakia included in Pan-European transport corridors and/or are part of TEN-T network and the locations of railway lines included into the AGTC Agreement; from the intention of locating the industrial parks in Slovakia [6]. The actual plan of covering Slovakian territory with services of public intermodal terminals is shown in the map in Attachment 2 of this paper [2]. The intended public intermodal terminals and the state of investments are shown in Table 4 and total estimated costs are about 240 mil.€ of which 204 mil.€ should be gained from European funds [2].

Location	Estimated costs (mil. €)	Notes on implementation state
Bratislava	44	Construction should start in 2012, tri-modal IWW/rail/road public terminal on Danube river in Bratislava node
Žilina	61	Construction should start in 2011, bi-modal rail/road public terminal
Košice	61	Construction should end until 2014, tri-modal rail (broad gauge)/rail(standard gauge)/road public terminal
Zvolen	Funding not assigned	In preparation phase, construction is not planned in short-term outlook, bi-modal rail/road public terminal
Leopoldov	Funding not assigned	Not even in preparation phase, construction is not planned in middle-term outlook, bi-modal rail/road public terminal

Table 4: Planned public intermodal terminals [1, 2, 6]

6 Conclusions with respect to future development scenarios

Possible scenarios of development in the area of intermodal transport in Slovakia are shown in Table 5 providing basic premises and their estimated impacts on intermodal transport. In reality, the premises and impacts will create a combination.

<table>
<tr><th>Negative scenario</th><th>Neutral scenario</th><th>Positive scenario</th></tr>
<tr><td colspan="3">Key premises</td></tr>
<tr><td>- Investments plans will not be realized or will be in significant lateness
- Privatization of ZSSK Cargo Slovakia, a.s. (freight transport) will not be successful
- The revitalization of ŽSR (infrastructure manager) and ZSSK Slovakrail, a.s. (passenger transport) will not be successful
- There will not be political will to perform essential changes in road toll system
- Economic activity in main targets of Slovakian exporters will be in downturn or in stagflation</td><td>- Investment plans will be partially realized
- Privatization of ZSSK Cargo Slovakia, a.s. (freight transport) will be successful, but will not bring essential increase of freight transit
- The revitalization of ŽSR (infrastructure manager) and ZSSK Slovakrail, a.s. (passenger transport) will be partially successful, without increase of profitability and passengers
- Road toll changes will be partial
- Economy will grow by average of 2-3% per year</td><td>- Investment plans will be fully realized
- Privatization of ZSSK Cargo Slovakia, a.s. (freight transport) will be successful, and will bring essential increase of freight transit from Asia to the centre of EU
- The revitalization of ŽSR (infrastructure manager) and ZSSK Slovakrail, a.s. (passenger transport) will be successful with increase of profitability and passengers
- Road toll changes will be fully implemented, including tolls for personal transport
- Economy will grow by more than average levels, Ukraine will enter EU</td></tr>
<tr><td colspan="3">Impacts</td></tr>
<tr><td>- Intermodal freight transport volume in and via Slovakia will be stagnating
- State-owned rail infrastructure manager and passenger operator will be permanently in deficit, and depending on government subventions
- Obsoleteness of infrastructure will be increasing and thus causing lower competitiveness and attractiveness of Slovakia in comparison with its neighbours</td><td>Intermodal freight transport in and via Slovakia will grow, but will be depending on government subventions
- State-owned rail infrastructure manager and passenger operator will be stabilized, but do not create enough profit for financing modernizations
- Modernization of infrastructure will depend on EU funds and government subventions</td><td>- Intermodal freight transport in and via Slovakia will grow by optimal levels
- Modal split of freight transport will change in behalf of rails
- State-owned rail infrastructure manager and passenger operator will be profitable and financing modernizations, freight transit via Slovakia will grow essentially
- The road toll will be increased from personal transport, which will cover the decrease from freight road tolls
- Modernization of infrastructure will still partially depend on EU funds and government subventions, but will run faster thanks to increased own sources of state-owned road and rail infrastructural managers</td></tr>
</table>

Table 5: Basic development scenarios

The present situation in the Slovakian economy tends to make a conclusion that the most probable scenario in relation to the intermodal transport development in Slovakia, which will happen in the future, is the neutral scenario. External and internal conditions in the Slovakian economy are not excellent and do not make a space for optimistic prognoses for any of the industry sector. Intermodal transport, which development still depends on government and European subventions, is not an exception all the more in situation that government faces the sovereign debt crisis, which creates critical risks for the infrastructural investments in the future.

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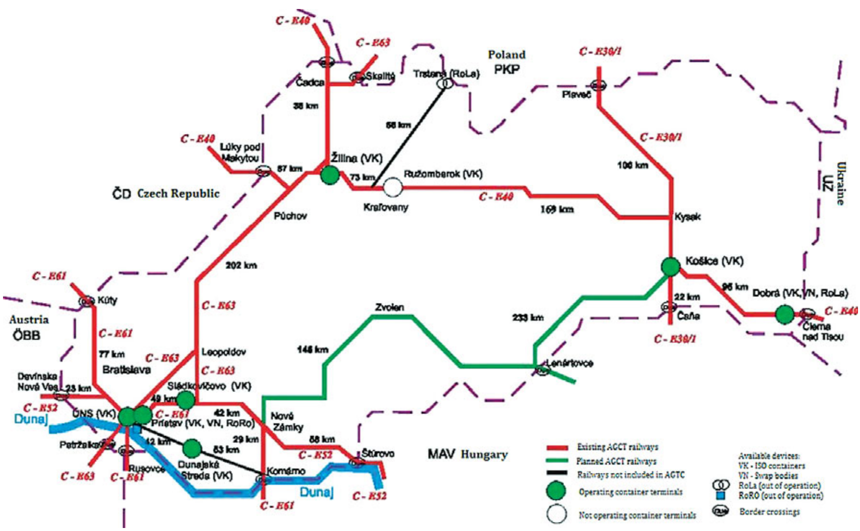
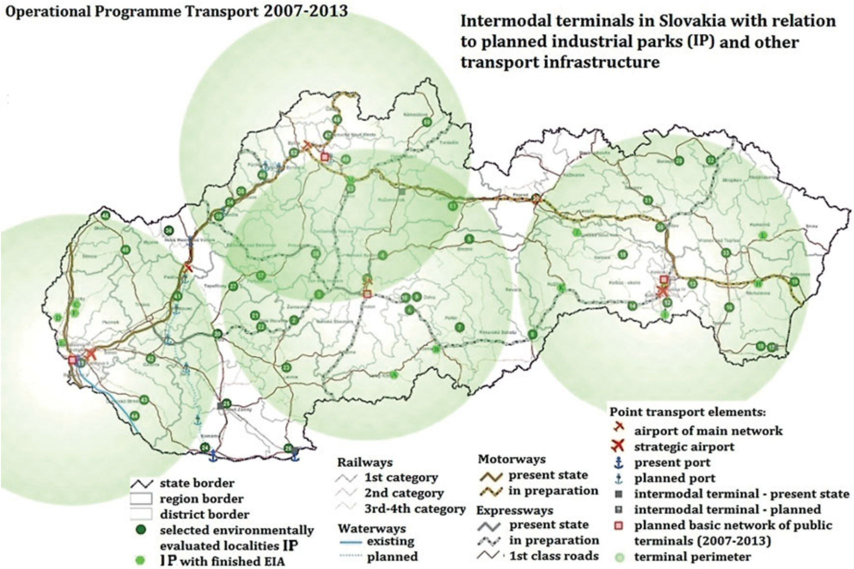
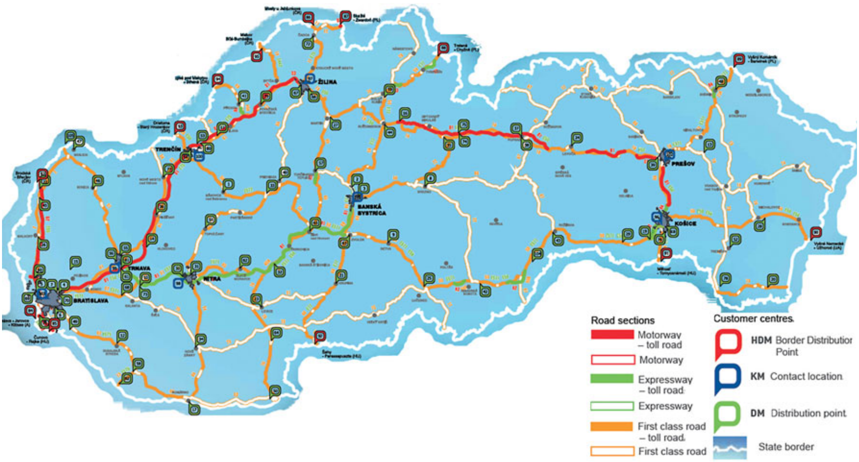


Attachment 1: Present state of intermodal infrastructure in Slovakia, all facilities including those out of AGTC network [1]



Attachment 2: Intermodal terminals in Slovakia – present state & future plans according to Operational Programme Transport 2007-2013 [2]



Attachment 3: Road toll in Slovakia- actual map valid from 1.7.2011 [3]

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