RESEARCH PAPER CONCERNING THE
TECHNOLOGICAL DIMENSION OF ACCESSIBILITY WITHIN THE
AMBER COAST LOGISTICS REGION

Authorship: Fraunhofer CML

Work Package 3: Flow of Goods and institutional/ legal aspects especially relevant for low accessibility areas

Activity 3.3: Various aspects of accessibility

Figure 1: Transport corridors in the Amber Coast Logistics Region

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Hamburg, August 2012
1. Introduction

Amber Coast Logistics is a collaborative project that supports the coordinated development of intermodal supply chains and logistics centres and thus fosters the connection of remote areas in the southern and eastern Baltic Sea region, the Amber Coast. A prerequisite for development is the knowledge of the current situation. This research paper describes in short the technological aspects of accessibility of the Amber Coast region.

In order to analyse the technological dimension of accessibility of regions, different aspects have to be defined in advance. Usually there are a number of different technologies available to conduct transport between regions;

- transport modes as well as
- transhipment technologies between transport modes

Within the Amber Coast Region different regions are included, ranging from EU member states which were among those creating the EEC, Central European countries which are EU members since 2004 to non-member states in Central Eastern Europe. A macro level insight into transport infrastructures and transport flow statistics suggests, that there are still some improvements required to further support economic growth through making trade and transport more compatible between these regions.

Table 1: Logistics Performance Index 2012\(^1\)

<table>
<thead>
<tr>
<th>Country</th>
<th>LPI Rank</th>
<th>Infrastructure</th>
<th>Logistics competence</th>
<th>Reaching destination within scheduled time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>4</td>
<td>4.26</td>
<td>4.09</td>
<td>4.32</td>
</tr>
<tr>
<td>Denmark</td>
<td>6</td>
<td>4.07</td>
<td>4.14</td>
<td>4.21</td>
</tr>
<tr>
<td>Poland</td>
<td>30</td>
<td>3.1</td>
<td>3.3</td>
<td>4.04</td>
</tr>
<tr>
<td>Lithuania</td>
<td>58</td>
<td>2.58</td>
<td>2.91</td>
<td>3.7</td>
</tr>
<tr>
<td>Estonia</td>
<td>65</td>
<td>2.79</td>
<td>2.82</td>
<td>3.23</td>
</tr>
<tr>
<td>Ukraine</td>
<td>66</td>
<td>2.69</td>
<td>2.85</td>
<td>3.31</td>
</tr>
<tr>
<td>Latvia</td>
<td>76</td>
<td>2.52</td>
<td>2.64</td>
<td>3.08</td>
</tr>
<tr>
<td>Belarus</td>
<td>91</td>
<td>2.78</td>
<td>2.65</td>
<td>2.87</td>
</tr>
<tr>
<td>Russia</td>
<td>95</td>
<td>2.45</td>
<td>2.65</td>
<td>3.02</td>
</tr>
</tbody>
</table>

Above shown extract of the actual Logistics Performance Index (see Table 1:) illustrates nameable differences in between the project’s and associated countries. The LPI-rank ranges from 4 to 95 of 155 evaluated countries.

\(^1\) www.lpisurvey.worldbank.org 2012
This research paper focuses on a macro level on barriers and bottlenecks hindering fluent, efficient and sustainable transport flows in order to refer to the technological dimension of accessibility. Technological barriers are not only intractable engineering problems. They often involve problems of access to knowledge and experience.

Potential technological barriers for all modes include the areas of

- cross-border transports
- transhipment technologies
- access to intermodal terminals and logistics centres and
- ICT-Systems

The analysis investigates the transport modes rail, road, inland waterway and seaborne as well as intermodal transport chains, supplemented by descriptions of existing logistics centres and ICT-Systems.
2. Analysis
The analysis of the actual condition of the technological accessibility within the Amber Coast Logistics region involves the following countries: Germany\(^2\), Denmark, Poland, Latvia, Lithuania and Belarus as project partners’ countries. As important trade partners also Estonia, Russia and Ukraine are included.

Figure 2: Inland freight transport by mode of transport in 2009 (in percentage of tkm)\(^3\) \(^4\)

A first look at the share of railway, road and inland waterway transport in Figure 2 show structural differences between Denmark, Germany, Poland, and Lithuania and the other countries, with road transport dominating with 60% up to 91% the inland freight in 2009. Railway transport has high shares in Lithuania, Estonia, Latvia and Belarus ranging from 40 up to 84%. Inland waterway transport is present in Germany (about 12%, whole country) and Belarus (about 6%).

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\(^3\) Hamburgisches Weltwirtschaftsinstitut HWWI gGmbH Mai 2012

\(^4\) IMFO 2008
2.1 Seaborne Transport

The seaborne transport in the Baltic Sea can be distinguished into different transport market segments:

- LoLo Container transport, both Deep Sea (e.g. direct calls to Polish seaports) and Short Sea Feeder transport
- LoLo of general cargo and bulk cargos
- RoRo, which includes RoRo freight ferries, RoPax ferries and railway ferries as well as system transports with cassettes.

Figure 3 and Figure 4 give an overview of seaborne transport and port connections in the ACL Region:

Figure 3: Ro-Ro and ferry routes 2011

Within the extended Amber Coast Region, there are two ports with Hamburg (121.2 mill. tons) and St. Petersburg (58 Mill tons), which dominate the picture by size. However, due to its function as a major Deep Sea port and as a feeder hub between global regions and the Baltic Sea, the port of Hamburg cannot be compared by size to Baltic Sea ports. Measured in tonnes, especially oil terminals and oil ports rank high in such lists, like Fredericia and Butinge. In many Baltic Sea ports port statistics disclose

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5 baltictransportjournal 2011, the lines indicate port-to port services without proper routing information, which however neglects the heavy use of the Kiel Canal (over 90 vessels, excluding small and leisure boats used the canal daily in 2011)
gross weights, which leads especially in RoRo ports to considerable differences, e.g., a net weight of 17.9 mill. tons equals a gross weight of 26.6 million tons in the case of the port of Lübeck.

Table 2: Ports with a transhipment above 10 mill tons in 2010

<table>
<thead>
<tr>
<th>Port</th>
<th>1000 tons net weight</th>
<th>Dominating market segments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hamburg</td>
<td>104.520</td>
<td>Container, Bulk</td>
</tr>
<tr>
<td>Tallinn</td>
<td>36.264</td>
<td>RoRo, Bulk</td>
</tr>
<tr>
<td>Riga</td>
<td>29.057</td>
<td>RoRo, Bulk</td>
</tr>
<tr>
<td>Klaipeda</td>
<td>28.851</td>
<td>RoRo, Bulk</td>
</tr>
<tr>
<td>Gdansk</td>
<td>26.421</td>
<td>Container, Bulk</td>
</tr>
<tr>
<td>Rostock</td>
<td>19.489</td>
<td>RoRo, Bulk</td>
</tr>
<tr>
<td>Lübeck</td>
<td>17.854</td>
<td>RoRo, General Cargo</td>
</tr>
<tr>
<td>Fredericia (Og Shell-Havnen)</td>
<td>12.946</td>
<td>Bulk</td>
</tr>
<tr>
<td>Gdynia</td>
<td>12.346</td>
<td>Container, RoRo</td>
</tr>
<tr>
<td>Swinoujscie</td>
<td>10.683</td>
<td>RoRo</td>
</tr>
</tbody>
</table>

Table 3: Ports between 10 million tons and 3 million tons in 2010

<table>
<thead>
<tr>
<th>Port</th>
<th>1000 tons net weight</th>
<th>Dominating market segments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aarhus</td>
<td>9.386</td>
<td>Container</td>
</tr>
<tr>
<td>Butinge</td>
<td>9.017</td>
<td>Bulk</td>
</tr>
<tr>
<td>Szczecin</td>
<td>7.969</td>
<td>Bulk</td>
</tr>
<tr>
<td>Rödby</td>
<td>5.832</td>
<td>RoRo</td>
</tr>
<tr>
<td>København</td>
<td>5.142</td>
<td>Container</td>
</tr>
<tr>
<td>Liepaja</td>
<td>4.345</td>
<td>RoRo</td>
</tr>
<tr>
<td>Helsingør</td>
<td>3.990</td>
<td>RoRo</td>
</tr>
<tr>
<td>Puttgarden</td>
<td>3.990</td>
<td>RoRo</td>
</tr>
<tr>
<td>Kiel</td>
<td>3.825</td>
<td>RoRo</td>
</tr>
<tr>
<td>Sillamäe</td>
<td>3.501</td>
<td>Bulk</td>
</tr>
<tr>
<td>Wismar</td>
<td>3.457</td>
<td>General cargo</td>
</tr>
<tr>
<td>Kalundborg</td>
<td>3.084</td>
<td>Bulk</td>
</tr>
</tbody>
</table>

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6 Eurostat 2012  
7 Eurostat 2012
### Table 4: Ports between 3 million and 500,000 tonnes in 2010

<table>
<thead>
<tr>
<th>Port</th>
<th>1000 tons gross weight</th>
<th>Dominating market segment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aalborg</td>
<td>2.725</td>
<td>Bulk</td>
</tr>
<tr>
<td>Sassnitz</td>
<td>2.672</td>
<td>RoRo</td>
</tr>
<tr>
<td>Frederikshavn</td>
<td>2.408</td>
<td>RoRo</td>
</tr>
<tr>
<td>Odense</td>
<td>2.011</td>
<td>Bulk</td>
</tr>
<tr>
<td>Police</td>
<td>1.829</td>
<td>Bulk</td>
</tr>
<tr>
<td>Köge</td>
<td>1.698</td>
<td>RoRo</td>
</tr>
<tr>
<td>Pärnu</td>
<td>1.695</td>
<td>Bulk</td>
</tr>
<tr>
<td>Kunda</td>
<td>1.657</td>
<td>Bulk</td>
</tr>
<tr>
<td>Gedser</td>
<td>1.401</td>
<td>RoRo</td>
</tr>
<tr>
<td>Rönne</td>
<td>1.336</td>
<td>RoRo</td>
</tr>
<tr>
<td>Grenaa</td>
<td>1.250</td>
<td>RoRo</td>
</tr>
<tr>
<td>Randers</td>
<td>1.106</td>
<td>Bulk</td>
</tr>
<tr>
<td>Aabenraa</td>
<td>1.096</td>
<td>RoRo</td>
</tr>
<tr>
<td>Kolding</td>
<td>979</td>
<td>Bulk</td>
</tr>
<tr>
<td>Stralsund</td>
<td>808</td>
<td>Bulk</td>
</tr>
<tr>
<td>Skulte</td>
<td>642</td>
<td>Bulk</td>
</tr>
<tr>
<td>Nyborg</td>
<td>634</td>
<td>Bulk</td>
</tr>
<tr>
<td>Vene-Balti</td>
<td>505</td>
<td>Bulk</td>
</tr>
</tbody>
</table>

Most large ports (except for the oil terminals) are multi-functional, which means, even though most of them concentrate their business on few market segments, there exist in many ports both RoRo and container terminals and different bulk handling facilities, ranging from dry to liquid bulk to general cargo such as wood and paper.

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8 Eurostat 2012
Generally, transport units define the harmonisation standards in ports. Technologically there are no barriers to be identified from the point of view of simply missing or malfunctioning handling equipment.

Technological barriers include also the issue of capacity constraints regarding the fairway access in terms of draught and width and generally the port terminal capacities. Despite large investments over the past decades into port infrastructure, the issue of providing sufficient capacities for the forecast growing trade demand prevails. Given the shortfall of public financial means it will be a major issue to ensure sufficient investments into required future port infra- and superstructure.

\footnote{baltictransportjournal, the lines indicate port-to port services without proper routing information, which however neglects the heavy use of the Kiel Canal (see footnote 5)}
2.2 Road Transport

Technological accessibility by road is determined by road network and permissible dimensions of trucks in terms of length and weights (total or per axle). Different regulations regarding dimensions of the vehicles may cause hindrances and bottlenecks at borders or in hubs. Also emissions and truck tolls as a technical issues are covered here.

Other related aspects like bearing capacities of bridges, maximum passage heights or even turning radius of curves will be covered in the paper concerning the physical accessibility. Additionally administrative regulations may apply regarding security requirements, labour conditions, driving bans and different toll systems which are part of the paper “Administrative Accessibility”.

Figure 5 provides an overview about the road network.

The road network in the Amber Coast Logistics region is dense. Nevertheless, there are great differences between the networks in Denmark and Germany compared to those of the other countries. Especially Germany has an extensive network of capable highways. Denmark also shows a highway network on East-West and North-South axes, while Poland, Lithuania, Belarus and Russia have only segments with highway-standard

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10 Tetraplan A/S 2011
11 www.geofabrik.de 2012
and capability. Latvia does not have any highways. Primary roads complete the network, but they are determined by a smaller capability compared to highways and a slower transport speed.

Permissible Truck Dimensions

Permissible maximum weights and lengths of trucks are illustrated in Figure 6.

Figure 6: Permissible core dimensions of trucks

Truck dimensions are more harmonised in the newer European member states than in the western states, since in the western countries there have been more exceptions to the rules over the past decades. E.g., for fostering the intermodal transport, Germany permits 44 tonnes for trucks in intermodal pre- or end-hauls. The younger member states Poland, Estonia, Latvia and Lithuania changed national regulations according to the EU-harmonisation when you joined the union.

Gigaliners, Modular Trucks

A new development in truck size is the development of modular truck concepts, the so called Gigaliners. While in Sweden and Finland this modular transport has become a common standard, they include notably different permissions for trucks of 25,25 m maximum length and 40 t maximum weight (60 t only in the Nordic countries) often labelled as “tests” in Western European countries. In Germany the permissions for Gigaliners even differs between federal states. Despite existing permissions in Denmark
and Northern Germany however, no border crossing permissions for Gigaliners have been provided yet.

Emissions

To reduce the overall emissions of trucks has been a goal of European policy for a long time. Considerable progress to limit pollutants in trucks exhaust gases has been achieved by the industry. Euro VI will be effective from fall 2013 on. A threat to the technological compatibility of the road transport system are developments which suggest that national and regional governments develop own schemes, mostly reasoned through air pollution concerns, trying to regulate commercial truck traffic through mandatory truck routing on certain roads or driving bans on certain times of the week/day. Even though these are administrative barriers, such regulations can only be overcome with e.g. additional technologies.

Truck Toll Systems

The technological impact about truck tolling systems is that these systems are all single platform solutions, which require the truck companies to install as many on-board-units as many countries they want to drive in. Alternatively the truck drivers are obliged to pay the toll at terminals along the roads. These unharmonised systems increase unnecessarily the costs for road transport, which is among others the downtimes of the trucks for installation and maintenance of these systems as well as the purchasing costs.

Nevertheless, road transport is a well harmonized system, in which providers of road transport find highly compatible infrastructure in the Amber Coast Region. It should be the goal to keep or to improve the level of standardization in road transport. This can be achieved by encouraging national and regional policy makers not to risk the already achieved level of standardisation in dimensions and permissions through implementing own local rules and regulations.
2.3 Rail Transport

Figure 7 shows the rail track network in the Amber Coast Region. The region shows a dense railway network. During the cold war Western countries reduced considerably the density of their railway network, the Eastern European countries kept their railway network in terms of density, however, in some areas at the cost of lack of maintenance.

Today, the Eastern European states besides Poland still have a high share of rail transport from 40% (Lithuania) up to 80% (Belarus).

Technological barriers in railway transport include:

- Track gauges
- Loading gauges
- Standards of electrification
- Control and safety systems (such as ERTMS)
- Other linked based regulation

Track Gauges

12 www.giswiki.org 2012
13 www.geofabrik.de 2012
14 www.bueker.net 2012
15 www.bahnstatistik.de 2012
As commonly known, there is a system break between Western and Eastern Europe regarding the track gauge. While in the former Soviet Union and Finland the track gauge is 1.520 mm, the Western European standard is 1.435 mm. This system break exists ever since. At border crossings systems for loading/unloading or for an exchange of bogies exist. Wagons which can change automatically the track gauge have already been invented but are only used between Finland and Sweden. The border crossings where the system change can be carried out include Brest, Sestokai, Przemysil and the Port of Sassnitz.

Barriers often lead to a certain concentration of traffic volumes in consolidation points, where an exchange between both systems is possible. So there actually can be a positive effect of a natural or technological barrier. A concentration of flows is often very welcome in freight transport, since it allows the use of means of mass transportation and enables the supply of value added services in these nodal points, just because of the critical mass reached. So as such, the different track gauge is not considered as a major barrier.

Loading Gauges

Limited loading gauges are a constraint especially for intermodal transport, because they limit the dimension of the Intermodal Transport Units to be transported on rail. This mainly concerns semi-trailers and swap-bodies, while for standard maritime containers this is only seldom an issue because of their smaller dimensions. Of course, also for High Cube or Open Top containers the loading gauge is an issue. Limited loading gauges are rather a problem in mountainous areas in Western European countries than in the Eastern countries. The loading gauge in the Amber Coast area is not considered as a major technological bottleneck.
Standards of electrification

Another legacy from the past, in which national railways tried to protect their area through different standards, is the standard in electrification. Even in the mid-1990s Denmark for instance decided to have a different standard than its neighbouring countries Germany and Sweden. Technologically this barrier can be overcome by modern multi system locomotives at the price of additional costs for such units. The share of electrification is above 50% of the network only in Germany and Poland. In Denmark only the main lines across the fixed links and in Jutland is electrified. Electrification in the other countries is limited to some main corridors or urbanisation centres.

European Standardised Security and Communication System

The European Rail Traffic Management System (ERTMS) consists of the European Train Control System (ETCS) and the Global System for Mobile Communications – Rail (ways) GSM-R. This system was developed for high speed trains and is spread to the Trans-European Network TEN. ECTS standardises train security systems, while as GSM-R stands for harmonized communication protocols. In Germany, Denmark, Poland and Lithuania ERTMS is already installed. Latvia plans to take over the standardization until 2013.

16 www.unife.org 2012
17 www.uic.org 2012
Belarus, Russia and Ukraine still use other standards. Unharmonised safety standards are another issue to change locomotives at borders or to use more expensive multi-system locomotives.

Other regulations per rail segment

Per link segment of the network more deviating regulative parameters exist, like axle load, speed limits and train length. These issues affect heavier bulk trains more than intermodal trains. The growing number of intermodal transport connections linking the ports of Hamburg and Bremen to Poland, Belarus, Russia and the Baltic States as well as from Baltic ports to Verona, Vienna and Koper shows a high degree of technological accessibility despite these regulations.
2.4 Inland Waterway Transport

The inland waterway transport is only of minor importance in the ACL Region, simply reasoned by the topography of the region. Figure 9 shows the inland waterway network in the ACL Region. The different colours refer to the capability of the waterways.

*Figure 9: Inland waterways in Amber Coast Region*[^18] [^19]

Especially the Eastern part of the Baltic Sea countries is determined by few inland waterways and lower categories compared to Western and Central Europe: at least category V is necessary for use of European standard large inland vessel. This category today only exists in Poland (Swinoujscie – Szczecin, Gdynia – Gdansk – Tczew) and Ukraine (Belarusian border to Kiev). Technological barriers are eminent in these different water classes, since always the weakest point of the network determines its suitability.

[^18]: www.binnenvaart.be 2008
[^19]: www.european-waterways.eu 2012
2.5 Intermodal Transport and Logistics centres

Intermodal transport chains and logistics centres combine transport modes and add logistics solutions like value added services.

Intermodal Transport Chains

Since the 1980s railway operators have developed intermodal transport chains connecting seaports with hinterland destinations. Resulting fast transportation and release of seaports' storing capacities made this concept successful and growing. Facing new mega trends like environmental concerns, intermodal transport shares grow.

Figure 10: Sample of Intermodal Transport Chains

Figure 10 shows an actual sample of intermodal services connecting the Amber Coast region. As the services change from time to time, this map must be seen exemplary. The network shown above offers a capacity of 250,000 TEU per year (without planned connections in dotted lines). The technological accessibility in intermodal transport is hindered by the already described barrier in different railway gauges.

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20 www.maerskline.com 2012a
21 www.worldcargonews.com 2012
22 www.maerskline.com 2012b
23 www.pccintermodal.pl 2012
24 www.polzug.de 2012
Logistics centres shall here be defined as locations where different logistics providers offer not only handling, storing, transport, and value added services but combine services for the transport sector and transhipment between different transport modes like road and rail. There are already quite a number of logistics centres in the Amber Coast Region, but the density of logistics centres in the Eastern part is lower than in Germany or Denmark as shown in Figure 11. Denmark and Germany supported the creation of logistics centres through master plans. Still there is a considerable subsidy for intermodal transhipment facilities provided in Germany.
2.6 ICT Use and Integration

Technological accessibility does not only focus on transport but also on information and communication technologies (ICT). To illustrate the actual situation in ACL Region some key indicators like broadband connections for fast internet access, quota of mobile phones for mobile connectivity and some remarks on the countries’ ICT-infrastructure might give an impression.

Broadband Connections

The share of companies with broadband connections gives an impression of ICT-familiarity and -demands of an economy. These shares vary from about 90% in Denmark, Germany, Lithuania and Estonia to about 80% in Latvia and about 70% in Poland. No data for Belarus could be obtained.

Mobile Communications

Another hint to ICT-connectivity and mobile connectivity is the number of mobile phones/100 habitants and the internet penetration of the population. Most mobile phones are used in Lithuania (150/100 habitants), which may be a sign of an unsatisfying fixed line telecommunication network. About 130 phones/100 habitants are used in Germany, while in Denmark, Poland and Estonia the number is 120. In Latvia the rate is 100 phones per 100 habitants.

Internet Penetration

The internet penetration may be used as a sign for the ICT-infrastructure in a country, which might be similar for the business sector. While this penetration is below 50% in Belarus and Russia, Lithuania and Poland show a share of about 60%. Latvia’s penetration is about 70%, Germany and Estonia around 80% and Denmark leading with nearly 90% of its habitants using internet connections.26

Countries’ ICT-Infrastructure

Denmark and Germany already have sufficient broadband networks, a mature mobile communication market and a high internet penetration. However, especially for electronic data exchange in freight transport internet connections are a key for the companies. Even in well-equipped countries, the connections in rural areas, where the logistic industry is situated, can be very poor.

In Poland there exists also a hindrance in coverage of ICT-infrastructure. Nevertheless, the internet use is developed in the business sector. The big potential in private households’ internet penetration contains chances for the whole economy.

In Lithuania biggest part of internet users connects via mobile phones. The given penetration number of 60% thus may not describe the situation properly.

26 www.internetworldstats.com 2012
Belarus’ telecommunication infrastructure is determined by a fixed line network, which is developed to a broadband network, but also a growing mobile telecommunication market. High growth rates from a still low level will help to keep up with other European countries soon.

Russia is also working on expanding its broadband services, but firstly in the cities in the Western part; due to the immense country’s size wireless technologies also play a big role.
2.7 SWOT-Analysis

The SWOT-Analysis of the technological accessibility of the Amber Coast Region gives an impression of the region’s potential (see Figure 12).

**Figure 12: SWOT-Analysis Technological Dimension of Accessibility**

<table>
<thead>
<tr>
<th>Focus</th>
<th>Strengths</th>
<th>Weaknesses</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seaborne Transport</td>
<td>Nameable investments in new port capacity in Denmark, Germany, Poland, Latvia, Lithuania, Russia Dense network</td>
<td>In some areas poor road hinterland connections to ports (last mile problem)</td>
<td>Investments backed through growth projections Direct calls by overseas vessels</td>
<td>Increasing costs through regulations such as SECA Weakening economic climate Limited capacities in ports</td>
</tr>
<tr>
<td>Road Transport</td>
<td>Dense network</td>
<td>Still many bottlenecks; underdeveloped road network in Eastern parts limits accessibility of regions</td>
<td>New motorways being constructed in Poland Fixed link across the Fehmarn-Belt Improved network</td>
<td>Bottlenecks worsen through increased demand Rise in fuel costs Further congestion</td>
</tr>
<tr>
<td>Rail Transport</td>
<td>Dense network Well-developed intermodal services</td>
<td>Many system breaks in electrification, safety and gauges</td>
<td>Harmonization and further liberalisation of the railway sector High potential for intermodal transport Better information for the customers</td>
<td>Tougher competition by waterborne transport (direct calls) and road</td>
</tr>
<tr>
<td>Inland Waterway Transport</td>
<td>High suitability for bulk transport</td>
<td>Small role in whole ACL transport system</td>
<td>Potential for dedicated solutions in Belarus, Ukraine and Poland</td>
<td>Lack of investments into inland waterways Displacement by faster and more flexible transport modes</td>
</tr>
<tr>
<td>Intermodal Transport</td>
<td>Dense road and railway Networks</td>
<td>Roads in eastern countries with low capacity See rail weaknesses</td>
<td>Realisation of intermodal transport chains to southern Europe and Asia Support through European infrastructure programmes</td>
<td>Displacing rail transport by road transport following intense road construction</td>
</tr>
<tr>
<td>Focus</td>
<td>Strengths</td>
<td>Weaknesses</td>
<td>Opportunities</td>
<td>Threats</td>
</tr>
<tr>
<td>------------------------</td>
<td>--------------------------------</td>
<td>--------------------------------</td>
<td>---------------------------------</td>
<td>----------------------------------------------</td>
</tr>
<tr>
<td>Logistics Centres</td>
<td>Well developed in Western countries</td>
<td>Low density today in Eastern Europe</td>
<td>New projects in eastern countries</td>
<td>No master plan in eastern European countries Few state subsidies</td>
</tr>
<tr>
<td>ICT – use and integration</td>
<td>High connectivity in urban areas High growth rates</td>
<td>Partly poor access in rural areas</td>
<td>Demand forces further improvements</td>
<td>Free use of internet at low costs is hindered</td>
</tr>
</tbody>
</table>
3. Summary

Seaborne transport

The ports in Amber Coast Region vary in size and served market segments. The technological accessibility of ports is sufficient. The demand of handling facilities in ports is taken into account and investments into port extensions take place.

Overall there are no hindrances seen today in technological dimension. The SECA regulation demands technological changes of the vessels.

Looking at future developments, ports will have to follow recent discussions concerning alternative fuels and fewer emissions, such as LNG, cold ironing and other coming environmental-friendly developments to avoid a fall back compared to their competitors.

Road transport

The national road networks in the ACL countries show different standards. All countries have dense road networks, but the share of motorways with high transport capacities vary widely. Especially in Denmark and Germany road transport is a fast and reliable transport mode while in the other partner countries road transport is determined by smaller and thus slower secondary roads.

Deviations concerning maximum length and weight can be observed in Denmark (heavier), Belarus and Russia (longer). A common approach of the countries regarding longer trucks, so called Gigaliners, is not to be found yet.

Besides these deviations technological hindrances cannot be seen.

Rail transport

The ACL Region shows a dense railroad network. Rail transport has a large share of freight transport in eastern countries. The technological barriers, manifested in different gauges, safety systems and electrification, divide the rail systems not only in East and West, but partly also by country per country. Existing technological solutions to overcome these barriers are in use, but further harmonisation and liberalisation could ease some of the problems. For the eastern part of the ACL Region intermodal railway connections to Western and Southern Europe are established. Electrification is not well developed in the Eastern European countries.

Inland waterway transport

Inland waterway transport plays only a limited role in the ACL Region. The only barrier is the limited water class on some of the segments of the inland waterways.
Intermodal supply chains and logistics centres

The number and density of logistics centres and intermodal transport solutions vary within the region. Nevertheless, additional logistics centres are planned in the Eastern countries and besides the technological barriers already mentioned in the transport modes chapters there are no more barriers due to technological standardisation.

ICT use and integration

Technological barriers exist in missing fixed lines and broadband network links. The access to electronic data exchange for actors in the supply chain is limited, also in parts of the Western countries. Often internet capacities and speed are dedicated to the consumer market rather than to business clients. While Denmark and Germany show already mature ICT-infrastructures, the Eastern countries are keeping up. While mobile communication is spread widely, internet penetration in Lithuania and Poland is definitely smaller than in Denmark, Estonia, Latvia or Germany.

Additional results

One development observed in several contexts is a trend of de-standardisation. While for several years the EU-member states profited from EU-wide standards, developed in long-during negotiations, giving all stakeholders reliable grounds to build their business models on, today we see diversifications. The lack of standardisation e.g. concerning the Gigaliner-concept or coming changes in environmental standards in seaborne traffic can be considered as one step back in efforts of standardisation. This is also true for different national toll systems, which displaced the former idea of a common EU-wide vignette.
4. Literature