

**University of Economics, Prague**  
**International Business – Central European Business Realities**



**DB Schenker Rail customer tailored logistic  
solutions in relation to the rail freight market  
between Europe and Asia**

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## **Declaration**

Hereby I declare that this master thesis has been my independent work and has not been aided with any prohibited means. I duly marked out all the quotations. The used literature and sources are stated in the attached list of references.

In Berlin 16.08.2012

Rajnoch Jan

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## List of abbreviations

|       |                                                        |
|-------|--------------------------------------------------------|
| AWT   | - Advanced World Transportation, a.s.                  |
| BDZ   | - Bulgarian State Railways                             |
| CIS   | - Commonwealth of independent states                   |
| CIS   | - Customer information system                          |
| COTIF | - Convention Concerning International Carriage by Rail |
| DBSR  | - DB Schenker Rail                                     |
| LCL   | - Less than container load                             |
| RID   | - Dangerous goods transported by rail                  |
| RZD   | - The Russian Railways                                 |
| SWL   | - Single wagon load                                    |
| TEU   | - Twenty foot equivalent unit - container              |

# SECTION I – FOUNDATION OF THE THESIS

## 1. Introduction

For the centuries, the old Silk routes in hinterland Eurasia were connecting the Eastern and Western empires and served as a channel for exchange of goods and ideas between the two different worlds. Over the past decades, the international trade between Europe and Asia has rapidly increased and reflected more than 10 million TEU transported by container ships annually. At the end of the year 2011 the Eurasian maritime traffic reached 13.5 million transported containers. (Rudnitsky, 2012)

Behind the numbers of transported volumes stand a broad variety of customers ordering day-to-day the freight operators to load and ship their goods to the other part of the Eurasian continent. Consequently the broad variety of customers is naturally reflected by different transport demands, whose nature might be difficult to standardize. Therefore the logistic provider must often come close to the customers and apply the tailored logistic solution, which directly meets his expectations. As far as the silk, spice and other traditional goods have been gradually replaced by laptops, tablets and car components, the new transport solutions have been tested to meet the altering nature of logistic demands. And right the changing demands for transport performance seems to be the key driving force for innovative logistic solutions between East and West.

The classic logistic approach would apply the sea cargo, since the offered capacity enables the lowest prices for container transportation. Nevertheless, the whole costs might be significantly increased due to the fact that the sea vessels need to cover more than 12.000 kilometers, which regularly takes more than 6 weeks. Then if the applied maritime transport cannot leverage the time-to-market effect or related price erosion of valuable goods, the customer often orders the air transportation. However, the freight airplanes do not have to be necessarily a better option, since it is the most expensive transport mode. Therefore the two-way combination of sea and air has been tested as a compromise between the price and speed. For practical instance, the goods are shipped by vessels from Chinese industrial ports to Dubai or other alternative hub, from where it is consequently transported by cargo planes to the target destinations in Europe.

Consequently here comes the question, whether the rail freight connection the European and Asian markets can effectively compete with this applied air to sea combination. If yes, then to which transport mode belongs the capital cost advantage, and what kind of circumstances must be fulfilled that the rail freight stands as the best transport option?

Above all, the historical experience has shown, that from the vital logistic chains in hinterland Eurasia might benefit not only the remote end points, but furthermore the landlocked countries with no

access to the sea, as applies for most of the CIS countries and Mongolia. These countries might soon emerge as the new transition markets. Operations of regular freight services on the rail and road over the so called “land bridge” between China and Europe moves these markets closer to the international business affairs. Consequently such a potential for Eurasian traffic with emphasis on the rail freight might put the whole Central Asia into the new light as a region of new trading opportunities.

In the wake of globalization a lot of European industries have moved the production plants to China with either an aim to be closer to the place of demand or just to capitalize on the cheap labor force and lands provided by Chinese market. Nevertheless the magnitude of Chinese economy so called phenomenon of “Chinese dragon” is changing again and see it as a cheap labor force market might nowadays be a fallacious approach.

The pioneer spirit for innovations of high-tech products brings the Chinese economy on far away more competitive level with Western European markets than it was three decades ago. Some of the studies even point out that the constant change and progress has already brought China as the transition market on the verge of becoming country of the third generation. Due to rising wages in traditional industrial clusters a lot of companies are shifting their plants eastbound further to the Chinese hinterland. Ironically some of them even leave China to avoid increasing labor costs and further approach new Asian markets like Vietnam or Myanmar. As a result the whole supply chains, together with transport ways are changing too.

Nonetheless, for the companies exporting masses of products from East Asia to Europe, the biggest challenge remains still unaltered as the matter to deliver cheaply and as fast as possible. Therefore the rail freight operations together with combined transportation might be seen as one of the most go-ahead logistic service concerning the Eurasian trade.

Finally and again after the years of silence caused by economic recession in 2008 the rail freight activities along the so called “Iron silk road” are starting to gather the steam.

## 1.1. DB Schenker Rail – company profile

With a truly European presence and support of its own European operations network, DB Schenker Rail is the one of the most dominant rail freight operators in Europe. To provide customers with cross-regional support a strong sales function at the European level has been developed and has consistently expanded over the years. DB Schenker Rail divides the European activities into the three business segments:

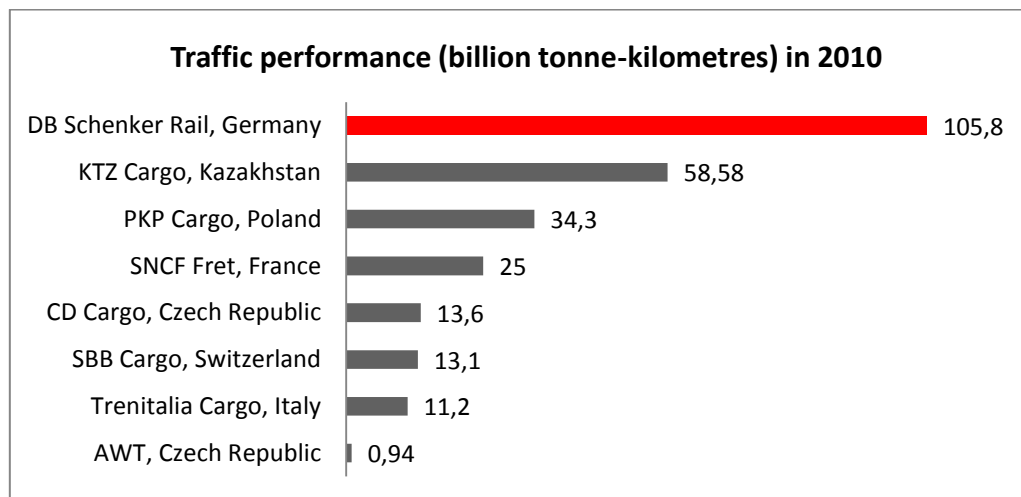
- **Region West** – Great Britain, France, Spain
- **Region Central** – Germany, Netherland, Switzerland, Scandinavia, Italy
- **Region East** – Poland, Romania, Bulgaria

Furthermore, due to the effective cooperation between these regions DB Schenker Rail is able to guarantee the highest transport efficiency, no matter if the cargo leads from Spain to Russia or even from Sweden to Turkey.

*“Some 32,500 employees in 15 countries in Europe work to ensure that cross-border transportation is managed efficiently and in a customer-oriented and environmentally friendly manner. Today almost sixty percent of DB Schenker Rail’s transport services are pan-European. With 109,000 freight cars and 3,587 locomotives, DB Schenker Rail has the largest fleet on the continent.”*

(DB Schenker Rail, 2012)

**Figure 1: Traffic performance of selected rail freight operators<sup>1</sup>**



Source: UIC, DB data – Competition report 2011, press releases, created by author

However, DB Schenker Rail attempts to be not only the best choice on Europe’s rail, but further with the first pioneer back and forth rail freight activities between Europe and Asia tries to capitalize on new business opportunities.

<sup>1</sup> The value of traffic performance of the RZD in Russia has not been included, since the 2703,7 billion tkm would be detected as an outlier in the diagram and would distort the comparison between other rail operators.

## 1.2. Topic justification

### Topic justification:

The section called the topic justification provides the answer why the customer demands and in overall the rail freight market between Europe needs to be researched.

Nowadays, the company DB Schenker Rail is the European leader in the rail freight market and needs to sustain the leading position. On that account the company investigates, what the current or potentially future customer demands are and how to meet their specific logistic requirements. With that respect another subject question has been raised:

***What are the rail freight customer needs today and what he will need tomorrow in relation to the logistic processes between Europe and Asia?***

Furthermore, in terms of the rail freight market between Europe and Asia special attention has been paid to the current status quo related to the normative, administrative and technical conditions, which naturally differ from country to country. Such conditions might be at the same time considered as barriers for the further development of fully competitive rail freight activities between Europe and Asia.

In terms of the European space, most of the companies related to this thesis are located in **Germany, Czech Republic, Slovakia and Poland**. On the other hand, in terms of Asia most of the companies are related to the **Russian Federation, Kazakhstan and China**.

However, even if the company knows in detail the customer needs, the answer for the offered rail freight logistic solution might be negative. Therefore, the DB Schenker Rail is in need to know what measures should be met that the customer says yes and puts his merchandise on the rail instead of other transport mode.

Last but not least, with respect to the day-to-day customer rail freight requirements, the thesis describes the current real settlements and attempts to propose new logistic solutions for the specific companies. Due to the fact that most of these requirements should not be treated as *“one approach fits to all”*, the solutions design tend to be rather customer tailored.

The topic – ***“DB Schenker Rail customers’ tailored logistic solutions in relation to the rail freight market between Europe and Asia”*** – attempts to capture all these related issues.

### 1.3. The problem statement:

With respect to the rail freight market between Europe and Asia the four main problems - challenges have been identified:

1. **Profitability of the rail freight service** as the key challenge for the rail-freight solutions
2. **Low transport volumes** of single companies and the consequent low attractiveness of the rail freight service as a “new” transport mode between Europe and Asia
3. **Non-standardized customer demands**
4. **Changing patterns of Chinese economy** alter the nature of logistic chains with Europe

#### The problems related reasons – challenges detected:

1. Profitability and related challenges:
  - High transit tariffs on Trans-Siberian railway
  - Low margins of transported products
  - Capacity utilization in terms of train lengths and container loads
  - Still often and necessary eastbound transport of empty containers
2. Not all the companies have the capacity to fulfill the whole block train and therefore most of the time the single wagon load solution must be applied. Lower transport volume might be a crucial attribute, why the customer does not choose the rail freight and goes for other transportation modes in relation to the Russia or Asian markets. As a consequent the **tailored approach with maximal capacity utilization** must be applied to convert the customer “NO” to “YES”.
3. Due to variety of reasons, the conditions raised by the companies differ as the key demands to tailor their logistic solutions. As often requirement stands the maximal responsibility of the logistic provider and **complex solution with customs clearance** charged as one single price. Some of the companies will negotiate about the rail freight only as the component to other transportation modes.
4. Changing patterns of Chinese economy create new logistic demands in terms of export and import activities with European markets. Altering status quo asks for **utilization of new rail corridors, terminals and intense cooperation with other rail operators**.
  - Design, connection and investigation of new logistic corridors is required
  - Connection and investments in the key rail - logistic terminals in Europe, Russia, CIS, China is needed

The whole concept of logistic solutions is an output of clash between customer requirements and conditions presented by the company. Therefore to deal further with the problem statement, all the state of affairs has to be taken into account.

#### **1.4. Research objective and research questions**

First of all, the main aim of this study is to **design new logistic solutions** for DB Schenker Rail potential customers in relation to its rail freight activities between Europe and Asia.

Secondly the thesis attempts to detect key decision customer factors for choice of their transportation mode, which is currently applied.

Last but not least, not only the complex analysis of the customer requirements is seen as the priority of this thesis, but furthermore the question, **how to attract more customers on the rail track between Europe and Asia.**

##### **Research objectives:**

- A. to describe and propose measures with potential to increase profitability of Eurasian rail freight
- B. To define the borders where and how the rail freight might compete with other modes for relations Europe - Asia
- C. to design measures with an aim to increase attractiveness of Eurasian rail freight for companies with lower transport volumes
- D. to justify the rail freight as the suitable solution for transportation of high-tech products from Asia to Europe

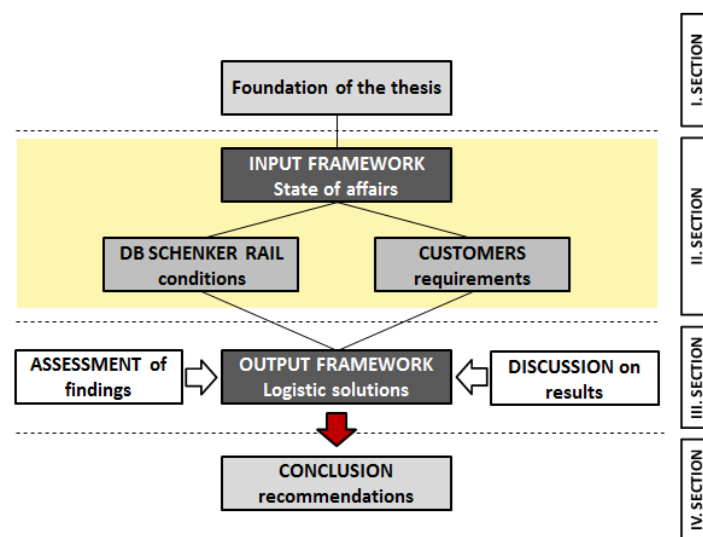
##### **Research questions:**

- What the rail freight customer needs today and what he will need tomorrow in relation to the logistic processes between Europe and Asia?
- How to design logistic solutions for better customer treatment in relation to the new proposed rail corridors?
- What are the main advantages of new logistic solutions in relation to the current status quo of the rail freight transportation between Europe and Asia?
- What measures should be met to move more merchandise flow from competitive transport modes on the rail between Europe and Asia?

## 1.5. Structure of the thesis

- I. SECTION - Foundation of the thesis** deals with conditions and requirements needed for academic paper. This section consists of two parts: introduction and methodological approach.
- II. SECTION – Input framework** covers the so-called state of affairs related to the rail freight transportation between Europe and Asia. Two approaches have been respected: company's status quo for new logistic solutions and the customers key requirements.
- III. SECTION – Output framework** as the key part of the thesis describes concrete proposals as the new logistic measures related to the defined problems. This part creates the basis for the customer's made-to-measure logistic solutions in relation to the rail freight transportation between Europe and Asia.
- IV. SECTION – Conclusion and recommendations** provide the assessment of the study findings. Furthermore, this section brings the polemic on the acquired results including the recommendations for the further research studies.

Figure 2: Structure of the thesis



Structure of the thesis – source: created by author

## 2. Methodological approach

As the main data source used to accomplish this thesis is the information gained during the extensive interviews made with representatives of the companies as the logistic customers. Special attention has been paid to the companies with eastbound export activities to the Kazakhstan, Russia and China.

The main aim of the telephone interviews was to detect the key decision factor for the choice of transportation mode and further to investigate the nature and characteristic of logistic solution, which might be applied.

Furthermore, the data collection method is grounded in the solid research of the main publications and previous studies made in the field of logistic processes between Europe and Asia.

Last but not least several personal interviews have been carried out within the DB Schenker group in Berlin or Frankfurt. In addition the current state of affairs has been consulted with the representatives of the Advanced World Transportation a.s. company in Czech Republic.

All in all the information gained during the thesis elaboration have been critically discussed and presented in front of the representatives from DB Schenker Rail in Berlin.

### 2.1. Main publications and previous studies

In this part brief overview of the most appropriate publications is provided.

#### Global studies of rail-freight transportation:

1. Is There a Market for a Container Train China – Western Europe?, (Bauer K. 2008)
2. Euro-Asian Container Transportation Market: Current Status and Future Development Trends with Consideration of Different Transportation Modes, (Kouvola Research Unit 2006)
3. The worldwide market for rail freight transport and its operators, (SCI Verkehr GmbH. 2009)
4. The Impacts of Globalization on International Road and Rail Freight Transport activity, (Woodburn A. and coll. 2008)
5. Delivering Tomorrow, Customer Needs in 2020 and Beyond A Global Delphi Study, (Deutsche Post AG 2009)

#### Master thesis and other academic papers:

1. The N.E.W. Corridor and the Northern Axis, (Helseth M.J. 2008) *The University of Turku*
2. Future Studies and Forecasting in Logistics, (Heikkinen 2012) *Kyminlaakso University of Applied Sciences*
3. Railway Wagon Market Analysis and New Multi-Purpose Wagon Solution for Freight Transports – Finnish Manufacturing Perspective, (Hilmola O.P. 2008)

**Other case studies:**

1. Industry vision for Europe-Asia railway transport development, (Travaini G. 2007)
2. On track! Retailers using rail freight to make cost and carbon savings, (Freight Transport Association Limited Hermes House 2010)
3. Rail Freight: Returning to Profitability, Reversing the impact of the global economic crisis on European rail freight, (ATKEARNEY 2009)
4. Convention on International Customs Transit procedures for Carriage of Goods by Rail (Zhukov V.P. 2009) Organization for Cooperation of Railways (OSJD)
5. Volvo Logistics European Rail Concept – Viking Rail, (Berlin Institute of Technology 2009)

## **2.2. Hypothesis justification and development**

**As the main hypothesis of this Master thesis might be considered:**

- I. The proposed logistic measures will detect the areas with cost reduction potential for rail freight processes between Europe and Asia
- II. Price list analysis – comparison of truck and rail transportation eastbound will detect a “border line” as an automatic key decision making factor about which transport mode to choose.
- III. The cost capital analysis will confirm the rail freight service as the best transport mode for delivery of high-tech components from Chinese Chongqing to the European markets.
- IV. Complex analysis of customer demands uncovers new possibilities for customer treatment and enables to achieve better results in terms of customer relationship feedback.
- V. An extensive demand analysis will enable to detect potentially new customers of rail freight service between Europe and Asia.

## SECTION II –INPUT FRAMEWORK

### 3. Megatrends driving the logistic demand between Europe and Asia

To be able to evaluate and to set up a right prediction of the future customer requirements, the companies – logistic providers have to monitor the trends with the most impacts on the customer logistic needs.

Nowadays, the changing nature of trade activities between Europe and Asia is naturally reflected in the altered character of the customer requirements for their logistic solutions. Furthermore, it has been said that right the logistic companies should capitalize on the transformation of global conditions and customer behavior. Not only the increase of transport volumes between traditional world powers as China or Germany, but also economic development in new markets promise new challenges for logistic companies.

*“Logistic providers can only overcome the challenges by intensively investing in the development of new transport routes and introducing a new degree of flexibility into their operations.”* (Delivering Tomorrow, 2012)

Therefore, **the main aim of this part is to provide an overview of the most influential trends, shaping the logistic processes between Europe and Asia.**

The following four trends described in this chapter show how they over the years might alter the demands for the logistic know-how, which is necessary to optimize the supply chain processes between Europe and Asia.

Furthermore, an overall forecasting has been made to depict the most likely scenario of logistic practices between those continents in the time horizon for next 10-15 years.

In 2009 the representatives and experts from the Deutsche Post DHL launched a Delphi study to depict the customer logistic needs in 2020. One year later this study has been followed by survey *“Towards Sustainable Logistics”*, accompanied by *“Delivering Tomorrow”*- series of studies related to the prediction of logistics in 2050.

In addition in October 2011 the Ernst & Young company published the *“20th annual trends and issues in logistics and transportation”* - study operating in the new logistic normal.

However, in terms of logistic forecasting and identification of new logistic trends plenty of first-rate studies have been recently made, the future growth opportunities are hard to visualize and quantify.

Nevertheless, altogether the variety of logistic experts across the different logistic companies managed to find out solid ground-breaking news and changing patterns of the customer and corporate demands.

### 3.1. Economic changes and political changes

One of the most significant aspects, which nowadays shape the logistic processes are the ongoing globalization trends accompanied by the production movements to the parts of Eastern Europe and Asia. Due to cheaper labor force and access to the natural resources even the countries in hinterland Euro-Asia are becoming more attractive and consequently new targets for foreign direct investments in the car or high-tech industries.

The economic crisis originated in 2008 has shown that economic volatility might be a huge drive of change in the logistic processes. All business sectors and logistics particularly have been affected by these economic circumstances. As a lesson learned seems to be the fact that the logistic companies should be incessantly ready to adapt to the changing economic environment.

Nevertheless, the subsiding impacts of economic crisis accompanied with other problems related to the profitability brought back the discussion about **privatization of the rail freight companies predominantly in Eastern Europe**.

For instance, at the end of 2010, representatives of Slovak Cargo called for strategic investor with an aim to denationalize part of the rail freight concern. Despite the interests of international business communities the privatization process is ceased by fiat of current Slovak government.

Further, in the mid-2012 due to harsh conditions and financial performance the Bulgarian State Railways announced tender to privatize its freight unit. With a market share around 70 % the company counts as the largest rail-freight operator in Bulgaria, however most of its operated fleets is obsolete and immediately needs modernization.<sup>2</sup>

Despite the vast indebtedness and high tender requirements, the freight unit of the BDZ is of the substantial strategic importance as far as the Thessaloniki port counts as another gateway for cargo traffic between Europe and China.

Nonetheless, on the other side of the continent the situation does not seem to be placid either. Due to dynamic development in China, the cities often deal with transport congestion. Therefore the rail is believed to play an important role and will be further integrated as an integral component of dynamic economic development. There are plans to extend the railway length to 100.000 km by 2020, which would be an increase of more than 27.000 km compared with 2003.<sup>3</sup>

The main aim is to form railway network connecting most cities with population over 200.000 people.

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<sup>2</sup> Albeit the procedure is still in force and continues, the tender conditions are changing to attract more investors. For instance, due to generally high requirements of Bulgarian government, in the first privatization bid only one out of five investors finally bought the privatization documents.

<sup>3</sup> To compare with the total railway net of the Czech Republic which was 9487km in 2008

Furthermore, the economies of CIS have been rapidly changed over the last decades, even despite the fact that the trade performance with other economies as China or EU is still affected by high transportation and transactions costs.

The empirical study – *“Explaining patterns of trade between the CIS and the EU and China”* made by Hung-Yi Li in 2011, has proved the positive impact of trade and exchange reforms in the CIS on trade activities with EU and China. Furthermore, the consistent policy of EU towards CIS, mutual participation in the multilateral trading systems and Russian WTO membership contribute to the economic openness in hinterland Euro-Asia and higher merchandise flows. (Vos, R. 2011)

### **3.2. Climate change and challenges related**

Nowadays, the rising prices of propellants together with the environmental issues stand for the key aspects affecting the logistic processes in the world. Climate change and the following consequences will have significant effects on logistics and on that account should be considered as one of the central challenges.

Therefore, the green logistic solutions are seen as the priority for the future, respecting the fact that to the overall world emissions of CO<sub>2</sub> the transportation sector contributes with more than 14 %.

According to the Georg Stegemann the aim to decrease the emissions produced by transport modes might be seen as the biggest challenge the logistics will face in the upcoming decades. Even despite the risk of price short term volatility on the commodity markets, the rising price of fossil fuels does not perform such alarming trend as the rising volumes of emissions produced in transport sector.

(Stegemann, 2012)

Another prediction ads, that customers will have an augmented need for consultation and will require tailored solution with the lowest level of CO<sub>2</sub> emissions. *“The logistic company that offers the most intelligent low-CO<sub>2</sub> solutions will emerge as the market leader”* (Delivering Tomorrow, 2012)

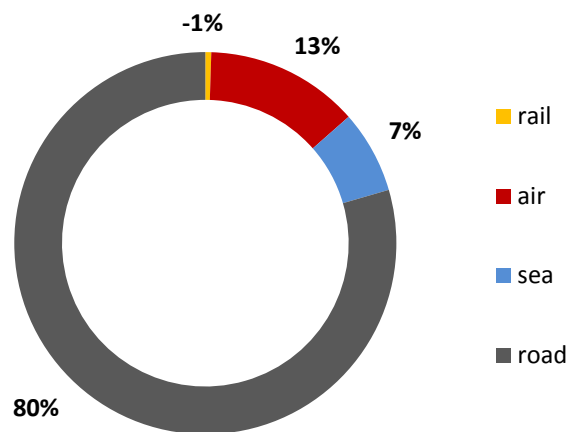
Up to the year 2020 the environmental disruptions will become one the most important appeals the society will have to face. An increase of floods followed by extreme droughts, depletion of natural resources, water scarcity and changes in flora and fauna– will strengthen the discussion about the climate change all over the world. Last but not least the experience shows the sensitivity of logistic processes in terms of extraordinary natural events. As an example might serve the floods in Thailand 2011 accompanied by an overall supply chain logistic collapse in South East Asia.

Handling of natural resources and attitude to the environment protection will change over the Euro-Asian space. Despite the likely different level of significance in Eastern and Western Europe, the drive

for green logistic solutions will open space for new innovative technologies with new benefits to be capitalized in the logistic processes. As far as the customer needs, demands and expectations are changing, an emergence of new logistic players in hinterland Euro-Asia might be expected.

According to the study “*Delivering Tomorrow – 2012*” many logistic experts and specialists agree with presumption that sound portion of the companies would be able to sacrifice the speed on account of more green logistic solution. In that case the rail freight between Europe and Asia might get an additional advantage, since sound portion of goods are transported by planes and ships. On the other hand the presumption that the companies would be willing to accept even higher prices for green – rail transport in comparison with the road or sea routes remains unconfirmed and unlikely.

**Figure 3: Emissions produced per transportation sector**



*Source: UNEP, Climate Neutral Network, (created by author)*

As can be seen from the graphic above the biggest contributor with 80% of all the emissions produced by transportation modes is the **road transport**. Moreover, more than 90 % of cars produced nowadays are aimed to the non-OECD countries and are the main subscriber for increase of global car fleet, which is expected to triple by 2050. (UNEP, 2012)

The **sea cargo** is the chief transport mode as far as more than 90% of the goods worldwide are shipped by sea. In comparison with other modes it contributes to the world emissions with around 13%, however due to global trade expansion is expected to increase more than 70 percentage points by 2020.

Even though the **air transportation** is frequent target, when it comes to the discussion about climate change and CO2 emissions, with 7% it counts as the third most CO2 contributing transport mode.

After all as the most eco-friendly transport solution is seen the **rail**. Due to the fact that most of the rail tracks are electrified, this transportation mode weights on total transport CO2 emissions with less than 1%.

However in Western Europe the debate over the green logistic supplies gets more intensive, the importance in Eastern Europe or even further in Russia or China remains rather ambiguous. Nevertheless, growing external risks and environmental changes will affect the logistic flows directly and will be a major drive of future logistics innovations all over the world.

### **3.3. Energy fuel prices and risks related**

The price charged for the transportation mode follows the development on the commodity markets and the price of cruder oil.

*A sure indicator of world economic growth is the rising price of oil. Over the long term it will continue to climb. In the year 2020, it will be at least twice as high as in mid-2008, i.e. approximately \$300 per barrel. (Ernst & Young, 2011)*

#### **Energy fuel prices - predictions related to the rail freight:**

- Price of oil will continue to rise and will again reach new maximum value till the 2020
- Rail freight solution due to the nature of lowest energy demands will become more interesting and preferred transportation mode
- Price – predominantly determined by the costs of fuel will be still the main decision factor about which transportation mode to choose

In October 2011 the company Ernst and Young launched a study called: *20th annual trends and issues in logistics and transportation study - operating in the new normal*, where one of the company key questions survey were: *What are your plans if diesel fuel rises to \$5 per gallon?*

The 47.9% of more than 760 interviewees representing more than 14 business industries said, their logistics networks would not change. Moreover, no actions would be at that time planned as a result of rising fuel prices.

Nevertheless, from the conclusion follows, that in case of the further rising price of oil, the logistic providers will pass the increased costs along the customers.( Ernst & Young, 2011)

Therefore, the first signs of changing behavior in terms of decision making about transportation modes will be seen right at the customers, who fully bears the transportation costs. Consequently, the rail freight will become more interesting solution even for the customers with small exported volumes.

For instance, despite the priority up to now given mainly to the road, due to anew rising prices of the fuels the company Fans a.s. from Czech Republic starts in 2012 to evaluate rail solutions for their export activities aimed to Russia, Kazakhstan and further hinterland Euro-Asia.

### 3.4. Population changes

An overall development and different patterns of population growth will naturally affect the economic performance all over the world.

The fact that the European society is getting older and the population growth is mainly pulled by immigration flows from the less developed countries, naturally alters the behavioral patterns of European society.

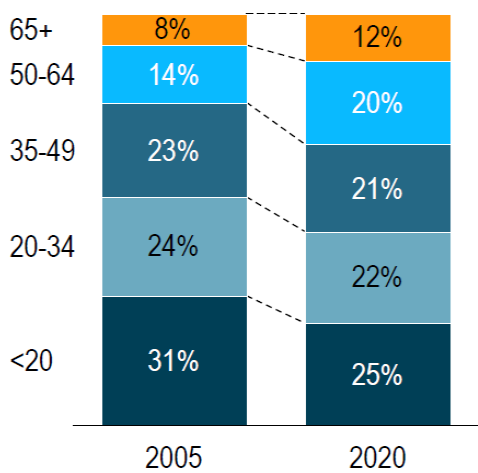
Early traditional heavy manufacturing is being outsourced to the regions with younger and cheaper labor forces and consequently an increasing portion of Europeans participate in the service sector.

As a result the services and production processes with the highest added value are becoming the core of the European economy and development of heavy industries together with agricultural sector seems to stagnate.

Due to generally aging population in Europe and Russia higher demand for pharmaceutical products might be expected. Even though a dynamic development of Russian economy is expected till 2020, most of the population will not be able to participate in economic growth, since it is based on the extraction of natural resources namely of oil and gas.

On the other side, the magnitude of economic development in South and South-east Asia goes hand in hand with dynamic population growth. In addition, the continent of Euro-Asia deals not only with a different pace of population growth, but predominantly with the different patterns of consumer behavior, demands and economic specializations.

Figure 4: Population predictions – development of age groups [%]



However, some of the studies show rather skeptical prediction in terms of China. As might be seen from the diagram, the composition of Chinese population is changing too as a result of 1 child policy applied in recent times. For instance the Roland Berger study predicts that the China is moving towards a demographic problem due to rapidly aging and shrinking workforce, which might decrease from 1bn to 900M in 2030. (Roland Berger, 2011)

Source: Roland Berger 2011

Besides other things the Roland Berger study in 2011 shows:

- Chinese market has grown rapidly due to low cost manufacturing and cheap labor force, which attracted large amount of foreign investments
- Right now the cost **competitive advantage is disappearing** in comparison with other Asian markets
- Companies that had not been in compliance with earlier labor standards nowadays face up to **33% of increase in wages**
- every fourth people in China **will be older than 60 years up to 2030**
- demands for support of Chinese retirees will increase up to 2020

To sum it up and with respect to the changing patterns of population structure over the Euro-Asian space, new logistic demands might be predicted in chemical and pharmaceutical industries. Namely in the rail freight business this should be reflected by higher transport volumes of merchandise marked as RID goods.

Anyway the population boom in Eastern Asia will be correlated to higher quantitative needs and demands for material goods. In the year of 2020, China will be undisputed technological leader and simultaneously will become one of the leading industrialized nations in the world.

Last but not least, according to the Delphi study, even if the growth slows down and the world population would be leveled off between seven and eight billion people till the year 2020, the current situation might lead to the dramatic resource scarcity and damage of the environment. (Delivering Tomorrow 2012)

## 4. Customer requirements for the Euro-Asian rail freight solution

Demand uncertainty and the constantly changing nature of customer requirements should be reflected at the strategic concept of DB Schenker Rail.

*“We put our customers and their needs first because satisfied customers are the basis for the success of our company. Our customers choose us for the high quality of our products, our competitive prices and our reliable provision of service.”* (DB Schenker, customer oriented mission statement)

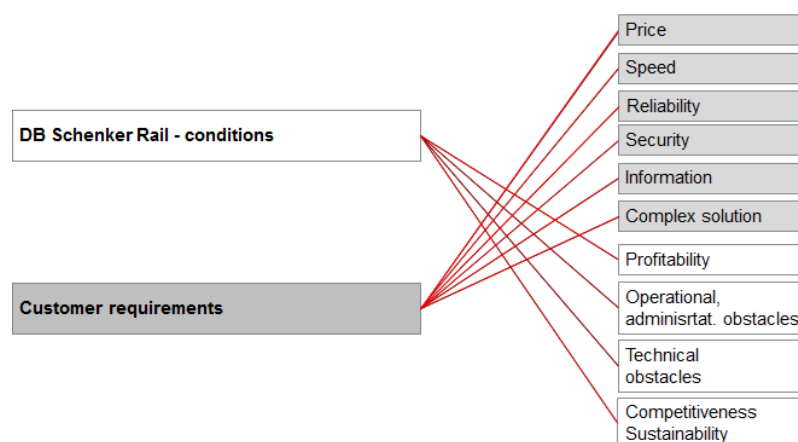
Therefore, the synchronization of the supply and demand for logistic processes should be major challenge for the company, regarding the fact that the logistic solutions are getting even more difficult due to the growing length of the supply chains and transport distances between Europe and Asia.

On the basis of companies survey the six major categories of customer requirements have been identified. First of all, the aspect of price is dealt in detail, since it stands for the customer in most cases as the key factor for their decision makings. Secondly the factor of speed is investigated and compared between different transport modes in logistic relations between Europe and Asia.

The facet of reliability and security follows behind, as their essence is getting more important for the guarantee of sustainability and long term competitiveness of the Euro-Asian rail freight.

Last but not least stands the requirement for solution complexity, which on one hand might involve particular specifications due to the character of merchandise (custom clearance, access to the rail siding), but on the other hand performs the balance ratio between all the desired aspects (appropriate price related to the transport speed, security, etc.)

**Figure 5: Relationship between the DB Schenker Rail conditions and customer requirements**



*Source: created by author – linkages between DB Schenker Rail conditions and customer requirements*

## 4.1. Price

Even if the transport speed weighs heavily on the scale, price will always be of the main interests when considering the logistic solutions. The price is therefore still seen as the critical decision-making factor of customer, which might be hesitating about which transportation mode to apply.

Despite the upcoming interests of customers in rail solutions in direction to Russia, Kazakhstan and China, the current state of affairs make it difficult to slash the price on more competitive level. Consequently, still sound portion of the companies choose the road transportation, even if the place of delivery is remote thousands of kilometers in hinterland Euro-Asia.

### Price calculation formula - container loads - TEU transported between China and Germany

(Kurt Bauer 2008):

$$[(1,100\text{km I} * 15 \text{ EUR II} / 70 \text{ III}) + (8,900\text{km IV} * 24 \text{ EUR V} / 140 \text{ VI})] * 1.8 \text{ VII} = \text{EUR } 3,170$$

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*I - transport distance in Europe on standard gauge track (Germany and Poland)*

*II - total costs per train km for the entire train (capital costs for rolling stock, track access, energy, etc.)*

*III - av. number of containers transported per train on European tracks (according to DB the max. number of containers per train is 89)*

*IV - transport distance in Russia and China*

*V - total costs per train km for the entire train (capital costs for rolling stock, track access, energy, etc.)*

*VI - av. number of containers transported per train on Russian and Chinese tracks (due to max. train length)*

*VII - the one-way costs are multiplied by 1.8 because the train will run more or less empty from Europe to China (the costs are, however, only marginally lower for an empty train)*

An approximate price applied for the twenty food equivalent unit container transported on the rail between Germany and China should be around 3170 EUR.

### Discussion about the price formula provided by Kurt Bauer

**I** – transport distance between Germany and Poland remains the same (Berlin-Warsaw-Brest)

**II** – total costs per train km for the entire train may vary with respect to actual tariffs on track access in Russian Federation, energy costs remains stable since most of the tracks are electrified

**III** – max. number of containers remains fixed due to the max. length of 650m for the block train in Europe, however the capacity is usually not fully used and vary around 40 containers of 40' size.

**IV** – transport distance between Russian and China varies in dependence on the corridor applied, the shortest transit leads over the Kazakhstan territory and the number 8900km should be adjusted.

In total the cargo train between China and Germany covers over 11,000km.

**VI** – max. number of containers remains fixed due to the max. length of 1000m for the block train in Russia, however the capacity is usually not fully used and vary around 40 containers of 40' size.

**VII** – the index of 1.8 should be adjusted and lowered if the round-circle solutions are applied, which lowers the extent of empty containers transported on the rail between Germany and China.

#### **Conclusion:**

The calculated price 3170 EUR for TEU transported between Germany and China might meet the customer requirements in the practical business.

Nevertheless, 40' foot container as equivalent unit for rail freight between Europe and Asia is more common and therefore new calculation should be made. As a consequent the recalculated price for single 40' container between Europe and Asia might range between 7000-8000 EUR.

#### **Price calculation formula – non-container loads**

On the other hand, it is clear that the rail transport should compete with other transportation modes solely just in terms of the price or speed. In addition to criteria already mentioned, the price calculation might take into account an extraordinary character of the merchandise, if applies.

#### **Dimensional weight - volume weight ratio**

Shipping costs have been historically based on the weight and size of the transported goods, therefore the volume-weight ratio is applied, which takes into account the XYZ dimension simultaneously with weight.

For instance, the calculation might be based on the following equation regardless of whether you are paying for the weight or the space:

**Table 1: Length (cm) x width (cm) x height (cm) / 5000<sup>4</sup> (equals the volume weight in kg)**

| Transport mode | Standard space | Max. weight |
|----------------|----------------|-------------|
| Air freight    | 1 m3           | 167 kg      |
| Truck          | 1 m3           | 333 kg      |
| Sea freight    | 1 m3           | 1,000 kg    |

Source: UPS, *How to determine billable weight*, 2012

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<sup>4</sup> DHL dimensional weight formula – 5000 may be replaced by 4000 depending on the import country

In addition to the charged price, the logistic operator might await the customer question of how many cubic meters might be loaded in 20' or 40' container size or potentially 40' high cube container. For instance of 20' container has a volume of 33m<sup>3</sup> and will usually hold approx. 27-28 cubic meters of cargo – depending on the packing. Further, the 40' general purpose container has a volume of 67m<sup>3</sup> with the possibility to hold between 55-60m<sup>3</sup> of cargo, which again depends on the system of packing. The largest container capacity stands for the 40' high Cube (40'HC) container, which has clear volume of 76m<sup>3</sup> and might absorb up to 70 m<sup>3</sup> of cargo, which might theoretically catch the capacity of 70 EURO pallets for such container.<sup>5</sup>

As a consequence, we might conclude that the transport of the **heavy weight loads should be naturally a premium business sector** for the sea or the rail freight concerning the freight activities between Europe and Asia. On the other hand, the domain of air cargo will remain the goods, whose character require fast delivery regardless the higher transport costs.

Last but not least according to the Bauer's study, the price for transporting one kilogram of cargo by air might exceed 4 EUR per 1kg. (Bauer, 2008)

Nevertheless, despite the high prices and lowest level of volume weight ratio a lot of companies accept the air cargo as transport solution for their exports. The related reason might be specific nature of transported merchandise as perishable goods, single-unit goods or high-value goods susceptible to price erosion effect.

#### **Price erosion effect - valuable goods**

In the industry of high technologies the price decline is a natural fact of life. Due to the constant innovations and new breakthroughs in the high-tech industry the products prices tend to drop as their performance increase.

Therefore, the price erosion factor has a strong influence on company's profits, since the lost value over the delivery time is recorded as reduced value of assets the company holds till the time, when the product is finally sold.

According to the study *"Euro-Asian Container Transportation Market: Current Status and Future Development Trends with Consideration of Different Transportation Modes"* in 2006. The price erosion related to the electronics industry might vary between 20-30%.

Nowadays, the most conclusive price erosion effect might be seen on the market of PC tablets and Kindle Fire e-book readers.

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<sup>5</sup> The capacity utilization and system of container packing is further described in the chapter Solutions proposed to increase rail freight profitability – capacity utilization

As one of the most innovated high-tech products in 2012 the PC tablets producers are made to cut the prices to keep the current products competitive as the new ones are coming onto market. For instance, in the middle of 2012 the Amazon Company announces to cut the price for the Kindle Fire by 25%, since Google releases its own 7-inch Nexus tablet at the end of the year.

(Portnoy, S. 2012)

However, the price cuts and consequent price erosion effect is rather impracticable to correctly predict and most of the times depends on the current situation on the market, we may speculate on the impacts on the transportation costs. If we consider the medium estimate 25% of annual price erosion for high-tech products, we might calculate monthly price erosion of 2,0833 %.

Thus, if the sea transportation is applied the price erosion might reach 3,1249% <sup>6</sup> at the time of delivery to the European ports, since the sea transit time between Europe and Asia ranges between 35-45 days. On the other hand, if we take into account already tested rail transit time between Chongqing and Duisburg the price erosion effect comes just up to the 0,8736% since the 13 days applies as the duration time.<sup>7</sup>

To sum it up, **the rail freight should be preferred transportation mode between Chinese high-tech production centers and European sales market**, since it minimize the price erosion effect in comparison with sea transportation and still enables transport of higher volumes and lower prices in comparison with air transportation.

**Table 2: Comparison rail and road transportation mode - prices charged in relation between Bohumin (CZ) and the export destinations**

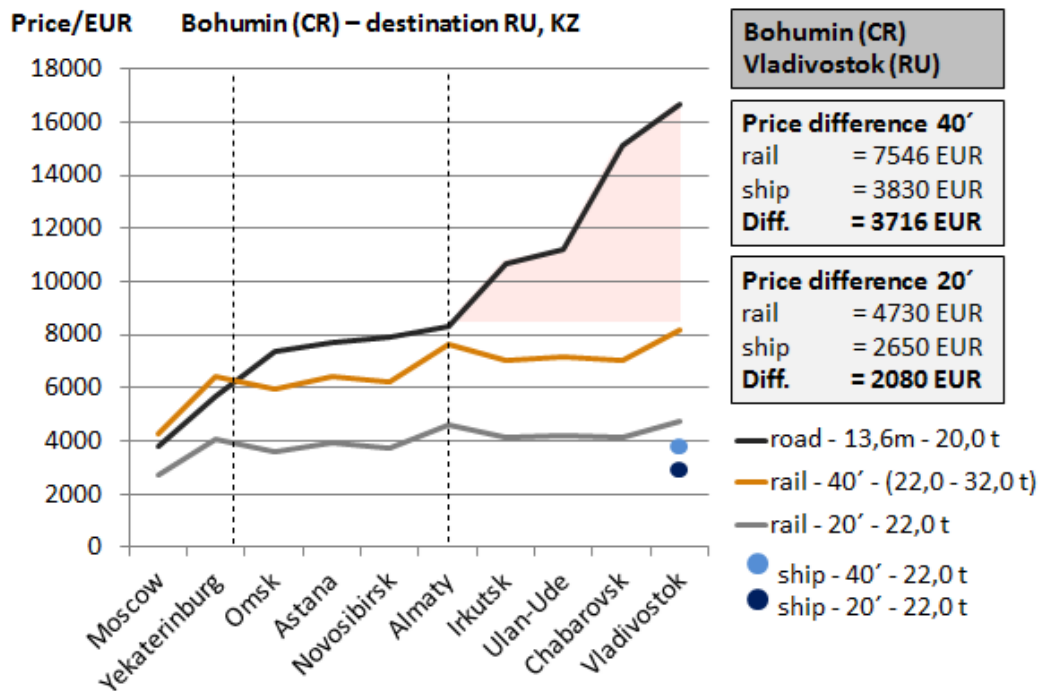
|                              | Moscow | Yekaterinburg | Omsk     | Astana     | Novosibirsk |
|------------------------------|--------|---------------|----------|------------|-------------|
| road - 13,6m - 20,0 t        | 3800   | 5700          | 7400     | 7700       | 7900        |
| rail - 40' - (22,0 - 32,0 t) | 4252   | 6452          | 5988     | 6447       | 6201        |
| rail - 20' - 22,0 t          | 2736   | 4043          | 3611     | 3961       | 3702        |
|                              | Almaty | Irkutsk       | Ulan-Ude | Chabarovsk | Vladivostok |
| road - 13,6m - 20,0 t        | 8300   | 10700         | 11200    | 15100      | 16700       |
| rail - 40' - (22,0 - 32,0 t) | 7657   | 7028          | 7153     | 7016       | 8146        |
| rail - 20' - 22,0 t          | 4606   | 4133          | 4222     | 4146       | 4730        |

Source: Created by author, data source – price list company XY valid till 31.3.2012

<sup>6</sup> Calculation formula I:  $3,1249\% = (25\%/12) * 1,5$

<sup>7</sup> Calculation formula II:  $0,8736\% = (25\%/12) * 13/31$

Figure 6: Comparison of different transportation modes for 20` and 40` container CZ-KZ-RU



In the following diagram the price level for the rail and road transport has been depicted in relation to the export target destination.

For instance, for the company Viadrus the **target location of Yekaterinburg is the breaking point for decision making about road and rail transport**, since the price levels intersect in this area. Further, the rail solution is getting comparative advantage, since the price level is lower than road, however in terms of target destination Almaty this advantage is minimized as the price levels are getting closer each other.

Nevertheless, from the Almaty further to the destinations in far-east Siberia the road transport is getting significantly more expensive and loses its competitiveness as appropriate transportation mode (his area has been highlighted by rosy colour).

Furthermore, for the destination of Vladivostok or Nachodka Vostochny the rail has to compete with the sea transport, which offers significantly lower prices. As can be seen from the table the price difference between rail and sea transport for the 40` container might reach 3716 EUR and for the 20`container 2080 EUR.

The nature of the negotiation about the prices and quality of the service changes with respect to the customer needs. Especially in Western Europe green supply solutions are required, which consequently makes the rail freight more interesting.

However the idea that the customer in Russia, Kazakhstan or even in China would be ready to pay higher price for the rail freight just because of the environmentally friend logistic solutions seem to be still deceptive.

## 4.2. Transport speed

With respect to the specification of requirements for the delivery speed, the logistic providers operating between Europe and Asia may choose from all the possible transportation modes.

Naturally, the fastest delivery enables the air freight, which has the smallest capacity, the highest prices but takes less than one day. On the other hand, the slowest speed performance belongs to the sea routes, which might take up to 6 weeks, but due to the largest capacity stands for the mode of lowest prices.

Furthermore we can combine different modes, to achieve a better – optimal ratio between a speed and price. As a hybrid mode of the two transport options might be considered the frequently used combination of sea and air between Europe and Asia. With this supply chain solution the freight is shipped by sea from China's industrialized coast to Dubai or another related logistic hub, from where the goods are finally transported by plane to Europe with total transit times between 10 to 12 days.

The main aim besides other things might be for instance to avoid or to lower the price erosion effect of valuable goods produced in China and transported to the European destination. (Bauer K., 2008)

DB Schenker Rail attempts to lower the transit times of Euro-Asia rail solution on all over the tested lines. Between Shenyang in China and Leipzig in Germany it has achieved 23 days. Further, on the way back from Chinese tech-hub Chongqing the train heading to Duisburg beats the desired 13 days of transit time and it is further believed to speed up.

Comparison of the transport duration shows, that the container train might effectively compete with the sea and air combination. Furthermore, it consolidates its position against the clear sea transport, which takes at least 35 days and is more than double of the duration of the rail link.

Even though, the difference between two gauge changes (the standard European 1435 mm and broad one 1520 mm in Russia and other CIS countries) is seen as the main technical hurdle for fluent transport performance, nowadays it is believed that the transit times might be shortened most effectively by easing and harmonization the cross border procedures.<sup>8</sup>

### **Call for faster logistic solution between Chongqing – China and Duisburg - Germany**

In 2010 the Chinese city Chongqing sold more than 15.74 million laptops abroad, which counts as 25% of city's total export revenues. Consequently, most of the Chongqing's electronics exports lead further to Europe with the traditional sea route, which requires at least a month of shipping and is preceded by thousand-kilometer overland journey to reach the nearest Chinese port – Shenzhen.

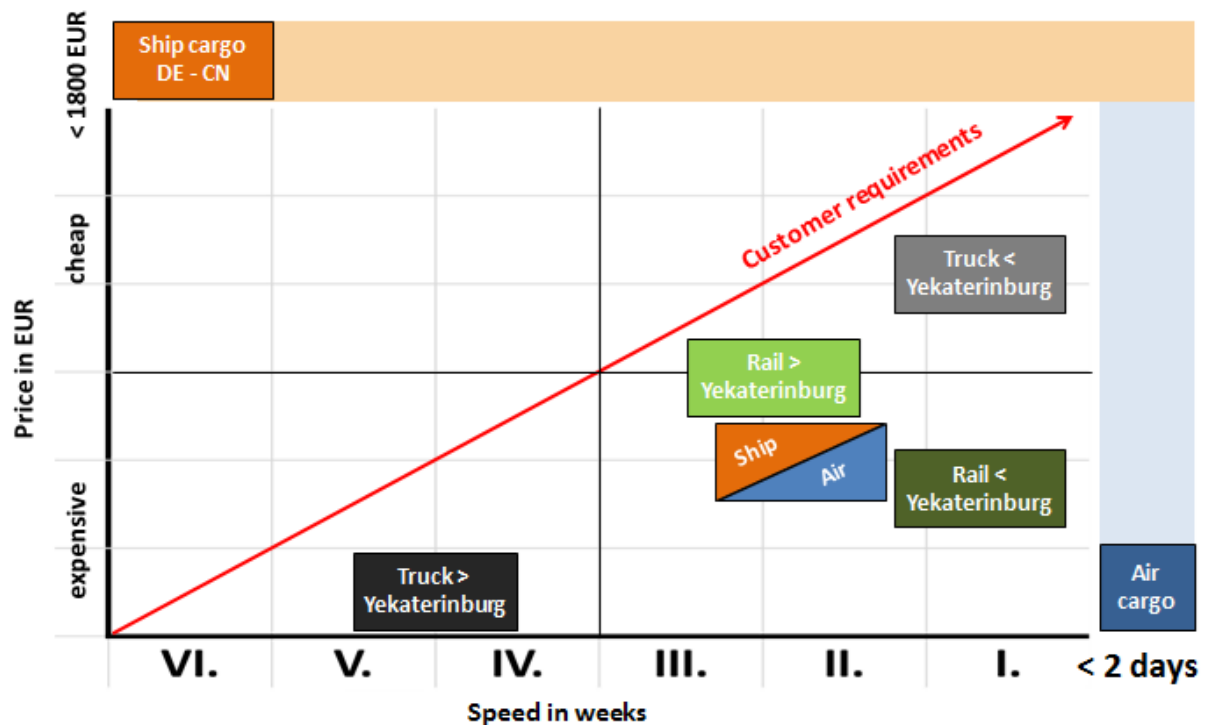
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<sup>8</sup> Cross border procedures are further investigated in the chapter called: **Administrative obstacles**

As a consequent, the Chongqing's exporters are looking for faster delivery solutions at appropriate price level, which would enable to minimize the price erosion effect. (Winterbottom, 2011)

Such a demand as already investigated before is based solely on the speed performance related to the price charged for the transportation mode. Therefore, the following diagram has been designed to depict price perception and speed performance of different transport modes or its combination.

**Figure 7: Customer requirements and decision making factors (perception of price and speed performance)**



*Created by author – data source:*

First of all, with respect to the two mentioned dimensions the red arrow shows the direction of customer requirements – potential area, where the perception of price is low (cheap) and speed performance is as high as possible. Consequently for the sake of simplicity the different transportation modes are compared solely on the basis of price and speed with no attention paid to the capacity or flexibility.

The rose area shows the domain of the sea cargo as the cheapest transportation mode between Europe – Asia and at the same time stands as an outlier, since no other mode might compete with sea just in terms of price.

The same applies for the blue area which depicts the domain of air cargo as the fastest transport mode. Since no other transport solution might compete with air just because of delivery time, the column stays untouched by other modes.

The most intense competition based price and speed performance might be seen between truck and rail mode in hinterland Euro-Asia. Regarding the price list described in the previous chapter, some of the Czech companies if possible tend to apply truck transportation up to Yekaterinburg, since the solution is cheaper. For instance, the price difference between rail and road in terms of delivery of 40' container to Moscow from Northern Moravia in Czech Republic might be 452 Eur.<sup>9</sup>

Nevertheless, the prices charged for the truck transportation after crossing Yekaterinburg is increasing significantly and losing further the competitiveness further associated with lower speed performance in comparison with rail.

One of the real competitors for the rail over the long distances might perform the hybrid combination between air and sea cargo.

However the time transportation is comparable, the straight rail freight between Europe and Asia is cheaper than the combination of air and sea. Furthermore, if higher speed performance is achieved, the transit rail freight might firmly consolidate its position as an appropriate transport mode.

Nevertheless, the rail transit time between China and Germany does not necessarily have to beat the 12 days to be fully competitive with the combination between air and sea transport, but should further pay attention to its reliability.

### **4.3. Reliability**

Fast and cheap transport delivery might be a first step to meet customer requirement, nevertheless those two aspects need to be under the patronage of the reliability.

Reliable transport times are necessary for building a long term relationship with the customer, since the production processes are directly dependent on the delivery time guaranteed by the logistic operator. In the worst scenario some reliability distortion – significant delays of parts from factory to the other one might lead to a production distortion. Therefore the reliability is one of the most important issues in the relation to the customers and sustainability of applied logistic solution.

With respect to the nature of environment and infrastructure conditions the reliability of the truck transportation over the long distances might be easily affected. On the other hand, the air and sea transport providers regularly reach very high level of punctuality.

Therefore, the main challenge for the rail forwarders is to guarantee the reliable transport service to be able to fully compete with other transport options. Furthermore, taking into account that six possible countries might be involved during the whole train journey, an effective cooperation is seen as the core of success for the Euro-Asian rail freight business.

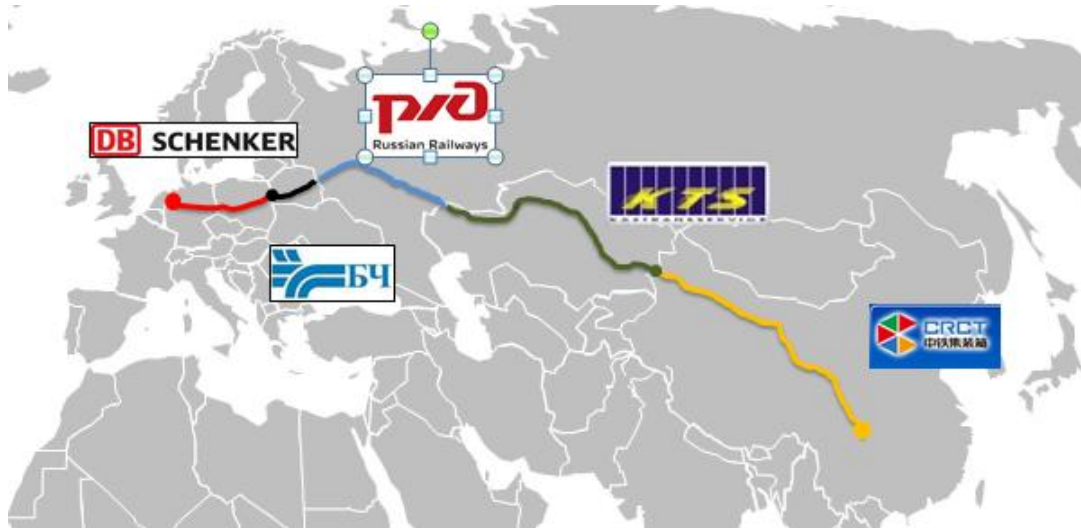
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<sup>9</sup> See the graphic Comparison of different transportation modes for 20' and 40' container CZ-KZ-RU

### Overview of rail transport options between Germany and China:

- Germany – Poland – Belarus – Russia – China
- Germany – Poland – Belarus – Russia – Mongolia – China
- **Germany – Poland – Belarus – Russia – Kazakhstan – China**
- Germany – Poland – Ukraine – Russia – Kazakhstan – China

Figure 8: 3rd transport option - involvement of the rail freight operators Chongqing – Duisburg



Source: Created by author, Map base – DB Schenker Rail

Reliability is an absolute must and following aspects are seen as crucial for its guarantee:

1. **Continuous monitoring**
  2. **Comprehensive back-up system**
  3. **International exchange of information**
- 
1. Continuous monitoring and issues related are described in the part called: **information as one of the customer requirements**
  2. If the locomotive breaks down, a prompt replacement must be secured along the whole route with respect to the current location and **responsibility of particular operator**
  3. For example, in case of the applied 3rd transport option the **cooperation between different rail operators** includes: *Germany, Poland – DB Schenker Rail, Belarus – Belarusian Railway, Russian Federation – Russian Railways (RZhD), Kazakhstan – JSC “Kaztransservise”, China- China Railway Container Transport Corp., Ltd. (CRCTC)*

According to the study: *Quality indicators of rail freight transport 2011*, **the reliability of carriages and the delivery of goods without damaging or other affection is the key quality indicator for the rail freight transport.**

With the high probability of delay on the rail route, predominantly related to the time consuming cross border procedures or double shifting of load on the different wagon chassis, the attractiveness of the route might decrease. However, the container shipping in inland Euro-Asia still offers vast unemployed capacity and economies of scales, which will further lead to more competitive rates as far as the reliability is improving.

Nevertheless, since more rail freight operators are employed during the whole transit way, they might be tempted to blame on each other in case of possible delays on the tracks or furthermore in case of indemnity case caused by extraordinary events during the transport.

#### **4.4. Security**

The guarantee of the delivery is the alpha and omega for the company's logistic success, since the operators stay legally in charge of the merchandise value.

Despite the fact that all the possible transport modes between Europe and Asia must deal with security issues and risks involved, the sea and air freight are still naturally protected by the environment from an unauthorized access to the container or merchandise violation.

The situation for the rail transport is different, since the natural circumstances enable direct access to the rail track and higher frequency of the theft or unauthorized container openings on its way through hinterland Euro-Asia might be expected.

Therefore, one of the biggest challenges for rail forwarders on the route between the Europe and China will be to demonstrate that offered rail solution is for the transported products well secured and in case of emerging problems, the situation is about to be solved as quickly as in other transport modes.

However, the other transport options should not be considered as completely out of risks either. First of all, all the cargo ships have to cross the Gulf of Aden and consequently face the risk of being hijacked or attacked by Somali pirates. This area counts as the most risky transport corridor in the world since the most piracy incidents are detected around Somali peninsula.

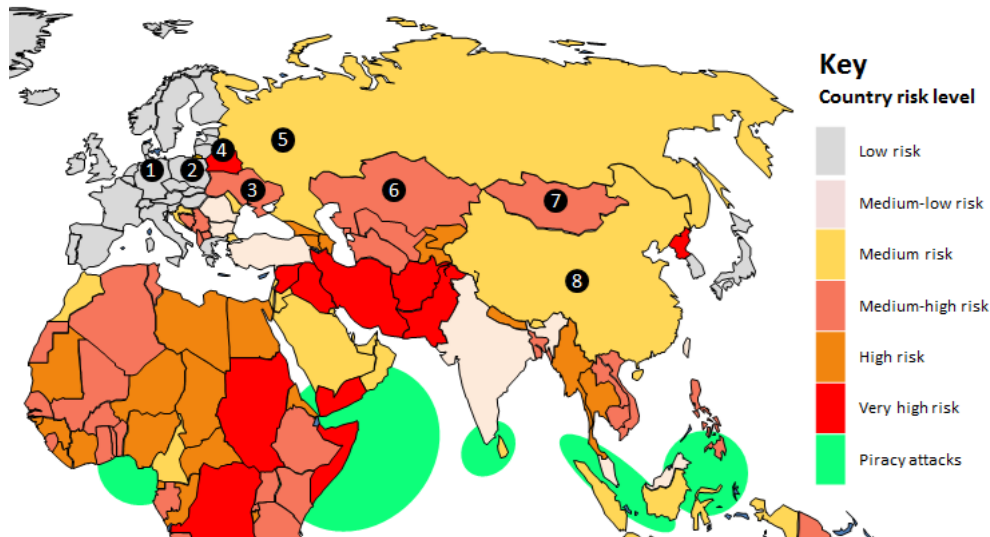
Albeit, the situations is proclaimed to be improved, in July 2012 still 11 vessels and 174 hostages were reported as held by the Somali pirates. According to the ICC Commercial Crime Services out of 189 sea attacks reported worldwide in 2012, the 70 incidents refer to the Somalia.

Further, as reported for the 29 July 2012 the 13 out of 20 abducted ships worldwide were held in Somalia. (ICC Commercial Crime Service, 2012)

Secondly it has been proved that the road transportation is affected far more by accidents per unit of service (e.g. tkm) and contributes more to the environmental disruption. (UNECE, 2012)

No matter what the transport mode is applied, all the logistic providers have to count with broad variety of external and internal risks during the transport.

**Figure 9: Political and security transport risks 2012**



*Created by author – data source: Aon.com – 2012 Political Risk Map*

#### **Main transport risks involved in specific countries**

1. **Germany** – no significant risks detected
2. **Poland** – no significant risks detected
3. **Ukraine** - supply chain disruption (Aon.com 2012)
4. **Belarus** – container manipulation at the shifting terminal Brest, political risks, supply chain disruption (Aon.com 2012)
5. **Russia** - weather conditions – temperature and humidity during the winter season
6. **Kazakhstan** – weather conditions – temperature and humidity during the winter season
7. **Mongolia** – low quality of rail infrastructure
8. **China** – container manipulation at the shifting terminal Alashankou at Kazakhstan border, supply chain disruption (Aon.com 2012), natural events - floods

Due to highly valued products on the rail-route the guarantee of transport delivery is an absolute must for the rail logistic process.

The risks related to the realized transportation over the territories in hinterland Euro-Asia are directly reflected in the price charged by the insurance companies. Thus, the customers naturally demand constant access to the information about the current train location and state of the merchandise.

## 4.5. Information

In the deep past, the rail freight operators did not really know what was going on with trains when they crossed the border. Nowadays an incessant access to the information about current location or state of the transported merchandise is considered as matter-of-course service.

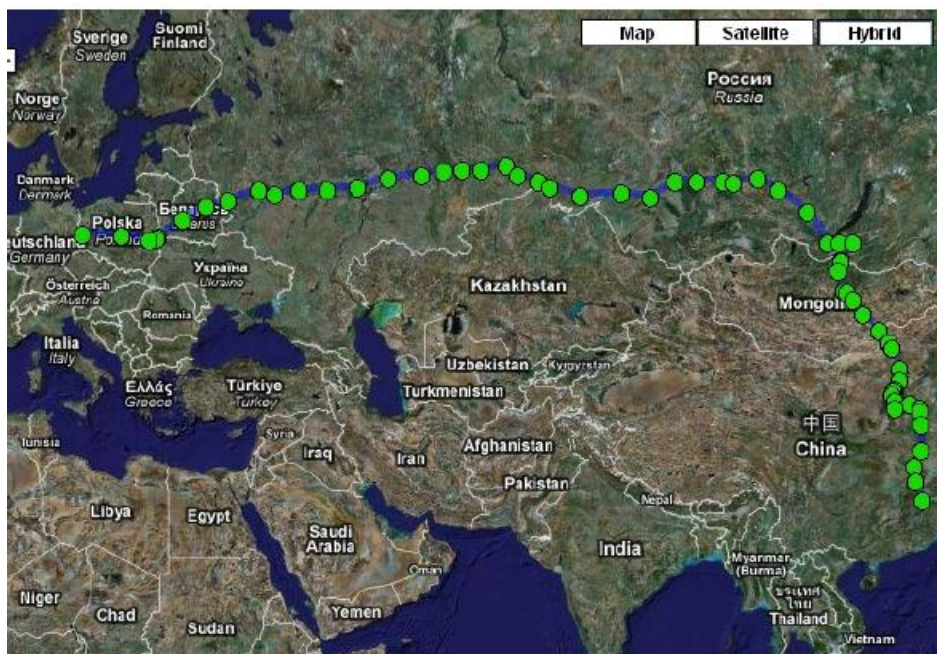
Such customer demand naturally creates a new playground for the IT companies, which come with new solution for the customer information systems (CIS).

With that respect the company DB Schenker Rail relies on its Smartbox which provides the customer with all the required information.

### Information provided to the customers by DB Schenker Smartbox:

- Geographical position
- Temperature in the container
- Air humidity in the container
- Light entering the container
- Angle of inclination of the container
- Acceleration force (G force)
- Container door alarm (open-closed)
- Movement inside container

Figure 10: DB Schenker Smartbox – temperature monitoring in hinterland Euro-Asia



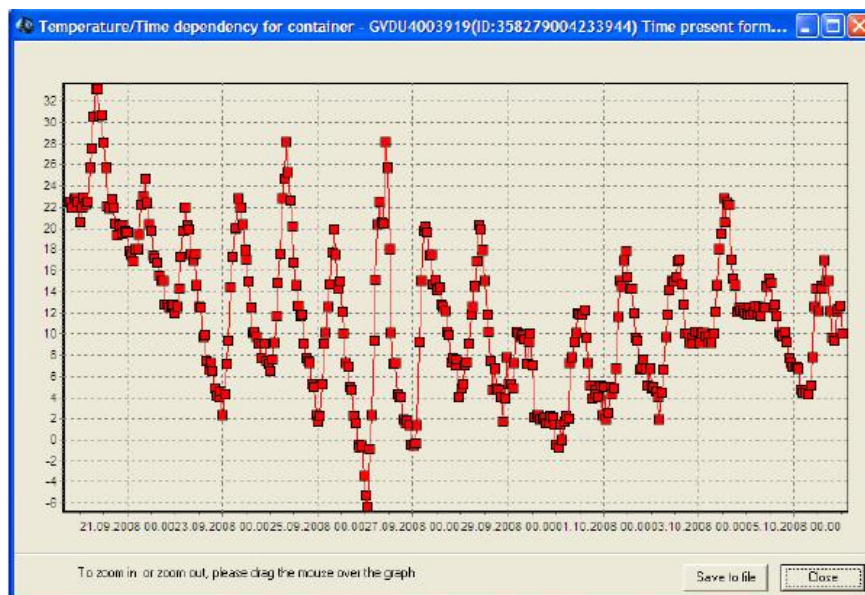
Source: DB Schenker Rail, 2009

During the whole transport route, in this case 6 countries had been involved (Germany, Poland, Belarus, Russia, Mongolia, China), the core mission of Smartbox is to inform about temperature and humidity conditions inside of the container. If the actual conditions follow the comfort interval, which is adjusted with respect to the transported goods, the Smartbox dispatch OK signal - depicted as the green color.

Consequently at the end of the transport route the following graphic might be made, to evaluate temperature development and to detect areas of possible threats. The following picture shows the recorded temperatures from -6 to +32 Celsius.

Naturally the same kind of diagrams are being used in terms of humidity inside of the container or G-Force values and all the values stand for the customers 24 hours at disposal.

**Figure 11: DB Schenker Smartbox – graphic evaluation of the temperature detected**



*Source: DB Schenker Rail, 2009*

Due to continuous data recording during the whole transport chain, the DB Schenker Smartbox provides precise information about the possible damage, which secondly not only increases the reaction time in case of unexpected event, but further gives a better argumentation position for the recipients or dispatchers.

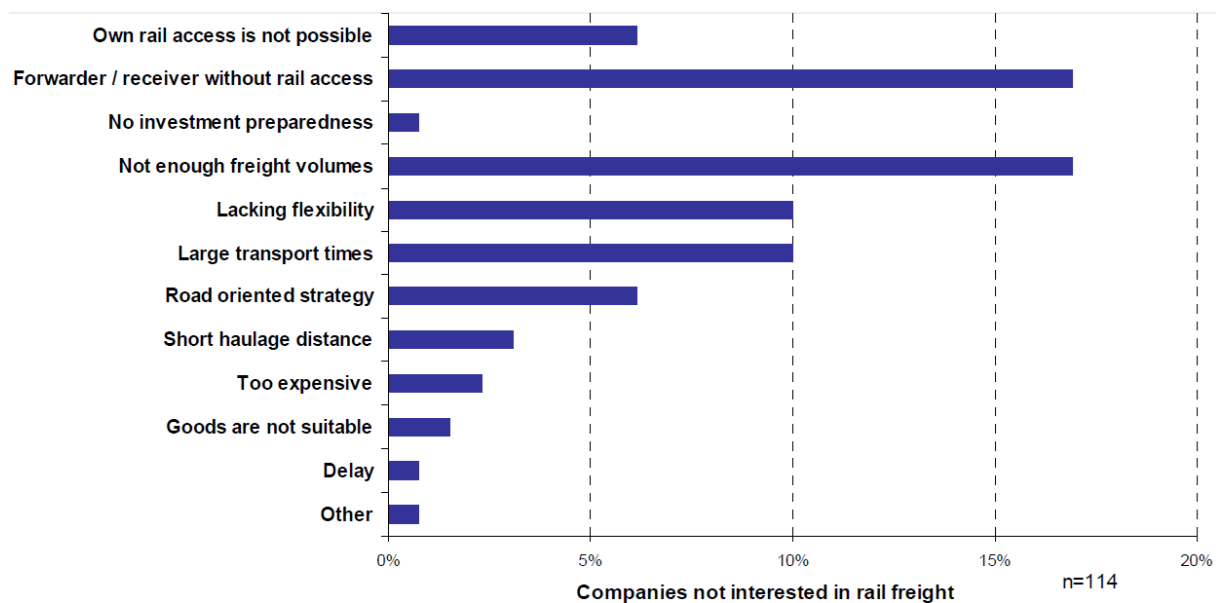
## 4.6. Complex solutions

From the customer point of view, the nature of decision making about logistic solution is not only about which transportation mode to choose, but nowadays more other factors influence the final choice.

Therefore the rail freight operators especially in terms of their international activities must be prepared to offer complex scale of solutions, often customized to the customer needs. Otherwise the company takes a risk that the rail freight solution will be refused for a variety of reasons.

The following diagram depicts the results of the survey made in 2009 by the Association for European transport and contributors. In total 114 representatives of European companies had been asked to express the reason why they do not apply the rail as logistic solution.

**Figure 12: Main reasons why companies do not choose the rail freight solutions**



*Source: Endemann P. 2009, Association for European transport and contributors 2009*

As might be seen, the most frequent arguments refer at first to the **lack of freight volumes** (what confirms the statement made by the company PBS Velka Bites, Viadrus, LDM or Fans a.s.) and secondly to the **company's limited access to rail track** (stated by the company Inco Engineering and Ferit s.r.o.)

In this case **to convert company's – NO to the YES** means to be able to offer a complex logistic solution as:

- the truck assistance for delivering the goods to the own rail siding
- access to the open terminal, where goods are combined with others and consequently dispatched in the whole train.

## **Examples of the key specific requirements for transport solution:**

**Customs clearance process** – the company Viadrus – Czech Republic, in an ideal case the transport company deals with and pays for the customs clearance – the company applies truck transport in relation to CIS and Russia.

**Green logistic solution** – Heidelberg printing company – Germany – the company follows a green production policy and is the pioneer in “green” printing business. Consequently all the partners, including logistics are required to lower the carbon production and CO2 emission. – the company applies sea transport in relation to China.

**Support of other transport modes (trucks)** – the company Inco Engineering - Czech Republic – apart from the rail solution, which is necessary due to the weight of goods, the company requires simultaneous truck transport as a backup mode for the rail.

**Access to the own rail siding** – the company Inco Engineering – Czech Republic – the company requires a strong logistic partner with access to his own rail siding

**Flexibility in terms of 2 days** – the company Arako - Czech Republic – due to limited warehouse capacity, the company requires high transport flexibility to clear the store-space and to avoid the store costs.

**Possibility to choose between transportation modes** – Ferrit s.r.o. with respect to the actual export destination and the nature of the transported merchandise

**Exw. Incoterms** - LDM s.r.o. – Czech Republic – the company does not deal with transport and leave the solution on the counter partner. Ex Works term is preferred to minimal obligation for the seller – the company LDM s.r.o.

Last but not least the complex solution, understood as the additional service offered by the rail freight operator has the power to distinguish the company for the competitors and acquire the status of being the best in the market, since the pure transportation between points A and B is the basic of all the operators.

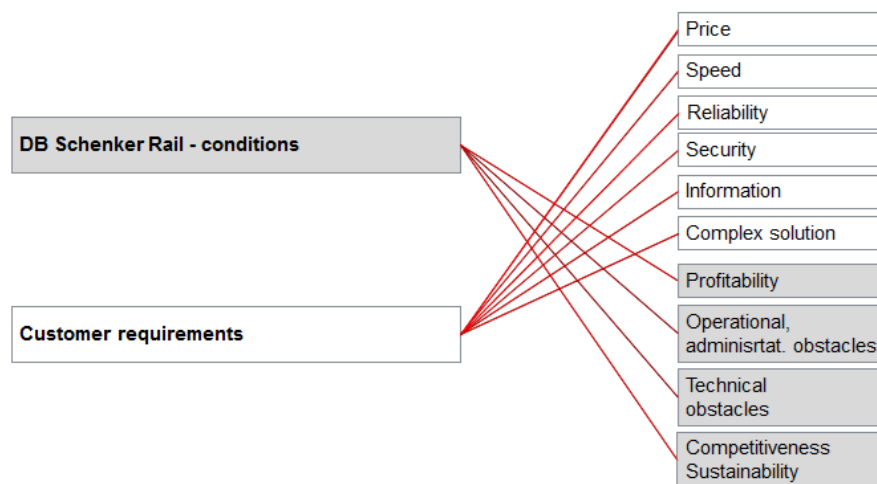
## 5. State of affairs and capabilities of DB Schenker Rail

To develop a sustainable rail freight business between Europe and Asia means to face and to find solutions for constantly upcoming challenges. Being part of the Euro-Asian rail freight business means to deal with operational, technical and administrative hurdles, which still might be a reflection of some political interests. At the same time the company must be sure that the practiced freight activities in the far East meet the nature of profitability and customer satisfaction.

Albeit the Eastern rail freight market offers growth opportunities in terms of launched or intended privatizations, the a priori of being the best in the rail freight business is seen in the customer relationship rather than growing size.

*"If somebody knocks on our door we will consider it, but there is no merger and acquisition activity at present. It is a lot of work to acquire companies, and simply purchasing a company does not mean you will necessarily do better."* Hedderich Alexander – CEO DB Schenker Rail 2012

Figure 13: DB Schenker Rail – conditions for logistic solution



Source: created by author – linkages between DB Schenker Rail conditions and customer requirements

To improve economic competitiveness of rail freight transportation between Europe and Asia, four key questions have to be raised ahead of designing any new logistic solutions:

1. Is the new logistic settlement of the nature to be **profitable**?
2. What are the **operational and administrative barriers** to put the logistic solution in practice?
3. What are the **technical barriers** to put such logistic solution in practice?
4. How to guarantee the **competitiveness and sustainability** of applied solution?

## 5.1. Profitability

Several studies have shown that the most important factor in the transport organization is the economics of transportation. (Railistics 2010)

Beyond all the doubts, the financial performance of the rail freight activities in the new landscape between Europe and Asia will be extremely important. As far as it has been said, that cash is king across all the sectors, and the fact of how quickly the DB Schenker Rail manages to turn cash back into cash will be a key indicator of success in this area.

The rail freight industry has been heavily hit by the economic crisis in 2008 and apparent impacts are significant even nowadays. Thus, all the measures should be made with an aim to move the rail freight activities between Europe and Asia toward profitability and sustainability.

According to the calculation made in the previous part, which describes the price as one of the key aspects of customer requirements, further calculation in terms of required profitability has been made:

If the profit margin of approx. 10%, is required, the minimum market price to be charged for a container from China to Europe is EUR 3,500. (Bauer K., 2008)

### The profitability of logistic solutions might be lowered by:

- Inapt customer base – low margins, unreliable and unstable volumes
- Low level of the capacity utilization
- increasing costs caused by administrative and technical barriers
- transport of empty containers

**Figure 14: Key measures to increase profitability:**

|                        |                                                                          |
|------------------------|--------------------------------------------------------------------------|
| Customer portfolio     | Customers with high margin products and appropriate merchandise quantity |
| Capacity utilization   | Loading space utilization, longer and heavier freight trains             |
| Cost reduction         | Application of procurement principles                                    |
| Round circle solutions | Measures to avoid transport of empty containers                          |

*Source: created by author*

## 5.2. Administrative and operational obstacles

There is a vast of reasons why the Euro-Asian rail freight operators still face a lot of administrative and operational hurdles, when crossing the borders in hinterland Euro-Asia.

Previously the countries needed to control and monitor the transport flows because of the national interests. Nowadays, due to Russian WTO accession in 2011, the trade and logistic representatives believe in smoothed access in the Russian market and the ongoing liberalization of the European rail freight markets further initiate actions against the existing administrative and operational hurdles on the rail.

However, no matter how much the Eastern markets have been open to the Western business activities, the bureaucratic hurdles in terms of crossing the Eastern borders are still of the main consideration.

The first one is being regularly met at the border between Poland and Belarus, where the train – crossing the river Bug enters a “new world”, where different transport rules stay in force.

Apart from the technical aspects that the containers must be shifted onto different wagons appropriate to the broad-gauge railway in the terminal Brest, the rail operators had to deal with new waybill SMGS. As a result the transporting documents had to be previously re-issued to meet transport requirements, valid for Eastern European space. While in Western Europe applies the CIM waybill, entering the Russian federation, Kazakhstan or Asian markets require the application of SMGS waybill.

With respect to the current status quo the bottlenecks have been divided in the three categories:

### **Administrative obstacles:**

- Border crossing documents **and** different bills of loadings, CIM and SMGS
- Absence united information system (e-document system)

### **Operational bottlenecks:**

- Different legal regulations:
  - Europe, Ukraine: CIM COTIF
  - Russia, CIS, Baltic countries, Albania, Bulgaria, China, Mongolia, Poland: AIFC
- Congestion on the main rail corridors
- Lack of common IWT language
- Different rules for carriage of dangerous goods by rail – RID
- Lack of harmonization of national regulations (operational standards, certification)
- Modal shift from SSS to rail

- Customs clearance – often slow and difficult
- Shortage of wagons (more attractive to compensate other operator for using his wagons than to invest or lease own wagons)

#### Commercial aspects:

- Price instability – transit tariffs (prices might increase even over the short period and are not predictable over the longer period of 2 – 3 years)
- Different approaches, commercial treatment of cargo and wagons (multi-level of ownership)
- High prices and additional fees required for using terminal services in CIS (lack of neutral terminals across the whole Euro-Asian railways)

**Figure 15: Application of different consignment notes across the Euro-Asian rail freight**

#### Freight Traffic Situation on July 2011



Source: The Railway business magazine, The Railway PRO 2012

*“The use of the common CIM/SMGS consignment note leads to a saving of some forty minutes per wagon or eight to ten hours in the total transit time of a train. Discontinuing the transcription of CIM and SMGS consignment notes provides a saving of some EUR 40 per consignment” (Ilie, E. 2012)*

Nowadays, to lower the time-consuming procedure and re-issuing the new documents the new CIM-SMGS waybill is seen as the step towards harmonization of cross borders procedures. Due to this kind of unification the counts of errors and time spent at the border have been reduced from early usual 7 days to just 24 hours. (Zyla, C. 2012)

### 5.3. Technical obstacles

Technical obstacles and obsolete infrastructure negatively affect the speed performance of the rail freight. Nonetheless, albeit these issues are frequently associated to the CIS countries, the Kazakhstan pays as an exception with almost an ideal transit speed, where trains covers more than 1000 km per day. Moreover, further investments in infrastructure planned by members of CIS should improve the current status quo and enable the rail freight speed up in hinterland Euro-Asia.

The following summary highlights the most technical barriers faced on the Euro-Asian rail freight corridors:

#### Technical obstacles:

- Slot restrictions of the rail network and different gauges (Europe, China – 1435 mm, Russia, CIS – 1520 mm)
- Different electrical systems on the separate segments
  - Germany and Austria/ AC 15 KW7/16 2/3 Hz
  - Eastern Central Europe: AC 25 kV/50Hz
  - Russia: AC 25kV/50 Hz and DC 3kV
- Different signaling/ control systems
  - Europe: ERTMS/ETCS, PZB, EVM
  - Russia: Train control system KLUB, ITARUS-ATC
- Inadequate capacity of facilities at the border crossing stations
- Capacity limitations of rail – train length and tonnage
- Railway terminals capability of handle long trains
- Rail infrastructure – non electrified rail stretches, monorail tracks
- Weather conditions during the winter season

#### Weather conditions – hinterland Euro-Asia and challenges related

Weather conditions during the winter in hinterland Euro-Asia created new challenge especially related to the transport of laptops, LCD screens and other high-tech products transported westbound from Chinese Chongqing.

The optimal temperature for laptops is set up to the range between 10 and 35 degrees Celsius. Thus, the temperatures lower than 10 °C may perform discomfort conditions with possible negative device affection. Further, the freezing temperatures in Siberia and related condensation inside the containers might seriously harm high-tech devices since the water might come directly in contact with the computer's electronic parts, causing them to short out.

Nowadays, almost all of the laptop's LCD screens contain liquids, which are very sensible to the temperature volatility.

Transportation of laptop in a container with under freezing temperatures creates a risk that the humidity accumulated inside the container might turn to frost on the computer. The computers and LCD screens under the extreme temperature conditions behave in the same way as any other materials. Extreme cold temperatures typical of Siberian areas might cause the products to contracts, as on the same principles the warm temperatures make them expand.

As a result the laptops and LCD screens may evince specific dis-functions such as shortening of laptop's life, malfunction of proper performance etc.

No electricity in the container wagons is another aspect, which hinder the installation of permanent air-condition devices in the containers during the winter transport over the territory of Siberia.

**Figure 16: Trans-Asia railway network – illustration of different rail gauges**



Source: UNESCAP 2012

#### **Potential risks detected to the transport of high-tech devices:**

- **Humidity** – comes into existence inside the containers as the temperature inside and outside the container space differs
- **Temperature** – freezing temperatures directly damage the devices since the liquid crystals inside the screens might freeze
- **Dust** - no problem, since the containers block the dust from getting inside the container
- **Handling** – risks related at the places – terminals, where the containers are shifted on the different rail gauge, since the high-tech products are sensitive to the shocks

## 5.4. Sustainability and competitiveness = customer satisfaction

One of the most important aspects of logistic success is a long-term customer satisfaction. Therefore, the business focus of DB Schenker Rail should be regularly reflected in the customer surveys, to highlight the strengths and potentials of improvement.

In 2011 the DBSR customer survey reached the average grade of 4.7 (on a scale of 7 = completely satisfied to 1 = completely dissatisfied), which on one hand confirmed the already positive from 2009 result, but at the same time pointed out the vast potential for business improvement.

According to the customer rail freight survey made by ORR - the independent safety and economic regulator for Britain's railways in 2009, **the three key cornerstones of customer satisfaction** in the rail freight service has been defined:

- **Customer price perception**
- **DB Schenker Rail - responsiveness to the customer needs**
- **Reliability of service / journey time**

With respect to the ORR 2009 customer rail freight survey, this study attempts to incorporate these three aspects to the field of Euro-Asian rail freight business, since they are mentioned as the key cornerstones of customer satisfaction.

As far as the price has been identified as the most important service quality attribute, this thesis paid special attention to the price calculation and price level comparison between different transport modes. To sketch the path for responsiveness to the customers changing needs, the main logistic trends have been described with likely affection of the customer logistic requirements. Finally, the chapter reliability and transport speed in this thesis deals with last important attribute of customer satisfaction defined as reliability of service/ journey time.

To sum it up, the achieved level of the customer satisfaction directly relates to the business sustainability and DB Schenker Rail competitiveness in rail freight relations between Europe and Asia.

## SECTION III – OUTPUT FRAMEWORK

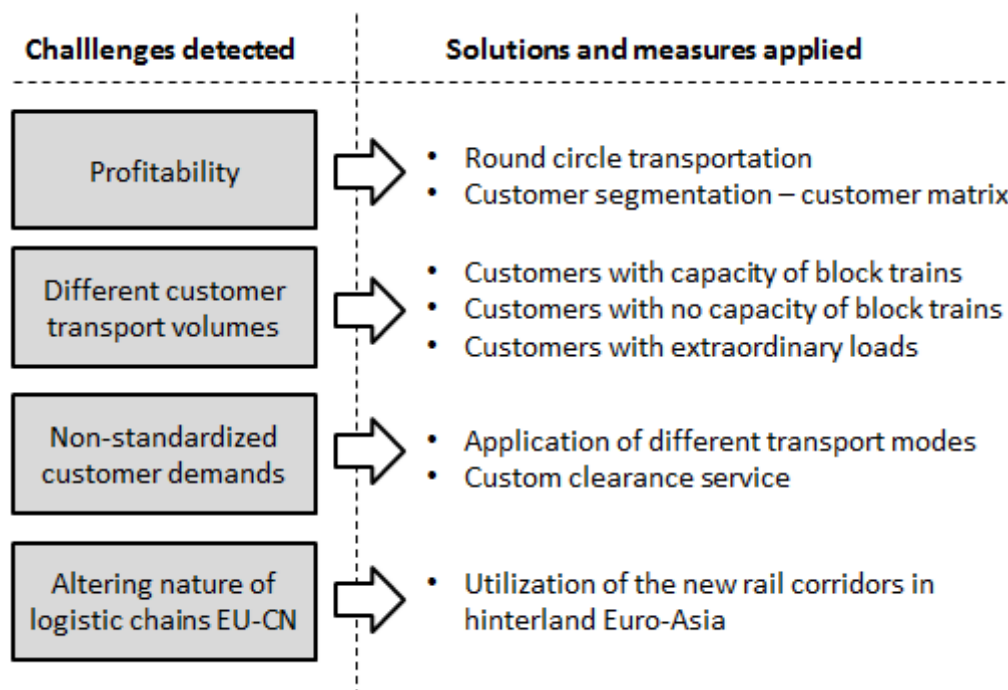
### 6. Customer applied measures for the rail freight transportation Europe – Asia

The third section defined as customer applied measures for the rail freight transportation between Europe and Asia follows the input framework, described as customer and company key standpoints towards new logistic solutions.

This part takes into account both of these standpoints and further with respect to the problem statements, attempts to describe already applied and propose new solutions in relation to the rail freight between Europe and Asia.

The following picture depicts the problems as challenges detected on the transport relations and arrows points out the areas of possibly new or already applied solutions.

**Figure 17: Challenges – problems detected and solutions proposed**



*Source: created by author*

## 6.1. Solutions proposed to increase rail freight profitability:

Over the last years DB Schenker Rail participated on several attempts to develop a direct rail freight service from Germany to China. In October 2008 one of the first trains arrived from Xiantang to Hamburg and was greeted with great fanfare. Nevertheless the triggered global financial crisis in 2008 showed its magnitude and practically stopped overnight all these projects including the DB's traffic on this route.

*"Railfreight is very vulnerable to volatility among its competitors, it needs stability to succeed,"* Alexander Hedderich. (Wright R. 2012)

Therefore the guarantee of the long-term profitability and therefore a sustainability of this logistic service remains as key challenge. In general to increase the profitability, several approaches might be applied, however in this chapter two ways have been described. On one hand the company may apply the round circle solutions and counterbalance the eastbound and westbound volumes to avoid transport of empty containers.

On the other hand the company may focus on the customers with high margins, whose transport solutions is more difficult or requires special approach. According to the Bruno Sidler, chief operating officer for Amsterdam-based Ceva logistics, just about 2-3 % of trade volumes is transported by air, however these goods perform about 40% of the total values transported worldwide. Basically the value of some goods is so high that is worth of transporting by air than to go by sea. (Wright R. 2012)

Beside other things the goal of this chapter is to investigate, what might be the role of the rail freight in terms of highly valued goods and what the capital costs are for different transport modes.

### 6.1.1. Round circle solutions for rail freight transportation

#### **Eastbound transport**

**Destinations:** from Leipzig (Germany) to Shenyang (China)

**Company:** BMW

**Merchandise:** car components

In November 2011 the department DB Schenker Rail Automotive started a commercial service for the car manufacturer BMW. This is a very good example of newly established daily block train between Europe and Asia and at the same time excellent framework of cooperation with partner railways in Poland, Belarus, Russia and China. In June 2012 the amount already reached 240 container trains traveling from Leipzig to BMW assembly plant in Chinese Shenyang. The whole block train takes

more than 6.500 automobile parts and needs around 23 days to cover the journey of nearly 11.000 kilometer length.

*"In the past, there wasn't an owner for a project. Too many railways were involved to make it work and nobody would take responsibility for such a service, which is why there wasn't a direct rail freight link alone between China and Germany."* Hedderich Alexander, CEO DB Schenker Rail, 2012.

By opening a plant in Shenyang the BMW company gets direct access to its largest market in terms of sales, which already surpassed the Germany and USA by the estimation to reach 200.000 vehicles produced in Shenyang at the end of 2013. (ChinaDaily, 2012)

### **Westbound transport**

**Destinations:** from Chongqing (China) to Duisburg (Germany)

**Company:** Acer

**Merchandise:** 40.000 notebooks

Nowadays, most of the notebooks (up to 90%) are exported from China by sea or air. In case of Europe as the main purchaser of Chinese high-tech products, the goods are transported from the Chinese harbors and then shipped to the Europe.

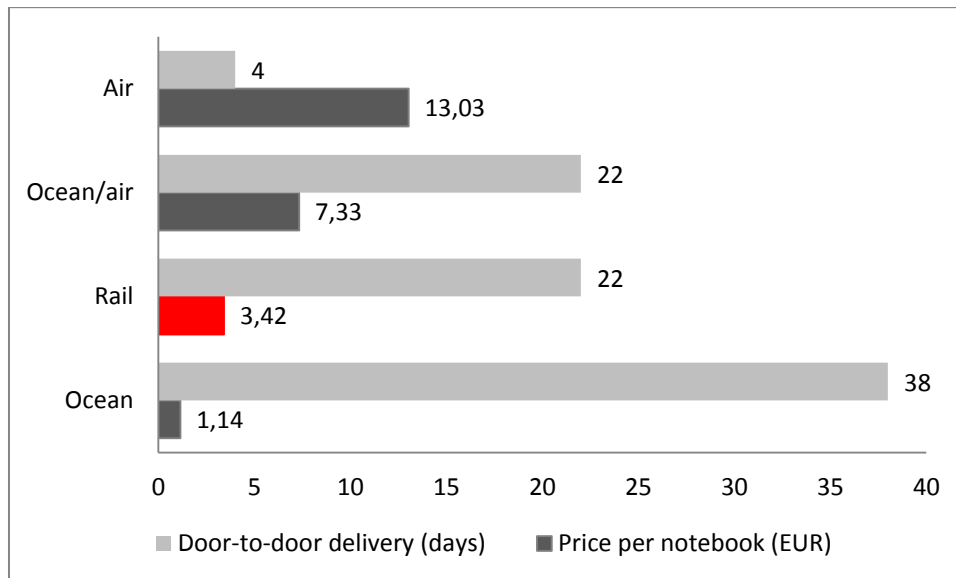
The Chinese megacity Chongqing attracted recently the companies like Acer, Dell, Hewlett-Packard and reached the production capacity of 1 million computer laptops annually. Such a dynamic development brings about the questions for discussions about new and more effective delivery channels.

The answer seems to be Euro-Asian rail connection so called the Euro-Asian land bridge with delivery performance around two weeks and still not capitalized capacity. However, the travel time is the main attraction of the route, high cost and extremely low temperature and high humidity might impact the quality of the products and therefore stay as the biggest challenges.

This solution marks and opens new logistic systems not only for the notebook industry but even more brand vendors and companies in Asia are expected to follow this way in the future as the whole system matures.

The following diagram deals with decision making factors about what transport mode to apply for westbound delivery from China to Germany. At the end the conclusion is made about suitability of the rail freight as the new upcoming logistic solution.

**Figure 18: Comparison of transportation cost for one laptop between Chongqing and Duisburg<sup>10</sup>**



Source: Sachsenröder & Partner, 2012

To evaluate the transport performance of the different modes, we can at first just compare the door-to-door delivery time and charged price for the relation Chongqing – Duisburg.

Rail offers more than **50% cut in transport costs in comparison with ocean/air** combination at the same delivery time. However, albeit the **rail enables 16 days delivery time reduction in comparison with the sea cargo**, the cost per one transported unit is three times higher.

### Total capital cost calculation

To a greater extent and more complex analysis we can add the **price erosion of 8-10%** for the laptops per year, further **the cost of capital** measured by annual interest rate and re-calculated for the transport duration and finally to conclude and compare the overall time-to-market effect for the different transport modes.

According to the assumption that 2500 laptops - units fit the 40' container with an average price 400 EUR per single laptop, we get the total value of 1.000.000 EUR per 40' container.

Further, if we take into account the 38 days as the duration of the sea transport and theoretical 10% of laptop price erosion per year, we get the 1,04% price erosion during the journey. With respect to the total value of 1 million EUR the price depreciation might be around 10.411 EUR per 40' container. Such depreciation must be naturally added to the transport cost, which is in this case 2850 EUR per 40' container.<sup>11</sup>

<sup>10</sup> We assume 2500 units per 40' container on the route for ocean and rail mode for the exchange rate EUR/USD = 0,81453

<sup>11</sup> Transport cost of single unit is 1,14 EUR per laptop, multiplied by 2500 (capacity of the 40' container)

The cost of capital refers to the cost of company debt and the cost of equity. For the sake of simplification, we might assume that the company – receiver of laptops produced in China borrows the 1.000.000 EUR to cover the payment of 40` container delivery and waits 38 days to receive the goods for the final sale to the end customers in the store. If we assume the 5% cost of capital per year for the sea delivery time of 38 days and value of one 40` container, the cost of capital refers to the value of 5205 EUR.

Finally by summation of costs, price erosion and cost of capital we get **the total costs**, which turns to be 18.466 for the sea transport. In overall this is what we can call **the value of time to market effect** – the total costs relevant for the time needed to deliver the laptops from Chinese Chongqing to Duisburg in Germany.

The final results enable us a comparison across the different transport modes. (see the table below)

**Table 3: Comparison of total capital costs for the different transport modes – WESTBOUND**

|                                 | sea          | rail         | air          | sea/air      |
|---------------------------------|--------------|--------------|--------------|--------------|
| transport cost per unit (EUR)   | 1,14         | 3,42         | 13,03        | 7,33         |
| duration (days)                 | 38           | 22           | 4            | 22           |
| transport cost per 40` cont.    | 2850         | 8550         | 32575        | 18325        |
| Price erosion for mode          | 1.041%       | 0,603%       | 0,110%       | 0,603%       |
| price erosion per 40` cont.     | 10411        | 6027         | 1096         | 6027         |
| cost of capital per 40` cont.   | 5205         | 3014         | 548          | 3014         |
| <b>Total costs (t-m effect)</b> | <b>18466</b> | <b>17591</b> | <b>34219</b> | <b>27366</b> |

*Source: created by author, data source (grey rows) Sachsenröder & Partner 2012, DB Schenker*

Despite the lowest cost per shipped unit on the sea, the total costs are higher than for the rail freight. Such result has been caused by the longest transport duration, where the price erosion and cost of capital comes in force.

Even though the air transportation effectively leverages the time-to-market effect, it still stands as the most costly transport mode, since the cost per shipped unit are the highest. Nevertheless, by an application of the combined sea-air mode the total cost might be apparently lowered.

All in all, the rail mode refers to the lowest level of the total costs, even if just 22 days as delivery time between Duisburg and Chongqing is achieved. Further, the total costs might be lowered if the higher transport speed is achieved (already tested 13 days between Duisburg – Chongqing).

Figure 19: Example of the round circle solution for the rail freight Euro-Asia



Source: The map modified by author – the original map source: Deutsche Bahn AG

#### Legend for picture – Round circle solutions

1. **Leipzig** – Germany, train starts the journey with BMW car components
2. Changing point of locomotives at the Polish-Belarus border
3. **Brest** – terminal in Belarus – cargo is shifted from 1435 mm on the 1520 mm rail gauge
4. Changing point of locomotives at the Belarus-Russian border
5. **Manzhouli** – terminal in China, cargo is shifted from 1520 mm on the 1435 mm rail gauge
6. **Shenyang** – China, train delivers car components to the BMW assembly plant
7. **Chongqing** – China, train starts westbound journey with high-tech component
8. **Druzhba** – terminal in Kazakhstan – cargo is shifted from 1435 mm on the 1520 mm rail gauge
9. **Duisburg** – Germany, train delivers the high-tech components to Duisburg

#### Challenges related to the round circle solution:

- merchandise transported on both eastbound and westbound transportation must be suitable for 40' foot high cube containers
- additional customers between Shenyang and Chongqing (direction from Shenyang to Chongqing) to close the round circle
  - what is being produced in Shenyang and has the export potential in Chongqing?
  - Is the Shanghai suitable logistic stop in between?
  - What kind of logistic synergies might be found between for the rail freight between Shenyang – Shanghai – Chongqing?
- technical solution for winter season which could guarantee stable temperature and humidity conditions inside the containers rolling on the rail from China to Europe

### 6.1.2. Customer segmentation – high margin customers

Customer segmentation is the tool by which the company manages to group the customers in order to deliver differentiated service and potentially tailored logistic solution.

The main aim of the segmentation – customer clusters is that not all the customers might be treated in the same way. Therefore, the approach *“one size service fits all”* should not be applied, as far as it also does not distinguish between customers in terms of their importance and special needs.

Consequently, with respect to the importance given to the customer, which might differ concerning the company's criteria, consequently some customer matrix might be designed.

#### Why the DB Schenker Rail needs customer matrix model?

Without customer segmentation adjusted to the Euro-Asian rail freight activities, the DB Schenker Rail risks to apply a “one size fits all” approach, which might oversee specific requirements of particular customers and consequently leave them dissatisfied.

An apt segmentation of the contracted customers on the Euro-Asian rail-road will enable to highlight key factors for decisions made about further logistics solutions.

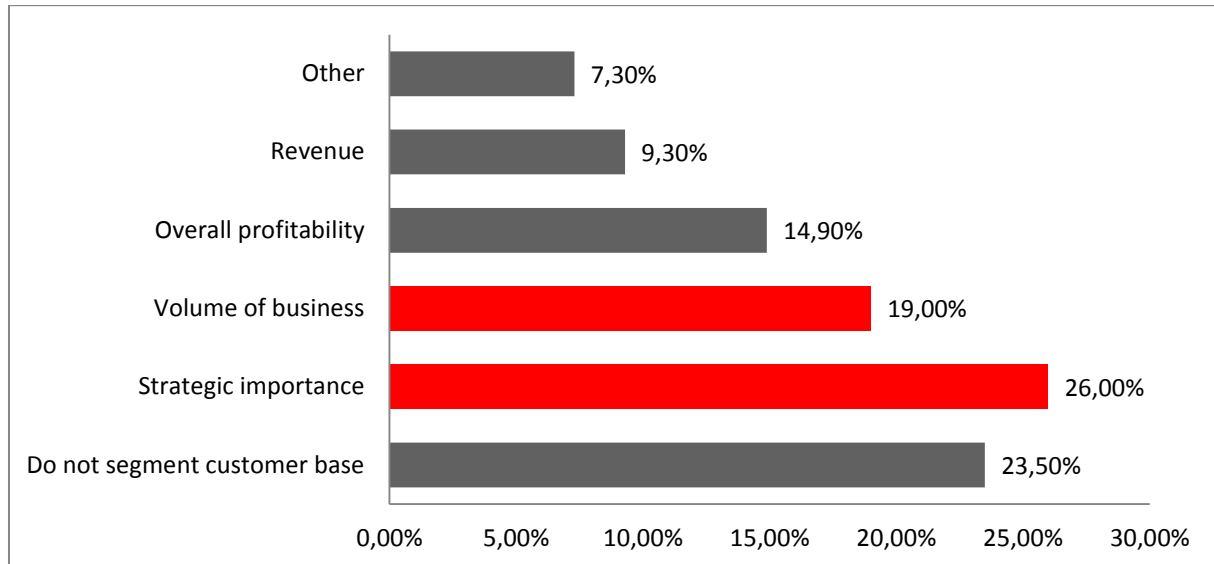
Traditionally the customers are treated in the way related to the different business sectors as for instance the transport of raw natural resources, high-tech products, industry equipment, car-components or dangerous goods – RID etc.

Nevertheless, concerning the DB Schenker Rail standpoint not only the business sector, but furthermore the following characteristics might be seen as the key factors for further advanced segmentation to develop customer matrix and evaluate customer importance:

- Potential **margin** of the transported products
- **Volumes** - quantity of transported products
- **Permanence** - sustainability of transported volumes
- Potential **growth** of transported volumes

The logistic provider should also take into account that the decisions made about what customer to choose and what logistic solution to apply might affect in different levels the company's profitability or even market share in comparison with other logistic providers.

**Figure 20: Method of customer segmentation**



*Source: Ernst & Young 2011, Operating in new normal (created by author)*

As can be seen from the figure number 20 in terms of the customer segmentation the logistic providers give the highest priority to the clients with high volume of business – transported volume and above all to the customers with specific nature of importance.

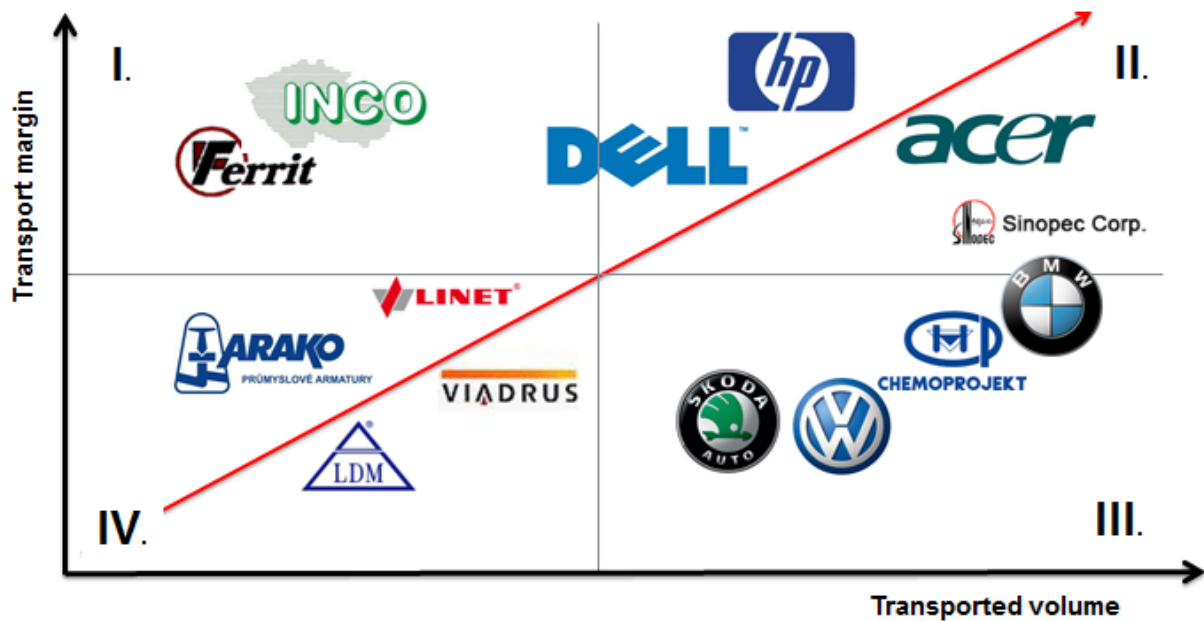
On the other hand results provided by the Ernst & Young study showed, that surprisingly more than 23% out of 760 respondents – representatives of logistic companies do not segment their customer base.

Car industry and companies representing the high technology sectors nowadays seem to be of the strategic importance on the rail-road between Europe and Asia.

Nevertheless, the perception of the strategic importance might differ with respect to the character of the transported merchandise (e.g. BMW – high volumes, Hewlett Packard – high margin, high volumes, Inco Engineering – high margin)

The following matrix takes into account two key aspects of logistic customers: at first the transport margin on the vertical axis and the transported volumes on the horizontal axis. Furthermore by dividing the diagram in four different parts, the companies might be associated to specific quadrant reflecting the character of the transported goods.

Figure 21: Proposed customer matrix – companies related to the Euro-Asian rail transportation



Source: Created by author, perception of the companies in terms of volume and possible transport margin (no empirical data source)

At first the **quadrant number 1** shows the companies with potentially high margin of transport solutions but on the other hand at the same time with quite small transported volumes. As an example have been used the companies exporting products of extraordinary character. For such companies is typical to have a few contracts during the year and consequently just one or two demands for logistic solution in relation to the CIS, Russia or possibly China. The reason for high margins of these companies is the higher difficulty of the logistic solution, since the transported goods might be extremely heavy, long, etc. Specific case study with described solution applied has been associated to the chapter **the rail freight customer with extraordinary goods**.

Naturally, the most important companies belong to the **quadrant number 2**, where not only the margins but even the transported volumes are high. As an example might serve the companies with regular volumes of high-tech products transported from Chinese technology hubs to the various European destination.

The **quadrant** marked as **number 3** stands as important too, since the belonging companies transport high and stable volumes, but with less demanding logistic solution (containers, palettes, etc.). Such quadrant might be typical of the industrial or manufacturing companies. Moreover, according to the transported volumes the companies associated to the quadrant number 2 and 3 have the potential to possibly fulfill the block train.

However, the level of transported volumes cannot be seen as invariable, as some of the aforementioned companies are sensitive to the economic volatility. For instance, the company Acer - the world's third-largest computer maker for 2012 more than halved its growth forecast due to a weakening economy and generally circumspect customer perception of its new operating systems. Consequently the prediction for growth of shipments to the Europe - Acer's largest export market, related to 35 percent of total sales, had to be lowered by half from 10 to 5% estimated growth rate. (Culpan T.,2012)

The **quadrant number 4** is associated to one of the problem statements and is investigated in details in the following part called **the rail freight customers with no capacity of block trains**.

Last but not least the transport product segmentation enables the company to optimally design the logistic process in terms of similar technical solutions or the required customs clearance service in terms of the different merchandise.

## 6.2. Solutions in terms of different transport volumes:

### 6.2.1. Rail freight customers with capacity of block trains

Having a possibility of choice most of the railways would probably prefer to run the block freight trains. As far as the block trains do not need to be usually stopped on the route for shunting procedures, the transport of the goods has the potential to be faster than the Single Wagon Load, since no time is lost in the stops of the marshaling yards.

In most cases the block trains carry the traditional commodities as the coal, steel, chemicals – RID goods, agricultural products or nowadays often the cars, respectively car components. Consequently the whole train carrying the goods of one customer from the point A to the point B, seem to be the most cost-performance option. This is after all where the European rail transport excels and is most economic. (International Railway Journal, 2012)

However, dealing with one single customer for the block train might bring about specific business risks for the rail freight operator. The problem might come around, when the wagons (often dedicated and technically appropriate to the specific business sector) are on the basis of customer demand purchased by the freight operator and the customer at the end turns as having insufficient capacity. Naturally, the risks stays on the customer side as well, since he has to pay for a full train no matter if he has enough goods for it or not.

**Table 4: Overview of current and potential block trains to run between Europe and Asia**

| Customer                 | Direction | Capacity    | Type of goods        | Destination        |
|--------------------------|-----------|-------------|----------------------|--------------------|
| <b>BMW</b>               | eastbound | Block train | Car components       | Shenyang-Chongqing |
| <b>HP, Acer</b>          | westbound | Block train | High-tech products   | Chongqing-Duisburg |
| Potential customer       | Direction |             | Type of goods        | Destination        |
| <b>Skoda Auto a.s.</b>   | eastbound | Block train | Cars, car components | Shanghai           |
| <b>Chemoprojekt a.s.</b> | Eastbound | Block train | RID goods            | Shanghai           |

*Source: Created by author*

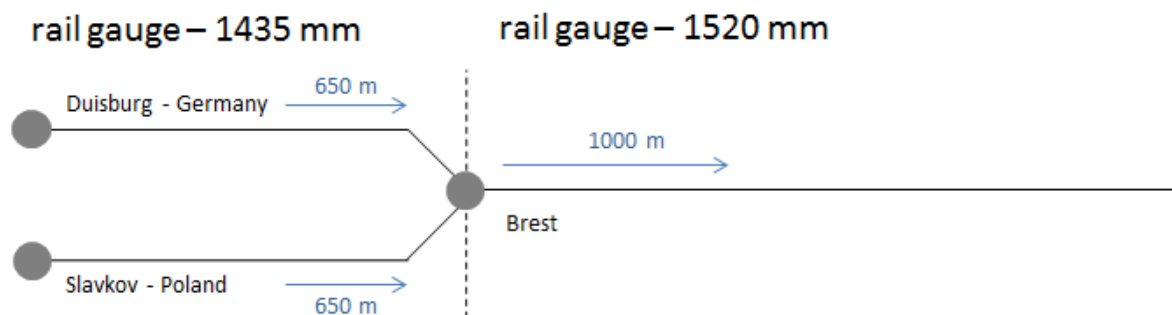
Furthermore, it turns that sound portion of the companies investigated in this paper– potentially the new rail freight customers do not have such a capacity. On the European at least, bulk freight flows are at static level or even in decline. On the other hand the real growth potential is seen in the

transport of highly-valued and semi-finished goods as the new upcoming commodities of the block trains.

Nowadays, the ongoing deregulation in the European rail freight market opens and intensifies the competition in the block train business. If the rail forwarder manages to contract one single customer for the whole train, he keeps the benefits for himself, whereas in terms of the single load wagon the business should be practiced rather as mutual cooperation between different forwarders.

Last but not least, the attention should be paid to the capacity utilization, especially for rolling block trains between Europe and Asia. Since there are different limits for maximal length (650 m in Europe and 1,000 m in Russia), the crossing point Brest enables to add wagons when heading eastbound or in the other way around requires the split of train for maximal length of 650m, when heading westbound.

**Figure 22: Combination of block trains at the Polish – Belarus border with respect to max length**



*Source: Created by author*

However, the capacity utilization is for the customers with lower volumes an important issue too, might even stand as a key decision factor about what transportation mode to choose.

### **6.2.2. Rail freight customers with no capacity of block trains**

As might be seen from the previous chapter – the diagrams marked as I. and IV. refer to the companies with lower transport volumes. Such companies naturally do not have the capacity to form a block train and usually choose different modes than rail.

Nevertheless, there is still a committed core of European operators, which firmly believes that right the single wagon traffic has a promising future. According to the Rail Freight Portal – UIC the customer goes for the single wagon load, when he wants to dispatch just one or more wagons, but don't have the capacity for whole train. (Rail Freight Portal, 2012)

The main aim of this chapter is to investigate specific companies with lower transport volumes, their decision making process about which modes to choose, and if this is different from the rail, what the rail freight operator should do to convert his “NO” to “YES”, when the rail freight operator offers his service.

*"I can confirm there is a long-term future for single wagon freight on European tracks. I'm not sure you could have made such a statement eight to 10 years ago. This is the basis for growth."*

(Dr. Hedderich, CEO of DB Schenker Rail for International Railway Journal, 2012)

Further, with respect to the customer location the collecting system and preferred collection points – as the rail terminals should be defined. Last but not least, the research showed notably more companies with lower export volumes, than the companies with immediate capacity to fulfill the whole train.

Finally, in this chapter the three small cases, each related to the one Czech company, have been investigated and the following order has been applied: **issue – challenge - solution.**

**Table 5: Overview of current and potential wagons to run between Europe and Asia**

| Potential customer         | Direction | Capacity   | Type of goods        | Destination        |
|----------------------------|-----------|------------|----------------------|--------------------|
| <b>Kralovopolska, a.s.</b> | eastbound | 6 pcs.     | Cantilever Trolleys  | China              |
| <b>Viadrus</b>             | eastbound | 1-2 trucks | Heating systems      | Russia, Kazakhstan |
| <b>Fans a.s.</b>           | eastbound |            | Steel constructions  | Russia, Kazakhstan |
| <b>TOS Varnsdorf a.s.</b>  | eastbound |            | Ship industry        | Beijing - China    |
| <b>Inco Engineering</b>    | eastbound | 20 wagons  | Mining stuff, valves | Vietnam            |
| <b>Arako spol. s.r.o</b>   | eastbound | 1-2 trucks | Security valves      | China - Yixing     |
|                            | eastbound |            | walves               | China - Shen Tou   |

*Source: Created by author*

## Case study - 1

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**Company:** Viadrus – ZDB Group, a.s., Bohumin, Czech Republic

**Issue:** company in the most cases applies the truck mode, for transport to Kazakhstan and Russia

**Challenge:** to convert truck to rail

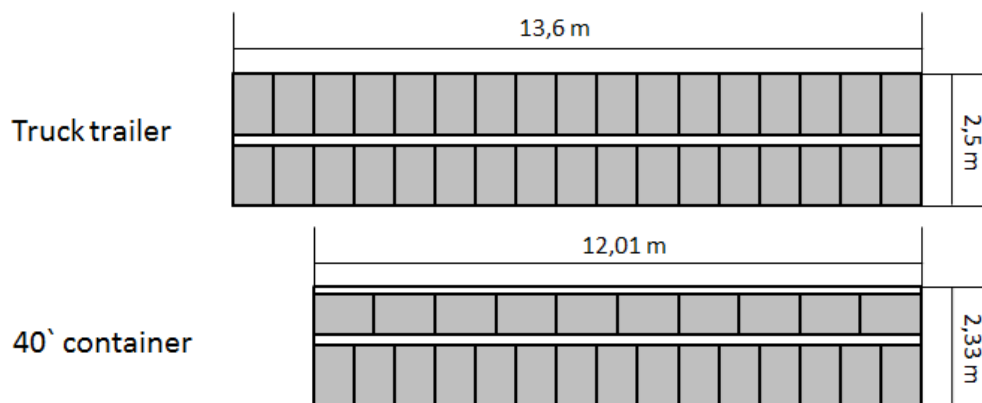
**Solution:** rail might be applied for the higher volumes (e.g. more than 72 palettes) and for the larger distances (Yekaterinburg and further)

The company Viadrus a.s. from the Czech Republic, located in Bohumin and exporting regularly the heating systems and radiators to Russia, Kazakhstan and other CIS countries.

Nevertheless, despite the long distances the company regularly applies the truck mode, as far as it is considered cheaper and more flexible than the rail freight. Furthermore, the aspect of higher capacity has been used, why the company goes for road rather than rail.

Therefore, the following picture has been made, comparing the capacity and loading systems of EUR pallets between 13,6m long truck trailer and 40' container.

**Figure 23: Comparison of loading EUR pallets between Truck trailer and 40' container**



|                                       | Truck trailer – 93m <sup>3</sup> | 40' container – 76,28 m <sup>3</sup> |
|---------------------------------------|----------------------------------|--------------------------------------|
| <b>No. of EUR pallets in 1 layer</b>  | <b>33-34</b>                     | <b>25</b>                            |
| <b>No. of EUR pallets in 2 layers</b> | <b>66-68</b>                     | <b>50</b>                            |

*Source: created by author*

First of all as might be seen from the diagram above, the comparison of just single truck trailer and 40' container gives the competitive advantage to the road. However, if higher volume than 66-68 pallets is required, the container rail transportation mode becomes more appropriate since another container to the 40' might be added. In this case the turning point might be about 70-72 EUR pallets (50 pallets – 40' cont. + 22 pallets -20' cont.), since the maximum loading capacity for truck is 68 EUR pallets.

Secondly, the price has been argued as the key decision factor for the choice of transportation mode. Regarding the price analysis and diagram made in the previous chapter it is obvious, that the rail freight gets the price advantage, when the goods are transported to the Yekaterinburg and further.<sup>12</sup> To sum it up, the rail freight might be a suitable transport solution, when the company achieves higher transport volumes, especially for export destinations passing Yekaterinburg and further.

<sup>12</sup> Applies for the starting points in Northern Moravia in Czech Republic – Bohumin, Ostrava, Paskov

**Company:** Fans a.s., Hlinsko, Czech Republic

**Issue:** company in the most cases applies the truck mode, for transport to Kazakhstan and Russia

**Challenge:** to convert truck to rail

**Solution:** competitive price with the truck transport mode, adjustment of pallets size

The company Fans a.s. conducts business in the construction and rebuilding of cooling towers for industrial plants mainly in energetic sectors. Concerning the central and eastern European markets the company is active in delivering the technological solutions across all the Russian territory and other CIS countries.

So far for the logistic deliveries, the company preferred the truck transportation as it was cheaper and easier logistic solution (company production plant has no direct access to the rail siding). However, according to the company information, the rail freight solution is nowadays being re-considered, since the price of fuels continues to rise. For such solution the company looks for the logistic partner, which is able to pick up the loads by truck at the production place and put it on the rail wagon, prepared to roll to the final destination.

Obviously for such a logistic demand the transported goods should be loaded in the containers to enable combination of different transport modes. Therefore, to avoid the low level of capacity utilization the following comparison and the discussion about the pallets size has been conducted.

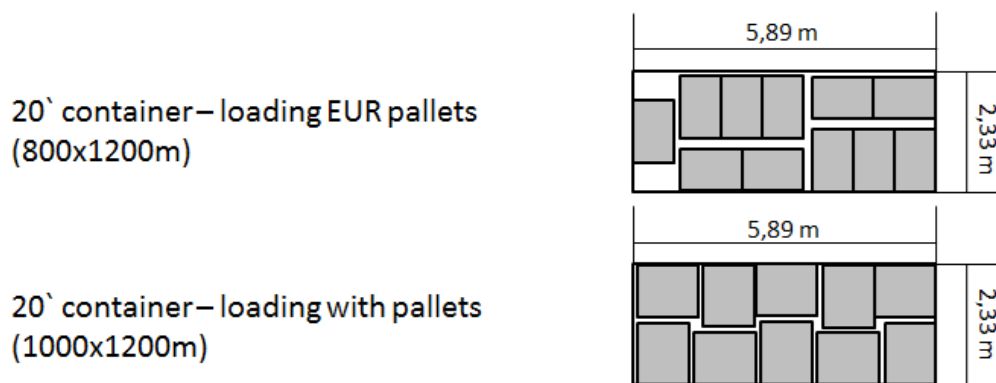
According to the company information, the export volumes range between 1-2 truck trailers heading eastbound to Russia or Kazakhstan. Nevertheless, the size of the merchandise- usually loaded on pallets, might be adjusted to the container size to maximally fulfill the capacity.

**Consequently, the following conclusion has been achieved:**

If the logistic operator offers the competitive price with the truck transportation regarding the export destination, the company is ready to go for container transportation on the rail and to adjust the pallet size to meet maximally the capacity of the 20' container. If higher volumes are transported, the company might eventually fill the 40' container with standard European pallet size 800 x 1200 cm without adjustment.

With that respect the comparison has been made for loading of standard **20' container with different pallets dimensions** (EUR 800x1200cm and Industrial 1000x1200cm) and the capacity utilization and number of pallets has been calculated.

**Figure 24: Comparison of loading TEU with EUR pallets and Industrial pallets**



|                                        | EUR - Pallettes 800 x 1200 cm | Ind. - Pallettes 1000x 1200 cm |
|----------------------------------------|-------------------------------|--------------------------------|
| <b>No. of pallettes in 1 layer</b>     | <b>11</b>                     | <b>10</b>                      |
| <b>No. of pallettes in 2 layers</b>    | <b>22</b>                     | <b>20</b>                      |
| <b>Space utilization<sup>13</sup>:</b> | <b>78,5 %</b>                 | <b>88,8 %</b>                  |

*Source: AWT Cechofracht, calculation and proposition created by author*

Last but not least by placing the goods into the container must be first of all followed by instructions and customer requirements (loading horizontally or loading vertically). Consequently in terms of loading must be respected the order of planned unloading including the drivers' instruction if the intermodal – combined transportation is realized.

Furthermore, with regard to the transport security is necessary to load the axle of the wagon or truck uniformly and to avoid potential movement of the merchandise during the transportation process.

At the end such containers might be transported to the selected terminal with appropriate location and consequently dispatched eastbound as the single wagon load.

<sup>13</sup> Space utilization might vary with respect to the system of vertical packing

### 6.2.3. Rail freight customers with extraordinary loads

As the last part of the solutions in terms of different transport volumes are mentioned the customers with extraordinary – understood extra heavy or oversized loads. According to the chapter customer segmentation, such companies fall into the first quadrant, where **high transport margins** might be achieved (due to more complicated logistic solution), however **lower transport volumes** should be expected (just a few contracts within a year).

Most of these companies are related to the heavy industry sector, which had previously a deep tradition in Europe. Nevertheless, the technological knowhow is still kept and innovated by some European companies and further capitalized in the markets, where the heavy industry and mining sector plays important role for the economy.

As the customer example have been used the two Czech companies Ferrit s.r.o. and Inco Engineering s.r.o., which are the manufacturers and suppliers of mining hoists. Both of the companies have regular business contacts in the strip and deep mines of Siberia in Russia, mines in Ukraine, Kazakhstan, China or Vietnam.

According to the information gained from the company Inco Engineering s.r.o. one of deliveries heading to one of Siberian mines might be a mining shaft, which might be for example 80 tones heavy and more than 15 meters long. Obviously, if such merchandise is delivered in a block and not taken apart, only the rail mode with special wagons comes into the consideration.

Nonetheless, since none of these companies has direct access to the railway (own rail-siding), the truck mode must be applied at first, to deliver the load to the place, where the load is shifted on the special rail wagon, designed to carry extraordinary loads.

In the Czech Republic the company CD Cargo, a.s. offers the catalogue of wagons (see the list of annexes), especially designed to transport over-sized and extra heavy loads.

**Figure 25: Example of logistic solution - stone crusher plant (177t) transported from Germany to Kazakhstan**



*Source: RRL Logistic Group, reference of logistic projects, [www.rrl-europe.com](http://www.rrl-europe.com)*

## 6.3. Solutions for the customer complex requirements

The time when the logistic processes were just about to transportation from A to the point B, is just a matter of history. Nowadays, the logistic providers are put to the more challenging position, since the customer requirements are more demanding and higher complexity of solution is required.

### 6.3.1. Implication of different transportation modes

#### Case study – 3

---

**Company:** Inco Engineering s.r.o.

**Issue:** company requires simultaneous truck and rail transportation for relation Russia and CIS

**Challenge:** to convert truck to rail

According to the talks with representatives of Inco Engineering s.r.o, the company will not negotiate a new logistic contract solely based on the rail freight solution. As a product example has been mentioned the 80 tones heavy and 15 meters long mining shaft, which is at the same time convoyed by vast number of palettes of EUR size.

As a result the company might achieve the transport volumes of **20 wagons (parts of the mining shaft) and 30 trucks (EUR palettes)** going simultaneously to the final destination in Russia or Kazakhstan. Furthermore the combination of rail – truck mode is required due to the fact that the company has no direct access to the rail siding (e.g. CD Praha production plant)

Furthermore, the aspect of price has been mentioned as key decision factor. Due to the changing tariffs on the Russian railways, the company sometimes till the very last moment does not know which transport mode to choose. For the destinations in Russian or Kazakhstan the road transport was often applied and is still considered as the best alternative for the rail.

Nowadays, the company sees the future perspectives in Vietnam, where the likely solution seems to be the ocean transport.

Therefore, the company needs strong logistic partner, which is able to offer a complex logistic solution tailored to the current export destination and nature of the load.

To sum it up and with respect to the company's demands, the DB Schenker Rail has the capacity to meet all of the customer demands and offer new logistic solution.

As another example for the customer complex requirement serves the company Ferrit s.r.o.. whose representatives expressed the demand to deal with just one logistic partner instead of several ones for all of the countries, the company deals with.

Therefore, the Ferrit s.r.o needs a contract with logistic partner, who is able to offer not only the solution for the rail freight to Russia or China, but further will deal with the sea, road and air transport modes in terms of other export countries.

**Figure 26: Export destinations of the the company Ferrit s.r.o.**



*Source: Ferrit.cz – company's representation, created by author*

### **6.3.2. Customs clearance and other procedures**

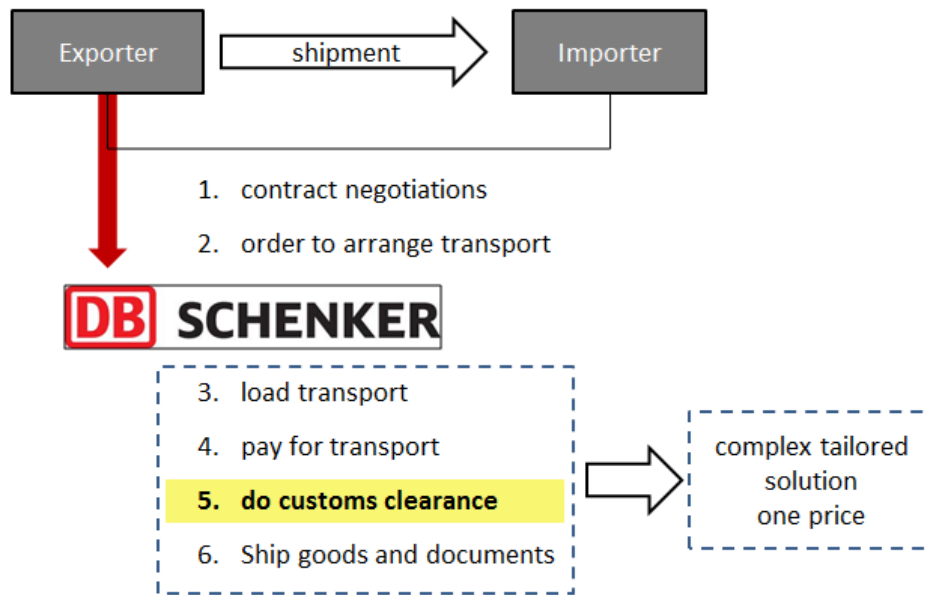
The fact that the transport provider deals with all the necessary documents and customs clearance is nowadays considered as a matter of course. Therefore, the transport provider is often asked to pay customs costs and to fully overtake responsibility for the products transported. Consequently such service naturally goes beyond the traditional transportation and brings to the logistic further value-added.

Customs clearance and its subsequent payment is therefore an evident part of the complex logistic solution, especially for the small and medium enterprises, where the transport volumes are lower.

Picture:

The following diagram depicts the incorporation and scheduling of customs clearance procedures together with other logistic services offered by the rail freight operator.

**Figure 27: Custom clearance as a part of the complex service**



*Source: Created by author*

First of all, the exporter (product seller) deals with the importer (product buyer) in terms of contract details. Afterwards, the exporter orders the rail freight provider to arrange the transport and reserve the rail cars. With respect to the requirement the time schedule – plan of rail cars delivery, booking request and confirmation of dates is made. However, the rail cars do not have to be always at disposal and therefore the private wagons must be rented, what naturally lowers the profitability since they are more expensive.

Once the rail cars are provided for loading and the merchandise is loaded and all the documents are prepared (waybill CIM/SMGS with custom stamp, other commercial documents, customs declarations and other certificates), the rail operator pays for domestic part and international part of railway transport.

To deal with customs clearance procedures the exporter or if possible the logistic operator must usually prepare the following documents:

- Customs registry card
- Transaction certificate
- Invoice and Packing list
- Sales contract and Consignment note
- Other certificates (e.g. certificate of origin, certificate of conformity etc.)<sup>14</sup>

At last the customer (exporter) expects a one single price for all the offered services, bundled as one complex solution.

<sup>14</sup> The nature of certificates depends on the character of exported product

## 6.4. Measures towards altering nature of logistic chains between Europe and China

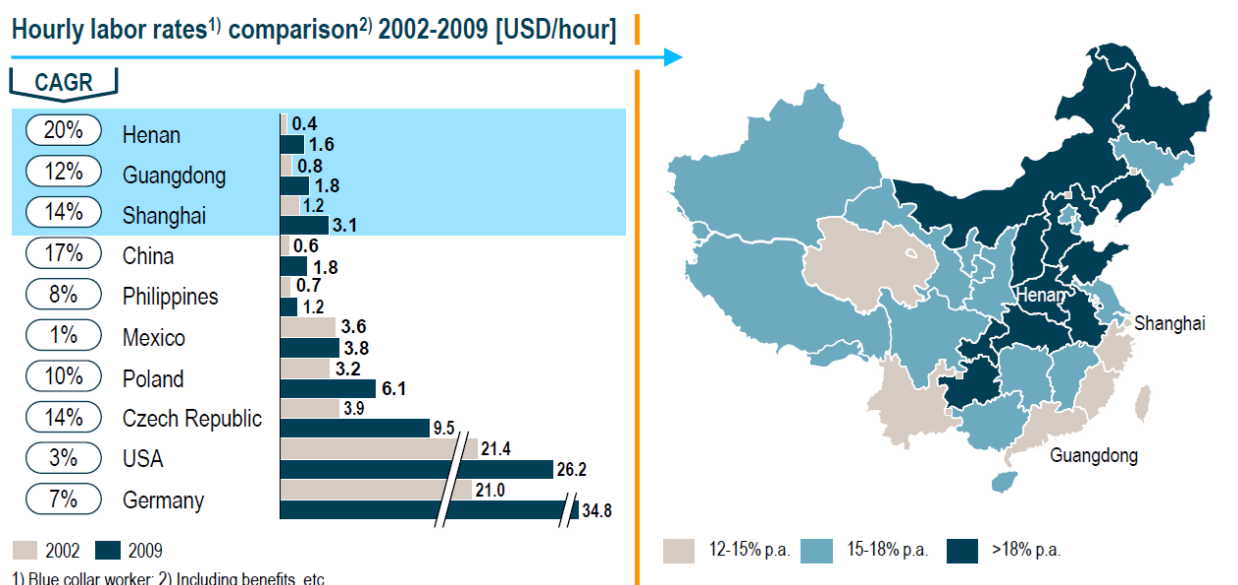
The China in 2012 is the country preparing itself for a new era. Dramatic changes and dynamic development has been deeply incorporated into the Chinese economy, since it lasts for more than last 30 years. Since the China has firmly acquired the status as the second largest economy in the world and new challenges are perceived not only by domestic entrepreneurs, but furthermore by international companies, whose business activities are related to the magnitude of Chinese economy.

It has been a long time since the perception of China was just a follower, imitator or user of foreign high technologies. After the three decades of shaping the competitive advantage of China new challenges and ambitions are seen, not only to be a highly competitive, but to be a leader in innovations and industry. (The China Analyst, 2012)

As the Chinese wages are rising, some of the companies move their productions back to the countries of origin (USA, Europe, etc.), further to the Chinese hinterland or even leave China to go for other transition countries, where the labor cost are lower.

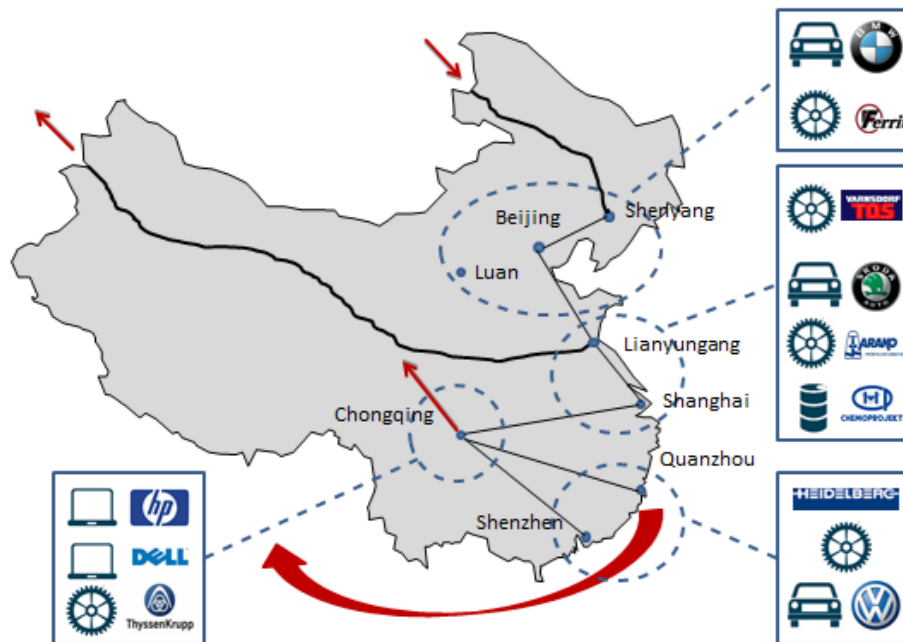
*„A number of firms, especially those making clothes and shoes, have upped sticks and moved to Bangladesh, Cambodia, Indonesia and Vietnam. Nike, for instance, used to make most of its trainers in China, but many of its big suppliers have moved elsewhere, and in 2010 Vietnam became the company's biggest production base worldwide.” (The Economist, special report 2012)*

**Figure 28: Labor rate inflation development 2002-2009, (Roland Berger Study 2011)**



Source: Roland Berger, Strategy Consultants study, Detroit – December 2011

**Figure 29: Target areas of selected companies and main import/export directions to/from China**



*Source: Created by author*

The overhead illustration shows the target areas some of the companies, whose relations to the China have been investigated in this thesis. Consequently, with respect to the previous illustration of changing nature of Chinese wages, we might estimate the consequent impacts.

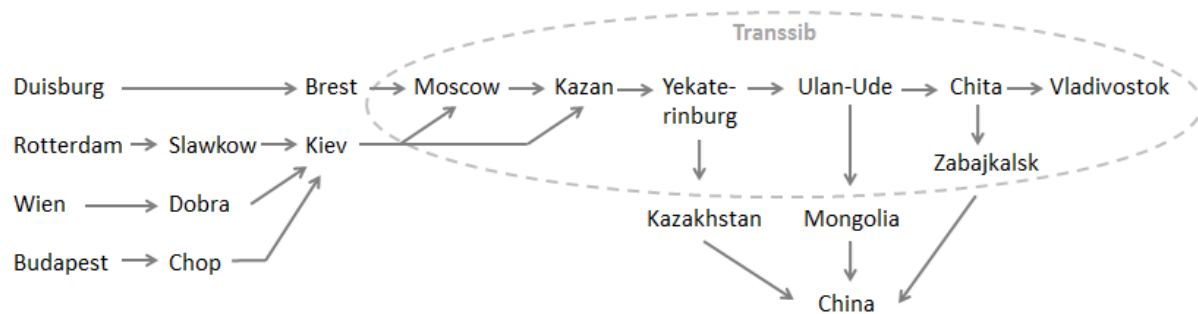
Since the increasing wages might force companies to move westbound – further to the Chinese hinterland, some of the cities are becoming new logistic centers. For instance might serve Chongqing, which ranges as one the fastest and most dynamic cities in China in the last 5 years. This city became a center of high-tech companies and serves as exporting hub in relation to Russia and Europe. However, these companies and especially their export potential might be affected, if the wages continue to rise. Therefore, the long-term sustainability of logistic chains – in relation to Europe will directly depend on the sustainability of the competitive advantage of these companies. Nevertheless, such a competitive advantage should not be based on the low costs strategy, since the rising wages are lowering it, but rather on the innovations and technological progress.

#### **Key measures:**

- To **monitor development of wages** in the Chinese territory
- Within the Chinese territory to **focus on the companies producing high-tech products**, since their bloom corresponds with current development of Chinese economy
- To **prepare design of new logistic solutions** for the companies with lower added value in manufacturing business, since they are likely to move the production plants as the Chinese wages continue to rise.

### 6.4.1. The investigation and utilization of the new rail corridors

**Figure 30: Rail tracks between Europe – China over the Russian Federation and Kazakhstan**



*Source: created by author*

#### **Rail connections to the eastern Mediterranean Sea**

More than two thirds of the international trade in Europe is realized through the sea ports. This ratio is expected to grow, as the predictions claim the trade activities outside European Union to get more intense.

According to the Colliers International the more intense trade activities will affect the employment most of the European ports, with might come close to their maximum capacity and secondly lead to the investigation of new routes and access to the center of the Europe. As one of the key areas is already seen the Eastern Mediterranean, where the highest growth of logistic activities is expected.

*“This is the key area where we are likely to see the most growth. Ports such as Koper and Trieste will become critical when serving Eastern Europe as the region starts to play a bigger part in the global supply chain.” (Stransky, K., 2012)*

The ports as Koper and Trieste in the Adriatic will likely experience the fastest growth since they enable to deliver the containers to the Central and Eastern Europe 5-7 days faster than if the cargo ships need go to Rotterdam or Hamburg. Consequently the rail connection – connected rail infrastructure to such new growing ports will be required.

#### **Rail connection between Kyrgyzstan and China – corridor of the future for the transport between Europe and Asia**

In March 2012 the government of Kyrgyzstan and China approved and set a priority to the construction aimed to connect both countries by rail to establish a new transport corridor between China and Uzbekistan.

The rail gauge would follow the Chinese dimension 1435 mm and would therefore require a transit shed to meet the broad gauge 1520 mm in Uzbekistan. General impacts on the Kyrgyzstan economy and influence of the rail connection have been discussed by the Kyrgyzstan public.

Apart from an easier logistic access of other Asian goods to the Kyrgyzstan the three main positive factors have been so far considered as the most significant:

- **Creation of more than 2.000 new jobs in railway construction**
- **Tourism inflow – estimated about 250.000 Chinese tourists (Kyrgyzstan visitors per year)**
- **In total income – about 210 million USD per year for Kyrgyzstan`s government**

(Ibrayeva, M., 2012)

The following picture depicts the construction line (highlighted by sign 1), which is about 392km long and has further potential to connect Iran, Afghanistan or Tajikistan. As a consequent such rail link is believed to be a boost for trade flows between these countries and will bring about reduction of costs in comparison with other so far applied roads.

**Figure 31: Rail connection between China and Kyrgyzstan – 1 , Terminal Khorgos - 2**



Source: Map background – UNESCAP 2011, created by author

### **Terminal Khorgos – Kazakhstan`s Trans-Eurasian Transport Hub**

In the overhead picture the Terminal Khorgos located on the Kazakh-Chinese border is highlighted as number 2 (depicted as red point).

*“As a result of a number of agreements between Astana and Beijing, the area around Khorgos is set to become a Special Economic Zone (SEZ), with 30-day visa exemptions for businessmen operating in the zone.”* (Petersen, A., 2012)

Due to the Russian-Kazakh Customs Union, the Khorgos is becoming an important gateway for Chinese and other Asian markets, with possible benefits not only for Kazakhstan, but farther to Russia, Belarus and European markets. The aim is that once the goods went through customs procedures at Khorgos, the other ways across the Russia should be smoothed and without other checks.

## SECTION IV- ASSESSMENTS AND CONCLUSION

### 7. Key thesis findings

- Sea freight will maintain the dominant mode for the trade between Europe and Asia, as far as the other transport modes cannot compete with its capacity and price, which is natural reflection of economies of scale.
- Air freight will still remain a key player in Eurasian trade, however the rail freight might take over a considerable part in transport of the high-tech products, **as it keeps the lowest level of capital costs** related to Eurasian transport.
- The rail freight solution – **single wagon load might effectively compete with the eastbound truck transport mode (relation Central Europe – Russian Federation), especially in terms of destinations farther Yekaterinburg**. For the destinations closer Central Europe, the truck mode capitalizes on the price – cost advantage.
- Several studies proved vast business potential for rail freight activities between Europe and Asia, however the potential will still remain unsaturated if certain technical and administrative barriers are not overcome.
- High margin customers – companies exporting high-tech products and companies with extraordinary loads have the most positive impact on the profitability performance in Eurasian freight.
- The company DB Schenker Rail should improve the communication across the departments for different transport modes and increase the capability to meet the customer complex requirements – **different transport modes within DB Schenker should follow the mission of cooperation** instead of competition
- During the elaboration of the thesis **more companies with lower volumes of transported goods – potential customers of single wagon load** have been investigated, than the companies with clear capacity of block trains.
- Companies, currently located in China with high-value added manufacturing businesses as high-tech products will maintain and strengthen the logistic chains with Europe via Euro-Asia hinterland rail freight solution.
- The companies, with **low-value added manufacturing business as textile industries are likely to move their production placements** inside China or even to leave the country and alter the logistic chains as the Chinese wages continue to rise.
- During the project processing, the three companies expressed direct interest to negotiate with DB Schenker Rail about a new logistic solution in terms of products delivery to Russian Federation, Kazakhstan and Vietnam.

## 7.1. Hypothesis results

This part brings the conclusions about the hypothesis – supposition made at the beginning of the thesis:

- I. The proposed logistic measures will detect the areas with cost reduction potential for rail freight processes between Europe and Asia. - **Confirmed**
- II. Price list analysis – comparison of truck and rail transportation eastbound will detect a “border line” as an automatic key decision making factor about which transport mode to choose. - **Confirmed**
- III. The cost capital analysis will confirm the rail freight service as the best transport mode for delivery of high-tech components from Chinese Chongqing to the European markets. - **Confirmed**
- IV. Complex analysis of customer demands uncovers new possibilities for customer treatment and enables to achieve better results in terms of customer relationship feedback. - **Confirmed**
- V. An extensive demand analysis will enable to detect potentially new customers of rail freight service between Europe and Asia. - **Confirmed**

## 7.2. Recommendations for future research

This thesis predominantly deals with issues related to the rail freight customer demands, logistic trends directly affecting them and finally the logistic solutions applied as the output – synergy between the customer and company status quo.

Nevertheless, several aspects remain as the challenges related to the Eurasian rail freight operations. First of all the issues of single wagon loads should be further investigated, as it applies as the key business for DB Schenker as the rail freight operator. A lot of companies within the European space carry out the low export volumes, which might give advantage to the trucks – road solution as the competitive transport mode for the rail. The future research in this field should focus on the issue, how and where effectively gather the small volumes of merchandise to be able to fulfill the whole train. Moreover, the problematic of LCL (less than container load) and related companies has been omitted since the transport solutions for rail freight might be even more time consuming.

Above all, as one of the key challenge for the regular rail freight operations between European and Asian markets remain the temperature and humidity inside of the containers during the winter season. Between November and March the temperature in Siberia and Kazakhstan might descend on the extremely low levels. Such conditions do not enable transport of the high-tech components produced in Chinese Chongqing and whose majority is aimed for European markets. Ironically most of the high-tech companies might schedule the launch of the new innovated products for the winter

time, especially before the Christmas when the customer demand is high. Unfortunately, due to extremely harsh weather conditions in Siberia, the rail freight service cannot be applied since the stable temperature inside of the container has not been guaranteed so far.

Therefore the winter solution for the Eurasian rail freight remains the key technical challenge and should be a subject of the future research.

### **7.3. Limitations of the thesis**

On the grounds of the thesis content, the whole concept might be seen as a strategic message rather than the empirical study.

Another limitation might be the validity of issues investigated in this master thesis. Especially due to the dynamic nature of the rail freight relations between Europe and Asia, the validity of the results might be affected over the years. One of the experiences showed the rail freight sensitivity to the market performance. With that respect the data related to the prices, speed performance and its comparison might change, if an overall economic environment changes too.

Furthermore, the thesis investigates the customer requirements more in general perspective, rather than related to the particular exported merchandise.

All in all, the thesis expresses the author's current understanding of the rail freight business between Europe and Asia, and therefore might differ from the expert views.

## 8. Conclusion

In October 2008 finally the first freight train rolling from Chinese Xiantang arrived to German Hamburg and had been welcomed with a great fame. However, despite the promising future assigned to the first pioneer transport performance, the traffic initiated by the Deutsche Bahn practically disappeared overnight after just a few weeks of operation as the global financial crisis came to its force.

Nowadays, after the years of the traffic slow-down caused by the economic crisis in 2008 and almost a “rail freight silence” between Germany and China the company DB Schenker Rail gathers the initiatives to re-establish the Eurasian rail freight service again.

However, just five years of break made the patterns of Euro-Asian supply chains different again. New European companies outsourced the production processes to the Eastern Asia and others relocated the plants farther to the Chinese hinterland to capitalize on cheaper lands and wages.

Consequently, nowadays the challenges faced by DB Schenker Rail, seem to be even more complex than 5 years ago. Therefore a special attention should be paid to the lessons learned from already tested rail freight operations between Europe and Asia.

From the commercial point of view – standpoint of DB Schenker Rail, one of the most important attributes of the rail freight service between Europe and Asia, should be the nature of profitability. The rail freight operations over the Eurasian continent might be very sensitive to volumes volatility of its customers, since the logistic processes are usually more complicated and need stability to succeed. Therefore all the measures or potentially new logistic solutions should be designed towards the stability and profit. In this thesis some of the currently applied solutions have been described, and several potentially new approaches have been suggested.

First of all the attention has been paid to the so-called round circle solution. Due to the imbalances between import and export performances between Europe and Asia, the maritime transport has to regularly deal with great volumes of empty containers transported eastbound towards the Asian markets. Such state of affairs creates a challenge for the transcontinental rail freight too, since due to generally lower capacity on the rail, every empty container significantly reduces the profit potential. As example of already applied round circle solution has been used the eastbound transportation of car components for BMW from German Leipzig to Chinese Shenyang and westbound transportation of high-tech products from Chinese Chongqing to the German Duisburg. This solution maximizes the capacity utilization as the whole train, upon the presumption that minimum empty containers are transported on these relations.

With respect to the capacity utilization, another approach has been discussed with representatives of the companies, which do not have the export volume to fulfill the block train. This measure has been aimed to eliminate the empty spaces inside of the containers dispatched on the Eurasian transport relations and deals with adjustment of palettes size. The calculation of capacity utilization inside of 20' and 40' showed different results when the merchandise is loaded in EURO palette size (800x1200cm) or industrial size (1000x1200cm). As a result some of the companies confirmed the possibility to adjust the palette size to eliminate the "carried air" inside of the containers.

All in all to a new customer matrix has been designed to distinguish between the companies – logistic customers in terms of the strategic importance for the rail freight operator. In this case two customer characteristics have been expressed as the key attributes: the transported volume and transported margin related to the logistic solutions. As the quadrant with highest level of strategic importance has been assigned to the companies with ability to build a block train and whose transported products require a special treatment. Such attributes might be nowadays typical of companies transported the high-tech products as laptops, tablets, LCD screens etc.

As a consequent the question has been raised, whether the Eurasian rail freight performs a suitable transport mode for these products. In this case not only the comparison of basic transport performance between different modes as price and time has been made, but the analysis attempts to approach the question with higher complexity.

Time-to-market effect, related price erosion and cost of capital have been added to the calculation with an aim to subvert the argument about the sea transport as the cheapest mode. The calculation has shown that despite the price advantage the sea transport does not express the lowest total costs, since it cannot eliminate the negative impacts related to the time to market effect. On the other hand, the results confirmed the inland rail freight solution across the whole Eurasian continent as the best option not only because of compromise between the transport speed and price, but mainly because of time-to-market effect.

Concerning the eastbound transportation mainly the companies with lower transport volumes have been investigated. Usually for such customers the single wagon load solution has been applied, since these companies do not have the capacity to form a single block train. Therefore, the single wagon load has to directly compete with the truck transportation, which is still applied even for a long distance from Central Europe eastbound to Central Asia.

Nevertheless, there is some kind of "key decision line" beyond which the rail freight usually gets the undisputable advantage as it starts to be cheaper and more reliable. For German companies for a long time such a "magic line" performed the Moscow and basically everything, what was transported till the Moscow was automatically carried by trucks. Even the calculation showed that for the Central

European companies – namely located in Northern Moravia in Czech Republic the “magic line” – counterbalance of transport costs between trucks and rail perform the target destinations, with travel distance around the 3500 km. (for starting points in Northern Moravia the results pointed Yekaterinburg).

The main aim of this study was to **design logistic solutions and measures** for DB Schenker Rail and its potential customers in relation to its rail freight activities between Europe and Asia. With respect to that, a special question has been raised to find out, what the rail freight customer needs today and what he will need tomorrow. To describe the current customer needs several phone-call interviews have been made. Then the most related global trends have been described to show the path of future logistics demands and possible impacts on the rail freight operations in hinterland Eurasia.

The results showed a broad variety of customer requirements, which in many times require special commercial treatment. The main aim in this case is to offer the customer the tailored solutions, which will perfectly fit to his expectations and needs.

From the DB Schenker Rail perspective such a status quo might perform a big challenge, especially if the nature of customer demands is constantly changing.

All in all it is clear that the best logistic processes are not only about to transport something from the point A to the point B, but mainly the additional services and the quality offered decide about the leader in the market. Moreover it is clear that the companies do not choose just transport mode and will not automatically go for a rail freight solution, since much more relevant is the quality of logistic operator as a business partner.

Therefore, being the best but not the cheapest in market, might guarantee that DB Schenker Rail will be automatically the customer first choice as the logistic partner.

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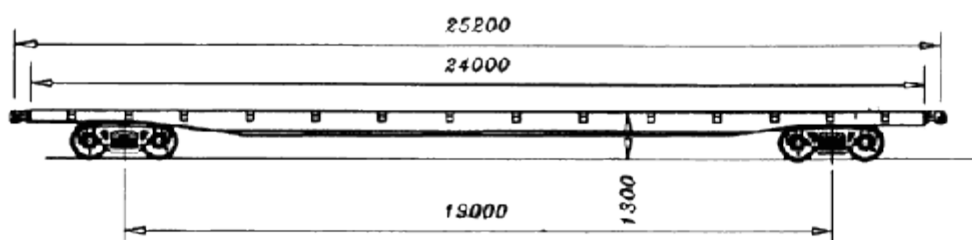
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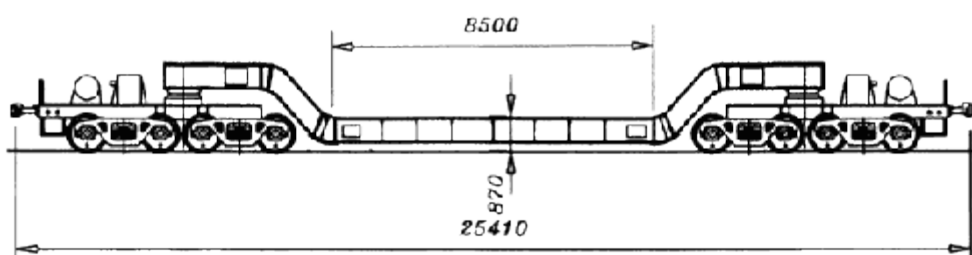
## List of annexes

#### A. Appendix to the chapter – rail freight customers with extraordinary loads

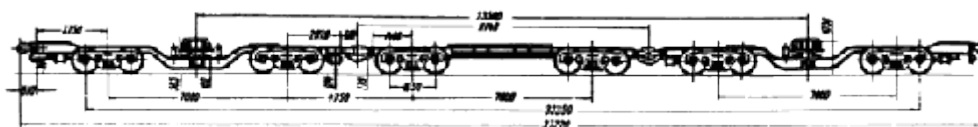
Rail freight wagons offered by the company CD Cargo, a.s. in Czech Republic



An open special wagon with a payload of 64 tones for carrying extra long goods.



An eight axle open goods wagon with a payload of 120 tones.



An open special wagon equipped with a swivel base with a capacity of 120 tones for carrying extra-long goods