



**UNIVERSITY OF GOTHENBURG**  
**SCHOOL OF BUSINESS, ECONOMICS AND LAW**

Master Degree Project in Logistics and Transport Management

# **Intermodal Rad-rail Transport Business Models in Sweden and Germany**

A comparison of an intermodal transport company in the two markets

Daniel Jelcic and Karolis Vizgaitis

Supervisor: Jonas Flodén  
Master Degree Project No. 2014:55  
Graduate School

## **Abstract**

The thesis investigated how the intermodal rail-road transport business model is influenced by external factors in two countries. For the analysis TX Logistik was chosen as an illustrative case and its business models in Germany and Sweden were examined. The competition with intermodal companies and trucking, policy and society, infrastructure and innovation, and demand were taken into account as external factors. After conduction of two interviews with TX Logistik representatives from Sweden and Germany, the description and analysis of TX Logistik business model in these two countries were made, according to Osterwalder's business model's canvas. It was identified that the company uses a subcontractor business model. The comparison of the German and Swedish intermodal transport markets in terms of the mentioned external factors was also done. Finally, the business models' adaptations in the German and Swedish markets were analyzed. It was found out that the policy, demand and intramodal competition influenced the strategy and, consequently, the business models, significantly. However, there are some areas for improvement. The company should establish partnerships with other institutions in order to achieve promising innovations for the reduction of transport time. This would improve the value proposition and strengthen a competitive position against all-road transport. The governments, on other hand, should review their policy regarding regulation, certification and also fees for the usage of infrastructure.

## **Keywords**

Intermodal Freight Transport, Business Models, Osterwalder, External Factors, Deregulation, Rail Freight Transport, TX Logistik, Germany, Sweden

## Acknowledgements

This report is the result of our master thesis that we completed during our last semester at the School of Business, Economics and Law – University of Gothenburg. The researchers would like to acknowledge everyone who has contributed with knowledge and personal experience in order for this thesis to be written. Firstly, the researchers would like to thank our supervisor, Johan Flodén, for the feedback and help given throughout the process. Also, a gratitude to Johan Woxenius at the School of Business, Economics and Law – University of Gothenburg, who took his time to help us. Second of all, the researchers are grateful for TX Logistik's participation and their corporation throughout the thesis. Huge thanks to Thomas Andersson, Jörg Nowaczyk and Per Zachrisson. Finally, the researchers would like to express appreciation to their families and girlfriends for their encouraging and help during the project. Without the help from abovementioned people, this thesis would not have been possible to write.

Gothenburg, 5th of June 2014

---

Daniel Jelcic

---

Karolis Vizgaitis

## Abbreviations

3PL	Third Party Logistics
AEG	Germany's National Railway Act
B2B	Business to Business
B2C	Business to Consumer
BNetzA	Federal Network Agency
CRM	Customer Relationship Management
DB	Deutsche Bahn
EBA	The Federal Railway Authority in Germany
ECTS	European Train Control System
ERTMS	Europe Rail Traffic Management System
ESR	Europe Shippers Railway
EU	European Union
GDP	General Domestic Product
ICT	Information and communication technology
IT	Information technology
LSP	Logistics Service Provider
LTL	Less-than-truckload
SJ	Swedish State Railways
STP	Specific Transmission Module
TEU	Twenty-foot Equivalent Unit
TCE	Transaction Cost Economies
Trafikverket	Swedish Transport Administration
Transportstyrelsen	Swedish Transport Agency
TL	Truck load
TX	TX Logistik
USA	United States of America
UK	United Kingdom

# Table of Contents

1 Introduction.....	1
1.1 Background.....	1
1.1.1 Deregulation.....	1
1.2 Problem Description.....	2
1.3 Purpose.....	2
1.4 Research Questions.....	2
1.5 Delimitations.....	3
1.6 Disposition.....	3
2 Theoretical Framework.....	5
2.1 The Interpretation and Key Characteristics of Models.....	5
2.2 Models of Transport.....	7
2.3 Business Model Concept.....	7
2.4 Business Model and the Strategy.....	9
2.5 Business Model Lifecycle.....	10
2.6 Business Models' Environment and Usage.....	10
2.7 Business Models' Comparison to Scientific Models and Recipes.....	11
2.8 Osterwalder's Business Model.....	12
2.8.1 The Nine Building Blocks.....	12
2.8.2 Pillar 1: Product.....	13
2.8.3 Pillar 2: Customer Interface.....	15
2.8.4 Pillar 3: Infrastructure Management.....	17
2.8.5 Pillar 4: Financial Aspects.....	18
2.9 Intermodal Transport in the Literature.....	19
2.10 External Factors.....	19
2.10.1 Railway Market Deregulation and Competition.....	20
2.10.2 Policy and Society as External Factors.....	21
2.10.3 Innovation and Infrastructure as External Factors.....	23
2.10.4 Demand as External Factor.....	24
2.10.5 Truck and Rail Competition.....	25
2.11 Intermodal Rail-Road Business Models.....	26
2.11.1 Operator-3PL Model.....	27
2.11.2 Anchor Customer Model.....	28
2.11.3 Agent Model.....	28

2.11.4 3PL Model.....	29
2.11.5 The Subcontractor Model.....	29
2.11.6 The Complete Transport Company Model.....	30
2.11.7 The Own Account Transport Model.....	31
2.11.8 The Local Cooperation Model.....	31
3 Methodology.....	33
3.1 Research Strategy.....	33
3.2 Research Design.....	34
3.3 Data Collection.....	35
3.3.1 Primary Data.....	35
3.3.2 Secondary Data.....	36
3.4 Data Processing.....	37
3.5 Research Quality.....	37
3.5.1 Reliability and Validity.....	37
4 Empirical Findings.....	39
4.1 Company Description.....	39
4.1.1 Expansion to Markets and Mergers.....	39
4.2 TX Logistik in Germany.....	40
4.3 TX Logistik in Sweden.....	43
4.4 Market Description in Germany.....	46
4.4.1 Deregulation and Intramodal Competition as External Factor.....	46
4.4.2 Policy and Society as External Factors.....	50
4.4.3 Innovation and Infrastructure as External Factors.....	52
4.4.4 Demand.....	53
4.4.5 Competition with Trucking Industry as External Factor.....	55
4.5 Market Description in Sweden.....	56
4.5.1 Deregulation and Intramodal Competition as External Factors.....	56
4.5.2 Policy and Society as External Factor.....	61
4.5.3 Innovation and Infrastructure as External Factor.....	63
4.5.4 Demand as External Factor.....	65
4.5.5 Competition with trucking industry as External Factor.....	70
5 Analysis and Discussion.....	73
5.1 Comparison between the German and the Swedish Market.....	73
5.1.1 Deregulation and Competition.....	73

5.1.2 Policy and Society .....	74
5.1.3 Innovation and Infrastructure .....	74
5.1.4 Demand .....	75
5.1.5 Competition with Trucks .....	75
5.2 SWOT Analysis of German and Swedish Markets .....	76
5.3 Analysis and Discussion of the Business Models.....	78
6 Conclusion and Recommendations.....	81
6.1 RQ 1: Which are the most important factors influencing the business models in the rail-road intermodal transport industry in Germany and Sweden and how do they affect the business models? .....	81
6.2 RQ 2: What can rail-road intermodal transport companies do in order to improve their business models and what can be done by outside actors, so companies can improve the business models? .....	82
6.3 Further Research .....	82
7 References.....	83
8 Appendix.....	92
8.1 Appendix 1.....	92
Interview: Thomas Andersson, Managing Director, TX Logistik AB, Sweden .....	92
8.2 Appendix 2.....	96
Interview: Jörg Nowaczyk, Division Manager TXCARGOSTAR Intermodal, TX Logistik AG, Germany and Per Zachrisson, Product Manager Intermodal, TX Logistik AB, Sweden .....	96
8.3 Appendix 3 Logistics Regions in Germany.....	100
8.4 Appendix 4 Germany's Main Truck Flow.....	101
8.5 Appendix 5 Europabanan .....	102
8.5 Appendix 5 Sydostlänken .....	103
8.6 Appendix 6 Main Corridors.....	104
8.7 Appendix 7 Truck Flow .....	105
8.8 Appendix 8 Cargo Train Flows .....	106

## List of Figures

Figure 1: The Business Model Process .....	10
Figure 2: Areas of a Business Model's Usage .....	11
Figure 3: Operator - 3PL Model .....	28
Figure 4: Anchor Customer Model .....	28
Figure 5: Agent Model .....	29
Figure 6: 3 PL Model .....	29
Figure 7: German Rail System Structure after Reform .....	47
Figure 8: DB Schenker's and Competitors' Performance in terms of Billion ton-kilometers .....	49
Figure 9: Germany's Export and Import .....	54
Figure 10: GDP per capita in EUR .....	54
Figure 11: A Schematic Picture of Goods Transports Operators in Sweden since 1991 .....	59
Figure 12: Herfindahl-Hirschman Index for the Market of Cargo Transports on Railroads in Sweden .....	61
Figure 13: Volume Price Index for Exports, Imports and GDP from 2000 to 2011 (year 2000=100) ....	66
Figure 14: Export and Import in Millions of tons 2000 – 2011 .....	66
Figure 15: Distribution of Swedish exports in thousands of SEKs 2010. Export Flows over 10 Billion SEK .....	66
Figure 16: Distribution of Swedish imports in thousands of SEKs 2010. Import Flows over 10 Billion SEK .....	67
Figure 17: Distribution of Swedish Exports in tons 2010. Export Flows over 1 Million tons .....	67
Figure 18: Distribution of Swedish Imports in tons 2010. Import Flows over 1 Million tons .....	68
Figure 19: Calculated Regional Distribution of Production and Consumption Respectively of Swedish Exports (left) and Imports (right) .....	68
Figure 20: Calculated Regional Distribution of Production (left) and Consumption (right) Respectively for Domestic Trade Flows; tons .....	69
Figure 21: Start and Finish Points for Flows over 100 000 tons, which Generates Transit Traffic in Sweden .....	69
Figure 22: Development of Prices for Railway, Road and Sea Transports, Index 2004=100 .....	70
Figure 23: Revenue/Cost Ratio for Railway in Particular EU Members in 1997 .....	73

## List of Tables

Table 1: The Nine Business Model Building Blocks .....	13
Table 2: Value Proposition and its Elementary Offerings .....	15
Table 3: The View of the Four Pillars .....	27
Table 4: The Business Model in Germany .....	43
Table 5: The Business Model in Sweden .....	46
Table 6: The Market Share in Germany .....	49
Table 7: Development of Market Concentration Measured in Transport Activity (ton km) .....	60
Table 8: SWOT Analysis of the German Market .....	76
Table 9: SWOT Analysis of the Swedish Market .....	77



# 1 Introduction

---

*This chapter will present the background of the problem area investigated in this thesis, the purpose and research questions, and delimitations of the thesis and, finally, the outline of the thesis.*

## 1.1 Background

In order to create opportunities for international trade and economic growth, a well-managed transportation system is essential. Today, the transport system faces a number of challenges (Flodén, 2009), such as external costs (Macharis, 2011) and infrastructure quality (Deblanc, 2009). According to Eurostat (2007), the transport in Europe has increased with 35 % between 1995 and 2005, and this is due to increased trade. This increase of transports (billion ton km) has mainly been handled by road transport, where road haulage increased by 37.9 % and rail haulage only by 9.2 % during the same period of time (Eurostat, 2007). Hence, the growth of emissions of greenhouse gases was due to the increase of road haulage (Flodén, 2009). The EU has during the past decades put efforts in decreasing the greenhouse emissions and a large share of the reduction is believed to come from a modal shift from road transport to more environmentally friendly rail haulage. This had led to the increased attention towards intermodal transport. However, rail freight lacks the flexibility, which road haulage has, and therefore, a combination between the two modes forms a competitive transport solution (Flodén, 2009).

Nevertheless, the intermodal transport is still a way of doing business. In order to survive, companies must find a proper arrangement of their business, which could generate revenues. This is also a part of sustainable thinking, because, as Elkington (1997) suggests, a profit is a part of corporate social responsibility along with people and the planet. In other words, doing business in a right manner is important not only for the company, but also for society. Therefore, the logic of business, according to Osterwalder (2004), can be called a business model. Despite the necessity to investigate this field, a majority of reports about intermodal transport focuses only on narrow operational aspects as Bontekoning et al. (2004)<sup>1</sup> study identifies. However, this is a critical topic for the intermodal sector development, because as Flodén and Sorkina (2013) notice, business models in this industry are challenging since multiple actors are involved.

### 1.1.1 Deregulation

The situation in Europe regarding the intermodal road-rail industry has during the recent years undergone an important change. In earlier times rail transport companies and road transport companies have been undoubtedly separately, where rail freight companies have operated as subcontractors towards the road transport industry. The deregulation of the European railway industry has made this structure to evolve (Flodén & Sorkina, 2013). Sweden and Germany were one of the first countries to deregulate their railway sector in mid-1990s. It is shown that the Swedish railway market is one of the most developed examples in Europe, and the competition is continuously increasing due to the increased number of competitors in the market (Vierth, 2012).

Due to containerization of freight and deregulation, re-regulation, restructure and liberalization of railways across Europe, rail freight business models have been and still are changing (Leviäkangas et

---

<sup>1</sup> The study presents several scientific studies, where it is shown that the majority of reports only focus on operational aspects.

al., 2007). The business model typology has evolved as a result of changes in business processes and practices over time and when the internet era began, business models of trading, B2C and B2B were changing (Leviäkangas et al., 2007). New intermodal freight companies have emerged with new business models mostly due to the deregulation. The intermodal transport market has become more diverse with a large number of companies offering services (Flodén & Sorkina, 2013).

## **1.2 Problem Description**

European Commission (2001) promotes intermodal transportation in order to reduce external costs, caused by all-road transportation. Hence, the importance of intermodal transportation in the entire transport system is increasing at the European level. There can be different combinations of various transport modes, nevertheless, one of the most common is rail-road transport. Additionally, deregulation of railway market, which took place in the beginning of 1990, encouraged the occurrence of new actors in the intermodal sector (Debie & Gouveral, 2006). The private enterprises have a clear focus on earning profit, however, in this industry it is very difficult to find companies with high profit margins (DB, 2013). Yet, the national companies experience a leading position. For instance, in Sweden it is shown that on an industry level train operators moving freight have an average profit margin between 1-3 % during the years 2005-2010 (Transportstyrelsen, 2010). One reason for this situation might be a choice of an inappropriate business model, which is a business' logic for earning money (Osterwalder, 2004).

The majority of intermodal transport related scientific literature emphasizes the particular aspects of intermodal transport instead of investigating the entire system (Bontekoning et al., 2004). Thus, it is difficult to evaluate how some improvements affect other parts of the business and where the optimization will bring the largest advantages. Here, the business model concept can be useful, because it represents the entire logic of making business. Business models depict the whole picture, which could fully present the effects of optimization to the company. Flodén (2009) distinguishes four types of general business models in the intermodal transport industry, however, there is a lack of research about the influence of external factors towards particular business models. Also, it is necessary to investigate the discrepancies of various markets and how they determine the business models, since deregulation of the market enabled companies to become international actors. The research of business models in distinct markets, such as in Germany and Sweden, could facilitate policy making decision, which would improve conditions for the private stakeholders. Moreover, this should help companies to find approaches how to improve their value configuration and other components of their business model. Furthermore, there is a lack of benchmarks between Germany and Sweden in terms of intermodal rail-road markets, which provides an additional value for scientific and business aims.

## **1.3 Purpose**

The purpose of this thesis is to investigate how rail-road intermodal freight transport companies' business model is affected in different countries depending on markets, external and internal factors and to give recommendations of how firms in the industry can improve their business models.

## **1.4 Research Questions**

In order to achieve the purpose of this thesis, the researchers have to answer the following research questions:

**RQ 1:** Which are the most important factors influencing the business models in the rail-road intermodal transport industry in Germany and Sweden and how do they affect the business models?

**RQ 2:** What can rail-road intermodal transport companies do in order to improve their business models and what can be done by outside actors, so companies can improve the business models?

## **1.5 Delimitations**

Due to time restrictions and the scope of the phenomenon being investigated the researchers had to limit the research area. Therefore, a case study at one company, TX Logistik, has been conducted in order to investigate the phenomenon. TX Logistik has operations in several countries, but due to restrictions as mentioned, an investigation will only occur in Germany and Sweden. Further, the researchers are only investigating the business model for the intermodal division of TX Logistik. In Germany the business is divided into four divisions, while in Sweden the main focus is on intermodal and timber transports.

The focus in this thesis is on road-rail intermodal transports, hence, competition with truck versus rail has been carried out. No focus is put on other modes of transportation when comparing the modes with each other.

External factors could be several different factors. However, in this thesis it is narrowed down to five external factors, which are competition, policy and society, demand, infrastructure and innovation. These five factors together with deregulation are explained in more detail in section 2.10. Other external factors, such as climate, landscape, etc. are not evaluated. Internal factors, on the other hand, will be based on the interviews conducted to see if internal factors have an impact on the business model.

Lastly, we will not give recommendations of, for example, reorganizing the business structure, changing of routes, changing mission and vision, etc. in order to improve the business model. But only what has a direct impact on the business model, both external and internal factors.

## **1.6 Disposition**

Firstly, the theoretical framework is presented. This chapter contains all factors and information, linked to the purpose and research questions of the thesis, as well as getting an understanding of the problem area and empirical analysis. In *chapter three*, the methodology, used for this research, is presented. The research strategy, design and method are described, along with the data collection process. Furthermore, a discussion, regarding reliability and validity of the findings and benefits and drawbacks with the chosen method, is presented. *Chapter four* contains empirical findings, which were collected through interviews with representatives from the focal company and through research about the countries, involved in annual reports, reports, ordered by authorities, reports, published by authorities, etc. Next chapter, *chapter five*, an analysis and discussion is presented by comparing and connecting the theoretical framework with the empirical findings. Lastly, the conclusion is presented where the researchers answer the research questions and summarize the most important factors influencing the business model of an intermodal road-rail transport company. The researchers' recommendations for firm in the industry as well as further research are presented.



## 2 Theoretical Framework

---

*The analyzed topic of this thesis, intermodal transport business models, is rather new. Therefore, the related scientific reports quantity about this particular sphere is limited. It would be useful to take a look, first of all, how various authors define a concept of the “model”. Later the interpretation of business model idea will be presented. Furthermore, a review of external factors influencing a business model is presented. Finally, there will be a review of literature about the existing transport business models in general and intermodal transport particularly.*

### 2.1 The Interpretation and Key Characteristics of Models

The understanding of particular concepts can come from various sources. The Oxford dictionary (2013), for instance, provides five different versions of the definition for the word model as noun and three explanations for the model term, when it is used as a verb. Below there are given all mentioned descriptions for the noun “model”:

- a three-dimensional representation of a person or thing or of a proposed structure, typically on a smaller scale than the original
- a thing used as an example to follow or imitate
- a simplified description, especially a mathematical one, of a system or process, to assist calculations and predictions
- a person employed to display clothes by wearing them:
- a particular design or version of a product

The definitions for the “model” as verb include:

- fashion or shape (a three-dimensional figure or object) in a malleable material such as clay or wax
- (model something on/after) use (a system, procedure, etc.) as an example to follow or imitate
- display (clothes) by wearing them.

Of course, not all of these descriptions suit the given topic. Nevertheless, it can be stated, that model is an approach to simplify and depict particular phenomenon or objects. This purpose is critical, when it comes to scientific research, since the majority of investigated phenomena are highly complicated and it is nearly impossible to draw right conclusions without a certain simplification. Coleman (2009) also notices other important properties, including that the model systems should be closed and any real situation could be translated into mathematical expression. Similarly, Goodwin (2006) emphasizes the importance of ability to convert any scientific discussion, for instance, about the biological clock to a clearly materially realizable system.

Coleman (2009) distinguishes 14 important aspects of the scientific models. They include purpose of the study, object of the study, process, phenomena, fundamental law, mathematical or statistical function, variables, spatial coverage, temporal coverage, software and hardware, person/group that proposed the model, discipline, replication and related materials.

Baden-Fuller and Morgan (2010) mention two common scientific model types: mathematical models that are used by the economists and model organisms, which are common in biology. The first type aids to answer various “what if” questions, arisen from real world situations or theories. These

models use experiments with different elements in order to forecast economic units' behavior and base these forecasts on the mathematical calculations. Nevertheless, economists take made-up world experiments, while biologists investigate "real world" experiments. They analyze various life forms, what elements are common between these forms and what are differences, what is the behavior of them, what factors determine the uniqueness of the particular form, etc. In general, models help to understand the world functioning. Of course model findings are compared with theories and real world events, in order to understand the appropriateness of the model. The usage of models for the research purposes can lead to the insights about the smallest behavior's details, general theories or middle level mechanisms. It does not matter, whether the model is designed for economics or biology, it has to be manipulable or experimentable.

It should be understood that all definitions of a model's concept should be taken into account, otherwise, certain limitations will lead to an inability to call a certain method or object term model. For instance, in the science it is very common to discuss about mathematical or biological models, which are completely different by their essence, although both these concepts considered being models (Downes, 2011). Nevertheless, the most important characteristic of the model is still a representation of a relation to the world, despite that forms of the models are very different. Since models represent the empirical world, there should be answered a question, whether they are true or false, although there can be certain cases, when models are neither true nor false (Baier-Jones, 2010). The models' truth or falsity is confirmed by the propositional account. The models contain or entail propositions, which are true or false, although the propositions of themselves are not models. Models can have different forms of representation such as text, mathematical equation and diagram, however, they all are not excludible from each other as well as entailed propositions. Important property of the models compared to the theories is local application, while theories' generalization is valid (Baier-Jones, 2010). Nevertheless, even if models are false, they can be useful, since, according to Wimsatts (2007), they can provide extremes of the continuum, for example. As Contessa (2010) notices, the scientific models, especially mathematical ones, usually do not show, what kind of entities they represent, thus, we often do not know, whether the reality is reflected properly.

At the same time the interpretation of the models as just reflections of reality is misleading, because it also helps to solve various problems that are investigated by the scientists. In other words, the model not only represents the world, but also aids to explain, how it functions (Downes, 2011). The models' explaining function is also seen differently. For instance, Craver (2006) suggests mechanistic explanatory, which assumes that the model should be extremely realistic. This attitude is very similar to Goodwins' (2006), however, it is doubtful, because it is very often complicated and nearly impossible to recreate all aspects of the phenomena. For instance, Elgin & Sober (2002) state that there can be included some idealizations in the scientific model, however, the model still has to follow the law of nature. The latter attitude is called *covering law* explanation (Busalich, 2011). These idealizations are very important, because as Gierre (1988, 78-80) notices models are idealized systems, given in scientific text books. Baier-Jones (2010) states that it is impossible to cover all aspects of phenomenon, therefore, some idealizations are unavoidable. McMullin (1985) distinguishes construct idealization, which means that a model's representation can provide a certain result only, if the model is simplified. Consequently, the hypothetical-construct explanation is offered by him (McMullin, 1978). His attitude is based on the idea that the model structure, which explains the feature, also causes the same features. Thus, this explanation can also be called as causal (Busalich, 2011). He also provides an idea about de-idealization, which should bring back to an

original object or a real life situation. However, Busalich (2011) argues that all of these explanation types are limited, because none of them takes idealizations and fictionalizations as self-explaining. Therefore, she suggests using structural explanation, which is neither causal nor nomothetic. This explanation is based on the assumption that primary, explanandum is explained by depiction of various theories' limits and at the same time, it shows that the explanandum is a result of that structure (Bosalich, 2011, p. 38).

It might be possible to continue the philosophical discussion about scientific models, however, they are primarily applicable to nature sciences, such as physics or biology. Therefore, their properties are not always suitable for the more socialized objects such as logistics and transport operations or other business related sectors. Nevertheless, the models that are used in these sectors also contain particular idealizations and have both representational and explaining functions.

## **2.2 Models of Transport**

In the transport/logistics field the most common are mathematical models. For instance mathematical models are used in order to improve the capacity and service quality of airport work, to optimize routes and stock level, regulate and plan transport in the most efficient way, etc. (Avi-Itzhak & Madelbaum, 1969; Garcia, Pachesso & Alvarez, 2013; Afanasyeva & Bulinskaya, 2011; Zhang & Shi, 2013).

According to Timms (2008), models are primarily valuable for transport planning and there are three types of transport models: a) models, which take into account short term predictions for small scale changes b) models that implement short term forecasts for large scale shifts and c) models that have long term predictions. However, Flyvbjerg et al. (2006) notice that usually these models have high inaccuracy compared to real results. Timms (2008) argues that models aid to understand transport and mobility phenomena. Moreover, he provides some criticism for Flyvbjerg et al. 2006, because they focus only on long term models and their analyzed cases were highly influenced by external factors, which had distorted final results.

Pas (1990) states that there are two main periods for the transport models: a) a social physics era and b) an economics era. The first one uses the analogies with physics such as law of gravity, while in the economics era the greater attention was paid to people, who make free, maximum-utility based choices. Nevertheless, in both eras models focused on the travel demand (Timms, 2008).

Models in the intermodal transportation can be used for some simulation or analysis. For instance, Flodén (2011) suggests the heuristic model, which compares intermodal and all-road transportation in terms of costs and quality. Burgholzer et al. (2013) present a micro simulation model that aids to analyze the situations, how particular disruptions affect the whole intermodal system. Brnjac, Abramovic and Maslaric (2010) use models to forecast the demand for the transportation in the certain corridor. Bergqvist (2008) analyzes a heuristic model that facilitates the evaluation of rail-road intermodal transport services. In general, we can state that majority of scientists see a model as decision support tool and the result are somehow oriented towards future.

## **2.3 Business Model Concept**

However, there can be an alternative view towards intermodal transportation. We should take into consideration that transport is also a kind of business. For instance, several scientists analyze some different business models that are used in intermodal transportation (Flodén & Sorkina, 2013;

Flodén, 2011; Flodén, 2009; Lehtinen & Bask, 2012). Business models are significantly different from scientific models, as their primal purpose is not the same. Baden-Fuller & Morgan (2010) relate the concept of business model firstly to the strategy of the company and compares business models with other models in three groups:

- The first group compares scale models and role models, where scale models are copies of existing things (e.g. a scaled-downed version of a truck) and where role models are things to be copied (e.g. scoring as many points as Wayne Gretzky). Together, these two notions form a company's business model.
- The second group compares the model of biology organisms and mathematical models (described above in section 2.1)
- The third group compares business models with recipes. This particular analysis aims to explain the context of how business models can be viewed as models. Some key aspects will be provided in section 2.7.

But, first of all, we should investigate what is the concept of the business model. The Financial Times lexicon (2014) defines business model as “the method or means by which a company tries to capture value from its business”. This source also notifies that business models focus on value creation and it characterizes the main strategy of the company. In the Financial Times lexicon (2014) it is emphasized that the business model explains the conversion of inputs into outputs, which leads to a return that exceeds opportunity costs. A rather wide definition of business model is provided by Osterwalder (2004, p. 15): “A business model is a conceptual tool that contains a set of elements and their relationships and allows expressing a company's logic of earning money. It is a description of the value a company offers to one or several segments of customers and the architecture of the firm and its network of partners for creating, marketing and delivering this value and relationship capital, in order to generate profitable and sustainable revenue streams.”

As Chesbrough and Rosenbloom (2002) notice, the term “business model” is more popular among practitioners and investors than in the scientific literature. They identify one of the reasons for this situation, that this concept involves many different academic and functional disciplines and there is no clear dominance of a particular subject.

According to Chesbrough and Rosenbloom (2002) business models include following aspects:

- Value propositions' articulation
- Identification of a market segment and revenue generation mechanism's elaboration
- Explanation of value chain structure
- The cost structure and profit potential's estimation
- Describes the position of the firm within the value network linking suppliers and customers (incl. identifying potential complementors and competitors);
- Competitive strategy formulation

Weill et al. (2006) see business models as a construction of two components a) what the business do and b) how business generates income by performing these things. They developed a typology based on the different types of selling rights that helps to distinguish four business models: Creator, Distributor, Landlord and Broker. This typology also invokes four types of assets: physical, financial, intangible and human. Therefore, Weill et al. (2006) suggest usage of 16 different models in total.



Osterwalder (2004) emphasizes that a business model is not the same as “business modeling”, which is related to the creation of particular business processes. People often confuse some parts of a business model with whole business model, although, they are not. For instance, an online auction is just a pricing mechanism, and not a business model. According to Osterwalder (2004, p. 14), “the business model is an abstract representation of the business logic of a company”. Teece (2010) agrees with this idea and notices that business models primarily reflect conceptual model, not only financial model. Business models help to understand customers’ behavior, revenues and cost, changing customer requirements and potential rival’s reactions. They describe the logic of earning a yield.

Osterwalder (2004) says that a business model does not necessarily leads to success, which is very dependent on implementation and managing procedures. However, Teece (2010) emphasizes that in order to achieve success the proper design of business is vital and business model has to be adapted to the changing competitive environment. Otherwise, even advanced products, personnel with great competences and perfect management will not help to stay in the business. The universal criteria, showing the appropriateness of the model, include attractive value propositions, beneficial cost and risks configurations and ability to capture value significantly. Nevertheless, the successful business model does not ensure the possession of competitive edge, as other companies try to imitate the prosperous business logic (Teece, 2010).

## **2.4 Business Model and the Strategy**

Teece (2010) notices that business models have more general nature compared to a business strategy. On the other hand, a joint strategy analysis with business model analysis is necessary in order to defend a competitive advantage from the competitors’ efforts to replicate. This is a path for securing the sustainability of a business model. The architecture of a business model must be differentiating, hard-to-imitate, effective and efficient. These characteristics lead to the creation of the competitive edge. The maximal results will be achieved when different aspects will be specialized, and at the same they will have a good systematic synergy (Teece, 2010).

Osterwalder (2004) explains those strategies and business models are on the different layers of business. Nevertheless, they both have orientation towards the earning of money logic. The business model is an expression of strategy. The model stands between strategic layer and process layer, therefore, it can be said that a business model aims to convert the strategy into real procedures.

Chesbrough and Rosenbloom (2002) identify three reasons, why a business model is not the same as a strategy. First of all, a business model focuses on creation and delivery of the value to a customer, while value capturing is more important for the strategy. The bigger attention towards the risks, formed by the competitors, is paid in the strategy than in the business model. Secondly, financial position is not clearly specified in the business model. It is assumed that a model can be financed by the internal funds and potential financial problems are not addressed. However, shareholders require that financial aspects would be reflected in the strategy. Finally, the level of knowledge for the business model and the strategy is unequal. The knowledge for the business model is limited and influenced by the previous success, while deep and analytical calculations and decisions are made for the strategy (Chesbrough & Rosenbloom, 2002).

## 2.5 Business Model Lifecycle

Svejenova and Vives (2011) use a framework for identifying four phases of a business model's lifecycle – origination, design, operation and change. This framework also depicts relationships of associated elements. The change of business model is necessary, otherwise the sustainability will not be guaranteed. In the origination stage the vital factor is motivation. Svejenova and Vives (2011) indicate that main source for the motivation is a passion for the business, a profit and people that capture value. Design and operation of a business model depend on who is the target customer, what value proposition is offered and how it is delivered. The turn can be inspired by the external or internal causes and the procedures of change can be proactive or reactive, depending on the certain situation. An instance of proactive shift is an innovation, while reactive are responses to the special situation, which can influence operating or efficiency of the model.

Osterwalder (2004) presents the business model process, which is different from lifecycle, as it focuses on the starting of business model. This process is depicted in Figure 1. In the business model process, primarily, the business model design aims to convert the strategy into business model project. In other words, value propositions, customer relationships and value networks are the expression of the strategy. Then there is an external or internal financing and at the ending stage the business model is implemented.

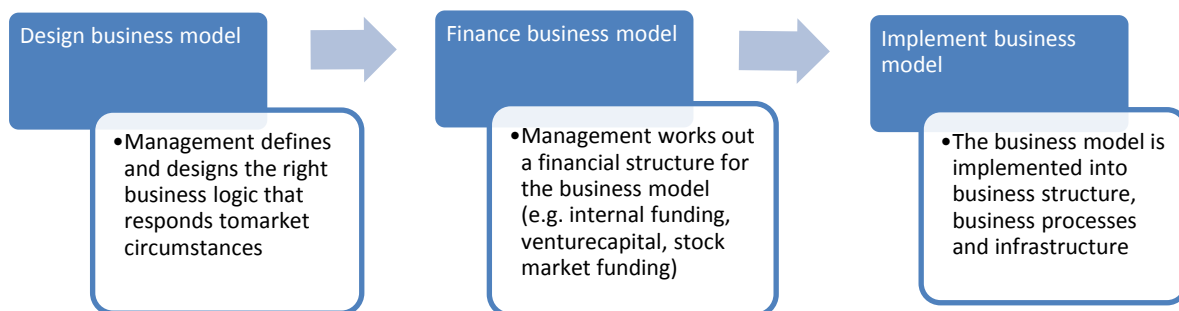


Figure 1: The Business Model Process (Osterwalder, 2004, p 15)

## 2.6 Business Models' Environment and Usage

According to Osterwalder (2004), the business model is shaped by three main internal elements and five external factors. The three elements include strategy, organizational side and ICT (Information and Communication Technology). The organizational side is a "material" of business models, which consists of departments, units and workflows. Business model and organizational structure are interconnected, therefore, some changes of the business model affects the organizational structure, e.g. some departments are added or closed, depending on the situation. Moreover, the optimization of business organization is achieved through a proper understanding of business models' infrastructure. The technology is sometimes a crucial aspect for the e-commerce companies, such as eBay or Amazon. However, sometimes the link between technology and business models is not so evident, although the technology helps to create more efficient networks with other enterprises, thus, importance of technology to the business model is high.

Osterwalder (2004) identifies five types of external factors that influence a business model. The first type is a technological change. The technology is rapidly developing, hence, managers have to find an

approach how to adopt in the business model’s context in order to improve value proposition or to reduce costs. The reduced costs due to the new ICT solutions enforce companies to increase efficiency by outsourcing some non-major activities, for instance. The second type of environmental pressures is competitive forces. The companies have to adapt to the rapidly changing environment, otherwise, they will be pushed out the market by the rivals. Customer demand is another type of external factor. Companies must react to changing client income level, their consumption patterns and even fashion trends. The firms cannot ignore social environment, since their activities can influence the society negatively, and this situation may harm firms’ image. Also the social environment can change some consumption habits. Finally, business model changes are determined by the issue of new laws.

Osterwalder (2004) distinguishes five categories of business models’ functions. These areas and functions are shown in Figure 2. In short, these categories mean that primarily business model has the purpose to explain business logic and share it. The proper understanding of the business model facilitates analysis and management functions. Naturally, a business model has to adapt to the changing environment, thus, there should be some processes related to the improvement of this logic, creation of alternative business models’ portfolio and testing of which versions are the most suitable for the enterprise. If the company owns a unique and successful business model, it can patent in order to protect the business model from a potential imitation.

Understand and share	Analyze	Manage	Prospect	Patent
<ul style="list-style-type: none"> <li>•Capturing the business logic</li> <li>•Visualizing the business logic</li> <li>•Understanding relationships between different elements</li> <li>•Communication and sharing of business logic with all stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>•Measuring business areas for improvement</li> <li>•Observing internal and external changes</li> <li>•Comparing company’s business model with competitors</li> </ul>	<ul style="list-style-type: none"> <li>•Designing business model with optimized all elements</li> <li>•Planning, changing and implementing of business model</li> <li>•Reacting to external pressures</li> <li>•Aligning business strategy, organization and technology</li> <li>•Improving decision making</li> </ul>	<ul style="list-style-type: none"> <li>•Innovating business model</li> <li>•Maintaining of business model portfolio in order to prepare for the changing environment</li> <li>•Stimulating and testing of business models</li> </ul>	<ul style="list-style-type: none"> <li>•Some companies patent entire their business model in order to avoid copying</li> </ul>

Figure 2: Areas of a Business Model's Usage (Adapted from Osterwalder, 2004. pp 19-22)

### 2.7 Business Models’ Comparison to Scientific Models and Recipes

Models for management, as well as for biology and economics, have a purpose to reduce a lack of knowledge. Baden-Fuller and Morgan (2010) argue that business models are more similar to model organism rather than mathematical models. Model organisms represent not only the same class, but also the general class. For instance, one lab mouse is a representative of mice and, at the same time, representative for mammals. A comparison can be made with one McDonalds’ restaurant, which represents other McDonalds’ restaurants and the whole fast food industry. Management scientists investigate the same company many times, thus, their deeper understanding about particular company leads to the development of theories, conceptualization and awareness of practical aspects. Thus, one example turns one ideal type. This type enables comparison of companies with

different businesses. Managers see business models more as biological model organisms, where one small change influences the whole organism. Biologists and managers conduct real time experiments, where all unknown factors are involved. The biggest difference between business models compared to scientific models is that managers have the knowledge about their business and they can influence the business model, while subjects of scientific models and experiments do not know anything about the model (Baden-Fuller & Morgan, 2010).

According to Baden-Fuller and Morgan (2010), the business model can be compared to recipes. Business models define technologies, ingredients (resources) and the order, in which the ingredients should be processed with particular technologies. Although, the recipe is easy to copy, you have to be a good chef in order to make a successful dish. Moreover, there are different versions of recipes and ingredients and resources can have diverse characteristics, thus, the final result might not be the same as the original one. The same situation stands with business models. Everything depends on the management quality level, key resources properties and a proper usage of technologies.

## **2.8 Osterwalder's Business Model**

The main goal of Osterwalder (2004) was to provide an ontology that allows accurate describing of the business model of a company. The first step for Osterwalder (2004) was to identify main areas that constitute the most important business model issues of an enterprise. The main areas counted to be four, and the following process was to break them down into nine interconnected building blocks that allowed conceiving the business model.

### **2.8.1 The Nine Building Blocks**

Influenced by the Balanced Scorecard approach (Kaplan and Norton, 1992) and more generally business management literature (Markides, 1999), Osterwalder (2004) developed a framework, which emphasizes on the four identified main areas that a business model has to address as well as the nine interconnected building blocks. See Table 1. The four main areas, also called pillars, are 1) Product, 2) Customer Interface, 3) Infrastructure Management and 4) Financial Aspects. Talking of the product, we look at what business the enterprise is in, the products and the value the company is offering to the market. Customer interface describes three aspects; the target customers of the company, how it delivers products and services to its customers, and how the organization creates strong relationships with its customers. The third main area describes, how efficiently infrastructural or logistical issues are performed, with whom, and as what kind of network enterprise. Financial aspects ask about the sustainability of the revenue model, the cost structure and the business model. According to Kaplan & Norton (1992), there are four perspectives for managers to consider for being successful. The innovation and learning perspective, which is connected to the Product, analyzes how the company can continue to improve and create value. In the second perspective, the customer perspective (connected to Customer Interface), the company is asking itself how it is seen by its customers. In the internal perspective, connected to Infrastructure Management, the enterprise studies what it must excel at. Lastly, how an organization looks towards its shareholders is the financial perspective and is related to Financial Aspects.

Another similar route to take is explained by Markides (1999), who is giving managers and companies a recipe to their business strategy. It involves looking at three questions; "who", "what" and "how" of a business. The "who" is asking who the enterprise should target as customers. Products' or

services' range is linked to the question "what". Finally, the best way of distributing company's products or services to its customers is connected to the "how".

However, Osterwalder (2004) did not stop at this level. He did a more detailed and formal framework and split the four pillars into nine interconnected building blocks. The nine building blocks consist of value proposition, target customer, distribution channel, relationship, value configuration, capability, partnership, cost structure and revenue model.

**Table 1: The Nine Business Model Building Blocks (Osterwalder, 2004, p 43)**

Pillar	Building Block of Business Model	Description
Product	Value Proposition	A Value Proposition is an overall view of a company's bundle of products and services that are of value to the customer
Customer Interface	Target Customer	The Target Customer is a segment of customers a company wants to offer value to
	Distribution Channel	A Distribution Channel is a means of getting in touch with the customer
	Relationship	The Relationship describes the kind of link a company establishes between itself and the customer
Infrastructure Management	Value Configuration	The Value Configuration describes the arrangement of activities and resources that are necessary to create value for the customer
	Capability	A Capability is the ability to execute a repeatable pattern of actions that is necessary in order to create value for the customer
	Partnership	A Partnership is a voluntarily initiated cooperative agreement between two or more companies in order to create value for the customer
Financial Aspects	Cost Structure	The Cost Structure is the representation of money of all the means employed in the business model
	Revenue Model	The Revenue Model describes the way a company makes money through a variety of revenue flows

Flodén and Sorkina (2013) point out that the term "Infrastructure" in this model refers to firm infrastructure and not transport infrastructure, while "Distribution Channel" is defined as means of reaching the customers (similar to marketing channel), rather than as a logistical term (how products are physically distributed).

### 2.8.2 Pillar 1: Product

The common outcome of an enterprise in a specific industry that is not continuously innovating their business risk to fall into the commoditization trap because products are quickly copied by firms on the global market (Kambil et al., 1996). It should be said that innovation is no guarantee for success. However, it is shown in recent research that organizations who are able to innovate and constantly improve their value propositions are the most successful ones (Osterwalder, 2004). And this is outlined in the business model ontology as a product innovation, which is one of the main four pillars of a business model.

**Definition:** “Product covers all aspects of what a firm offers its customers. This comprises not only the company's bundles of products and services but the manner in which it differentiates itself from its competitors. Product is composed of the element value propositions, which can be decomposed into its elementary offering(s).” (Osterwalder, 2004, p. 49).

### **Block 1: Value Proposition**

The value proposition is the first of the nine elements of the business model ontology. Bagchi and Tulske (2000) say that the value proposition can be understood as the statements of benefits that the company is delivering to its external publics. Another definition described by Kambil et al. (1996) is how items of value, such as products and services, as well as value-added services, are wrapped and offered to fulfill customer needs. However, Osterwalder (2004) proposes a conceptual approach of the value proposition element in order to better understand value and to create new and innovative products and services. By doing this, companies are able to map their existing value propositions and benchmark it against their competitors on the market and this systematic approach makes the value innovation easier.

It means that the element value proposition is an overview of an enterprise's offered products and services that together create a *value for* a specific customer segment. That is, the element value proposition describes the way a company differentiates itself from its competitors and is the reason why customers buy from that specific firm and not from another.

**Definition:** “A value proposition represents *value for* one or several target customer(s) and is based on one or several capability(ies). It can be further decomposed into its *set of* elementary offering(s). A value proposition is characterized by its attributes description, reasoning, value level and price level and an optional life cycle.” (Osterwalder, 2004, p. 50).

### **Offering Element**

As explained above, the value proposition element gives an overall view of a business, but it can be further decomposed into a set of elementary offerings (See Table 2) describing a part of an organization's products and services. To better observe how a firm stands against its competitors, the company can describe these elementary offerings in more detail. The purpose of doing this breakdown of the value proposition is to illustrate a specific product, service, or even product or service feature and define the assumed value to the customer. Furthermore, it will potentially allow the company to innovate and differentiate to achieve a competitive position.

**Table 2: Value Proposition and its Elementary Offerings (Adapted from Osterwalder, 2004, pp 51-54)**

Attribute	Meaning	Example
<b>Reasoning</b>	Why a firm thinks its value proposition or a specific elementary offering could be valuable to its customers. Usually value is created through use, risk, or efforts.	<b>Use</b> – Value is created by driving a car
		<b>Risk</b> – Reduction of the customer’s risk could be through car insurance
		<b>Efforts</b> – Making the life easier to the customer by home delivery of groceries
<b>Value Level</b>	By measuring the utility for the customer and the value level of a firm’s offer allows the company to compare itself to its competitors. This is done by a qualitative value scale that relates to the value offered by competitors.	<b>Me-too</b> – Commodity items
		<b>Innovative imitation</b> – Pocket pc
		<b>Excellence</b> – Swiss watches
		<b>Innovation</b> – iPhone
<b>Price Level</b>	Compares the value proposition’s price level with the one’s of the competitors.	<b>Free</b> – Online newspaper
		<b>Economy</b> – Southwest, EasyJet, RyanAir
		<b>Market</b> – Stocks
		<b>High-end</b> – Rolex
<b>Life Cycle</b>	A value proposition should be studied over its entire life cycle. This attribute identifies which one of the five stages of the value life cycle an elementary offering creates value.	<b>Value creation</b> – Customization
		<b>Purchase</b> – Amazon’s one-click shopping
		<b>Use</b> – Listening to music
		<b>Renewal</b> – Software updates
		<b>Transfer</b> – Disposal of old computers, selling of used books

### 2.8.3 Pillar 2: Customer Interface

The second pillar of the Osterwalder’s (2004) business model ontology is Customer Relationship, or so-called Customer Relationship Management (CRM). The relationship with customers is essential for companies. Managers should perceive CRM as a conceptual management problem and use, for example, IT as assistance when solving CRM related problems. Osterwalder (2004) considers a conceptual approach to customer relationship in his business model ontology and that is what managers also should do. Solving CRM problems in this way will help understand the importance of and the relation between an organization’s value proposition, target customer segments, distribution channels and the actual customer interactions.

The customer relationship element in the business model refers to the way a firm approaches the market, how the company actually reaches its customers and how it interacts with them. The Internet has increased the scope of possibilities for enterprises to interact with their customers, while the falling cost and improving performance of Information and Communication Technology (ICT) has contributed to the facilitation of customer-related information gathering and customer- and product-related information flow. With the Internet and the improvements of ICT, products and innovation can be enhanced, which will in return provide the company with new customers. Lastly, when companies want to serve their customers better or to enter new markets, they introduce new distribution and communication channels, such as the Internet or smartphones, but also new relationship tools, such as personalization and trust.

The customer interface covers all customer related aspects. The firm chooses their target customer(s), what channel(s) to use when reaching its customers and what kind of relationship(s) they want to establish with its customers. The customer interface is describing how and to whom a company is delivering its value proposition (the enterprise's bundle of products and services).

### ***Block 2: Target Customer Element***

The second element of Osterwalder's (2004) business model ontology is the target customer. Segmenting customers will result in identifying a company's target customers and it will enable a firm to allocate investment resources to target customers, who are the most interesting ones, as well as those who are the most attracted by the company's value proposition. The most common distinction of target customers is business-to-business (B2B) and business-to-consumer (B2C). This will also help an organization to define through which channels they will reach its clients most efficiently.

Segmentation has a long history that goes back to the 50s, but even nowadays, where customers can potentially be addressed one by one, market segmentation keeps its value. According to Wedel (2001), ICT helps companies make the strategic choice to target their market at any level between "mass" and "one-to-one" by matching revenue against cost.

### ***Block 3: Channel Element***

The third element of the business model ontology is a firm's distribution channel. The distribution channel is the connection between a company's value proposition and its target customer(s) and it allows an organization to deliver value to its customers, either directly, e.g. via a sales force, or indirectly via intermediaries. In this part of the business model ontology Osterwalder (2004) outlines the concepts that allow companies to formulate their channel strategy. This channel strategy can be defined as the group of a set of mechanisms or a network through a company "goes to market".

This element of the business model ontology describes how an enterprise gets in touch with its customers. The purpose of this element is to make the right quantities of the right products or services available at the right place, at the right time to the right customer. Of course, at the same time, a company needs to take into account aspects such as cost, investment, and flexibility. The distribution channel links a firm's value proposition to its customer(s) and can be maintained by a company itself or by their partners.

### ***Block 4: Relationship Element***

The relationship element is the fourth element of the business model ontology and it concerns the relationships a firm builds with its customers. The strength of the relationship between a firm and its clients is linked with the level of interactions between the two parties. Consequently, the company must carefully decide what kind of relationship they want to establish with its customer, since interactions with customers come at a given cost. Furthermore, it is important to carefully define the type of relationship because profits from customer relationships are the essence of all business. These returns can be reached through several activities, such as acquisition of new customers, the enhancement of profitability of existing customers and the extension of existing relationships.

There are some activities for companies to complete when evaluating the type of customer they want to establish a contract with. They must analyze data if they are profitable and worth spending money and efforts on, if they are likely to be subject to add-on selling, and to define the different mechanisms they want to use in order to create and maintain a customer relationship. This means



using relationship mechanisms to optimize the establishment, the retention of, and selling of additional products to a company's customers in order to maximize the value for the company throughout the customer relationship's life cycle.

### **2.8.4 Pillar 3: Infrastructure Management**

The third pillar, the Infrastructure Management pillar, is about how a company creates value. This pillar describes the value system configuration and what abilities are necessary to deliver the value proposition and maintain customer interface. The value configuration is about the activities a firm are doing in order to create value and deliver value, and, the relationship between them, i.e. the in-house capability(ies) and those acquired through the company's partnership network. This partnership network consists of one or more enterprises, its customers, suppliers, strategic partners and the community and generates the economic value to a company. It means that this pillar specifies the business model's capabilities and resources, their owners and providers, who are executing which activity as well as the relationship between them. Since more and more linkages between companies are electronic, the partners of a network are flexible in activities, such as coordinating schedules, sharing assets, utilizing each other's competencies and resources (Andrews & Hahn, 1998). However, in the Swedish hinterland intermodal transport, information flows are heavily based on sending Excel spreadsheets via e-mail or fax (Almotairi et al., 2011). Furthermore, through this information exchanges the members of the network can develop, pursue and close business together more efficiently. From a management perspective, the best scenario would be a company with plug-and-play characteristics, meaning separate themselves of one business and plug in another one without rebuilding all the reporting and administrative system (Andrews & Hahn, 1998).

#### ***Block 5: Value Configuration Element***

The first element of the Infrastructure Management pillar, and the fifth element of the business model ontology, is the value configuration element. The value a company is creating for its customers is the outcome of a configuration of inside and outside activities and processes. This value configuration of a firm shows all necessary operations and the linkages between them in order to create a value for the customers. The value chain, in which a company is one of the entities of, can be extended with the *value shop* and the *value network*. The value shop describes the value creation process of service providers such as consultancies, while the value network depicts middleman activities, for instance, in banks and telecommunication companies. In this module of the e-business framework, Osterwalder (2004) identifies particular measures such as Supply Chain Management (SCM), Efficient Consumer Response (ECR), or e-procurement.

#### ***Block 6: Capability Element***

The sixth element of Osterwalder's (2004) business model is the capability element. A capability describes the ability to use and execute repeatable patterns of actions in order to create, produce, and/or offer products and services to the market. Hence, the disposal of a set of capability(ies) aims to provide the firm's value proposition. According to Bagchi and Tulske (2000), these proficiencies depend on the firm's assets or resources, and, hereby, they are outsourced to partners with exchanging of information electronically in order to maintain the integration that is required for a firm to operate efficiently. This outsourcing strategy is possible because of ICT, where companies can "unbundle" and outsource activities that do not belong to a firm's core competencies. Streamlining of company's business and competitive advantage is achieved by focusing on main capabilities.

### ***Block 7: Partnership Network Element***

The partnership network element is the seventh element of the business model ontology provided by Osterwalder (2004) and it outlines, which parts of the activity configuration, as well as which resources are distributed among the company's partners. Generally speaking, partnership and alliances between parties have become an essential component in strategy management in majority of companies. Over the last decades partnerships and alliances have evolved from the traditional concept of joint ventures (e.g. for penetration of new geographic markets) to strategic alliances aiming at creating and enhancing the competitive positions on the market for the partners involved in the partnership. Osterwalder (2004) has two definitions of partnerships and alliances. The first one is "alliances as any voluntarily initiated cooperative agreement between firms that involves exchange, sharing or co-development, and it can include contributions by partners of capital, technology, or firm-specific assets" (Osterwalder, 2004, p. 89) and the latter one describes "alliances as links formed between two – or more – independent companies which choose to carry out a project or specific activity on their own, taking on all the risks and confronting competition alone or merging their operations or acquiring and divesting entire business units." (Osterwalder, 2004, p. 89).

There are four perspectives on partnering and alliances (Osterwalder, 2004):

- Perspective 1: Transaction Cost Economics (TCE), which means that economic decisions cannot be made on the basis of production costs alone. Companies should also take into account the cost of transactions occurring inside the company or through the market. This perspective emphasizes on optimization and that companies should focus on their core competencies.
- Perspective 2: This perspective is based on the resource-based view of the firm that highlights the type of partnering where the firm is acquiring resources they do not possess. Could include larger customer database, a powerful brand name or patents and technology.
- Perspective 3: This third perspective focuses on organizational learning and is closely linked with the second perspective of partnerships and alliances.
- Perspective 4: Lastly, the fourth perspective put efforts on the acquisition of markets, but also on the creation of completely new markets. This acquisition of new markets is mainly rooted in contemporary markets. Today it is not uncommon for competitors to form an agreement where they cooperate, and at the same time compete with each other. This phenomenon is called co-opetition and is linked to the increased risk and capital investments that illustrate today's competitive environment.

### **2.8.5 Pillar 4: Financial Aspects**

The last pillar of the framework is the Financial Aspects of a company. All the other main areas influence this one and this area is the outcome of the rest of the business model's configuration. It consists of the firm's revenue model and cost structure model and together these two models determine the enterprise's profit or its loss-making logic and, thus, its ability to survive in competition.

### ***Block 8: Cost Structure Element***

The eighth element of the business model ontology is the Cost Structure and it measures all the costs that occur, when a firm creates, advertises and delivers value to its customers. All the resources, assets, operations and partner network relationships and exchanges cost the company money. A

firm's cost structure model displays all the costs connected to the specific resource, asset, operation or partner network relationship when a company makes a value to its customers. Since the organization focuses on its core competencies and activities, while relying on partners for other non-core competencies and activities, there is a significant potential for cost savings along the value creation process.

### ***Block 9: Revenue Model Element***

The ninth, and the last, element of the business model ontology is the Revenue Model. The ability to translate the value a company is offering its customer into money and incoming revenue streams are measured in this revenue model. The revenue model can be assembled of different revenue streams that can all have different pricing mechanisms.

## **2.9 Intermodal Transport in the Literature**

The "Intermodal transport" concept is defined as "the movement of goods in one and the same loading unit or vehicle which uses successively two or more modes of transport without handling the goods themselves in changing modes" (UN/ECE, 2001, p. 17).

Bontekoning, et al.(2004) made an investigation about the trends of the scientific literature related to the rail-road intermodal transportation. According to them, North America and Europe are leading places for the intermodal research. There is a clear dominance of Dutch and British articles, however, these results are biased, since only English-written reports were taken into consideration. For instance, 80 % of German articles are in German, thus they were excluded from this research (Bontekoning, et al., 2004). Despite this fact, authors determined eight categories for the intermodal transportation research. Five of them arise from the key characteristics of intermodal transportation, which are described below:

- First of all, there is a task division between modes, where rail is used for long-haul and reduction of transportation costs, while trucks perform short-haul, collection and distribution functions.
- Secondly, the synchronization of the schedules is required, in order that any unnecessary stops would be avoided.
- Thirdly, the standardization of load units facilitates the easier transfer of units between distinct modes, thus, the efficiency of the transport chain is improved.
- Fourthly, transshipment is a vital factor in the synchronized schedules.
- Finally, there is a multi-actor chain management since many organizations are involved. Therefore, the control is decentralized and more complicated compared to single mode transportation.

Thus, first five categories can be called the following: 1) drayage; 2) rail haul; 3) transshipment; 4) standardization; 5) multi-actor chain management and control. Naturally, external agents, such as economic drivers and policy are also important. Consequently, two extra categories were identified: (6) mode choice and pricing strategies; (7) intermodal transportation policy and planning. Finally, an eighth category "miscellaneous" has been defined (Bontekoning, et al., 2004).

## **2.10 External Factors**

Five external factors have been chosen to be taken into account, which shape the market and may influence a business model. These factors consist of the competition with other railway/intermodal

operators (this factor arises from a market deregulation), demand, policy and society, innovation and infrastructure and competition with trucking. Some of these elements, particularly, technology change, competitive forces, customer demand, social environment and new legislation are seen by Osterwalder (2004) as external forces, which impact the business model of the company. There is also a direct relationship to PEST analysis that includes political, economic, social, technologic and legal aspects (Strategic Management Insight, 2013). Majority of them (political, social and legal) will be covered under the policy and society section, while innovation and infrastructure are seen as technological external factors and some economic elements will be included in the part about the demand.

Competition is another important element, which influence a company's business model. The importance of the rivalry as an external factor is depicted, for instance, by Porter's five forces (Law, 2009). It has been decided to take into account direct competition, with other railway/intermodal operators and indirect competition with trucking, as this industry is the most important.

Naturally, other external factors could be involved in the analysis, nevertheless, these five main elements are quite wide and, therefore, they are able to show a rather big and clear picture about a particular market. At the same time, other features and their influence to the intermodal rail-road business models can be handled in the further researches.

### **2.10.1 Railway Market Deregulation and Competition**

For many years European railway networks were vertically integrated. It means that one company had a monopoly in a certain country and was responsible for everything from the maintenance of the network to actual transportation processes. Nevertheless, the several issues, including outdated hierarchical organizational structures, government interference and ignorance of market requirements led to the continuous decrease of railway transport. Policy makers saw positive results of liberalization in other sectors, such as energy utilities, thus, it was decided to restructure a railway market as well. Therefore, in the late 1980's and early 1990's the reorganization reform in railways started in the majority of the EU countries (Geyer & Davies, 2000). They suggested that opening the state monopolies to the private sector would introduce competition. Baumol (1977) developed a theory, which states that the possibility of new entrants is enough to make competition viable. In order to achieve this goal, the restrictions of access must be eliminated.

According to Geyer and Davies (2000), there are two main approaches for the vertical disintegration. The first type is so-called the "vertical market separation", where the ownership of the infrastructure is segregated from the haulage and maintenance. The services can be delivered through either the open access or franchise mechanism. However, there is a less radical way for the restructuring of market. In case of "internal market approach", different business entities are formed (Nash & Toner, 1998). Some of them are responsible for the freight transportation, others work with intercity trains or provide commuting services, etc. Thus, competition between these units is restricted, compared to the first model of deregulation. The internal market type encourages the increase of costs' and subsidies' transparency and, parallel, there is an integration of services.

The deregulation of the railway market enabled new actors to enter it. The strategies of entry are determined by the time (Kotler, 1988; Makadok, 1998; Pehrsson, 2004). The "first mover" gains some advantages, such as securing key customers and having strong reputation. It is much harder to achieve these benefits for the late entrants (Kotler, 1988; Pehrsson, 2009). However, even after

market deregulation, the incumbents have leading market positions in Europe with shares of 75-90 % (Ludvigsen & Osland, 2009; OECD, 2005; RailwayPro, 2010; Simola & Szekely, 2009).

According to Debie and Gouvernal (2006), there are three types of enterprises that participate in the intermodal sector in Europe. They can be called as rail track provider, railway firms, which perform haulage and, finally, there is an intermodal transport operator. The latter kind is the most unclear, but, basically, it is a company that organizes overall transportation. Usually this position is taken by the forwarding agents. They purchase traction services from the railway companies, which have an access to the tracks through collaboration with infrastructure provider. Railway companies must own running permission and time slots, which they acquire from the track supplier. However, some kind of discrimination can be noticed, as the national railway companies may secure the best time slots. Moreover, traction providers pay a large access fee, which has no relationship to the volumes, and, thus, they experience unfavorable position compared to the national railway companies, which can afford to pay this fee easily, since they have large freight volumes (Debie & Gouvernal, 2006).

Debie and Gouvernal (2006) notice that the national railway companies are still leading in the European context, since they have large scale and scope of freight. They often form own intermodal operators. Private traction providers have not sufficient volumes. Therefore, they provide services to other operators, instead of controlling the whole transportation process by themselves. Also shipping lines started to organize rail intermodal transportation. The liberalization of the rail market led to the complicated relationships of different actors and, hence, it is much more challenging to outline clearly the term “intermodal operator”.

Four steps of railway freight market can be found. At the first stage, railway companies apply for the safety certificate. The second step is the application for the operating license. The request for the railway capacity is the third step. Finally, there is an access contract on rail network usage (EU, 2009; Mäkitalo, 2007; Mäkitalo, 2010).

Market-based view and resource-based view are the main theoretical frameworks for the strategic management (Laisi, Mäkitalo & Hilmola, 2012). Levitt (1960) explains the difference between these two types. The railway companies should understand that they compete not only in the railway market, but also in the whole transportation market. This is a way to expand and sustain business. From resource-based perspective, the company should have resources to compete with industries.

### **2.10.2 Policy and Society as External Factors**

The majority of the traffic in Europe is international and national share is continuously decreasing, thus, intermodal transportation and its perspectives in Europe should be reflected at the continental level (Debie & Gouvernal, 2006). Nevertheless, intermodal transport is encouraged at all political tiers and various authorities issue transport policies that supports effective market with comprehensive multimodal network and encourage its optimization in order to achieve external costs' reduction. Co-modal method facilitates a track towards better combination of mobility and decline of environmental impact. Macharis et al. (2011) identify that transport customers/producers generate externalities, which means that extra costs for society occur, however, actors do not have to endure them directly. External costs are understood as externalities, stated in monetary terms. Main external costs of transport consist of following components (Macharis et al., 2011):

- Accidents;

- Noise;
- Air pollution;
- Climate change;
- Congestion.

One of the intermodal transport promotion examples is “green transport corridors” that involve various blends of different transport modes. The main idea of promotion is awareness of potential users, which currently focus on road transportation about benefits of intermodal transport (Macharis et al., 2011). The European Commission uses research projects, financial measures and support policies for facilitation of intermodal transport mode promotion (Tsamboulas et al., 2007).

During the reorganization of railway networks some railway services on collateral lines are canceled, as they are rather expensive to run. Society wants to mitigate the fossil fuel usage and climate change, thus, intermodal transportation is seen as good substitute to unimodal carriage. Local governments seek to ensure railway transportation in distant areas, where truck transport is problematic, and there is a need for cheaper transport in order to encourage low-value industries (Tsamboulas et al., 2007). Municipalities are afraid of truck transportation increase, a reduction of number of potential transport options and diminishing of logistics service quality, thus, they promote intermodal transportation, although, levels of promotion decreased during recent years (Dablanc, 2009). Local authorities play an important role in the forming of the freight transport policy. They make investments in rail infrastructure, intermodal terminals and conventional facilities and provide direct subsidies to railway freight companies, also loans to companies, which want to invest into infrastructure. Regional governances organize communication, consultation and partnership programs that aid shippers to make feasibility studies about transportation options and even have a partial ownership of railway freight companies in some places (Dablanc, 2009; Liedtke & Murillo, 2012). Moreover, governments promote intermodal transportation through internalizing external cost. Transport services are taxed, depending on the negative impact they create. Therefore, the road transportation has to pay more taxes than rail services (Liedtke & Murillo, 2012). Pollution taxes have moderately positive effect towards environment and they do not influence economic growth considerably. Nevertheless, the railway fees are overpriced and customers do not want to switch from all-road transportation to intermodal, even if the pollution tax is taken into account (Campisi & Gastaldi, 1996).

Governments establish free-trade areas for facilitation of the trade, however, they have to improve transport infrastructure, otherwise, the trade might be restricted due to the increased transport costs, which are caused by the congestion, for instance. Thus, European Union from the 1960’s formulates common transport policy in order to develop transport network. Furthermore, decline of transport costs aids to decrease regional imbalances (Combes & Linnemer, 2000). Martin and Rogers (1995) uses Krugman’s (1991) framework for explanation about the transport costs, which occurs when a company exports goods. There are two types of costs: interregional and local. According to them, polarity increases when interregional costs are cut, nevertheless, reduced local costs help to balance the development of regions.

There exist several research projects in this field, which are funded by European Commission, including LOGIQ, PROMOTIQ, IQ, RECORDIT and SULOGTRA. They all have slightly different goals and tasks, for example, IQ focuses on the approaches how to improve intermodal transport quality;

RECORDIT suggests methods for increasing of intermodal transport's competitive advantage; PROMOTIQ investigates opportunities and obstacles for actors in this industry, etc. However, in general, the main idea of these projects is to improve attractiveness of intermodal transport in Europe (Tsamboulas et al., 2007). Goodwin (1999) notices the need to review the relation between the travel demand development and transport system capabilities. It is also crucial to gather data about transport behavior's shifts, otherwise, it will be difficult to improve the system.

For solving transport related issues, various models are used. However, there is a need to diminish complication. Hence, "colloidal structures" should be taken into account (McFadden, 2007). The colloidal structure combines different actors (forwarders, investors and operators) that synergies would be implemented and positive results would be achieved (Liedtke & Carrilo Murillo, 2012).

### **2.10.3 Innovation and Infrastructure as External Factors**

In order to encourage the modal shift it is necessary to implement innovated concerted models and to build state-of-art terminals (Trip & Bontekoning, 2002). Innovations in intermodal transport vary depending on situation, because for long distances, perishable and high value goods it is crucial to increase speed and reliability, while short distances require reduction of transport times and ensuring a greater frequency of services (Bontekoning & Priemus, 2004; Bontekoning et al., 2004). For a better accommodation to specific new market's needs the load units, wagons, service networks, loading equipment and other vital elements the system should be recreated and constructed. Operations and services gain a larger degree of flexibility due to the implementation of innovative ICT measures. The significant, positive results are achieved when technical innovations are combined together with organizational ones and usually technological novelties inspire organizational changes. Moreover, it is important to remember that breakthrough innovations in intermodal transport are rather complicated and they have some kind of impact in various tiers of the system, thus, it is very important to make some alterations in different parts of the system simultaneously, otherwise it will be difficult to reach expected outcomes (Bontekoning & Priemus, 2004).

There can be different approaches for innovation in the intermodal industry. Bontekoning and Priemus (2004) refer to different authors, who propose some innovations. Rotter (2004), for instance, analyzes hub-and-spoke system for the domestic intermodal freight trains. Intermodal operators and railway enterprises implement shuttle train concepts, nevertheless, for them the relatively large and permanent volumes of cargo must be ensured. Consequently, the regions that do not own sufficient volumes may be isolated from the main intermodal transport networks. Hence, companies try to gain some advantage from the good cost-quality ratio provided by shuttle trains, but also they enhance flexibility by bundling wagons through hub-and-spoke system. Long shunting operations' time, a quite high degree of land use and some shippers' fear that freight might be damaged somehow are potential drawbacks of this system.

Another example of innovation is integration of maritime and rail networks by using smart rail wagons, which are discussed by Hansen (2004). The main tools for this system consist of a linear motor, automatic coupling and ICT applications. The current situation when operations and infrastructure of different modes are not adjusted, leads to a high degree of inefficiency as a lot of handling operations and waiting time are added. If smart rail wagons are self-propelled, the integration with maritime terminal would be smoothed (Hansen, 2004).

Woxenius and Bärthel (2004) propose the theoretical framework, which they used for the Light-Combi analysis. Although, linertrain concept is beneficial for short distances and small flows, the project implementation stopped, since the accommodation of systems' different elements is complicated and, therefore, it is hard to ensure fast, reliable and cost attractive service. The successful implementation of breakthrough innovation could be viable only, if there is a proper combination of technological, organizational and economical changes (Woxenius & Bärthel, 2004).

Combes and Linnemer (2000) notice, that the improved infrastructure can lead to a cutback of transportation costs. However, reconstructed infrastructure and newly built infrastructure contends for the transport market, although, technical features diminish a possibility for a perfect substitution, especially when different transport modes are taken into consideration. Furthermore, an integration of new modes to the old ones requires additional costs (Combes & Linnemer, 2000).

There are several obstacles, according to Bontekoning and Priemus (2004), which affect the development of intermodal transport. First of all, freight and passenger trains often share the same network and very often freight trains have to give a priority to passenger trains. Another issue is the bureaucratic, monopolistic and conservative nature of European railway companies and related official bodies. The third difficulty is the rivalry with road transport, which is supple, up-and-doing and price-competitive industry. Fourthly, there is a problem that very often rail rolling stock lacks standardization, hence, complete automation of transfer cannot be implemented. Finally, the distribution of costs and benefits is unequal among various actors of the supply chain (Bontekoning & Priemus, 2004).

Deblanc (2009) states, that regional service of intermodal transportation undergoes problems related to the state of the infrastructure. The condition, for instance, in France of secondary lines vary among regions, and hence there is a risk that many lines will be shut down due to a poor state of tracks. Sustainability of regional intermodal transport services can be ensured only if infrastructure is timely renewed (Deblanc, 2009).

#### **2.10.4 Demand as External Factor**

As Lamngård (2007) argues, the decision about transport mode usually is made by the logistics manager, and still shippers' needs determine the demand for the transport services and a choice of a particular mode. Politicians may just promote and facilitate the usage of intermodal transport services. According to Campisi and Gastaldi (1996, p 402), the major factors that influence demand for the rail-road transport consist of "distance, cost, quality of services, possible alternatives, economic and environmental circumstances". However, as Campisi and Gastaldi (1996) identify, the price for transport industry is seen as inelastic, thus, the transfer to other transport modes is limited.

Tsamboulas et al. (2007) states that the modal choice and various possibilities and barriers should be looked from supply chain viewpoint. In distinct supply chains actors possess different levels of decision power. Also they might have discrepant touchstones and antecedences. Customers' expectations towards costs and quality differ depending on a particular supply chain as well. Naturally, intermodal operators have to implement different policies for various sections (Tsamboulas et al., 2007).

The majority of research projects investigate supply side, while there are not so many projects that concern demand (Tsamboulas et al., 2007). Ruesch (2001) identifies two major methods, which are



designed for determination of modal shift possibilities. They both depict supply and demand, however, macro approach is based on supply side, while micro approach reflects demand. Macro approach has a strategic nature and it analyzes a switch probability at regional, national and international level. The successful estimation can be made, when data about freight flows, transport networks, service and similarity elements is taken into account. Tsamboulas et al. (2007) propose to use macro-scan model, which assists in decision making process, whether to choose a road transportation or intermodal transport services. In other words, this approach identifies, which option is more promising for transportation of cargo between different regions, in terms of costs and door-to-door times. It also may include various conditions for transport supply and evaluate prospects from supply chain perspective. Thus, shippers and logistics service providers are able to more easily assess which transportation type is better in a particular case (Tsamboulas et al., 2007). External costs are also evaluated through calculations of reduction of road ton-km and carbon dioxide emissions (Choong et al., 2002).

Liedtke and Murillo (2012) argue that it is complicated to model freight transport, since companies are not willing to provide their sales forecasts. Moreover, there is a lack of cohesive statistics, as the selections of transport services depend on the particular kind of actor. Thereby, transport models focus more on the routing flows of freight rather than on establishment of private-sector transport networks. The main idea of the model is to show and analyze interplays between freight demand and intermodal operators, and investors into infrastructure (Liedtke & Murillo, 2012).

#### **2.10.5 Truck and Rail Competition**

Between 1970 and 1994 the total amount of freight transportation in Europe increased by 65.5 %, although rail transportation decreased by 22.3 % at that time. The main reason for this situation is the fast growth of road transport, which was equal to 146 %. One of the causes for the shrinkage of railway share is that railways did not collaborate. Trucking also does not experience incompatibility issues, regarding the infrastructure, while there are different gauges, signaling procedures and electricity systems in various European countries, and that restricts possibility to increase international railway haulage. Moreover, the railway companies are more bureaucratic and less market-oriented compared to trucking industry and this problem is more obvious in Europe than in USA. However, the main issue remains the market accessibility. Since trucks cause destruction to ancient bridges and tunnels, contribute significantly to air pollution and noise and create congestion issues, the EU Commission aims to find alternatives. Therefore, it establishes various directives such as EU Directive 91/440 for intermodal railway market liberalization, which demands that an open access to the tracks will be provided to all operators (Banham, 1997).

Bontekoning and Priemus (2004) argue that intermodal transport is very competitive, when it is necessary to transport large volumes, especially for long distances, to establish seaport hinterland connections, to convey bulk commodities and hazardous products and to carry cargo between factories and depots. Intermodal transport contents with road transport in terms of price in these sectors. However, intermodal transport occupies only 8.6 % of total transportation in the EU. Since growing perspectives in the traditional markets are doubtful, the intermodal transport companies should focus more on short distances, short-lived commodities, expensive products and small consignments. In 2001 three fourths of the cargo in the northwest part of Europe was carried over distances shorter than 150 km. The poor situation in frequency, reliability, availability and transport

time restricts intermodal transport's possibilities to compete in these markets (Bontekoning & Priemus, 2004).

The intermodal transport over long distances can increase its attractiveness for perishable and high value goods, if quality is enhanced. Major remedies include reduction of rail haul transportation and transshipment time, controlling of delays, upgrade of transport modes interactions and improved frequency of services. For the shorter lengths it is necessary to decrease costs and raise quality, hence, intermodal transport operators have to diminish pre-traction, end-traction, rail haulage and transshipments costs (Bontekoning & Priemus, 2004).

The competition between trucks and intermodal transport could be equalized, if all external costs are included into the price. Naturally, the change of rivalry will be influenced by the service quality and degree of competition that could be reached by two transport modes. Usually, rail and trucks contend over distances, which are moderately little for the rail, and lengthy for trucks. The inclusion of external costs will lead to fractional price growth. The appraisal of these increases can be done, if private and external costs are taken into account. Private costs mean operating expenditures and investments in infrastructure and rolling stock. Operating costs at large degree depend on the volume of service, because they consist of expenses related to the maintenance, fuel, salaries, user fees, insurance and depreciation. The sum of private operating costs and external costs prompts how much really a unit of service costs. The TL trucking in USA, for instance, has external costs, which are equal to 13.2 % of private costs, while external costs for railway represent 9.3-22.6 %. It is since private costs are much lower in railway industry than in trucking industry (Forkenbrock, 2001).

In general, evaluation of freight rail private costs is more complicated compared to reckoning of analogous costs for trucking. The contributors, that complicate estimation, include joint operations amongst rail companies, economies of scale and density, and shortage of data related to individual freight carrying. Many econometric models depicted that rail productivity increases over time and that costs are not linear (Forkenbrock, 2001). Kilometer costs for freight shipping decrease for both transport modes due to the increased distances, however, the reduction of costs for railway occurs more rapidly (Soliman et al., 1991). Keaton (1990) notices that economies of scale and density exist in the intermodal train operations, although they are not very probable for unit trains.

Vehicle requirements concerning weight and dimensions influence both railway and trucking industries. If limitations towards weight and dimensions are expanded, then trucks can carry larger amounts of cargo. Moreover, larger trucks will transport more cargo than before which will reduce the number of expeditions. Therefore, the operating costs of trucking decrease. Consequently, the railway industry has to diminish user costs and door-to-door times. These enhancements can be achieved through railway technology improvement and increasing efficiency of cargo handling (Soliman et al., 1991).

## **2.11 Intermodal Rail-Road Business Models**

The first developed business models for rail freight operators in the intermodal rail-road transport industry were established by Leviäkangas et al. (2007) and are based on the history of US and EU rail freight. The four models are:

- Operator-3PL Model
- Anchor Customer Model

- Agent Model
- 3PL Model

Leviäkangas et al. (2007) found out from the US experience that many intermodal corridors developed as a result of one channel leader in the chain, often a party other than the railroad. The channel leader:

- Sets the service level for the corridor
- Makes the agreement with the client (shipper/consignee)
- Collects the freight from the clients (or the main part of the freight)
- Negotiates rates with the railroads
- Credits the subcontractors their shares
- Carries the biggest economic risk in the corridor

The business models presented by Leviäkangas et al. (2007) are based on Osterwalder’s (2004) business model ontology. Their view of the four pillars is depicted in Table 3. Note that Infrastructure Management is replaced by the term Value Configuration Architecture, however, it seems to have the same meaning as Infrastructure Management.

**Table 3: The View of the Four Pillars (Leviäkangas et al., 2007, p 715-716)**

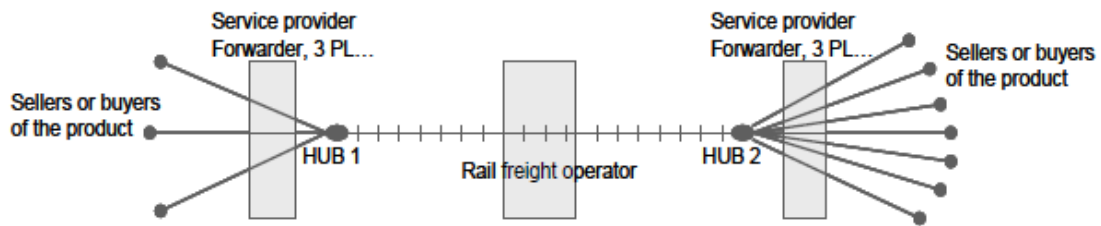
<b>Product (or service)</b>	The value proposition offered to customers. In the case of rail freight, this service is the movement of goods with competitive price, time and quality.
<b>Value Configuration Architecture</b>	Includes partnerships with other operators, intermodal marketing companies and track infrastructure managers through track contracts. Licenses and certificates also belong to this category. Capabilities include, e.g. available lines on which to operate, time slots, speed, loading capacity, wagon fleet and traction (motive power).
<b>Customer Interface</b>	The rail freight operator can either act as a wholesaler to third parties or as a retailer towards end customer. If acting as a wholesaler, potential competitors, such as road hauliers and shipping carriers can be customers. The channel for retailing would be the rail freight operator’s own sales people either in sales/marketing subsidiaries or sales personnel in a functional organization, e.g. marketing department.
<b>Financial Aspects</b>	Related to the cash flow distribution and components. Operating costs for personnel, fleet, traction and infrastructure must be covered. As in all business, cost recovery plus profit is the very first rule of defining the necessary revenues and pricing of services.

### 2.11.1 Operator-3PL Model

In the Operator-3PL Model, an intermodal transport service is produced by a partner relationship between the logistic service providers (LSPs or third party logistics, 3PL) and Rail Freight Operators. In this case, the leadership and service is divided approximately fifty-fifty between the parties. At the customer interface level, the LSPs are responsible for working with customers and negotiating transport conditions, while the obligation for carrying out and coordinate the service production between hubs belongs to the Rail Freight Operators. The Rail Freight Operators are also in charge of, e.g. the coordination between national freight companies, if the transportation includes cross-border operations. Examples of this type of Rail Freight Operator in the European markets are the

International Union of Road–Rail combined transport companies (UIRR) (Leviäkangas et al., 2007; Lehtinen & Bask, 2012).

*Operator – 3PL Model – Rail Freight Operator and 3PL share business responsibility; 3PL makes agreements with clients*

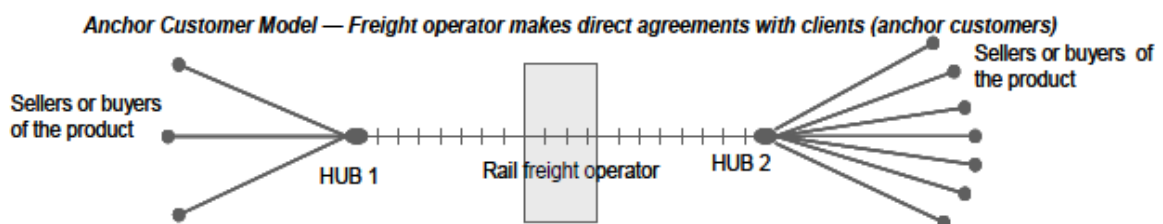


**Figure 3: Operator - 3PL Model (Leviäkangas et al., 2007, p 724)**

As depicted in Figure 3 the coordination responsibility to and from hubs lies with the service provider, forwarders, 3PL, etc. which is displayed by the two thinner rectangular. The figure also shows that the Rail Freight Operator has the complete accountability for the operation between hubs.

### 2.11.2 Anchor Customer Model

In the Anchor Customer Model, the Operator is the leader of the chain and the customer has the direct contact with the rail freight and other operators of the corridor. Usually there are one or few customers that generate a significant amount of volume of freight on the corridor. The Operator makes the first contact with the client (could be the other way around) and organizes the transport chain without intermediaries for coordination of the hub-to-hub service. On the contrary, the customer is responsible for the door-to-door service which means that the Operator does not cooperate with other operators. Typical products being transported in this model are industrial and bulk commodities such as furniture, steel and paper, where operators run full block trains to customers (Leviäkangas et al., 2007; Lehtinen & Bask, 2012).



**Figure 4: Anchor Customer Model (Leviäkangas et al., 2007, p 724)**

In Figure 4 it is shown that the Rail Freight Operator has the coordination responsibility between the hubs and that customers organize the transport to and from hubs.

### 2.11.3 Agent Model

The Agent Model is suggesting that the Rail Freight Operator establishes an agent network to provide local services to the customers in every country. Agents offer local services and make contracts in the name of the Operator, and the Rail Freight Operator controls the corridor. The difference between this Agent Model and the 3PL (forwarder) Model is that forwarders are typically more independent and provides a variety of services and options. The agent, on the other hand, focuses more on

specific transport service or chain and develops services for that, hence, the exclusion (almost) of LSPs in the Agent Model. The responsibility for door-to-door service production towards buyers of the product lies with the Rail Freight Operator and its agent network in this case. Examples of such service providers in the EU markets are DB Schenker and CargoNet (Leviäkangas et al., 2007; Lehtinen & Bask, 2012).

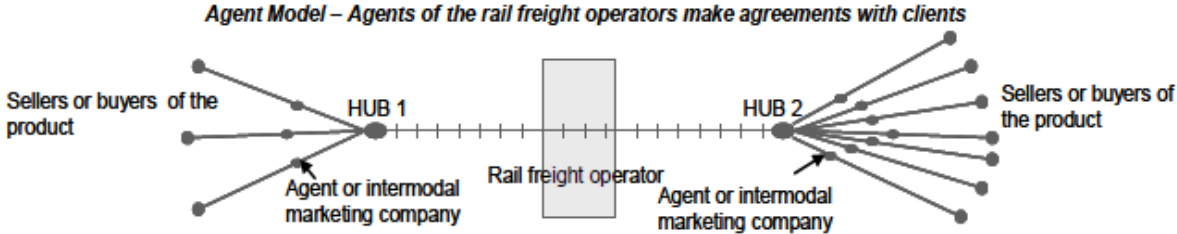


Figure 5: Agent Model (Leviäkangas et al., 2007, p 724)

Figure 5 displays the third business model, where it is the Rail Freight Operator has the coordination responsibility between hubs and its agents and organizes transportation to and from hubs.

**2.11.4 3PL Model**

In this 3PL Model, 3PLs’ role is crucial and the Rail Freight Operator focuses on operating the trains as part of the 3PL service providers’ network, and the 3PLs are in direct contact with customers as well as organizing the entire door-to-door transport chain. The key difference between the Operator and 3PL Model is that 3PL service providers do not have to be committed to any one intermodal choice. Instead they can choose from all options available such as road transportation. In this case, the 3PLs can either cooperate or compete with other 3PLs. If they compete, more rail freight operators are required in order to run the corridor. However, if they cooperate with each other, they can use only a limited number of freight operators (same operators) to run the corridor. In the EU DHL Freight and Kuehne & Nagel are examples of firms operating with this mode (Leviäkangas et al., 2007; Lehtinen & Bask, 2012).

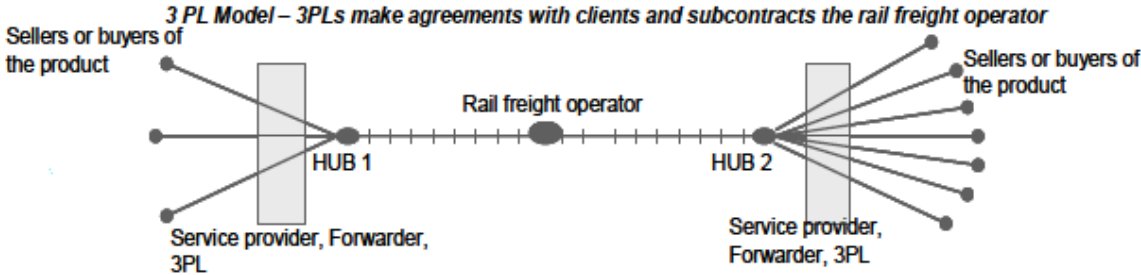


Figure 6: 3 PL Model (Leviäkangas et al., 2007, p 724)

Figure 6 illustrates 3PL Model, where it is presented that the LSPs is in charge for transportation to and from hubs, and that they can choose between different modes of transportation between hubs.

**2.11.5 The Subcontractor Model**

Later on, Flodén (2009) presents four other general types of business models in the intermodal transport industry, which are somehow related to the previous presented business models:

- The Subcontractor Model
- The Complete Transport Company Model
- The Own Account Transport Model
- The Local Cooperation Model

Flodén (2009) uses Osterwalder's (2004) framework for the explanation of all these models. He states that the Subcontractor Model is probably the most popular in the market. Intermodal transport operators offer their services only to the forwarders and road-hauliers, which gain a leading position in the distribution channel. The main value is obviously the transportation itself. However, there are some marketing aspects that are of value, because intermodal transportation has a better environmental image compared to all-road transportation. The relationship with customers can be divided into two groups: permanent and ad-hoc. Flodén (2009) emphasizes that it is important to keep stable customers with fixed bookings, as the finding process of new clients requires more expenses.

Naturally, if the company wants to retain its customers, it must be able to provide transportation services. The necessary capabilities for this activity are train service and terminals. Flodén (2009) argues that these capabilities include tangible and intangible resources. The examples for the tangible assets are locomotives and wagons, while intangible possessions are time slots, permits, licenses, etc. The renting of rolling stock is quite common in this industry, because it helps to reduce financial risks. Terminal handling operations are often outsourced, because the terminal requires a large initial investment. Even the rail haulage can be transferred to another company. Thus, obviously is that partnership in this business is the critical factor. Moreover, partnerships often occur when railway companies form a joint venture for the international transportation. The national railway agency is also a partner, since it provides infrastructure (tracks, safety equipment, etc. (Flodén, 2009).

The company's revenue generation mechanism is based on the payments paid for the main activities such as transport and terminal handling. Customers redeem fees, according to price lists, and there can be some discounts. At the same time, cost structure depends on the rail haulage and terminal operations (Flodén, 2009).

#### **2.11.6 The Complete Transport Company Model**

In the case of the Complete Transport Company Model, as it can be understood from the name, one firm is responsible for the transportation service door-to-door. The acceptance of LTL (less than truckload) shipments is possible in this model, unlike in the previous described model. Nevertheless, there must be already an existing network of consolidation terminals and sufficient volumes in order for this LTL service to be profitable. By the way, LTL shipments department of the forwarder might be seen as the customer for the company's intermodal business. In this business model it is also possible that the client will execute the road haulage on own account. The main difference between the Subcontractor Model and the Complete Transport Company Model is that the intermodal transport enterprise contends with forwarders and road haulers for the shippers (Flodén, 2009).

The generated value is basically the same as in the Subcontractor model, but also road haulage can be proposed, as well as consolidation of the LTL shipments. Flodén (2009) notices that the LTL shippers usually have smaller volumes, thus, they are less attractive. However, they often demand larger sales support. Overall, the relationship with customers is the same as in the Subcontractor

Model. The capabilities are also more or less the equivalent, however, road haulage and the consolidation of the LTL shipments might be annexed when needed. The geographical coverage can be expanded by the partnerships with road haulage companies. The fees from road haulage and LTL-consolidation are the only different aspects compared to the revenue model of the Subcontractor Model (Flodén, 2009).

#### **2.11.7 The Own Account Transport Model**

There are some cases, when big enterprises organize intermodal transportation for own means. This is the so-called Own-account transport model. The firm is responsible for the creation of timetables and ensuring of volumes, however, the actual transportation and handling operations are outsourced. The organizing of transportation aids to improve a control and reduce the costs, since unnecessary actors are excluded from the channel. The significant characteristic of this model is that the system is closed for external customers. Some companies sell extra capacity, but then these activities are seen as Subcontractor or Complete Transport Company models (Flodén, 2009).

The simplification regarding target customer, distribution channel and relationship is significant, because the customer is the company itself. As Flodén (2009) states, intermodal transport division customers are other divisions of the company. Thus, the relationship between “clients” and a service provider is very tight, since they have the same goal. The main risk here is related to lack of knowledge about intermodal transportation, because it is not a core business of the company, and at the same time these activities are quite complicated (Flodén, 2009).

Flodén and Sorkina (2013) analyzed two cases of the Own-account transport model – Volvo and COOP. Both companies outsourced transport operations, since they lacked knowledge about intermodal transport. The decision to outsource diminished flexibility, but it also reduced financial risks. Moreover, partners transferred some of their operations to other firms too. As Flodén and Sorkina (2013) noticed, informal contracts were established in parallel to formal contracts in order to improve the control. Volvo opened its system to other customer, nevertheless, the company tried to avoid this decision, because of other users’ requirements.

#### **2.11.8 The Local Cooperation Model**

Finally, there is a local cooperation model, where small actors cooperate, as they have own freight, but they cannot ensure sufficient volumes in order to organize intermodal transportation independently. It might be difficult to distribute income and revenue properly, since there is a lack of obvious channel leaders and all partners are relatively equal. This equality can lead to various disputes, which will cause inefficiency in the distribution channel. There are several forms of collaboration, including joint venture and informal agreement. This model needs a higher level of cooperation and it depends more on the partnerships compared to the Own-Account Transport business model. In local cooperation model the system is open to all potential customers and usually there is a service between two cities, where, in many cases, there was a lack of intermodal transport service. One example of the Local Cooperation Transport model is the Port of Gothenburg shuttles. They are organized by local road hauliers, which outsource railway transportation, however, these actors run a small terminal (Flodén, 2009).

Flodén (2009) states that there are various kinds of intermodal transportation, which have other types of business models. Examples include rolling highway for the transportation of trucks with

semitrailers (mainly due to the environmental and geographical reasons) and liner trains that pick and drop cargo during the short stops (Flodén, 2009).



### **3 Methodology**

---

*In this chapter, the researchers present the research methodology, including the choice of method and data collection, as well as a description of the steps carried out during the process of the thesis. It is also described how the data have been gathered and analyzed. Benefits and drawbacks associated with the chosen research methodology are continuously discussed. Finally, a discussion about reliability and validity of the collected data will be presented.*

#### **3.1 Research Strategy**

The research strategy and research methodology was argued after the purpose and the research questions were defined. There are various methods presented that can be used in order to answer the research question at hand, and the chosen method depends on what kind of study the researchers intend to do (Collis & Hussey, 2009; Patel & Davidson, 2003). The methodology chosen for a study can be related with positivism, “where generalizations leads to predictions, explanations and understanding (Collis and Hussey, 2009, p. 73) and where you try to find the cause-and-effect correlation (Collis and Hussey, 2009; Patel and Davidson, 2003), or with interpretivism, where you should be able to understand the question you intend to answer by analyzing different theories and/or patterns (Creswell, 1998). A positivist study focuses on quantitative studies where statistical analysis is used to understand the collected data. The statistical data could either be descriptive, where a description of the collected material is presented by numbers, or hypothesis-testing statistics, where you test statistical hypothesis (Patel & Davidson, 2003). Statistical data can, for example, be used to investigate if there are any relationships between different variables, or compare values in an interval (Collis & Hussey, 2009). In an interpretivist study, on the other hand, the researchers are trying to understand the observed phenomenon and the researchers’ interaction with the world around them (Collis & Hussey, 2009). The researches of this thesis will follow the interpretivist approach as the characteristics correspond with the subject as well as the intention with the thesis. In order to collect data, a qualitative study has been chosen since the data collected, in this study, has been expressed by words and not numbers, which is related to a quantitative study as mentioned above.

Various methods have been used for logistics research (Mentzer and Kahn, 1995), however, logistics research has favored positivist approaches, while qualitative and interpretative research is limited in this field (Arlbjørn & Halldórsson, 2002; Mentzer & Kahn, 1995; Näslund, 2002). The research strategy can either follow a deductive approach, where the researchers are aware of following a direction from a general law to a specific case (Alvesson and Sköldberg, 1994; Taylor et al., 2002), or an inductive approach, where the researchers are moving from a specific case or a collection of observations to general law (Alvesson and Sköldberg, 1994; Taylor et al., 2002), i.e. new theory is generated from empirical findings (Kovács & Spens, 2005). A third approach can be used in a study called abductive approach, which is more or less a combination of an inductive and deductive approach, where the purpose is to formulate a hypothetical pattern that can explain the case being studied and, thus, give a suggestion to a theoretical deep structure (Patel & Davidson, 2003). Even though the most common method used in order to complete a logistics research is a positivist approach, the researchers of this thesis have used an interpretivist, abductive approach. The researchers have combined the inductive approach with the deductive approach resulting in an abductive approach. Firstly, the topic chosen by the researchers gave the opportunity to freely think of what phenomenon was going to be studied and how, i.e. an inductive approach. Secondly, a

gathering of secondary data occurred in order to familiarize with the theory of the topic and to create the theoretical framework (a deductive approach) and at the same time collect the primary data of the phenomenon through interviews, i.e. an inductive approach. Lastly, an abductive reasoning has been applied in the analysis and conclusion, where empirical data and theory have been used to understand the phenomenon.

### **3.2 Research Design**

When deciding how the research will be carried out, we refer to our purpose and research questions and that will form the structure of the data collection and analysis (Patel & Davidson, 2003). Since this thesis follows qualitative aspects rather than quantitative, interpretivist methods have been discussed. There are several methods in order to collect data in an interpretivist study, such as Hermeneutics, which is a method that concentrates on the interpretation and understanding of text in the context of the inherent social and historical forces, Participant Enquiry, where it involves participants as much as possible in the study (the study is conducted in, for example, their own organization), or a Case Study (Collis & Hussey, 2009). Conducting a case study was, according to the researchers, the most suiting method of data collection for this thesis. A case study methodology is used to explore a single phenomenon (Collis and Hussey, 2009), which could be an individualist, a group of individualists, or a situation (Patel and Davidson, 2003) in order to gain in-depth knowledge (Collis and Hussey, 2009) as well as starting from an overall perspective in order to get as comprehensive information as possible (Patel & Davidson, 2003). Further, being able to collect both qualitative and quantitative data, as well as primary and secondary data was another reason for choosing case study as the preferred method. Interviews and previous research has helped the researchers to gain in-depth knowledge about the phenomenon in order to understand it and why it has occurred, which is connected to the purpose of this thesis. Observation is also an option for collecting data in a case study, however, in this study the researchers believe that observation would not provide sufficient information to answer the research questions. There are different types of case studies, and in this thesis the researchers have used a combination of a descriptive case study, “where the objective is restricted to describing current practice” (Collis and Hussey, 2009, p. 82), and an explanatory case study, “where existing theory is used to understand and explain what is happening” (Collis & Hussey, 2009, p. 82). This will help the researchers to describe the current practice, understand it and explain the factors behind it. Some drawbacks with conducting a case study are, for example, that it is very time-consuming, to decide the scope of your study is difficult, and even if the researchers are focusing on a particular organization, they do not exist in a vacuum, but interact with the rest of the society (Collis & Hussey, 2009). Another drawback with conducting only one case study is that it is not able to make generalizations (Bryman & Bell, 2011). In order to be able to make generalizations, the researchers would have been forced to conduct several case studies, which would require a cross-sectional design and focus on the sample of cases in order to generalize the results. However, the results of the conducted case study in this research allow generalizations to be challenged (Bryman & Bell, 2011).

In order to gain in-depth knowledge about business models in Sweden and Germany respectively we have used Osterwalder’s (2004) business model ontology as a representation of the business model. Osterwalder (2004) seems to be the most developed, used and universal business model according to the researchers’ opinion. Additionally, it is very frequently used by large variety of scholars for analysis of business models (Flodén, 2009; Flodén and Sorkina, 2013; Leviäkangas et al., 2007) in the intermodal transport industry. A positive and a negative aspect of using Osterwalder’s (2004)

business model typology is the degree of detail information. The positive factor is that the reader gets a clear understanding of how a business model works and the interrelated Pillars and Building Blocks defined by Osterwalder (2004). However, the negative aspect of it is that it is time consuming.

In order to do an analysis of the markets, the researchers first had to do a market description of the markets being investigated. The market description in this thesis is based on the five external factors that influence a company's business model, according to Osterwalder (2004). However, in this thesis, the market description will be carried out by combining Osterwalder's (2004) theory. Osterwalder's (2004) external forces are somehow related to parts of PEST analysis and Porter's five forces. From the PEST analysis method policy and regulations from governments has the greatest emphasize. Moreover, the competition with other intermodal actors, other railway operators, such as passenger trains, and competition with other modes in the market description is related to Porter's five forces. A combination of these theories has given the researchers the required market description. For the analysis of the markets, a SWOT-analysis has been conducted. The SWOT-analysis will present the differences and similarities between the markets and how it impacts the business model. This is believed, by the researchers, to have a good quality of how external factors are related to and influence a business model. Furthermore, additional strength is that the market description and market analysis theories are taken from different founders, which give the researchers diverse information on how to conduct a market description and market analysis.

### **3.3 Data Collection**

#### **3.3.1 Primary Data**

Primary data is data that investigators gather first hand (Rabianski, 2003). Primary data is specific and competitive data, which deal with the subject and is most often obtained by the researchers, and primary data is facts and information obtained for the purpose of the research (Rabianski, 2003). Patel and Davidson (2003) point out that we need to distinguish between descriptions and describing analysis of a phenomenon. Eye witnesses and first hand reports are called primary sources, while all other are called secondary sources (Patel & Davidson, 2003). Collis and Hussey (2009) defines primary data as "data collected from an original source (for example your own experiments, surveys, interviews or focus groups)" (p. 23).

Interviews are a method of collecting primary data in order to find out how the interviewee thinks, does or feels about the topic being questioned. There are three different types of interviews; structured, where questions are likely to be closed questions with a predetermined answer, semi-structured, or unstructured, which are associated with an interpretative paradigm. In this thesis a semi-constructed interview strategy has taken place. In a semi-constructed interview some questions are prepared, but there is room for adding follow-up questions in order to obtain more detailed information or exploring new, relevant issues that arise from a specific answer (Collis & Hussey, 2009). Some drawbacks with interviews are that questions can be misunderstood, an answer can be fabricated, the interviewee might choose not to reply on question(s), questions might be improperly phrased and inappropriate or incorrect answers will be given, or the chosen sample of people may not represent the population that the researcher wanted to study (Rabianski, 2003).

Semi-structured interviews with a TX Logistik (case study company) representative in Sweden and Germany respectively were taken place. See Appendix 1 and Appendix 2 for interview questions. In Sweden one interview took place with the Managing Director, Thomas Andersson, of TX Logistik. The

interview was held in Thomas' office in Helsingborg and lasted for 78 minutes. The interview took place on February 25 at 1 pm and was recorded after permission was asked. In order to carry out the interview with Thomas the researchers first contacted TX Logistik and asked if the company were willing to participate in the study. Before TX Logistik agreed on participating we had to send them what the thesis would concern and what they could help us with. After a short description of the thesis was sent and what we expected from TX Logistik, Thomas Andersson was the one contacting us for further discussions.

Thomas Andersson provided us with contact details in order to carry out the interview with a representative from Germany that was able to answer all the questions as Thomas did. The interview with Jörg Nowaczyk, Division Manager TXCARGOSTAR intermodal, from Germany took place on April 11 at 9 am in Helsingborg and lasted for 128 minutes. This interview was also recorded. Jörg Nowaczyk also asked Per Zachrisson, Product Manager Intermodal, to participate in the interview. This allowed the researchers to re-ask questions concerning Sweden from the first interview that was held with Thomas in order to see if we got the same answers from Per as from Thomas. In this way the researchers had greater quality of information concerning the Swedish operations.

### ***Selection of Company***

Previous research of market deregulation and railway transports has often compared the reasons behind the deregulation, the main deregulation characteristics, main entry barriers and how the railway industry got affected after deregulation. Most of the research has focused on comparing the UK deregulation with the German one and UK with Sweden since these countries have the highest level of deregulation in Europe. For instance, UK's deregulation led to the scenario where private funding maintain the railway infrastructure, while in Sweden and Germany authorities, such as Swedish Transport Administration and DB Netz respectively, are still responsible for the maintenance of infrastructure. Furthermore, there is a lack of investigations of a company's operations in two different countries, hence, the lack of research if market characteristics affect a company's business model in different markets. Therefore, this combined with the low level on research between German and Swedish market characteristics made the researchers to focus on finding an intermodal freight transport company in these two markets.

Continuously growing turnover, results, etc. (Bundesanzeiger Verlag, 2013) in an industry where profits are quite low in terms of percentage, for example, in Sweden (Transportstyrelsen, 2010) made the researchers to choose TX Logistik. TX Logistik and Hector Rail are the only companies operating in both Sweden and Germany. However, TX Logistik originates from Germany, while Hector Rail originates from Norway, it made it logic to choose TX Logistik as the involved company in this case study. Furthermore, TX Logistik is of the biggest private rail freight companies in Europe with several freight corridors across Europe, operates in various countries and is of big importance on the European market overall, and still succeeds, although, profit margin is not very high.

### **3.3.2 Secondary Data**

Secondary data is data that have been collected and published by someone else (Collis & Hussey, 2009). Secondary data is information that is not directly compiled by the examiner and may include published or unpublished work (Rabianski, 2003). Together with the gathering of primary data through interviews, secondary data was obtained through scientific articles, reports, books, and websites. The secondary data has been used in the introduction, theoretical framework and

empirical findings. Since we only had two interviews in total we were complementing the data collection with secondary information about, for example, TX Logistik's partnerships, market competition and market characteristics. The secondary data was retrieved from trade magazines, annual reports, reports ordered by authorities, online databases and search engines by searching for keywords like intermodal transportation, business models, rail-road business models, Sweden, Germany, deregulation, markets, external factors, model, TX Logistik, Osterwalder, elements of business models, competition, etc. Some reports have been found online and others have been supplied by lecturers from the researchers' home university as well as external lecturers.

### **3.4 Data Processing**

After the data was collected through the semi-structured interviews, the gained information was transcribed shortly after the interviews. The formulation of the questions asked at the interviews was in connection with the theoretical framework in order to be able to relate the empirical findings with written theory on the subject. This led to ease the connection between the empirical findings and the analysis. By doing this we established a strong logic between the theoretical framework, the empirical findings and the analysis. This in turn will help the reader as well. Even though the questions were in a specific order, the interviewee sometimes answered the asked question as well as the following one or a question further down in the document. This was not seen as a major problem during the interviews. However, it is easier to transcribe the interview afterwards without having to jump back and forward. Nevertheless, the researchers were able to ask follow up questions where a deeper answer was desired.

### **3.5 Research Quality**

Before the first interview was conducted, the interview questions were evaluated by the researchers as well as compared to the questions in (Osterwalder and Pigneur, 2009), where they have standard questions firms can ask themselves for each element in the business model ontology. Before the second interview, the questions were reviewed again by the researchers in order to avoid questions being answered before they were asked or rephrase questions in order to mitigate misunderstandings.

Sending the interview questions beforehand made the respondents to increase their ability to give as comprehensive answers as possible during the interview. The interviews were held in English in order to use the same expressions as the theory and because one of the researchers is not from Sweden and the representative from Germany do not speak Swedish. Using English and the same expressions as the theory in the interviews mitigated misunderstandings in translation. However, it could still be some misinterpretations about intermodal transport concepts expressed in English. As mentioned above, Thomas Andersson is the Managing Director of Sweden and has gained experience in the field through TX Logistik as well as from a forwarder's point of view in the transportation industry. Jörg Nowaczyk was our second interviewee and he is based in Germany as Division Manager TXCARGOSTAR intermodal with several years of experience in Germany and Denmark as well as from TX Logistik and from a forwarder's point of view before joining TX Logistik.

#### **3.5.1 Reliability and Validity**

Reliability is concerned with the matter of fact whether the results of a study are repeatable (Bryman and Bell, 2011), i.e. if the conducted research can be replicated in the future by other researchers and repossess the same results (Collis & Hussey, 2009). Validity, on the other hand, means that we

know that we investigate what we want to investigate (Patel and Davidson, 2003) and that the findings reflect the phenomenon being studied (Collis & Hussey, 2009). According to Collis and Hussey (2009), validity inclines to be higher in an interpretivist study, where the aim is to gain full access about the investigated phenomenon.

Although, this case study encompasses quantitative data in terms of statistical data concerning, such as exports, imports, transport activity (ton km) on railroads in Germany and Sweden, the majority of the research is based on the interpretivist standard with qualitative data collection. Collis and Hussey (2009) notice that, in the interpretivist paradigm, the researchers' behavior have an effect on the research, which tends to result in low reliability. Thus, the researchers have explained to the respondents how and why the study was conducted. This explanation was sent by e-mail before the interviews as well as explained face to face at the interview. By clarifying the purpose and research questions as clear as possible to the respondents, the answers attained should hopefully be relevant to answer the research questions at hand, than if they had not been evidently explained. Furthermore, since the interviews were audio recorded, the researchers found it easier to analyze the data and helped avoiding possible misunderstandings. The questions used in the interviews were cautiously constructed in order to escape errors and misinterpretations, and of course, making sure the questions measured what the researchers intend to measure. This was done in order to receive appropriate replies that could be used to answer the research questions. Furthermore, the obtaining and use of relevant sources, such as scientific articles, annual reports, and reports provided by professors at the School of Business, Economics and Law – University of Gothenburg, etc. have been carefully studied and selected in order to increase the validity and reliability of the study. The validity of the market analysis is seen as high, by the researchers, since the method used is a combination of established theories and the sources used for the market analysis are carefully selected. The researchers believe that this, together with a variety of reliable sources, has strengthened the reliability and validity of the material. Moreover, the preparation steps before the interviews were held are believed to increase the reliability and validity of the study, by asking the same questions and control questions to different people with great experience in field.

## 4 Empirical Findings

---

*This chapter presents the empirical findings retrieved from interviews and empirical findings retrieved from several sources in order to make a market analysis of the intermodal road-rail transport industry in Germany and Sweden.*

### 4.1 Company Description

TX Logistik (TX) was founded in 1999 in Bad Honnef, Germany, and is, according to TX Logistik (2014), one of the largest rail transport companies in Europe operating in nine countries including Germany, Italy, Austria, Switzerland, Sweden, Norway, The Netherlands, France and Denmark. The company has since its foundation focused on cross-border rail freight transport in Europe and designing transport networks without borders. Germany is the hub of the European flow of goods and because of the volumes generated, TX is departing more than 20,000 trains from Germany. The company's turnover in 2013 was EUR 232 million (TX Logistik, 2014).

TX offers four types of services; intermodal, automobile, freight, and maritime. TXCARGOSTAR intermodal proposes integrated transport solutions for continental and maritime cargo transports. The network of trailers, swap bodies and containers is available for customers, and in this network TX is transporting, for example, electronic goods with high value and goods which are sensitive to temperature (For more information about routes and timetables, visit <http://www.txlogistik.eu/networks/>). TX Logistik (2014) states that the advantages of using TXCARGOSTAR intermodal are, for example, real time monitoring of the trains through IT-systems, steady information in the case of deviation and early messages to customers and customer-oriented timetables, which is, according to TX, synchronized with the logistical requirements of the industry.

#### 4.1.1 Expansion to Markets and Mergers

TX is a small actor on the rail freight market with 2-3 % market shares in Germany in the cargo business compared to state-owned companies like Deutsche Bahn (DB). However, TX wants to double its turnover over the next five years, which will require innovations and investments in, for example, terminal operations equipment (discussed later in this chapter). Another way of increasing its market share is to expand to new countries. The typical model TX follows when investigating to expand to a new country or market is to see if there is sufficient demand. If there is sufficient demand, but not enough for a whole train TX looks for partners in that region to do the operations for them. When the demand is sufficient for a whole train, then TX is investigating to operate the whole line by themselves (markets with a continuously increasing trend in demand is investigated). At the moment TX is looking at the possibilities to expand to Hungary since cargo flows to Eastern Europe is increasing. The fundamental explanations of the expansion to the Nordic countries are enough demand and to control the flow by themselves (controlling the flow includes planning, coordinating and transporting activities between terminals). Earlier, trains had to be switched at cross-border operations and partners outside Germany had to take over the operations, hence, the loss of control. In order to control the flow, TX had to expand to Denmark, Sweden and Norway, and in order to be able to operate on railroads in these countries TX had to institute offices there, otherwise they would not be able to apply for track utilization, certificates, licenses, etc. Furthermore, in order to avoid switching locomotives at borders TX started to operate with multisystem locomotives and only change drivers at borders, if necessary (multisystem locomotives have technical equipment that fit systems in different countries) (Nowaczyk, 2014).

The third way of increasing markets shares is to merge with another company. When TX entered the Italian market the ownership structure of TX started to change. Trenitalia wanted a partner behind the Alps since foreign competitors started to enter the Italian market. Hence, the merge between Trenitalia and TX in 2001 occurred, where Trenitalia initially owned 15 % of TX. By 2005 the company owned 50 % of TX and by 2011 Trenitalia had 100 % share of TX, which is now a part of the Trenitalia Group. Nevertheless, it is worth mentioning that TX works completely as an independent company within the group. For instance, in Italy TX has kicked out the mother company of its businesses since TX wants to keep its success factors from Germany, which are high quality, high flexibility, high standards and, finally, having control of the flow on their routes and Trenitalia understood the needs of TX and accepted the situation (Nowaczyk, 2014).

## **4.2 TX Logistik in Germany**

The service offered by the intermodal division is transportation of units between terminals on fixed corridors. TX refers to units and not to the common expression TEUs and one unit is equivalent to one 40 ft trailer. TX departs around 6,000 trains per annum (an increase to 6,500 during 2014 is estimated) resulting in 200,000 units shipped Europe wide, where around 50,000 are reefer units (40 ft) making TX the largest intermodal company transporting reefer units. Customers can buy everything between single slots, i.e. one unit or a full train, i.e. 40 units. TX has three dispatches, one in Bad Honnef (Germany), one in Padborg (Denmark) and one in Helsingborg (Sweden), that are responsible for the booking and communications with customers, terminals and locomotive drivers as well as monitoring the trains if they will be on time or not (being on time is defined as arriving at the terminal within one hour of set arrival time) and everything is accompanied by control centers (Nowaczyk, 2014).

### ***Value Proposition***

The service offered by TX is rail transports of intermodal units between terminals both national and international. Services are completely customized since timetables are set after requirements from customers in order to fit with customers' entire logistics chain. For instance, when TX establishes a new line customers give guidelines in terms of lead times, departure and arrival times and TX tries to meet these requirements as much as possible and then offer them a proposal. Operations, on the other hand, are standardized and the aim is to standardize the production as much as possible in order to become more efficient and, thus, decreasing production costs (Nowaczyk, 2014).

Why customers should choose TX is because of the high quality received from their transport service, according to TX Logistik. TX is the only company controlling the entire flow from the Nordic countries (Norway, Sweden and Denmark) to Italy. Another reason is that TX puts the customer in focus and understands their needs. Other reasons are lower transportation price for long journey transports and first and last mile road haulage can be offered. Extra value offered by TX is that their locomotive drivers are making sure that, for example, all reefer units have the right temperature through the whole journey as well as solving the issue if a reefer unit's engine breaks down (Nowaczyk, 2014).

For staying competitive in the intermodal transport sector TX needs to innovate their services continuously. For instance, in order to attract classical reefer companies, TX has developed equipment that makes it possible for terminal cranes to lift non-liftable trailers onto rail cars of the type T3000 (a type of wagon called pocket wagon used for transporting 40 ft trailers). At the moment the equipment is launch in the terminal in Padborg (Denmark), where TX is the operator of the



terminal, and will continuously be available at other terminals. Furthermore, customer requirements and evaluations are putting TX in such a spot that they need to innovate their services that to be competitive and to achieve better quality, faster deliveries, etc. (Nowaczyk, 2014).

### ***Customer Segments***

TX customer target is B2B (business-to-business), i.e. forwarders and there is no particular focus on which cargo can be transported or not. Since the units transported are trailers or reefers, TX does not care what is loaded in those trailers or reefers. The most important customers are LKW Walter, DSV and DHL because they have the trailers but no trucks (most DHL-trucks are subcontractors for DHL with the permission of having DHL's logo on their trucks). There is no specific segmentation within the target segments, however, the goal with every established corridor is to have 70-80 % of the capacity occupied by couple of customers, who can assure continuous deliveries and the rest is filled up with customers ordering on daily basis, including current customers and new ones (Nowaczyk, 2014).

### ***Distribution Channels***

TX does not have a huge market organization to raise awareness of the company in the industry. In a study made in Germany it shown that 70 % of the participants in the study have heard about TX Logistik, but when they were asked what TX is doing the figure dropped to 20 %. TX does not advertise their company like, for example, DHL, but rather TX is approaching customers who ship big volumes and meet them in face to face meetings. Worth noting is that most of the employees of TX came from the forwarding industry, which is a factor why the marketing is not a major activity (Nowaczyk, 2014).

Customers evaluate the services offered by TX by looking at the quality in terms of being on time. The on time precision is what customers evaluate, when TX is reaching them and offers them its services because the time factor is of such an importance to TX's customers (Nowaczyk, 2014).

In order for customers to book a shipment they can use the booking system on Internet, where the customer enters all information required or via phone, fax, e-mail as long as all data required is there. TX can also import excel-files into their booking system. When customers place an order the dispatch are able to see the details and can forward this information to terminals and the personnel at terminals knows what to expect from the trains arriving the terminals. The delivery of the service is the traction and operating job between terminals. However, sometimes TX can even arrange pick-ups and drop-offs at warehouses or at terminals others than TX collaborates with. This can also be seen as an extra value service offered by TX (Nowaczyk, 2014).

After sales services, such as track and trace is standard activity offered to customers. Further, TX has key account managers that are divided into groups where every key account manager manages 20-25 customers. Their task is to help customers if they have any concerns about the transportation service, with their deliveries, or other problems in general. TX also has follow up sessions with its big customers (i.e. customers booking a whole train or at least 50 % of the capacity) every month where punctuality of deliveries to terminals are discussed. Moreover, strategically and tactical meetings are held with customers' managers that to discuss, what TX can do better and how TX and customers can grow together (also linked to Relationship) (Nowaczyk, 2014).

### ***Relationship***

For establishment of long term relationships TX looks at the sales data of customers that book shipments on daily and weekly basis. As abovementioned, TX tries to develop the relationship with customers continuously through, primarily, face-to-face meetings but also by phone, e-mails and fax. The frequency of interactions depends on who the customer is. It can range from daily to monthly contacts depending on the needs of customers and who they are. For example, with big customers TX has strategically and tactical face-to-face meetings every quarter. In order to make it easier to have contacts with customers, TX has a system, where it is possible to have meetings or conferences directly via a smart phone wherever the employee is (this can be linked to innovations as well). In this system it is also possible to show presentations to customers (Nowaczyk, 2014).

### ***Value Configuration***

In order for TX to create value for its customers several activities and processes need to be carried out. First of all, TX needs, for example, licenses and safety certificates in order to operate on the railways, which is authorized by Eisenbahn Bundesamt. Secondly, TX needs track permission and to apply for timetables, where DB Netz is responsible for, and thirdly, TX needs energy supply for its locomotives in order to drive, where DB Energy is the one and only power supplier. Furthermore, internally the dispatch division plays a vital role concerning the information exchange between TX and its customers and between TX and its terminals. Lastly, without the IT-system functioning, the entire business operation would crash and the employees of TX would go blind. In order to mitigate such an event, TX has a back-up server that is automatically turned on when the first one goes out. To diminish electricity failures TX has a back-up generator, since everything is Internet based, and for staying online, TX is automatically connected to a 3G-network, if they would lose the ordinary Internet connectivity (Nowaczyk, 2014).

### ***Capability***

Resources in terms of equipment, human and financial aspects are necessary for TX to deliver value to its customers. Equipment, such as locomotives (which all are electrical ones) and wagons are either owned by TX itself or leased from suppliers. At the moment TX owns five locomotives and 200 wagons (the entire firm). TX employs 120 locomotive drivers in Germany plus around 30 people working with issues concerning rail equipment and 200 people are working with administrative tasks. Financially, TX can loan and lend money between its divisions, if needed, but it depends on the size of investment (Nowaczyk, 2014).

### ***Key Partners***

Without partners and suppliers TX will not be able to deliver a value to its customers. For example, DB Netz and DB Energy are important partners for performing transportation activities. Furthermore, without locomotives, wagons, maintenance of locomotives and wagons, shunting and terminal operators it is not possible for TX to operate, hence, keeping good relationships with suppliers and partners is crucial aspect (Nowaczyk, 2014).

### ***Cost Structure***

The ongoing work is to decrease production costs, but at the same time deliver the high quality customers are paying off. The largest inherent expenses are fixed costs in terms of locomotives, wagons and staff, which accounts for 70-80 %, while the main variable costs are track fees and energy that accounts for 20-30 % of total costs. However, the most expensive activity is shunting that accounts for around 5 % of total production cost (Nowaczyk, 2014).

### Revenue Stream

Lastly, the value TX is delivering to its customers has its price as well and that needs to be paid by customers. Thus, the largest share of earnings comes from the transportation activity between terminals that customers pay for. However, sometimes when a locomotive is having a day off or stands still at a terminal, TX is looking on the market, whether there is a need for a locomotive, either for cargo or passenger operations (Nowaczyk, 2014).

### TX Logistik's Business Model in Germany

In Table 4 below the business model of TX's intermodal division is represented.

**Table 4: The Business Model in Germany**

Pillar	Building Block of Business Model	Description
Product	Value Proposition	Customized rail transport of intermodal units between terminals both national and international. Offering lower cost and reduced environmental impact compared to road transport. Have a fixed timetable for daily departures. High on-time accuracy. Road haulage for first and last mile can be offered.
Customer Interface	Target Customer	B2B. Freight forwarders, road hauliers and reefer companies.
	Distribution Channel	TX reaches out to customers or customers contacts TX.
	Relationship	Communications every day with customers on operational level. With big customers there are strategically and tactical meetings face to face every fourth month focusing on the transport operations. Focusing on establishing relationships with customers to have fixed booking commitments.
Infrastructure Management	Value Configuration	Performing intermodal road-rail transport including IT-system in order to control the flow.
	Capability	Having all resources necessary to perform intermodal road-rail transport as an intermodal transport company. Some equipment is owned, rest is leased.
	Partnership	Terminal handling and shunting activities are subcontracted (except for the terminal handling in Padborg). Rental of locomotives and wagons and maintenance of locomotives and wagons.
Financial Aspects	Cost Structure	70-80 % fixed costs in terms of locomotives, wagons and staff. 20-30 % variable costs in terms of track fees and power.
	Revenue Model	Revenue mostly from rail transport activity. Sometimes revenue from renting out locomotives. Payments from customers.

### 4.3 TX Logistik in Sweden

TX has been presence in Helsingborg since 2004 and is a fully operational base, where the company has developed and manages the operations in Scandinavia as well as coordinating the handling of national and international rail freight services. The main focus is on intermodal transports combined with timber transports and vehicle transports. The ports of Malmö and Trelleborg are important

gateways on the north-south corridor for the company and the ports are of strategic importance for intermodal and conventional freight transports TX Logistik (2014) and the first line in Sweden was Malmö-Eskilstuna serving DSV (Nowaczyk, 2014).

### ***Value Proposition***

TX in Sweden offers rail transport of intermodal units including containers and has four lines in Sweden, where two of them are between domestic terminals (Malmö-Eskilstuna and Malmö-Stockholm), one is between Malmö and Halme (Germany) and one line passing through Sweden (Padborg-Halden, Norway). Further, there are two so called company trains, where one is dedicated for timber transports and one completely customized reefer transport service for COOP between Helsingborg and Bro (Andersson, 2014). As for the intermodal division in Germany, all services in Sweden are customized (Andersson, 2014; Zachrisson, 2014), however, the operations are standardized.

Why customers should chose TX is because of the high on-time precision (94.5 %), the fixed timetables make it easier for customers to plan their business, TX's information exchange to customers when issues occur during the transportation and the lower prices compared to road haulage. Extra value offered by TX is that they can help customers to refill their diesel tanks on units being transported.

Andersson (2014) points out that, in order to make the reefer transports even more environmentally friendly and perhaps attract more reefer transports, TX is now looking at the possibility to supply reefers with electricity from wagons. This innovative initiative is taken together with COOP (a Swedish food retailer) and Transportforskningsinstitutet (the Swedish National Road and Transport Research Institute).

### ***Customer Segments***

TX's customer target is B2B, i.e. freight forwarders, shipping lines, trucking companies, saw and paper mills and COOP, and there is no focus on what is being transported in the intermodal units. The most important customers are LKW Walter, DSV, DHL and saw and paper mills. There is no specific segmentation within the target group, however, the same applies for Sweden as for Germany, i.e. trying to have as much commitment as possible for every offered line (Andersson, 2014).

### ***Distribution Channels***

The raise of awareness, how customers evaluate the service offered, how customers purchase services, how the service is delivered and after sales activities are the same in Sweden as in Germany, since the whole TX Group is working with standardization and where the goal is that it should be possible to go from country to country and working exactly the same (Andersson, 2014; Nowaczyk & Zachrisson, 2014). See *Distribution Channels* in section 4.2.

### ***Relationship***

The relationship procedures are the same in Sweden as in Germany (Andersson, 2014; Nowaczyk & Zachrisson, 2014). See *Relationship* in section 4.2.

### ***Value Configuration***

As mentioned in *Value Configuration* in section 4.2, several activities and processes need to be carried out in order to create value for customer. Firstly, TX needs, for example, licenses and safety

certificates in order to operate on the railways, which is authorized by Transportstyrelsen. Secondly, TX needs track permission and to apply for timetables, where Trafikverket is the responsible authority in Sweden, and lastly, TX needs electricity supply for its locomotives in order to drive, where Trafikverket is the only energy supplier for locomotives in Sweden (Andersson, 2014). As in Germany, the dispatch division has an important function and the IT-system and back-up servers, generators and Internet connections are the same in Sweden (Zachrisson, 2014).

### ***Capability***

Resources in terms of locomotives and wagons needed in order to carry out the business in Sweden are leased either from TX Logistik AG (Germany) or from leasing companies. In Sweden the distribution of locomotives are 16 electrical and 11 diesel ones. The reasons, why diesel locomotives are used in Sweden ,are because that the shunting operations are faster and when transporting cargo for saw and paper mills there is usually no electrified tracks to the plants. TX has around 80 people in total in Sweden, where 60 of them are locomotive drivers and 20 people working in the office with administrative tasks. The IT-system is vital and helps TX monitoring, for example, where the trains are and the amount kilometers run by each line. Decision on what IT-system to use is centralized in Germany and the offices in Europe need to follow the directions from Germany. Financially it is the same in Sweden as in Germany, however, in Sweden almost everything that TX has is leased or rented.

### ***Key Partners***

Key partners for TX in Sweden are Trafikverket that provides infrastructure and energy supply, terminal operators, leasing companies for locomotives and wagons and suppliers for maintenance of locomotives and wagons.

### ***Cost Structure***

Locomotives, wagons and staff are fixed, which constitute 70 % of total costs, while 30 % are variable costs (track fees and electricity). Rolling stock is the most expensive resource acquired.

### ***Revenue Stream***

Lastly, the revenue comes from customers paying for the rail services offered by TX. As in Germany, TX is able to rent out their locomotives to other rail operators if the locomotives are free. However, only locomotives driven by diesel engines are rented out.

### ***TX Logistik's Business Model in Sweden***

In Table 5 below the business model for TX Sweden is shown.

**Table 5: The Business Model in Sweden**

<b>Pillar</b>	<b>Building Block of Business Model</b>	<b>Description</b>
<b>Product</b>	<b>Value Proposition</b>	Rail transport of intermodal units including containers both national and international, timber transport in Sweden to saw and paper mills, and reefer transport for COOP from Helsingborg to Bro. Offers lower price than all-road transportation and are more environmentally friendly than all-road. Have a fixed timetable for daily departures. High on-time accuracy. No road haulage is offered.
<b>Customer Interface</b>	<b>Target Customer</b>	B2B. Freight forwarders, shipping lines, trucking companies and timber companies.
	<b>Distribution Channel</b>	TX reaches out and visit customers. Mouth to mouth.
	<b>Relationship</b>	Close communications every day on operational level with customers. Face to face meetings every fourth month with big customers discussing strategy and tactics.
<b>Infrastructure Management</b>	<b>Value Configuration</b>	Performing intermodal rail-road transport. Decision about IT-system and innovations regarding IT-system is based in Germany.
	<b>Capability</b>	Having all resources necessary to perform intermodal road-rail transport as an intermodal transport company. All equipment is leased.
	<b>Partnership</b>	Terminal activities, leasing of locomotives and wagons, maintenance of locomotives and wagons, and infrastructure provider.
<b>Financial Aspects</b>	<b>Cost Structure</b>	High fixed costs (70%) and low variable costs (30%). Fixed costs are locomotives, wagons and staff. Variable costs are track fees and electricity.
	<b>Revenue Model</b>	Revenue comes from the rail haulage activity. Sometimes revenue comes from renting out locomotives. Payments from customers.

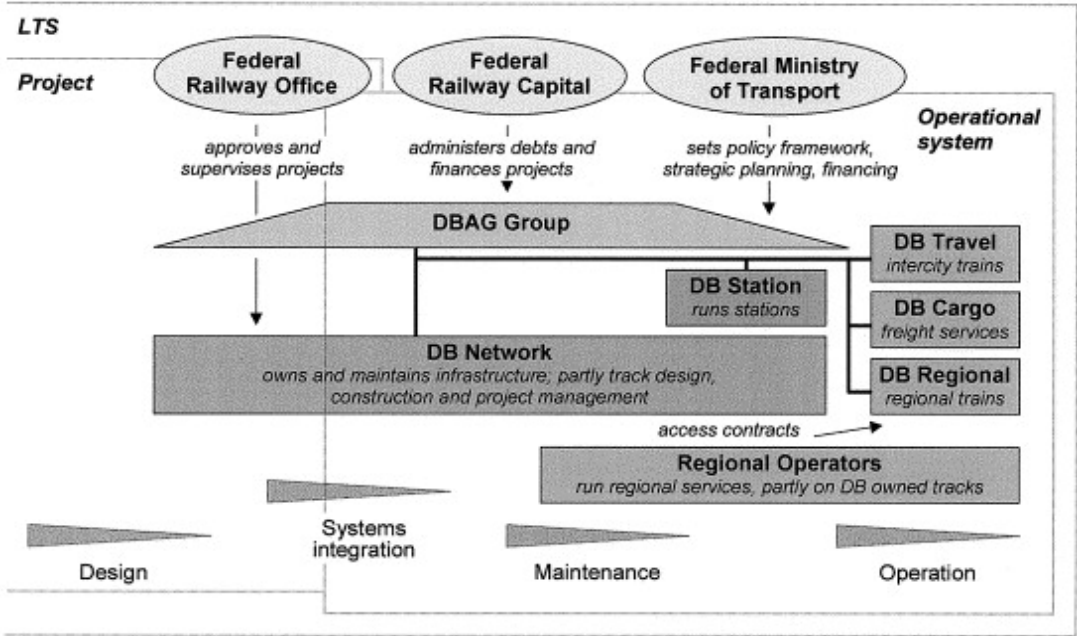
## **4.4 Market Description in Germany**

### **4.4.1 Deregulation and Intramodal Competition as External Factor**

#### ***Deregulation***

In the end of 1980's the financial state of Germany railway monopolist Deutsche Bundesbahn (DB Bahn) became extremely difficult. Thus, the German government initialized the Rail Reform Commission in 1989, which had to propose approaches that could lead to a sustainable financial configuration. Moreover, changes were necessary due to West and East Germany reunification. The German federal railways suffered from a large debt, at the same time, there was a huge need to upgrade East Germany's railway infrastructure and to create a fresh, business-oriented railway structure. The chosen way in Germany strongly differs from the UK approach, which is seen as very competitive. First of all, there was a merge of West and DR Germany state companies. During the

first stage, the commercial divisions of the enterprises were reorganized into the state-owned, public limited company DBAG, which was later reformed into a holding company, better known as DBAG Group. From 1999 there are five sovereign firms, which function as DBAG Group divisions. They ensure different activities, including freight traffic, regional traffic, intercity traffic, passenger stations and track infrastructure. See Figure 7 for the rail system structure. These departments are management units and they control other companies (Geyer & Davies, 2000).



**Figure 7: German Rail System Structure after Reform (Geyer & Davies, 2000, p 1001)**

The reorganization of German railways led to the establishment of the two organizations: the Federal Railway Office (FRO) and the Federal Railway Capital (FRC). The first body plans and controls state-funded projects and affirms new rolling stock and lines. The FRC takes care of the railway debt administration and federal railway assets (Hass-Klaus, 1998).

Overall the reorganization of railway system started in 1994, and primarily it concerned “regionalization” of passenger services, which officially was realized in 1996. After almost 10 years, Germany legitimized the Allgemeines Eisenbahn Gesetz (AEG), the National Railway act, which was the realization of the First Railway Package. The Second Package had to be put into effect after one year, but Germany postponed the date, thus, it received some criticism from the European Commission and finally this package was realized in national law on the 14th July (Steer Davies Gleaves, 2012).

Very important part of the package is the Interoperability Directive, which was replaced by the Transeuropäische-Eisenbahn-Interoperabilitätsverordnung (TEIV) and the Safety Directive. However, the Safety Directive and some other directives (2008/57/EC and 2009/131/EC) were not successfully implemented, thus, the European Commission initiated legal procedures against Germany (Steer Davies Gleaves, 2012).

The third package was based on the directive, which concerns an open access. It was put into the force on May 2009. Latter package was finalized on 3th of December with the directive, which determines train driver authorization procedure (Steer Davies Gleaves ,2012).

German rail market in general is very open and the Rail Liberalization Index identifies that more liberalized systems exist only in Sweden and Great Britain. The liberalization level is illustrated by the fact that there are 247 active operators of totally 353 licensed equities (Steer Davies Gleaves, 2012)

Geyer and Davies (2000) distinguish four major differences between German and UK railway networks. Primarily, the competition level is very low in Germany compared to UK, where everything depends on the market, as at the beginning of this century other companies, except DBAG, served only regions. Another disparity is simplicity of the German, as there is one coordinator of operational companies. In UK, there is a lack of this kind of organizer. The final difference is that in Germany the state always led in the investing towards infrastructure, while in UK private capital is responsible for funding infrastructure.

Dablanc (2009) states that Germany has a better situation than France when it comes to regional rail freight service development. First of all, Germany has many quite a lot industrial complexes, while in France main economic actions take place in several major industrial centers. Another advantage of German railway is that DB, during reorganization, studied all risky services and analyzed possible alternatives, while in France SNCF did not implement this practice. Nevertheless, in both countries local governments do not pay enough attention. For instance, in Germany federal states reduced an amount of their shares in the regional freight operators (Dablanc, 2009). The advantage is that German laws enable a possibility for private investors to invest into DBAG companies, although the infrastructure still basically belongs to the state, because, according to the constitution, the government must have a majority of stocks in the DB Netz. Consequently the federal government has to ensure investments into infrastructure (Geyer and Davies, 2000).

High charges for rail infrastructure and electricity are seen as large obstacles for new entrants in Germany. Since the infrastructure provider and the main operator belong to the same holding company there is a risk for discrimination of allocation of track slots. Other issues include permits and rolling stock for particular commodities (Vierth, 2012).

### ***Intramodal Competition***

For many years German rail freight business was increasing, except during 1994-2000 when rail transportation decreased. However, in Germany after 2000 the rail freight volumes continue to grow, while in majority of other states the rail freight industry faced some struggles. Unfortunately various subsidies and active political promotions for the intermodal transportation did not lead to the significant positive changes of railways market share (Debie & Gouvernal, 2006). See Table 6 for market shares in Germany.

It can be noticed that in Germany major actors have some roots in Europe's incumbent operators. The companies worth mentioning are DB Schenker (Germany), SNCF Geodis (France), SBB Cargo (Switzerland) and FS Trenitalia with relation to TX (Steer Davies Gleaves, 2012).



Table 6: The Market Share in Germany (Steer Davies Gleaves, 2012, p 24)

Group	Company	Market Share %
DB Schenker	DB Schenker Rail	72.3
SNCF Geodis	Captrain, ITL	5.5
SBB Cargo	SBB Cargo Deutschland	2.7
FS Trenitalia	TXL, OHE	2.6
Häfen und Güterverkehr Köln	Häfen und Güterverkehr Köln	2.0
Others	Others	14.9

The main competitors were doing a little bit better than DB Schenker, hence, the share of market, that belongs to DB Schenker, declined by 2.5 percent. This growth tendency for the competitors is seen for ten years and overall they managed to increase their business by 6.5 % in 2012. See Figure 8 for market shares in Germany. The major reason for these positive results is that competitors of DB Schenker focus on the intermodal shipments, and this sector grew most significantly among others. Three main types of goods for the rivals (intermodal, liquid petroleum and construction materials) constitute 70 % of competitors' portfolio. These amounts occupy more than 40 % of these sectors in Germany. Overall, if all sectors are taken into consideration, the market shares for competitors increased from 19.7 to 28.6 during the period 2007-2012 (see Figure 8) (DB, 2013). The new entrants take advantage in block trains, while DB Shenker has an orientation towards single-load wagons (Steer Davies Gleaves, 2012).

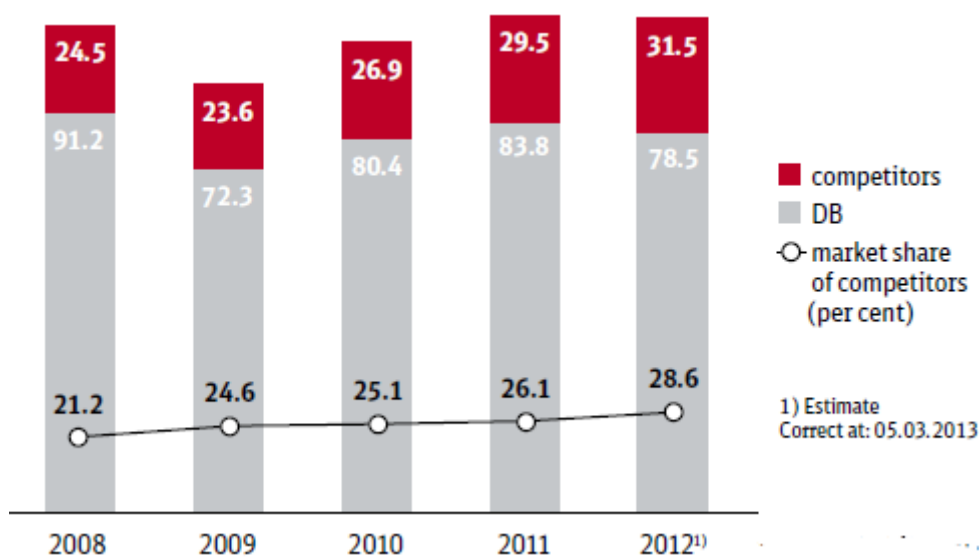


Figure 8: DB Schenker's and Competitors' Performance in terms of Billion ton-kilometers (DB, 2013, p 20)

DB report (2013) notices that despite the fact that the results of rail freight companies in Germany were really poor, they are still better than the European average. The European rail freight market (EU-27 including Switzerland and Norway) declined by five per cent, and it was the second worst performance during the ten year period. This situation was inspired by debt crisis, which influenced steel, coal and construction sectors negatively. The rail freight market is not profitable enough since there is a stable increase of costs and a lack of space for the increase of the prices, thus, railway companies cannot make reinvestments. Consequently, this industry is not attractive to private investors and external funding is very limited. Furthermore, the politically driven extra costs added

around 40 % to the main costs. The energy and programs must be adjusted to the rail rationalization campaigns and this must be done at the continental level (DB, 2013).

Dablanc (2009) notice that Mora C (a DBAG reorganization plan for increasing of efficiency) plan led to some partnerships in Germany, since there was reduced number of the “tariff points”, where the cargo is transferred to another actor from legal perspective. Thus, Railion (DB freight division) underwent between 5 % and 7 % revenue decrease related to carload services. Consequently, Railion started to collaborate with regional, which aided to preserve around €20 million. However, the extension of collaboration was minimal compared to the cooperative rail service agreements in the North America.

DB focuses not only in the local market but also expands to other markets. For instance, DB cargo company Railion (latter it changed into DB Schenker) procured traction from the Dutch and Danish operators and purchased some small Italian railway companies (Debie & Gouvernal, 2006). Furthermore, DB Schenker acquired the largest Polish railway operator PCC+PTK Holding in 2009. (DB Schenker Rail Polska, 2009).

Debie and Gouvernal (2006) argue that not all companies were satisfied with Railion services’. For instance, major shipping lines established an ESR, a company, which organizes intermodal transportation from main European ports, primarily Rotterdam. From the very beginning it did not provide the traction itself, however, the performance of the Railion was very disappointing. Thus, in 2002 ERS started to produce own shuttle haulage. Although ESR is a small actor, at the same time, it shows the need to integrate entire door-to-door service in whole Europe.

The very important role in the intermodal transport chain is played by terminal operators. The interesting fact is that German enterprises expand their businesses from the main hubs in Hamburg and Bremen to other places and even other countries. HHLA, for instance, collaborated with Railion and Czech Railway to establish services in Czech Republic. Moreover, HHLA purchased 50 % stock of Transfracht (DB former intermodal operator) (Debie & Gouvernal, 2006).

Another Terminal company, Eurogate, has more complicated services from organizational point of view and geographical exposure is larger compared to HHLA. This firm’s Hanibal service uses private rail companies in Germany, although in Switzerland and Italy, state-owned enterprises are involved. It also collaborates with ERS and German logistics firms in the financial field. Without this collaboration between competitors it would be very hard to ensure critical mass that is obligatory for the successful shuttle services (Debie & Gouvernal, 2006).

#### **4.4.2 Policy and Society as External Factors**

##### ***Policy***

The Federal Ministry of Transport, Building and Urban Development organizes plans and schemes, although DB is still able to make some decisions itself, since it have information that is not easily available to the authorities (Beria et al., 2012). Of course, there are other public bodies that control railways. For instance, Eisenbahn-Bundesamt (EBA) sets technical specifications, provides licenses and safety certificates and authorizes rolling stock, registration numbers, verifies subsystems and related documents, etc. Another authority is EisenbahnCert (EBC), which is a sovereign department from the EBA and is responsible for the ensuring appropriateness of the interoperability elements. It also finalizes verification of subsystems (Steer Davies Gleaves, 2012).

The complicated process of issuing safety certificates and authorization of vehicles disturb possibility to enter the market simply. The new legislation forces to get a new safety certificate, nevertheless, EBA shows only very progress towards new procedures implementation. For instance, only 114 out of 348 applications were processed on the first of December in 2010. Moreover, the whole issuing process could require €70 000 in administrative services and additional human resources. These extra costs create serious obstacles. Finally, many stakeholders notice that the entire process was messy, slow and it was not clear, which requisitions must be fulfilled. This situation resulted in the delayed obtaining of safety certificates (Steer Davies Gleaves, 2012).

The vehicle authorization procedure also experienced similar issues, because it was very slow and required too much effort. This was strongly influenced by the restricted number of the EBA staff. The trains that faced some struggles were E-Talent 2 from Bombardier, Flirt from Stadler and Coradia Lint/Continental from Alstom. It should be clarified that there are some defects and application problems from the companies' side. Nevertheless, there was a lack of explanation, which party is responsible for which questions. Moreover, untimely authorization procedure changes influenced the train manufacturers and operators negatively, because it led to construction modifications and delays of operations. The authorization may cost €120 000 and it takes 120 days for finalizing the processing (Steer Davies Gleaves, 2012).

BNetzA is responsible for collecting track usage fees and it puts into effect anti-discriminatory laws, which are described in the "Allgemeines Eisenbahngesetz (AEG)" and "Eisenbahninfrastruktur-Benutzungsverordnung (EIBV)". It also regulates the observance of regulations regarding access to infrastructure, including set up of timetables, railway path dedication, the accessibility to facilities etc. Moreover, the Antitrust organization can regulate situations, if private companies have some claims (Beria et al., 2012). During 2006-2012 BNetzA organized 600 investigations. No complaints could be identified in terms of rolling stock authorization and granting of safety certificates. Nevertheless, the access in Germany is quite complicated and, hence, discriminative. Finally, the Investigation Office for Rail Accidents of the Ministry of Transport coordinates the analysis of the accidents (Steer Davies Gleaves, 2012).

### ***Society***

20 years ago Germany was concerned about motor vehicles standardization, promotion of unleaded gasoline sales and improving inspection of operated vehicles. Nevertheless, the avails of these instrumentalities were diminished by the growth of the road transport, as the CO<sub>2</sub> emissions, which were caused by transport activities, increased nearly two times from 1970 to 1980. Moreover, land usage, congestion and accidents encouraged to search for some new measures. Hence, the German government decided to restructure East Germany's transport system, involving environmental aspects into the transport policy and reduce barriers for usage of more sustainable transport modes. Furthermore, technological development had to be promoted in order to introduce clean, not noisy vehicles and traffic management had to be improved by using road taxation. Also economic instruments should be used to tax external cost properly (OECD, 1993).

The orientation towards decreasing the negative environmental impact caused by transport continues until nowadays. The Federal Government of Germany intends to decrease greenhouse gas emissions by 40 % until 2020 compared to the situation in 1990. The transport activities created 16 % of total emissions. Thus, The Federal Ministry of Transport, Building and Urban Development

promotes modal switch to railways and inland waterways. In order to boost the reduction of the emissions the innovation program was established, which sponsors cleaner diesel engines and particulate traps usage, and 10 million were reserved for this purpose for period 2007-2011 (BMVBS, 2010).

#### **4.4.3 Innovation and Infrastructure as External Factors**

##### ***Innovation***

The rail transport provides high levels of noise, thus, just promoting rail will not solve all environmental issues. Hence, additional measures are taken in order to diminish creation of noise. For instance, access fees are planned to include noise impact. This should encourage the use of low-sound level brakes. The Federal Ministry of Transport, Building and Urban Development push European Commission to revise Directive 2001/14/EC. The know-how gained through “Quiet Freight Transport” explains how charges and quiet wagons can aid to reduce noise. The same program ensures financial help to the purchasing of quiet wagons and retrofitting of 5,000 operated wagons. Majority of these wagons will be used in Rhine Valley lines for five years (BMVBS, 2010).

Of course, not only environmental issues should be solved in order for rail to become a more attractive alternative. There are special programs that aim to fund the improving level of rail freight network. Moreover, path conflicts between passenger and freight operations must be solved at national level. It is also necessary to improve interoperability between different countries. Europe Rail Traffic Management System (ERTMS), a project, which promotes interoperability of rail transport between different countries, will help to achieve this goal. For example, the Federal Government plans to provide the Rhine Corridor (Rotterdam, Emmrich, Basel–Genoa) with European Train Control System (ETCS) signaling equipment. The investments of the project are approximately €870 million. Later, other corridors (B, E and F) will be involved in the program. Here the rolling stock will be provided with a specific transmission module (STP). This part’s implementation is planned during 2015-2020. With this equipment, the ETCS rolling stock can be used in entire Germany. It is estimated that the implementation of the system will cost €200 million (BMVBS, 2010)

There is a need to increase the efficiency of rail freight market, otherwise, it will not be able to cope with increased volumes. Thus, trains must be longer and exceed 750 meters. However, it means that infrastructure and safety requirements must be adjusted (BMVBS, 2010).

In order to achieve a better performance of intermodal transport system it is necessary to establish efficient linkages between different modes by using innovative technologies. The main tool in this field is programs that are dedicated for subsidizing modern capacity-expanding technologies. These funds can be involved in the Federal Ministry of Transport, Building and Urban Development budget (BMVBS, 2010).

The interesting project is “Eco rail innovation”, which is organized by DB together with sixteen private companies, research centers and other organizations. This initiative will lead to innovative solutions, which will aid to reduce emissions to zero-levels until 2050. The usage of the low-emission components and powertrains will be promoted (UIC, 2013).

## ***Infrastructure***

Germany has totally 41,981 km of railways, which makes it the 6th longest network in the world. The absolute majority of the network has a standard gauge of 1,435 mm (41,722 km) and half of it is electrified (CIA, 2008).

This situation is similar to other EU countries, for instance, in Italy the track is served by Rete Ferroviaria Italiana (RFI) and in France the company is called Reseaux Ferre's de France (RFF). Nevertheless, the levels of disassociation in different countries are unequal. In Germany's case DB Netz's separation from the mother company is based only on the accounting, while RFF is a completely separate body, despite the fact that they both belong to the state (Debie & Gouvernal, 2006). UK infrastructure provider also has a large degree of separation (Geyer & Davies, 2000).

The track providers in Europe influence intermodal market indirectly by allocating slots. Traditionally in Europe the priority is given to the passenger and state company trains due to the importance and historical background. DB Netz influences significantly the internationally competitive German intermodal companies, as there are discounts for clients that work with Hamburg and Bremen ports (Debie & Gouvernal, 2006).

In some German Bundeslander, for instance, in Niedersachsen, the local government has the rolling stock and rents it to the tender winning firm. Other companies still pose rolling stock and DB does not provide rolling stock to others. Furthermore, the depots and maintenance does not belong to DB Netz. The inability to have sufficient capacity is some kind of obstacle to new players. Moreover, licensing practice in Germany is a little bit discriminatory, because it involves special and quite strict requirements for the employees and technological aspects. However, in general, Germany is a more open market and has a larger amount of companies in both freight and passenger sectors than majority of European countries (Beria et al., 2012).

Overall, Germany's railways have the most straightforward financial system, although its organizational structure is complicated. The state funds just the investments and particular services. There are no subsidies for maintenance of new trains. The new trains have to be purchased by using own funds and public support cannot be used, which vary different from other European countries (Beria et al., 2012). Investments in infrastructure are covered by the own funds and state subsidies. Loans according to DB policy are not the sustainable way for financing. Unfortunately, there is a lack of investments into Germany's railway infrastructure (DB, 2013).

### **4.4.4 Demand**

Germany is in a very convenient geographical position. For instance, the EU geographical center is located 42 km from Frankfurt am Main in Meerholz. Thus, it is natural that the majority of TransEuropean routes cross Germany. Another illustrative fact is that 250 million people live in the territory of 500 km radius from the borders of this state. These factors make Germany very attractive country for transit traffic (GTAI, 2010).

Germany's geographical position enables an establishment of connections between suppliers and customers. Therefore, according to some surveys, it is the best location for distribution centers in entire Europe. Moreover, the logistics sector in Germany generated a turnover of €218 billion and that amount is twice as big compared to the closest European competitors, such as France or UK (GTAI, 2010).

**Development of German foreign trade**  
in EUR bn

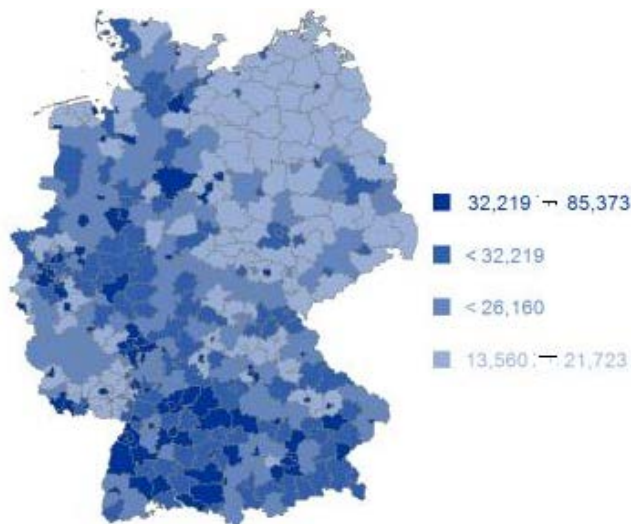


2013 = preliminary result.

© Statistisches Bundesamt, Wiesbaden 2014

**Figure 9: Germany's Export and Import (Statistisches Bundesamt, 2014)**

Furthermore, Germany has very good conditions to generate domestic traffic. It is the 4<sup>th</sup> strongest economy in the world. The country has positive trade balance (see Figure 9) and although both export and import were negatively affected by the financial crisis in 2009, soon they recovered. Secondly, Germany is the second largest exporter after China. Main trade partners are the EU members, especially there are large export volumes to the Netherlands and France. The USA is a clear leader as export target outside the EU. The main industries are machinery, transport equipment including cars and trucks, chemical products. The most popular imported products are electrical and optical equipment, machinery and transport equipment. Finally, there are 82 million of inhabitants, who constitute 16 % of entire the EU population. See Figure 10 for GDP per capita. They have the highest purchasing power among all other members which is 20 % of the total EU GDP (GTAI, 2010).



**Figure 10: GDP per capita in EUR (Finfacts, 2011)**

There are 21 main logistics regions (see Appendix 3 for map) according to Germany Trade and Invest report (2010):

- Bremen-Wesen region
- Hamburg Metropolitan region
- Rostock region
- Münster/Osnabrück
- Rhine-Ruhr region
- Hannover/Braunschweig
- Magdeburg
- Berlin/Brandenburg
- Saxonian Triangle
- Nordhessen
- Thuringia
- Rhine-Main region
- Rhine-Neckar region
- Stuttgart/Heilbronn
- Saarland
- Hahn
- Nuremberg/Upper Franconia
- Ulm
- Danube region
- München

In the majority of the regions freight villages or intermodal terminals exist. A big concentration of them is situated in Hannover/Braunschweig, Rhine-Neckar and Stuttgart/Heilbronn. Nuremberg is interesting due to the trimodal freight village, which is the largest South Germany hub that transships 11 million tons freight each year (GTAI, 2010).

The demand for the transport is shaped by the economic situation and international trade. Since the sales figures dropped down in 2012, these trends were reflected in transport amount too. Moreover, container shipping also experienced harsh times, although there was a small growth in terms of volumes. This economic situation was influenced by Eurozone debt crisis, therefore none of the transport modes had good results compared to previous years (DB, 2013).

The demand for rail traction slumped by 4.2 % in September 2012, while at the same period in 2011, the need increased by 7.4 %. This decline and overall trend of stagnation is a consequence of difficult economic situation. Compared to passenger sector, the rail freight market faced more challenges, because production volumes decreased in majority of businesses. The intermodal transport had some serious issues too. For instance, there were some obstacles because of construction activities and natural disasters, such as falling rocks in the alpine region. Therefore, the Gotthard railway was shut for approximately 40 days. However, still the main factor, that had a negative impact, was economic struggles. They especially affected transit transportation via Germany, and here losses were more significant compared to the domestic market. Overall, German railway companies did better compared to Scandinavia, Eastern Europe and other countries (DB, 2013).

#### **4.4.5 Competition with Trucking Industry as External Factor**

Road transport and rail freight market developed in a very alike way. For instance, the volumes that were transported by road grew by 17 % during 2000-2008, nevertheless, they declined by 7 % in 2009. Road transports had 72 % of the land-based market when the crisis started, although in

previous years the trend of decreasing share was visible and in 2008 it dropped only to 69.5 %. Another significant fact is that the combined freight transportation decreased by 10 % in just one year (Steer Davies Gleaves, 2012).

Truck industry (German and foreign with cabotage), which is the leading mode in Germany saw a continuous decrease, which totaled at 2.5 % for the whole year. Thus, the overall market share for transport declined to 71.1 %. Especially the situation was bad with local truck operators, as they had 4.5 % shrinkage of ton-km, while foreign companies grew by 1.5 %. A smaller decrease for the overseas firms was a consequence of increasing numbers of trucks from Eastern and Central Europe countries, including Romania, Bulgaria, Lithuania, Poland, Latvia and Slovakia. DB (2013) notices that capacity bottlenecks in Europe railway market concentrate in the particular regions and roads. Moreover, customers demand lower price, while there is a stable growth of costs mainly due to the increasing diesel prices. Thus, competition in this sector becomes more intensive (DB, 2013). The main traffic flows are located in the North West part of the country, see Appendix 4.

In Germany there is a restriction for the trucks' weight which is 44 tons, while one wagon can carry 90 tons (depending on type of wagon and track), thus it is two times more efficient compared to truck transportation (Rail freight portal, 2014). Moreover, in this country it is prohibited to drive with trucks on Sundays and public holidays (on all routes) and on Saturdays during summertime (on particular routes). There are some nighttime driving restrictions in certain roads too. Nevertheless, there are some exceptions for trucks, for example, that they are involved in intermodal transportation, as they can transport goods from terminal to the nearest consignee (Transports Friend, 2014).

Germany trucking industry undergoes the lack of drivers. First of all, the demographic trends in Germany have created a situation where 40 % of the truck drivers will have to go to retirement in the upcoming ten year period. Another factor is the stopped mandatory military service, which ensured 20 % of truck driver licenses. Moreover, the federal German government aggravated the licensing procedure, because now future truck drivers have to learn about customs requirements, economic driving and legislation related to the traffic regulation and safety. The training can take three years and cost up to €8,000. If drivers do not own the required documents, they will be charged €500 (Weiss, 2013).

The salary in eastern EU countries, such as Romania or Bulgaria, is five times smaller compared to Germany wages. Consequently, many companies are hiring drivers from these countries in order to reduce operating costs, although their working conditions are extremely poor. Another problem is related to the cabotage and illegal drivers because companies from Slovakia employ Ukrainian drivers and Latvian companies engage Pilipino, who does not own necessary documents (Weiss, 2013).

## **4.5 Market Description in Sweden**

### **4.5.1 Deregulation and Intramodal Competition as External Factors**

#### ***Deregulation***

Sweden initiated deregulation process in 1988 and in 1990 the first private railway activities entered the market. The reform was encouraged by stated-owned railway company due to its bad financial



situation). Primarily, the railway system was vertically separated into Banverket (today Trafikverket) who was responsible for the network and Statens Järnvägar AB (SJ) who was responsible for rail haulage. The very first private entrant was BK Tåg, which started to run regional passenger service (Nilsson, 2003). In 1994 when SJ decided to terminate the operations in non-profitable railway routes it gave opportunities for new entrants to take over lines giving up by SJ. Hence, most of the new entrants have direct background from old SJ (Laisi et al., 2012). However, it was not until 1996 that private companies got access to the whole railway network in Sweden (Alexandersson & Hulten, 2005).

Alexandersson (2010) argues that the deregulation of the Swedish rail market is inspired by industry-related issues that occur at both regional and national levels. He states that they had a more significant impact than an intention from institutions to move towards greater market accessibility. The major factors were low profitability of SJ, lack of investments towards infrastructure and a good example of road transport field performance. Consequently, railway infrastructure and operations were separated in 1988. These actions together with shifting responsibility for the local and regional rail services, followed by decentralized distribution of funds and rolling stock resulted in the market deregulation and appearance of competition. Nevertheless, Alexandersson (2010) notices that those primary reforms did not have a target to liberalize the rail market, although the conditions for entering the market were established. Thus, he entitles this process an accidental deregulation. Additional reforms toward a higher degree of liberalization were implemented later and competitive tendering was one of the crucial factors.

According to Alexandersson (2010), the government and the parliament provided a major institutional shift regarding the deregulation of the market. Despite this fact, they were not main initiators as their actions were derived from the demand from various actors; SJ, the Competition Authority, Banverket, the state's procuring agency, and operators such as BK Tåg, LKAB and Tågkompaniet (Alexandersson, 2010). A different point of view is provided by Lungvisen and Osland (2009), who argue that alterations were driven by the government and private companies could not do a lot in order to change circumstances depending on their needs, since they face a high level of bureaucracy. This might come from a collective approach, where legislation focuses more on the society than on the individual interests and, thus, a degree of risk taking, which is a critical factor for new entrants, is diminished (Lungvisen & Osland, 2009). Just the efforts towards deregulation of the whole rail sector, shown by the non-socialist government, can be understood as an exception, since the political ideology played a vital role here. As SJ's power shrank, the Competition Authority promoted a possibility to minimize the entry barriers by reducing some of SJ's assets. This organization gained even more power for diminishing a domination of SJ (Alexandersson, 2010).

Vierth (2012) notices that the increase of the competitiveness in Swedish rail freight sector was not based on the deregulation, although the deregulation processes influenced positively on the development of the market. There are no new entrants that are strong enough to compete with the incumbent operator, however, their existence led to a larger number of innovations. Moreover, cost efficiency improved since operators are able to get better results with a smaller amount of staff and wagons (Vierth, 2012). Lungvisen and Osland (2009) argue that the real competition can occur, if public bodies provide new entrants with financial aid and technical support. Still, new entrants need to have flatcars, multi-systems locomotives and easy access to intermodal terminals and this equipment is quite costly. However, more important is the threat of new entrants, which reduce a

possibility to increase freight rates. The lack of real competition causes two political issues. First of all, comparing the costs and resource effectiveness between incumbent operator and new entrants is complicated. Secondly, the state cargo companies are lacking of funds to operate in the international market. These two problems make it more difficult for rail industry to compete with road transportation (Lungvisen & Osland, 2009).

However, there are some obstacles for new entrants. For instance, companies always experienced low profits in rail sector. Furthermore, the new operators are more at risk to the changing market conditions. Although operators can easily enter the market, however, the state still owns facilities such as terminals and marshaling yards and this situation could cause some problems in accessibility to particular units of infrastructure. Other issues can be found in the international transportation, as interoperability is not sufficient, and there is a need for more expensive locomotives, which can be explored in countries where various electricity and signaling systems exist. Moreover, certificates must be approved in different states (Vierth, 2012).

After separation of operators and infrastructure providers, Green Cargo has to act according to market conditions and seeking for profitability became more important, despite the fact that it still is a state-owned company. However, Green Cargo did not reach a profit until 2005 (Lungvisen & Osland, 2009).

In 2004 the market increased a level of internalization. Operators from Norway and Italy entered the market. The interesting project was between Norwegian and Swedish national railways, when they formed CargoNet – an intermodal transport company that served between these two countries. Green Cargo together with DB established a company, called DB Schenker Scandinavia for the international market (Vierth, 2012). As Lungvisen & Osland (2009) notice the Swedish railway market was adjusted according to the The First Infrastructure Package and Interoperability Legislation.

### ***Intramodal Competition***

From 1996 until 2010, 22 new companies have entered the Swedish railway network. However, under the same period of time, 17 (18 including Cargo Net's exit in 2012) companies have left the market, where, for example, low profitability and bad punctuality at terminals are two reasons for quitting business (Transportstyrelsen, 2010; Vierth, 2012; Flodén & Woxenius, 2013). In 1996 there were 12 operators transporting goods in Sweden and in 2011 there were 15 companies in the business of transporting goods (Trafikverket, 2011).

Figure 11 shows several hiving-offs, fusions, bankruptcies, new entrants and name changes from 1991 to 2011. Vierth (2012) has identified four groups of operators in the Swedish market:

- Group 1: Malmtrafik i Kiruna AB (blue) (MTAB)
- Group 2: The state-owned company or companies tied to the state-owned one (green)
- Group 3: Competitors with more than 20 employers in 2010 (red)
- Group 4: Competitors with less than 20 employers in 2010 (grey)

1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
LKAB					MTAB (LKAB)															
SJ										Green Cargo										
TGOJ																				
										DB Schenker Rail										
										CargoNet AS / CargoNet AB										
			TÅGAB																	
												Hector Rail								
														TX Logistik						
																	Peterson Rail			
Inlandsbana																		Inlandståget		
BK TÅG															MidCargo					
Shortline Väst									FalköpingsTerminal				Tågfrakt							
										Skånetåg			VV Produktion			Stena Recycling				
												Railcare								
																				Rush rail

Figure 11: A Schematic Picture of Goods Transports Operators in Sweden since 1991 (Vierth, 2012, p 20)

### Group 1

Malmtrafik i Kiruna AB (MTAB) is a daughter company to the state-owned mining company LKAB. Before the deregulation LKAB had permission from the government to run its own trains from their mines to the ports of Luleå (Sweden) and Narvik (Norway) (Vierth, 2012).

### Group 2

Until 2001 SJ AB was running the goods transport in Sweden, but then Green Cargo AB was established and took over the operations of transporting goods. TGOJ Trafik AB has been operating over the years on the railways as well as leasing out and maintain rail cars for cargo transport. In 2011 TGOJ Trafik AB became an integrated part of Green Cargo AB. DB Schenker Rail Scandinavia AS is a company performing cargo transports between Sweden, Denmark and Germany for the owner of the company which is Deutsche Bahn AG (51%) and Green Cargo AB (49%). CargoNet AS/CargoNet AB was a company specialized in combined transports owned by Green Cargo AB (45%) and the state-owned Norwegian company NSB (55%) (Vierth, 2012).

### Group 3

In the end of year 2010 Green Cargo AB sold their shares in CargoNet to NSB. However, in 2012 CargoNet left Sweden and is only operating on the Norwegian market, but is still transporting cargo through Sweden (Vierth, 2012; Flodén & Woxenius, 2013). The reasons why CargoNet left Sweden were bad punctuality, declining results and a terminal regime that is not working (Vierth, 2012; Flodén & Woxenius, 2013). Tågakeriet i Bergslagen AB (TÅGAB) started their business in 1994 as a contractor for SJ AB and are today operating both passenger and cargo transport as well as maintenance of rail vehicles. TÅGAB operates in Sweden and to and from Norway. Hector Rail AB is a Norwegian company and has been operating in Sweden since 2004 in both passenger and cargo transportation and has operations in Sweden, Norway, Denmark and Germany. Peterson Rail AB is Daughter Company to the Norwegian Peterson Rail AS. Since 2007 the company is operating in

Sweden and is transporting timber and pulp to Norway. In 2011 the company acquired Stena Recycling (Vierth, 2012).

**Group 4**

Inlandsbanan AB is owned by 15 municipalities and is supposed to develop and administrate track systems, distribute rights as well as provide basic service on and along the tracks that the operators need. The daughter company, Inlandståget AB, is operating both passenger and cargo trains within Sweden. Midcargo (former BK Tåg) has a history of operating both passenger and cargo trains as well as offering consulting activities, but today they are only operating freight trains. RailCare AB’s task is to improve and maintain the railroad. As mentioned above, Peterson Rail bought Stena Recycling AB. Stena Recycling AB has 200 facilities around Sweden, Denmark, Norway, Finland and Poland and is transporting recycling material with their own locomotives and wagons. Tågfrakt AB (previous Falköpings terminal, Shortline väst) is managing terminal operations and cargo transport by truck (Vierth, 2012).

**Market Concentration**

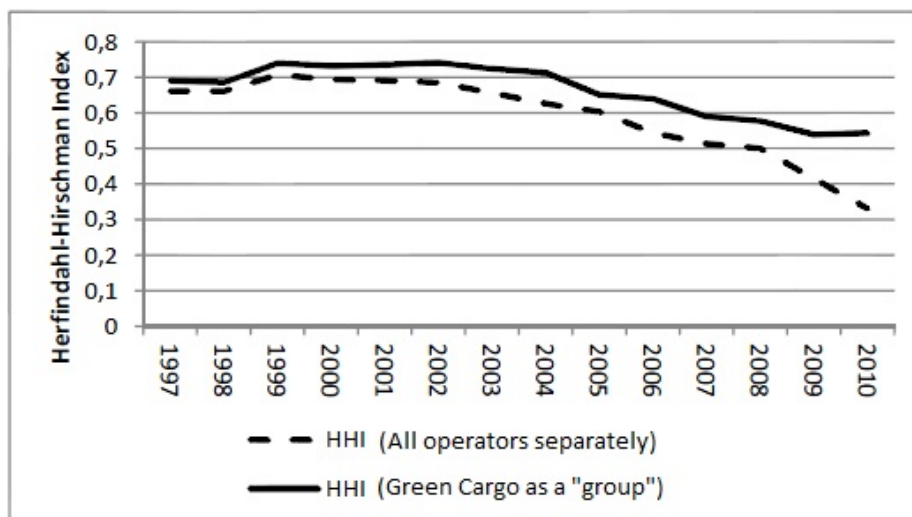
One way of measuring the market concentration is to measure the ton km transported, where the statistics is based on freight agreements between operators and customers. No agreements between operators are taken into account in order to avoid double counting and it is not common that operators buy transportation between each other (Vierth, 2012). In Table 7 the market concentration based on ton km is shown for Sweden.

**Table 7: Development of Market Concentration Measured in Transport Activity (ton km) (Vierth, 2012, p 28)**

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Green Cargo Group	81	81	85	84	85	85	84	83	79	78	77	76	73	72
MTAB	19	18	14	14	14	14	15	15	17	15	14	14	13	16
Operators >20 employees	0	0	0	0	0	0	0	0	3	5	8	9	13	11
Operators <20 employees	0	1	1	1	1	1	1	1	1	1	1	1	1	1

In the table above it is displayed that operators with more than 20 employees gradually taken market shares from the state-owned companies. Their market shares in ton km increased from 3 % to 11 % (top high 13 %) between 2005 and 2011. Hector Rail, TX Logistik and Peterson Rail are the main foreign actors who together transported 5 billion ton km and Hector Rail alone transported 2/3 of the 5 billion ton km in this group in 2010. Operators with less than 20 employees had a share of 1 %, while MTAB’s share is sensitive to the economic situation, hence, some fluctuation occurred.

Another way of measuring the concentration in a market is the Herfindahl-Hirschman Index (HHI) and is defined as the sum of squares of the market shares of each individual operator. HHI lies between 0 and 1, i.e. from a very large amount of very small firms to a single monopolistic company. In Figure 12 the HHI is based on ton km on the Swedish market between 1997 and 2010. The result shows that the concentration on the Swedish market for cargo freight on rail has decreased over time, which means a gradually increase of competition (Vierth, 2012).



**Figure 12: Herfindahl-Hirschman Index for the Market of Cargo Transports on Railroads in Sweden (Vierth, 2012, p 29)**

Vierth (2012) has done the investigation with two options. The first option where all operators are separate and another one where companies working closely with Green Cargo are consolidated to one entity. Even here it is depicted that the competition is gradually increasing.

However, the market is still dominated by the state-owned Green Cargo and companies integrated or connected to it. These operators produced together 72 % of all ton km, MTAB approximately 15 %, operators with more than 20 employees around 11 %, and operators with less than 20 employees about 1 % (Vierth, 2012).

#### **4.5.2 Policy and Society as External Factor**

##### ***Policy***

Transportstyrelsen (2012(b)) investigated the movement of companies to and from the Swedish market and according to them the movement is low. 12 out of 16 operators that were operating in Sweden during 2009 were operating in Sweden during the period 2005-2009 and the explanation behind this is believed to be the high barriers to enter the market as well as being able to compete with the already established companies.

In order to be able to operate on the Swedish market permission is required which means that companies need to meet the requirements in the Swedish railway law (Järnvägslagen, SFS2004:519)<sup>2</sup>. The Swedish Transport Agency points out that these requirements are important in order to retain the security. However, at the same time these requirements make it hard for new entrants since these requirements are seen as a barrier and the Swedish Transport Agency believes this affect the competition negatively (Transportstyrelsen, 2010). In the study made by Vierth (2012) operators do not see the requirements as a barrier, but the complicated rules are seen as a barrier since they result in high administrative costs. Laisi et al. (2012) present that the Swedish market faces strong barriers to entry in terms of bureaucracy. It is the main obstacle and is associated with the needed paper work (excessive number of needed documents), certificates and the entry process itself, which

<sup>2</sup> Visit [http://www.riksdagen.se/sv/Dokument-Lagar/Lagar/Svenskforfattningssamling/Jarnvagslag-2004519\\_sfs-2004-519/?bet=2004:519](http://www.riksdagen.se/sv/Dokument-Lagar/Lagar/Svenskforfattningssamling/Jarnvagslag-2004519_sfs-2004-519/?bet=2004:519) for more information about the Swedish railway law.

is seen as long and exhausting. Two other major barriers to enter the Swedish market are locomotives/rolling stock and investments (Laisi et al., 2012). Network capacity, finding a customer and loading areas are minor barriers in Sweden. Investments are not seen only as rolling stock but also as personnel. A lot of personnel are required with different expertise in order to fulfill the needed certificates, etc. Moreover, even if people had experience on the market, the entry process seems to be impossible without help from consultants and experts (Laisi et al., 2012). Vierth's (2012) study also shows that these complicated rules require operators to hire staff and/or consultancies in order to be able to follow the development of rules. Lastly, operators believe that these heavy regulatory systems will affect the market negatively, especially international cargo transports (Vierth, 2012).

There have been some disputes between new entrants and traditional companies, where new players feel that incumbent operators oppose against them. For example, Green cargo has been criticized for dumping prices and cross-subsidize (cross-subsidization if defined by Business Dictionary (2014) as "a strategy where support for a product comes from the profits generated by another product.") between wagonload, where Green Cargo is the only operator, and other domestic transportation. A newly established operator in Sweden thinks it is more delicate for cargo transport operators to report its competitors to the Swedish Competition Authority since they compete for cargo and not for passengers (Vierth, 2012).

When it comes to distribution of infrastructure capacity it needs to follow the law, according to Järnväglagen (SFS2004:519), and the distribution of infrastructure capacity to operators need to be done in a competitively neutral way without any discrimination for a fee. If requests for capacity cannot be coordinated, the infrastructure manager shall allocate capacity by means of fees or in accordance with the prioritization criteria leading to an economically efficient use of infrastructure (Vierth, 2012).

However, Vierth's (2012) study identifies that operators feel there are shortages of rail capacity, most of them in connection to big cities and on Öresundsbron (the bridge connecting Sweden and Denmark). One operator is criticizing the constraint of electricity distribution to trains which affects the time table scheduling and the use of rail capacity negatively. A transport buyer reasons that shortages of rail capacity constrain rail operators to compete with other modes of transportation. The track fees paid to the Swedish Transport Administration should result in a more efficient use of rail capacity. However, operators indicate that today's track fees (paid per gross ton km) do not encourage operators to drive with heavier trains (30 tons load per axle on malmbanan up north) or longer trains (new locomotives can move 20 % tons more), and operators criticize the fee structure, which they believe favor traditional companies who drive with old trains (Vierth, 2012).

Some operators point out the high track fees as a competition barrier. According to Swedish and European transport policy, track fees should be charged so that external short-term marginal costs internalize; today, however, the internalization rate for freight in total is between 17 % and 24 % (Trafikanalys, 2011(b)). The price determination is a part of the internalization of the traffic's external impact, i.e. another pillar of the Swedish and European transport policy which is based on three pillars: the prerequisite building regulations (including those related to competition between operators in a market), the internalization of external transport costs for all modes of transportation and a balanced investment policy (Vierth, 2012).

## ***Society***

The society plays a vital role as well for the railway business overall, when it comes to maintaining or increase of the quality of life for both humans and animals. The most undertakings done by the authorities in the railway business are to mitigate noise (Transportstyrelsen, 2014(b); Trafikverket, 2014(c)), air pollution and climate changes (Transportstyrelsen, 2012(a); Trafikverket, 2012). Transportstyrelsen is the authority who gives permission to reconstruct or build new infrastructure (technical systems) or vehicles that are used in the Swedish railway network. The permit application process that regulates noise is harmonized within Europe and applies in standardized railway networks (the ones that are specified in TSD (in Swedish: tekniska specifikationer för driftskompatibilitet)). Noise levels are specified in TSD Buller (TSD Noise), 2011/229/EU, and these documents say that cargo wagons must be equipped with composite blocks in order to meet the requirements. A list of accepted composite blocks in order to meet the specifications for winter conditions is available in TSD Gods (TSD Cargo) (Transportstyrelsen, 2014(b)). Trafikverket is the authority who is responsible for mitigating the noise levels from the railways. It is responsible for minimizing noise during the nights. Therefore, residential areas have been reconstructed, and Trafikverket is now looking at the possibilities to improve noise levels where healthcare, schools and care homes are situated (Trafikverket, 2014(c)).

Emissions from railways consist mostly of metal particles and emerge at the wear on the rails, contact line, wheels and brakes. However, since metal particles are heavy they do not fall far away from the railways and measurements show that the emissions do not exceed the EU's environmental quality standard for railways under open sky. Since the emissions from railways under open sky are low, Trafikverket does not believe there is a need for specific actions towards this matter. Nevertheless, the transport bodies's continuous work for reducing the wear and tear of rails and material will decrease the dispersion of particles (Trafikverket, 2012).

The emissions of carbon dioxide from rail traffic are low compared to other modes of transportation. As demand for fossil free electricity is rising, it is important to use the energy as efficient as possible even on the electrified routes. Looking at the whole transport sector in Sweden, the rail traffic emits less than 1 % of the total amount of emissions of carbon dioxide. Since the renewable electricity is a scarce resource, it is still beneficial to climate to use the power as efficient as possible. Two of the initiatives are, for example, eco-driving and feedback of energy, where eco-driving is nowadays mandatory in the education of locomotive drivers in Sweden (Transportstyrelsen, 2012(a)).

### **4.5.3 Innovation and Infrastructure as External Factor**

#### ***Innovation***

Several innovations have been made in the Swedish market of rail cargo transports, both in the way of operating and equipment. It is shown that rail operators produce more ton km with fewer employees and less wagons. For instance, LKAB was able to reduce their production costs from 21 % in 1992 to 11-12 % in 2000 and to 9 % in 2010 (transportation costs are a part of the production costs). The major reason for the decreased costs was due to the deregulation, but also innovations in the way of operating and equipment. Innovations were made in in the loading and unloading process and when it comes to equipment LKAB is able to load 30 tons per axis on Malmbanan as well as having larger trains (Vierth, 2012).

In Sweden the amount of wagons has decreased with 25 % between 1996 and 2010, but operators were able to load more per wagon. In 1996 rail operators were able to load 773,000 tons together, while in 2010 rail operators were able to load 837,000 tons together. 25 % fewer wagons have increased the loading ability with 8 % (Vierth, 2012). Other equipment innovations are more efficient locomotives and investments in locomotives that are able to operate in Sweden, Denmark, Germany and Norway, i.e. locomotives with equipment able to meet system requirements in different countries (Wajsman & Nelldal, 2008).

An operator brings up that the deregulation has led to lower transport prices and innovate planning of routes as well as new, innovative locomotives. A transport buyer explains that the deregulation has given its employed operator incentive to invest in new locomotives in order to meet customer requirements, such as capacity, environmental and energy efficient locomotives (Vierth, 2012).

### ***Infrastructure***

Sweden has a total of 16,500 track km and out of these 16,500, Trafikverket is responsible for 14,700. About 80 % of Sweden's railway network is electrified, which is good from an environmental point of view (Trafikverket, 2014(b)) and the power supplied to these tracks are environmental friendly (Trafikverket, 2014(a)). On those tracks, which are not electrified, the trains and wagons are running on diesel (Trafikverket, 2014(a)). In 2010 Sweden started to implement European Rail Traffic Management System (ERTMS), which will be implemented continuously until 2035 and will make it easier for both cargo and passenger trains to drive cross-border traffic (Trafikverket, 2014(d)).

In order to operate on the Swedish railway network, an operator needs to apply for a total of 105 permissions, partly with restrictions on type of vehicles and which infrastructure an operator can run its vehicles on respectively (Transportstyrelsen, 2011). The overall goal for the Swedish transport policy is to ensure an economically efficient and sustainable transport system for citizens and businesses throughout the country. Trafikanalys (2011(a)) pointed out that the quality of transport services decreased in year 2010 due to delays during the winter period. The CEOs for Green Cargo, TÅGAB, Hector Rail and Inlandståget state that this does not have anything to do with the deregulation (Stöhr et al., 2011). However, Sweden has some areas which are in need for improvement, especially the infrastructure area concerning road and rail transportation (Trafikanalys, 2011(a)).

Terminals are another important infrastructure facility for rail operators in order for them to carry out the transport service. In 1996 when the market was deregulated Rail Combi operated at the terminals, but after several critics Jernhusen (a Swedish state-owned terminal operator) took over the operation from 2010 (Vierth, 2012). In 2010 Jernhusen started to operate the terminals in Gothenburg, Jönköping, Stockholm-Årsta and re-opened the terminal in Västerås (Vierth, 2012). Nowadays, Jernhusen owns 13 (Jernhusen, 2011) out of 30 (Vierth, 2012) terminals in Sweden, whereof eight are intermodal terminals (Jernhusen, 2011). Jernhusen has a government mandate to contribute to the development of freight terminals and maintenance depots as well as having them available for freight operators and other users' disposal on competitively neutral terms. Interviews with rail operators show that they are satisfied with Jernhusen being the owners and developers of terminals and that Jernhusen were able to solve issues Rail Combi faced. Other terminal operators, such as municipalities (for example terminals in Eskilstuna, Falköping, Vaggeryd and Umeå), seaports, road hauliers and/or rail operators and so on compete with Jernhusen (Vierth, 2012).

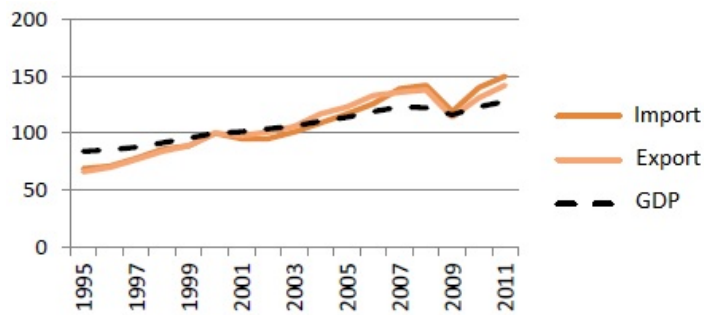


Interviews show that transport buyers and transport operators call for better infrastructure and terminals in Sweden. For instance, transport buyers and transport operators say intermodal businesses is the future and therefore it requires good infrastructure and terminals at the right spot open 24/7 for all operators. Further, Sweden should take a look at other countries' intermodal network in order to ensure similar conditions in the Swedish market. Some operators do not even make any long-term and sustainable network solutions if there are no good terminals. Lead times, precision and costs are key elements for transport buyers and transport operators and if the rail network cannot meet these tough requirements from different industries it is hard to use the rail network. Lastly, some rail operators feel that deregulation is faster than development of infrastructure, but if the infrastructure has bad quality it is hard to move cargo from road to rail (Vierth, 2012).

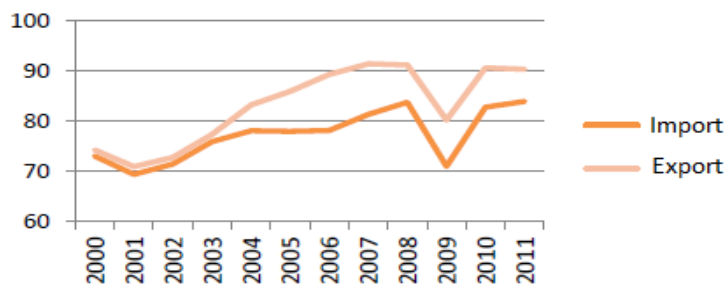
Some proposed and planned infrastructure development for the railway network in Sweden is Europabanan, which is a high-speed rail track (Åkerman, 2011) and Sydostlänken (TransportNet, 2010). Passenger trains would be operating on Europabanan that is planned to consist of a new link between Stockholm (Järna) and Gothenburg via Jönköping of 440 km and another route of 300 km between Jönköping and Malmö/Copenhagen (see Appendix 5). Both links would be double tracked, where trains would be allowed to drive around 300 kph (Åkerman, 2011). Adding this network to the existing one would allow more than a twofold increase in rail capacity, since freight trains would be separated from fast passenger trains (Mattsson, 2007). Sydostlänken will have an important impact on the business in the South East region of Sweden, where companies, such as Volvo Cars and IKEA, believe their ability to develop the business and recruit people will be positively affected since both freight and passenger trains will operate on Sydostlänken. The line will connect the Port of Karlshamn and Älmhult, a base of IKEA, via Olofström, where Volvo Cars has their body components plant (see Appendix 6). Furthermore, this new link will open up new opportunities for other companies in the region to transport their products to Eastern Europe and Asia (TransportNet, 2010).

#### **4.5.4 Demand as External Factor**

Sweden's export of goods and import of goods in Swedish Kronor (SEK) has over time increased faster than the country's GDP, which means that foreign trade has increased its importance for the Swedish economy; see Figure 13, (Vierth et al. 2012). Figure 14 illustrates export and import of goods measured in tons and counts for 45 % of the total flow of goods in, to/from and across Sweden (Vierth et al., 2012). Vierth et al. (2012) indicates that efficient transportation to and from point of origin and destination has increased its importance due to the increase of foreign trade in terms of tons. In both figures the value decreased in 2009 due to the recession, however, values for both figures increased to the same level in 2011.



**Figure 13: Volume Price Index for Exports, Imports and GDP from 2000 to 2011 (year 2000=100) (Vierth et al., 2012, p 19)**



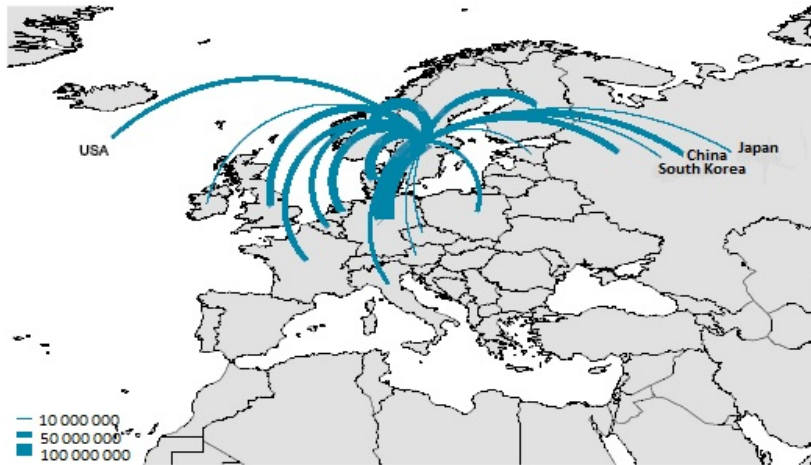
**Figure 14: Export and Import in Millions of tons 2000 – 2011 (Vierth et al., 2012, p 19)**

The largest importers of Swedish products (in terms of SEK) are the Nordic neighbors, Germany, the Netherlands and UK, see Figure 15. Germany is the most important export country in Europe for Sweden, while the largest amount of goods outside the EU goes to China and USA (Vierth et al., 2012).



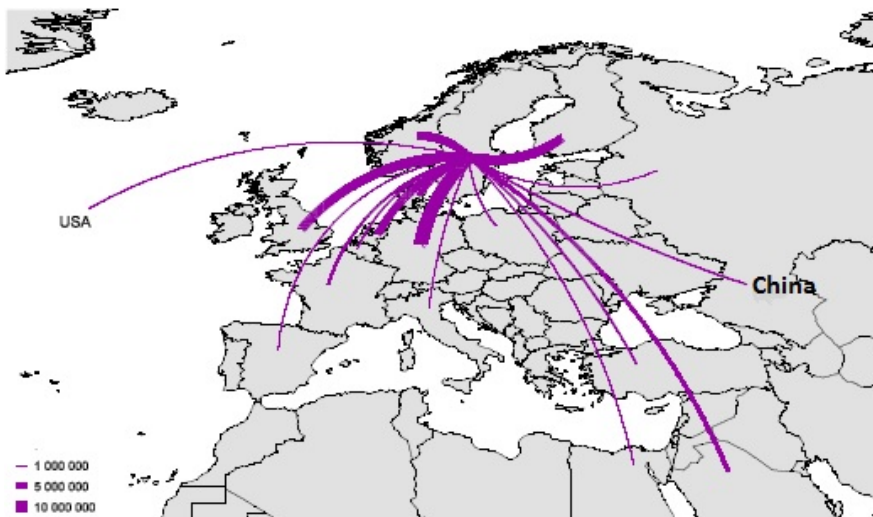
**Figure 15: Distribution of Swedish exports in thousands of SEKs 2010. Export Flows over 10 Billion SEK (Vierth et al., 2012, p 20)**

Figure 16 shows which countries Sweden imports most of their products from (measured in SEK). Germany is the largest exporter followed by Denmark and Finland (Vierth et al., 2012).



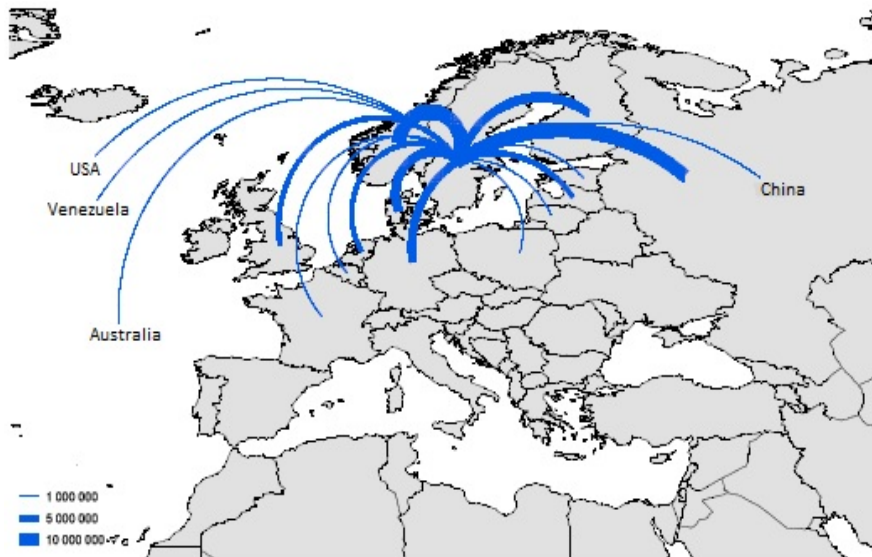
**Figure 16: Distribution of Swedish imports in thousands of SEKs 2010. Import Flows over 10 Billion SEK (Vierth et al., 2012, p 20)**

Swedish exports in terms of tons are similar to exports measured in SEK with a small difference. Again it is the Nordic countries that are important followed by Germany, the Netherlands and UK. Within the EU, Germany is still the most important export country measured in tons. Outside the EU, the largest volumes go to China, USA and Saudi Arabia, see Figure 17 (Vierth et al., 2012).



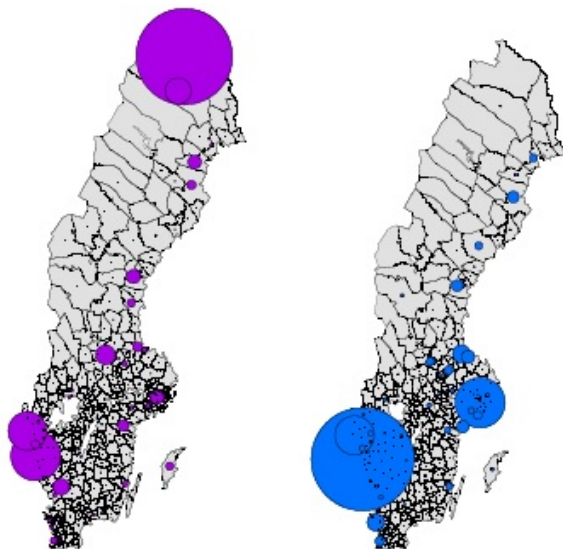
**Figure 17: Distribution of Swedish Exports in tons 2010. Export Flows over 1 Million tons (Vierth et al., 2012, p 21)**

Measuring Swedish imports in terms of tons Russia and Norway (see Figure 18) are the most important countries and these imports are linked to certain regions in Sweden. Other countries on top of the list are Finland, Denmark and Germany (Vierth et al., 2012).



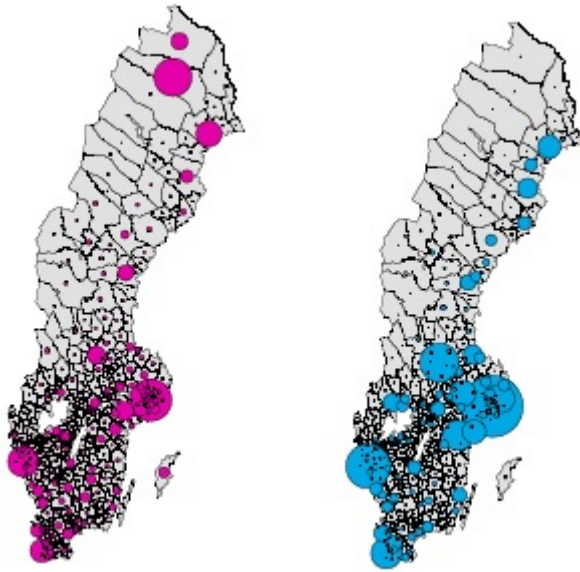
**Figure 18: Distribution of Swedish Imports in tons 2010. Import Flows over 1 Million tons (Vierth et al., 2012, p 21)**

Vierth et al., (2012) present a mapping of which region or city in Sweden is the producer of export flows and the receiver of imports (consumption including value-adding activities). The mapping is measured in tons and based on statistics from several resources. Figure 19 shows that regions exporting/importing iron ore and oil products dominate. Regions with the largest exports are Kiruna (14 million tons), Gothenburg (7 million tons) and Lysekil (6 million tons). Regions with largest import flows are Gothenburg (16 million tons), Stockholm (8 million tons) and Lysekil (6 million tons).



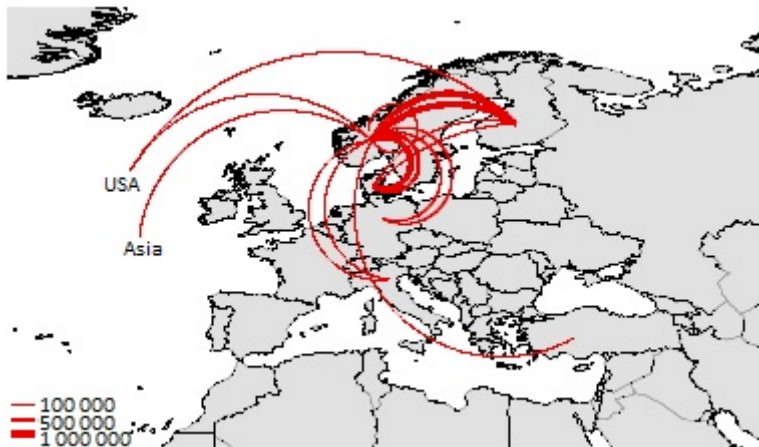
**Figure 19: Calculated Regional Distribution of Production and Consumption Respectively of Swedish Exports (left) and Imports (right) (Vierth et al., 2012, p 23)**

There is no official statistics for domestic trade in Sweden. However, Vierth et al. (2012) have been able to map the cargo's sender (production) and receiver (consumption including value-adding activities). Figure 20 shows the domestic trade, which accounts for 28 % of the total freight volumes.



**Figure 20: Calculated Regional Distribution of Production (left) and Consumption (right) Respectively for Domestic Trade Flows; tons (Vierth et al., 2012, p 24)**

Transit flows in Sweden account for 2 % of the total freight flow volumes (385 million tons) in, to, from and through Sweden. Figure 21 depicts that these product flows start and finish, in neighbor countries, including Norway, Finland, Denmark and Germany (Vierth et al., 2012).



**Figure 21: Start and Finish Points for Flows over 100 000 tons, which Generates Transit Traffic in Sweden (Vierth et al., 2012, p 24)**

Furthermore, demand for rail freight has increased in Sweden after the deregulation compared to countries that have not yet deregulated their railway market (Vierth, 2012). The haulage on railroads has overall increased with 18.3 % between 1997 and 2010 and this has continuously been increasing. Due to the recession in 2009, the volumes of cargo transport dropped with 16.5 %, but in 2010 it increased with 8.4 % (Trafikanalys, 2013). Moreover, intermodal transports increased their market share with 9 %, from 13 % to 22 %, between 1997 and 2010 and that is mostly explained by the increased amount of goods coming to and going from the Port of Gothenburg (Figure 19) and the development of hinterland transports (Vierth, 2012). Unfortunately, there is no information regarding product flows to, from and between intermodal terminals and shunting yards (Vierth et al.,

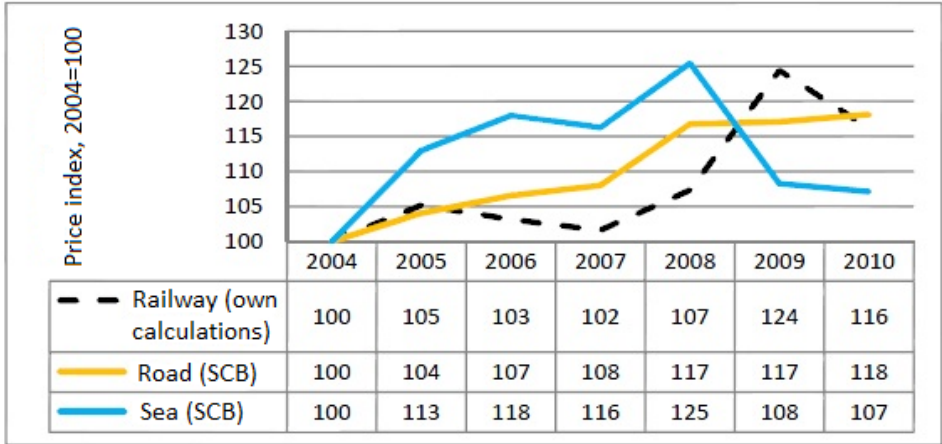
2012). However, Jernhusen has intermodal terminals in Gothenburg, Gävle, Helsingborg (starting 15<sup>th</sup> of October, 2014), Malmö, Nässjö, Stockholm-Årsta, Sundsvall and Västerås (Jernhusen, 2011).

**4.5.5 Competition with trucking industry as External Factor**

Even if intermodal transport has increased in Sweden over the past years, there is still tough competition in market, especially with road transportation (Vierth, 2012). For instance, looking at arriving shipments to Sweden, only 3 % is carried by rail or rail plus other mode of transportation compared to all road transportation, where their share is 11 % and road plus sea 17 % (Vierth et al., 2012). However, when observing land based shipments in 2008 in Sweden, rail accounts for 35 % and road accounts for 65 %. Further, if looking at all modes of transportation, rail accounts for 22 % of all shipments, while road accounts for 41 % (Vierth et al., 2012).

The usage of infrastructure to carry goods is concentrated to six main corridors, see Appendix 7 for map and corridors. It is clear that the north-south route and the sea route are dominating overall. The calculations are based on transport flows in tons. Around 40 % of the total freight volume on roads is concentrated on these six corridors, where the used roads accounts for 3 % of the state-owned road network in Sweden. For rail, on the other hand, around 90 % of the total freight volume on railroads is concentrated on these specific rail routes, where these railroads account for 35 % of the total railway network (Vierth et al., 2012). Appendix 8 and Appendix 9 show the traffic activity on roads for heavy vehicles (>=3.5 tons) and the flow of cargo trains respectively. It is shown that almost 23 % of the total traffic activity for heavy vehicles drive on the six main corridors. For rail it is shown that 75 % of the total traffic activity on railroads is carried out on the six main corridors, especially on Västa Stambanan and Södra Stambanan (Vierth et al., 2012).

Transportation prices for road and rail services have increased almost equally between 2004 and 2010, see Figure 22. Different factors need to be taken into account when transport companies calculate prices for customers, such as production costs, taxes and fees, service and quality standards, competition with operators, competition with other modes, etc. (Vierth, 2012). Price data is sensitive data and that is why there are only price indexes for road and sea (SCB, 2011). Vierth (2012) has, therefore, calculated an average price for rail (net sales divided by net ton km).



**Figure 22: Development of Prices for Railway, Road and Sea Transports, Index 2004=100 (Vierth, 2012, p 41)**

By 2010 the prices have, as mentioned above, increased almost equally; railway with 16 % and road with 18 %. However, railway prices increased significantly during the recession in 2009 and dropped



in 2010, while road prices were stable during the recession. An interesting observation made by Vierth (2012) is that railway prices decreased between 2009 and 2010, while the track fees increased with 10 %. In this case the assumption that operators fully pass on higher charges to shippers does not apply (Vierth, 2012). Rail operators in Sweden give the picture that the quality of transport services has increased due to competition from other rail freight service providers as well as from road hauliers. According to Vierth (2012), new entrants have taken over transports from Green Cargo (e.g. Hector Rail) and transports from road hauliers (e.g. TX Logistik and TÅGAB).

Moreover, different rules and regulations for trucks and railways, for example, weight and dimensions play an important role when planning internationally transportation routes. For instance, a DHL-driver was heading to France with a Finnish trailer, which had a gross weight of 48 tons. The driver got caught in a traffic control by the police in the Port of Gothenburg, where the driver received a fine due to overweight. For international traffic (five-and six-axis articulated vehicles) the maximum gross weight is 40 tons, while for domestic traffic it is 48 tons. The maximum length for this type of combination is 18.75 meters (Udikas, 2012). Moreover, Sweden has other domestic rules that are not applicable for international traffic. For example, the maximum length of a three-axis truck combined with a four-wheel trailer is 25.25 meters (Transportstyrelsen, 2014(c); Larsson, 2009), while in the EU the maximum length is 18.75 meters (Larsson, 2009) and the maximum gross weight for such a combination in Sweden is 25 plus 36 tons, which is a total of over 60 tons (Transportstyrelsen, 2014 (a)). Furthermore, the Swedish Government has given the Swedish Transport Agency and Swedish Transport Administration permission to implement regulations for trucks with a gross weight of 74 tons (Stenvall, 2014).

Weight regulations for trains are more streamlined than for trucks. The maximum weight on a wagon per axis is 22.5 tons (except for wagons operating on Malmbanan, where the maximum weight per axis is 30 tons as mentioned in section 4.5.3) (Trafikverket, 2014(a)). A two-axis wagon has a maximum loading of 29 tons (gross weight 45 tons) and a four-axis wagon has a maximum loading of 64 tons (gross weight 90 tons) (Skoglund & Bark, 2007). The speed of a cargo train is usually 100 kph, however, Green Cargo is driving at a speed of 160 kph, but loads only 20 tons per axis (Jönsson, 2004). Trafikverket (2014(a)) is continuously developing the rail network in order to handle wagons where it is able to load 25 tons per axis.





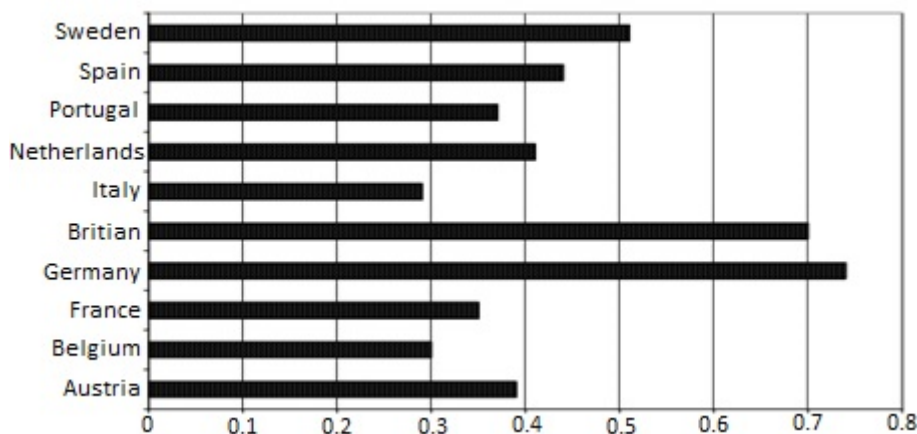
## 5 Analysis and Discussion

*In this chapter, a comparison between the German and the Swedish market, as well as an analysis of the empirical data collected in relation to the theoretical framework is presented. Lastly, a discussion about the empirical findings is given.*

### 5.1 Comparison between the German and the Swedish Market

#### 5.1.1 Deregulation and Competition

Both countries experienced somehow similar deregulation process and more or less at the same time. In Germany and Sweden the liberalization started in the regional passenger service and later it was extended to other fields. The major reasons for these changes were poor financial situation and inefficient structure of state-owned companies. The main differences are that in Sweden infrastructure provider (Banverket) and operator are completely different equities, while in Germany DB Netz is still under the DBAG umbrella, although, this company still provides tracks to other competitors in a fair manner. Overall, the rail liberalization index identifies that Sweden has a more liberalized and easily-accessible market than Germany, although, a difference is minimal. Nevertheless, Germany's market shows a better performance and more impressive financial results, which visible in Figure 23. It can be stated that the German railway system is more efficient compared to its neighbors.



**Figure 23: Revenue/Cost Ratio for Railway in Particular EU Members in 1997 (Nilsson, 2003, p 6)**

It seems that Germany's railway market also was deregulated accidentally, because the primal requirement was to reorganize DB, in order it would become more efficient. An important factor for changes the reunion of Germany, as it was necessary to upgrade East Germany's infrastructure, hence, somehow positive shifts were more critical in Germany than in Sweden.

Yet, it has to be noticed that despite a large degree of liberalization, in both markets incumbent players are dominating (DB Schenker and Green Cargo). Even their share of the market is similar (slightly more than 70 %), although, the market share is constantly decreasing, which means that competition is slowly growing.

The bigger disparity lies in the degree of internalization. German companies show more interest in going abroad. The foreign companies in Germany are also more active compared to Sweden's situation. Another large difference is related to the number of operators. In Germany the amount of

players in the market is more than ten times bigger compared to Sweden. Since the liberalization of the sector started in these countries at basically the same time, it cannot be said that this result is due to the longer existence of open access. It is more likely that Germany, in general, is more attractive and an assumption can be made that there are some better conditions for operating in it. Also, the researchers would like to notice that operators in Germany, even direct competitors, have more common projects than Swedish companies. For instance, in the presentation of best intermodal practices made by European Intermodal Association (2010), eight projects out of 32 involve Germany and all of them are organized by intermodal companies, while only one example represent Sweden in the study, called Whirpool Europe. Hence, it is arranged by the enterprise, which has main activities not related to transportation. Additionally, both countries were affected by the EU legislation, which determines interoperability and accessibility. Thus, their regulation cannot be completely different. During the interviews it revealed that there exist a lot of issues in the cross-bordering operations. The researchers, hence, would like to notice, that the EU, German and Swedish governments should review their regulation regarding interoperability, otherwise, it will be very difficult to take a share from trucking industry in the international transportation.

### **5.1.2 Policy and Society**

In both markets there exist high levels of bureaucracy. The procedures of getting safety certificates and other documents are complicated, time-consuming, requires additional staff and a lot of administrative and consultation work. This leads to increased costs, which constitute some kind of barrier to new entrants. In Sweden Trafikverket has a similar function as EBA and ESA in Germany, while Trafikverket works as a combination of BNetzA and the Ministry of Transport, Building and Urban Development. Although, in Germany there are more different bodies, directly related to railways, neither Swedish nor German system seem to be efficient enough. Hence, the governments have to analyze how it is possible to improve this situation, otherwise, it is very difficult to expect attractiveness of this sector, and consequently, the competition will increase.

The governments in Sweden and Germany see the railway as environmentally friendly transport mode, because of the greater usage of this transport mode should reduce total volumes of carbon dioxide emissions. Nevertheless, the increase of the rail traffic generates larger levels of noise, which could disturb local residents. Thus, the Swedish and German governments pay more attention to the reduction of noise caused by trains. Primarily, it is solved by upgrading wagons. Hence, the society requirements influence governments' decisions for transport policy, however, it cannot be said that there are special prerequisites neither in Germany's nor in Sweden's society. The promotion of intermodal transport is based on more general knowledge, that it is more environmentally friendly solution. The negative impact – a large level of noise – is also addressed more due to the general specifications of rail transport rather than due to particular complaints. Hence, from society's point of view, both analyzed countries are on the same level.

### **5.1.3 Innovation and Infrastructure**

It can be said that there are a little bit different trends between Germany and Sweden, regarding innovation in the intermodal rail-road transport. In both countries the governments provides a lot of programs, which help to improve interoperability. Meanwhile, in Sweden companies by own means try to improve productivity and in Germany companies are more concerned about ecological issues. Also, the researchers can notice that companies in Germany find more collaborative solutions with

the public institutions. Nevertheless, generalizations of this matter cannot be made without further investigation.

Germany has more than two times longer network than Sweden, however, in Germany only half of the network has electrified tracks, while in Sweden this number constitutes 80 %. Thus, in this field Germany has a large space where improvements can be made. At the same time, Germany has to ensure larger transportation volumes in order that infrastructure would be exploited efficiently.

The most interesting fact is that DB Netz helps to promote local ports. This means that Germany's federal government is more integrated in the railway system and, thus, into the entire transport strategy than the Swedish government, since this study shows there are no similar cases in Sweden.

Another interesting fact is that in Germany there exist more terminal operators, while in Sweden the market is dominated by Jernhusen. Thus, operators have more options to choose from in Germany. They can collaborate with another company, if they have some issues with a certain terminal operator. This is more complicated in Sweden, because variety of alternatives is much smaller. Germany has also freight villages, which offers more services than an ordinary intermodal terminal. Moreover, the German terminals are more interested in organizing intermodal transportations. Hence, they are more active in the market. Therefore, the rail companies can have more common interests with terminal operators. This is not a case in Sweden.

#### **5.1.4 Demand**

Germany has approximately ten times larger export and import volumes, GDP and population compared to Sweden. The geographical position is also more favorable for Germany, because it is located in the central part of Europe, while Sweden is in more peripheral position. Containers also have to cross Germany from the ports in Rotterdam (the Netherlands) and Antwerp (Belgium) if they want to reach other countries, especially land-locked ones such as Switzerland, Austria or Hungary, while in Sweden there is a less potential for such a transit traffic, since all Sweden's neighbors have access to a sea.

Moreover, the main consumption and industrial centers are distributed more equally in Germany compared to Sweden, as in this Nordic country all activities are centralized around Gothenburg and the Stockholm region, while in Germany only former East Germany is lacking behind. Thus, Germany has an absolute advantage in generation of both domestic and transit traffics compared to Sweden and it is almost impossible that the situation will change in the near future, because too many economic, geographical and demographic factors are involved. Obviously, Germany will for many years maintain a larger demand for transportation than Sweden, although, the trading patterns are somehow similar, because both countries trade with the same partners and the analyzed states focuses on the same industries.

#### **5.1.5 Competition with Trucks**

In Sweden there are better conditions for the road transportation, because the restrictions for driving hours, dimensions and weight are more loosened compared to Germany, especially, when it comes to a domestic carriage. These facts show the Swedish government's attitude, i.e. there is not much concern about limitations for the trucking industry, which would have forced shippers to switch from an all-road transportation to an intermodal option. Germany is much more proactive in this way, as it ensures some better conditions for trucks that are related to an intermodal

transportation system. Surprisingly, in Sweden rail has a larger total market share compared to Germany. One of the reasons for this situation might be the fact that in Sweden there are only few main consumption/production centers and the distance between them is relatively large. Therefore, the intermodal alternative should become more attractive. At the same time, concentration of these centers in Germany is larger, thus, it is to some extent more useful to transport only with truck for the domestic carriage.

### 5.2 SWOT Analysis of German and Swedish Markets

Table 8 and Table 9 present the SWOT analysis of the German and Swedish markets.

**Table 8: SWOT Analysis of the German Market**

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>• High level of deregulation</li> <li>• Integrated whole transport policy</li> <li>• Large infrastructure capacity</li> <li>• High degree of internationalization</li> <li>• Collaboration between different actors</li> <li>• High internal demand</li> <li>• Large concentration of industrial centers and hubs</li> <li>• Very good geographical situation</li> <li>• Sophisticated export results</li> <li>• Strong restrictions for trucking industry</li> <li>• Efficient market</li> <li>• Large range of terminal operators</li> <li>• Strong restrictions for the trucking</li> <li>• ERMTS</li> </ul>	<ul style="list-style-type: none"> <li>• Long, complicated and costly certification and authorization procedures</li> <li>• Infrastructure provider and main operator belongs to the same holding company</li> <li>• Incumbent operator has a large share of the market</li> <li>• Low profitability</li> <li>• Lack of investment into infrastructure</li> <li>• A large part of not electrified tracks</li> <li>• Slow implementation of European directives</li> <li>• High level of bureaucracy</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>• Separation between operator and track provider</li> <li>• More efficient certification and authorization procedures</li> <li>• Alternative funds for infrastructure</li> <li>• More shares taken from trucking due to the driver shortages</li> <li>• Adjusted interoperability</li> <li>• Smaller infrastructure charges</li> <li>• Larger internationalization</li> </ul>	<ul style="list-style-type: none"> <li>• Government will promote Green Cargo</li> <li>• More complaints about noise</li> <li>• More requirements for entering the market</li> <li>• Longer authorization procedures.</li> <li>• Government will focus more on the other modes</li> </ul>

**Table 9: SWOT Analysis of the Swedish Market**

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>• Very high level of deregulation</li> <li>• Large distances between hubs</li> <li>• Good export results</li> <li>• Large share of total transport market</li> <li>• Own-account models</li> <li>• A large share of electrified tracks</li> </ul>	<ul style="list-style-type: none"> <li>• Long, complicated and costly certification and authorization procedures</li> <li>• Incumbent operator has a large share of the market</li> <li>• Low profitability</li> <li>• Low capacity</li> <li>• Poor level of infrastructure</li> <li>• High level of bureaucracy</li> <li>• Loosened restrictions for domestic trucking industry</li> <li>• Cross-subsidizing by Green Cargo</li> <li>• Small number of terminals and their operators</li> <li>• Very small share international traffic by rail</li> <li>• Peripherical geographic position</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>• More integrated transport policy</li> <li>• More efficient certification and authorization procedures</li> <li>• Adjusted interoperability</li> <li>• Smaller infrastructure charges</li> <li>• Larger restrictions to the road transport</li> <li>• Intensive usage of alternative routes</li> <li>• ERMTS</li> </ul>	<ul style="list-style-type: none"> <li>• Government will promote Green Cargo</li> <li>• More requirements for entering the market</li> <li>• Longer authorization procedures.</li> <li>• Government will focus more on the other modes</li> <li>• Decrease of export</li> </ul>

By comparing data placed in the tables it can be stated, that both markets have a lot similarities. There is a large need to simplify certification and authorization procedures in order to attract a larger number of strong competitors. The government should review these processes and increase the level of interoperability. Moreover, infrastructure charges and electricity fees should be reviewed. The governments opened market to improve national operators' situation. Yet authorities have to think, how to establish a real competition.

The markets are also similar because they are influenced by the EU legislation. Nevertheless, the implementation of these regulations are struggling and this is very disappointing, since the cross-border operations are not efficient enough to compete with road transport

It can be noticed, that Germany has more positive aspects. First of all, it is in a very good geographical location, thus, major transport flows must cross Germany. Sweden does not own this advantage. In Germany there is also a larger population than in Sweden, thus internal consumption in the first country can compensate transit flows and outbound flows, while in Scandinavian state is more difficult to achieve and traffic is more depended on the exports. On the other hand, it is hard to export with railways from Sweden, because, trains have to go through Oresund Bridge or travel by ferries, and this is very inconvenient and costly. Although Germany often is seen as more closed

market compared to Sweden, the amount of active players is much bigger, hence, the demand and related economic, geographic and demographic factors are more important than the deregulation of the market. Germany also has more integrated transport policy, because there is a proper integration of ports and trucks with intermodal transport, while Sweden is lacking of this strategy.

Germany has more industrial centers, how distances between are quite short, and might more appropriate to use truck transportation. In Sweden there is opposite situation, as distances are long between main destinations, although there are not so many hubs here.

Germany has a larger network, thus, its transport capacity is bigger, however, there a lack of funding into infrastructure, although fees for infrastructure are very high. Thus, it might be problematic to run transport services in near future, if infrastructure will not be maintained in right way. Therefore, there should be looked for additional funding from alternative sources. The situation in Sweden with infrastructure is also not very promising, however, operators should use more substitute routes. A great benefit for Sweden, from environmental point of view, is a large level of electrified tracks. However, in Germany there are more terminal operators, thus, the choice is greater and the risks are diminished, because the dependence on operator, basically as it is in Sweden, is a very dangerous game, even if that company offers good services right now.

On the other hand, German rail freight market is very efficient compared to other markets, including Sweden. Railway companies know how to operate in effective way and reduce amount of unnecessary services. Swedish operators should learn from German companies how to collaborate and become international. For instance, there is DB Schenker Scandinavia but no Green Cargo Germany. Thus, Swedish intermodal companies are more restricted to state boundaries and their growth possibilities are limited and determined by Sweden's economic situation.

Noise levels might more problematic in Germany, because there is a larger density of population and more people can be affected by a higher level of noise. Thereby, the federal government in Germany should be more concerned about these issues than Swedish transport bodies.

Overall, the researchers would like to state, that Germany is more attractive market for the rail-road intermodal transport.

### **5.3 Analysis and Discussion of the Business Models**

From the information, which was received during the interviews, the researchers can say that TX uses a subcontractor business model. It means that forwarders organize transportation door-to-door and TX is responsible for the main haulage (by rail). Although, TX participates in the own-account business model in Sweden (COOP), but it also acts as a subcontractor. In very rare cases in Germany TX arranges the first and/or final transportation too, but still these occurrences are just exceptions and the core business model is still a subcontractor model.

The value proposition for TX's clients is customized because the company creates a timetable, according to customer requirements. The fixed schedule is seen as a great advantage for TX compared to its competitors. The researchers can notice that the customer segments, the distribution channels, CRM and the value configuration are the same in Germany and Sweden. It is not surprisingly that the segment does not differ. The more interesting aspect is that the major customers are exactly identical – main German forwarders LKW Walter, DHL and DSV. These are very

big players in entire Europe, therefore, it is easier for them to consolidate the larger amount of end customer and, at the same time, bigger customers, which can afford larger volumes of cargo, which is consequently vital for the intermodal transportation. Meanwhile, there are no large Swedish forwarders that are strong enough internationally. Thus, simplification of customer range helps to strengthen market position, as both sides – TX and a client – have more common business. The consolidation of volumes helps to reach economies of scale, which leads to reduce prices to end customers. Hence, the win-win situation for all parties involved. It can be said that TX's clients are at the same time very important partners. Consequently, the distribution channel is very simplified, but it aids to establish a closer relationship with TX customers. Even employees have some background in the forwarding industry, hence, they can easily find the way how to communicate with clients. The direct communication leads to a long term relationship.

Although, the business model in Germany and Sweden from the first look seems to be exactly the same, however, in the Germany side there are more capabilities. For instance, in the German division a larger number of locomotives exists and some are owned by the company, while in Sweden all locomotives are leased. Another example is the IT-system, one of the most important assets, which is fully-controlled by the German division in terms of which system to use and how to use it, although it is used in all countries where TX operates. Moreover, in Germany the company has implemented more business sub models (Intermodal, Maritime, Automobile and Freight) and all of them are coordinated by different departments. At the same time, in Sweden there are only intermodal and timber sector, which are controlled by one department. Therefore, the researchers can state that this undertaking has a very strong centralization degree of the organizational structure. The main activities are concentrated in Germany and Sweden has only a support function. This set-up obviously is influenced by the strategy, which is an internal factor, however, the strategy is impacted by the policies of different countries, because there is a need to establish a unit in particular state in order to get necessary certificates and licenses. Without these requirements it is likely that operations in Sweden would be leaner.

In Germany TX consolidates all flows and distributes to other countries, such as Sweden, where cargo reaches a final customer. The described centralization of the flows is influenced by the factors that are discussed under section 5.1.4. Germany is a much more suitable country for flows consolidation and distribution than Sweden, hence, it is noticed there is a very clear influence of demand to the business.

TX's business model is also shaped by the competition. The company originated in Germany, where it faced a large competition level, and it was forced to look for the alternative markets and to focus on the international transportation. The collaboration practices between competitors, which are very popular in Germany than in Sweden, encouraged to search for partners abroad in order to increase the efficiency of operations. If TX's origins were established in Sweden, its expansion would be less likely, as local companies in Sweden focus on domestic traffic.

The competition against trucking is especially important for one segment - reefers. According to TX, it is easier for trucks to transport refrigerated goods, because they meet a smaller number of requirements compared to rail. The rail company needs licenses for every country, it has to pay track fees, follow the timetable, at the same time. Furthermore, a driver can maximum drive in two countries, also the driver must know the local language, since the communication with

terminals/authorities is acted in local language. Moreover, the knowledge of the route is required, and driver must own a license in order to perform in each country. Hereafter, trucks are more flexible and faster (Nowaczyk, 2014). These advantages are critical for the reefer segment. The governments could take mentioned factors into account and facilitate them, otherwise, the necessary balance between all-road and intermodal road-rail transportation could not be reached.

TX is at the moment implementing some innovations in Germany, particularly concerning non-liftable trailers. This Innovation helps to increase the efficiency and such efforts can improve the value proposition. TX also plans to expand their business by performing terminal activities and certain places. However, if they want to gain their competitive edge against trucks, TX must generate novelties that really aid to reduce transportation times significantly. In this case, the partnerships with public and research institutions would be very helpful.

It might be hard to create a new revenue model in this industry. For instance, it would change a little bit, if TX Logistik tweaks its value proposition and start to run more terminals and charges for the additional services. Then there will be a shift of the revenue model. However, the government could improve cost structure. The fixed costs are influenced by the government decisions, because certification and authorization procedures are very expansive. Moreover, the railway regulation regarding the crossing of borders increases a need for drivers, which also adds fixed costs. The administrations could reconsider the current requirements and change into more convenient environment for this industry.



## 6 Conclusion and Recommendations

---

*Finally, in this chapter, the thesis is concluded by answering if the purpose is fulfilled, the research questions answered, what recommendations are given to firms in the industry and, lastly, ideas for further research is suggested.*

The purpose of this thesis was to investigate how rail-road intermodal freight transport companies' business model is affected in different countries depending on markets, external and internal factors and to give recommendations of how firms in the industry can improve their business models. The researchers argue that the purpose of this thesis is fulfilled since the research questions are answered, which are needed in order to fulfill the purpose.

### **6.1 RQ 1: Which are the most important factors influencing the business models in the rail-road intermodal transport industry in Germany and Sweden and how do they affect the business models?**

The researchers used a case study of TX Logistik, one of the largest European intermodal (rail-road) operators, and analyzed its business models in Germany and Sweden. Five external factors were taken into consideration: competition with intermodal operators (in relation to the deregulation), policy and society, innovation and infrastructure, demand and competition with trucks.

After investigation of the markets, it was found that Germany and Sweden are quite similar from the deregulation, policy and society point of view. In both countries there is too large degree of inefficient bureaucracy, when it comes to the regulation and issues of certificates. However, the German federal government has integrated intermodal transportation in the entire transport system in a more developed way. From the society perspective, in both countries the intermodal transportation is promoted due the reduction of greenhouse gas emissions, while the actions are taken in order to mitigate the levels of noise, caused by railway transportation. Although Sweden has a more liberalized market, despite this fact there are more players in Germany. Furthermore, the Germans find more collaboration approaches. Another advantage is a strong demand for transit and domestic transportation in Germany due to the combination of economic, demographical and geographical aspects. This is not a case for Sweden. The regulation for trucks transportation in Sweden is loosened compared to Germany, however, in Sweden rail freight gained a larger market share, probably, due to the larger distances from industrial/consumption centers. Germany owns a more intensive railway network, yet this result in a need for larger investments and the costs of maintenance also increases. Nevertheless, Germany has a bigger capacity and is more efficient compared to Sweden. Overall, Germany is a more attractive market for the intermodal rail-road transport business than Sweden.

The researchers identified that TX Logistik has implemented a subcontractor business model. Majority of business model's canvas are identical in both countries, however, the capabilities and target segments depict that Germany has a more strategic position in entire business model of TX Logistik. There is a large degree of centralization in Germany, which is like a hub for TX Logistik's business, while Sweden has a branch function of the hub. The expansion to other countries is encouraged by fierce competition in Germany and demand related factors. The way of doing business, for instance, the decision to open divisions in certain countries is a consequence of regulations and certifications. Hence, we can see that the business model is formed by the strategy, an internal factor, however, the strategy is strongly influenced by a combination of external factors.

This means that, to some extent, external factors have a more significant/important effect on the intermodal rail-road business model than internal factors.

## **6.2 RQ 2: What can rail-road intermodal transport companies do in order to improve their business models and what can be done by outside actors, so companies can improve the business models?**

Intermodal transport companies are afraid to take more risk and innovate their value proposition. The majority of novelties focus on the environmental aspects, which are not so necessary for the customers. Companies should work more with academic and public institutions in order to improve value proposition, for instance, reduce transportation time and amount of delays.

TX Logistik could improve its value proposition, if it forms partnerships with research organizations, public institutions, and even with its competitors and clients in order to create novelties, which would reduce total transportation time and amount of delays. The potential innovations would bring more benefits and better situation in terms of competition with trucking, especially in the reefers segment, where time is a critical factor.

This case revealed that governments should improve interoperability, facilitate certification procedures and reduce fees for the usage of tracks and electricity. Therefore, the environment for the business models could get a better shape, the intermodal companies would reach a greater profitability and this sector would become more attractive. The society, nevertheless, plays quite a small role to the business model in this industry.

## **6.3 Further Research**

The analyzed topic is very new, thus, the variety of options for further research is wide. For instance, it might be promising to pick another company from other countries and to analyze them according to the provided external factors. Naturally, alternative elements also could be taken into consideration. It is also possible to develop a business model framework, particularly for transport company, because Osterwalder's business model is more oriented towards e-business and not all aspects can be fully covered for the transport company.

## 7 References

- Afanasyeva, L. & Bulinskaya, E. (2011). Stochastic Models of Transport Flows. *Communication in Statistics-Theory and Methods*, 40(16), 2830-2846
- Alexandersson, G. (2010). *The accidental deregulation: essays on reforms in the Swedish bus and railway industries 1979-2009*. Stockholm: Economic Research Institute, Stockholm School of Economics (EFI)
- Alexandersson, G. & Hulten, S. (2005). *Swedish Railways: From Deregulation to Privatization and Internationalisation in a European Context*. Stockholm: paper presented at Third Conference on Railroad Industry Structure, Competition and Investment
- Almatoiri, B., Flodén, J., Stefansson, G. & Woxenius, J. (2011). Information Flows Supporting Hinterland Transportation by Rail: Applications in Sweden. *Research in Transportation Economics* 33, 15-24
- Alvesson, M. & Sköldberg, K. (1994). *Tolkning och Reflektion: Vetenskapsfilosofi och Kvalitativ Metod*. Lund: Studentlitteratur.
- Andersson, T. (25 February, 2014). (D. Jelcic and K. Vizgaitis, Interviewers.)
- Andrews, P. P. & Hahn, J. (1998). Transforming Supply Chains into Value Webs. *Strategy & Leadership* 26(3), 6-11.
- Arlbjørn, J. S. & Halldórsson, Á. (2002). Logistics Knowledge Creation: Reflections on Content, Context and Processes. *International Journal of Physical Distribution & Logistics Management*, 32(1), 22-40
- Avi-Itzhak & Madelbaum (1969). Scientific Models. *Logistics. OR.* 20(4), 91-92, Special Conference Issue 1969.
- Baden-Fuller, C., & Morgan, M. S. (2010). Business Models as Models. *Journal of Long Range Planning*, 43, 156-171
- Bagchi, S. & Tulsikie, B. (2000). *e-business Models: Integrating Learning from Strategy Development Experiences and Empirical Research*. 20th Annual International Conference of the Strategic Management Society, Vancouver.
- Bailer-Jones, D. M. (2003). When Scientific Models Represent. *International Studies in the Philosophy of Science*, 17(1), 59-74
- Banham, R. (1997). Getting on Track. *International Business*, 10(3), 14
- Baumol, W. (1977). On the Proper Cost Tests for Natural Monopoly in a Multiproduct Industry. *American Economic Review* 67(5), 809-822
- Bergqvist, R. (2008). Evaluating Road-Rail Intermodal Transport Services: A Heuristic Approach. *International Journal of Logistics*, 11(3), 179-199
- Beria, P., Quinet, E., De Rus, G. & Schulz, C. (2012). A Comparison of Rail Liberalisation Levels Across Four European Countries. *Research in Transportation Economics*, 36(1), 110-120

- Bokulich, A. (2011). How Scientific Models can Explain. *Synthese*, 180(1), 33-45
- Bontekoning, Y. & Priemus, H. (2004). Breakthrough Innovations in Intermodal Freight Transport. *Transportation Planning and Technology*, 27(5), 335-345
- Bontekoning, Y. M., Macharis, C. & Trip, J.J. (2004). Is a New Applied Transportation Research Field Emerging? – A Review of Intermodal Rail–Truck Freight Transport Literature. *Transportation Research Part A: Policy and Practice*, 38(1), 1-34
- Brnjac, N., Abramovic, B. & Maslaric, M. (2010). Forecasting Intermodal Transport Requirements on Corridor X. *Promet-Traffic & Transportation*, 22(4), 303-307
- Bryman, A. & Bell, E. (2011). *Business Research Methods*. (3. ed.) Oxford: Oxford University Press.
- Bundesanzeiger Verlag. (2013). *TX Logistik AG: Bad Honnef*. Retrieved on 05 February, 2014, from <https://www.unternehmensregister.de/ureg/result.html;jsessionid=0C06EBDAADE1620DDAB96D5CDA680593.web01-1?submitaction=showDocument&id=13029804>
- Burgholzer, W., Bauer, G., Posset, M. & Jammerneegg, W. (2013). Analysing Intermodal Transport Networks: A Micro Simulation-Based Model. *Decision Support Systems*, 54(4), 1580-1586
- Business Dictionary. (2014). *Cross Subsidization*. Retrieved on 15 May, 2014, from <http://www.businessdictionary.com/definition/cross-subsidization.html>
- Bärthel, F. & Woxenius, J. (2004). Developing Intermodal Transport for Small Flows over Short Distances. *Transportation Planning and Technology*, 27(5), 403-424
- Campisi, D. & Gastaldi, M. (1996). Environmental Protection, Economic Efficiency and Intermodal Competition in Freight Transport. *Transportation Research Part C: Emerging Technologies*, 4(6), 391-406
- Chesbrough, H. & Rosenbloom, R. S. (2002). The Role of the Business Model in Capturing Value from Innovation: Evidence from Xerox Corporation's Technology Spin-Off Companies. *Industrial and Corporate Change*, 11(3), 529-555
- Choong, S.T., Cole, M.H. & Kutanoglu, E. (2002). Empty Container Management for Intermodal Transportation Networks. *Transportation Research Part E*, 423-438
- Coleman, A. S. (2002). Scientific Models as Works Cataloging & Classification Quarterly, 33(3-4), 129-159
- Collis, J. & Hussey, R. (2009). *Business Research: a Practical Guide for Undergraduate & Postgraduate Students*. (3. ed.) Basingstoke: Palgrave Macmillan.
- Combes, P. P. & Linnemer, L. (2000). Intermodal Competition and Regional Inequalities. *Regional Science and Urban Economics*, 30(2), 131-184
- Contessa, G. (2010). Scientific Models and Fictional Objects. *Synthese*, 172(1), 215
- Craver, C. (2006). When Mechanistic Models Explain. *Synthese*, 153, 355-376

Creswell, J.W. (1998). *Qualitative Inquiry & Research Design: Choosing Among Five Approaches*. Thousand Oaks: SAGE.

Deutsche Bahn (DB). (2013). *Competition Report 2013*. Retrieved on 14 April, 2014, from [http://www.deutschebahn.com/en/press/brochures/competition\\_report/](http://www.deutschebahn.com/en/press/brochures/competition_report/)

DB Schenker Rail Polska. (2009). *DB Schenker Rail Polska S.A. – Strong Partner in European Rail Freight Transportation*. Retrieved on 15 April, 2014, from [www.rail.dbschenker.pl/site/shared/en/file\\_attachments/information\\_material/stinnes/dbschenkerailpolska.pdf](http://www.rail.dbschenker.pl/site/shared/en/file_attachments/information_material/stinnes/dbschenkerailpolska.pdf)

Dablanc, L. (2009). Regional Policy Issues for Rail Freight Services. *Transport Policy*, 16(4), 163-172

Debie, J. & Gouvernal, E. (2006). *Intermodal Rail in Western Europe: Actors and Services in a New Regulatory Environment*. *Growth and Change*, 37(3), 444-459

Downes, S. M. (2011). Scientific Models. *Philosophy Compass*, 6(11), 757-764

Elgin, M. & Sober, E. (2002). Cartwright on Explanation and Idealization. *Erkenntnis*, 57, 441-450

Elkington, J. (1997). *Cannibals With Forks: The Triple Bottom Line of 21st century Business*. Oxford: Capstone.

EU. (2009). Summaries of Legislation. Retrieved on 18 March, 2014, from <http://europa.eu/scadplus/leg/en/lvb/l24057>

Europe Intermodal Association. (2010). *Intermodal Freight and Logistics Best Practices*. Retrieved on 10 May, 2014, from [http://www.eia-ngo.com/wp-content/uploads/2010/01/Best-Practice\\_Viacombi.pdf](http://www.eia-ngo.com/wp-content/uploads/2010/01/Best-Practice_Viacombi.pdf)

European Commission. (2014). *Rail: ERTMS-European Rail Traffic Management*. Retrieved on 15 May, 2014, from [http://ec.europa.eu/transport/modes/rail/interoperability/ertms/index\\_en.htm](http://ec.europa.eu/transport/modes/rail/interoperability/ertms/index_en.htm)

Eurostat. (2007). *Panorama of Transport*. Luxembourg: Office for Official Publications of the European Communities.

Financial Times Lexicon. (2014). *Business Model Definition*. Retrieved on 10 February, 2014, from <http://lexicon.ft.com/Term?term=business-model>

Finfacts. (2011). *Even at 4 Percentage Points Faster Growth Germany's Weakest Regions Would Take 45 + Years to Catch Up*. Retrieved on 27 April, 2014, from [http://www.finfacts.ie/irishfinancenews/article\\_1021965.shtml](http://www.finfacts.ie/irishfinancenews/article_1021965.shtml)

Flodén, J. (2009). *Business Models for Intermodal Transport - Intermodal Road-Rail Transport in Europe*. The Ninth Annual International Business Research Conference, February 13-14 2009, University of North Florida

Flodén, J. (2011). *The Heuristics Intermodal Transport Model Calculation System*. Gothenburg: Report, University of Gothenburg

- Flodén, J. & Sorkina, E. (2013). *Business Models for Shipper-operated Intermodal Transport Solutions*. Rio de Janeiro: World Conference on Transport Research, WCTR, 15-18<sup>th</sup> July
- Flodén, J. & Woxenius, J. (2013). *Agility in the Swedish Intermodal Freight Market - The Effects of the Withdrawal of the Main Provider*. World Conference on Transport Research, WCTR, 15-18<sup>th</sup> July 2013.
- Flyvbjerg, B., Holm, M. K. S. & Buhl, S. L. (2006). Inaccuracy in Traffic Forecasts. *Transport Reviews*, 26(1), 1-24
- Forkenbrock, D.J. (2001). Comparison of External Costs of Rail and Truck Freight Transportation. *Transportation Research Part A: Policy and Practice*, 35(4), 321-337
- García, I., Pacheco, J. & Alvarez, A. (2013). Optimizing Routes and Stock. *Journal of Heuristics*, Volume 19(2), 157-177
- Geyer, A. & Davies, A (2000). Managing Project – System Interfaces: Case Studies of Railway Projects in Restructured UK and German Markets. *Research Policy*, 29(7), 991-1013
- Giere, R. (1988). *Explaining Science*. Chicago: University of Chicago Press
- Goodwin, B. C. (1967). Scientific Models. *Annals of the New York Academy of Sciences*, 138(2), 866
- Goodwin, P. (1999). Transformation of Transport Policy in Great Britain. *Transportation Research Part A*, 33, 665-669
- Gröndahl, T. (2012). *High Capacity Transports*. Stockholm: Master Thesis, Kungliga Tekniska Högskolan, Järnvägsgruppen
- GTAI. (2010). *Germany – Europe's Logistics Hub*. Retrieved on 29 April, 2014, from <http://www.gtai.de/GTAI/Content/EN/Invest/SharedDocs/Downloads/GTAI/Brochures/Industries/germany-europe-s-logistics-hub-en.pdf>
- Hansen, I. (2004). Automated Shunting of Rail Container Wagons in Ports and Terminal Areas. *Transportation Planning and Technology*, 27(5), 385-401
- Hass-Klaus, C. & Environmental and Transport Planning. (1998). *Rail Privatisation: Britain and Germany Compared* London: Anglo-German Foundation for the Study of Industrial Society.
- Jernhusen. (2011). *Gods & Kombiterminaler*. Retrieved on 05 May, 2014, from <http://www.jernhusen.se/Foretag/gods-kombiterminaler/Vara-terminaler/>
- Jönsson, P-A. (2004). *Löpverk För Högre Axellast Och Hastighet*. Stockholm: Järnvägsgruppen KTH
- Kambil, A., Ginsberg, A. & Bloch, M. (1996). Rethinking Value Propositions. New York, NYU Department of Information Systems from <https://archive.nyu.edu/handle/2451/14205>
- Kaplan, R. S. & Norton, D. P. (1992). The Balanced Scorecard – Measures that Drive Performance. *Harvard Business Review*, 70(1), 71-79
- Keaton, M.H. (1990). Economies of Density and Service Levels on US Railroads: An Experimental Analysis. *The Logistics and Transportation Review*, 26(3), 211-227

- Kotler, P. (1988). *Marketing Management: Analysis, Planning, Implementation and Control* (6th ed.). Englewood Cliffs, NJ: Prentice-Hall
- Kovács, G. & Spens, K. M. (2005). Abductive Reasoning in Logistics Research. *International Journal of Physical Distribution & Logistics Management*, 35(2), 132-144
- Krugman, P. (1991). Increasing Returns and Economic Geography. *Journal of Political Economy*, 99, 483-499
- Laisi, M., Mäkitalo, M. & Hilmola, O.-P. (2012). Stimulating Competition in the Liberalized Railway Freight Market. *Baltic Journal of Management*, 7(1), 68-85
- Lambert, S. (2006). Do We Need a 'Real' Taxonomy of e-Business Models? *School of Commerce Research Paper Series*: 06-6 (ISSN: 1441-3906) from [http://www.flinders.edu.au/shadomx/apps/fms/fmsdownload.cfm?file\\_uid=FD4E1-EB6B-7B71-0BCE-8FC142552687&siteName=sabs](http://www.flinders.edu.au/shadomx/apps/fms/fmsdownload.cfm?file_uid=FD4E1-EB6B-7B71-0BCE-8FC142552687&siteName=sabs)
- Lammgård, C. (2007). *Shippers' perceptions of environmental aspects and modal choice – a marketing opportunity for intermodal road-rail transport?* Reykjavik: The annual 19<sup>th</sup> NOFOMA conference proceedings.
- Larsson, S. (2009). *Weight and Dimensions of Heavy Commercial Vehicles as Established by Directive 96/53/EC and the European Modular System (EMS)*. Brussels: Workshop on LHVs
- Law, J. (2009). *A Dictionary of Business and Management*. Oxford: Oxford University Press
- Lehtinen, J. & Bask, A. H. (2012). Analysis of Business Models for Potential 3Mode Transport Corridor. *Journal of Transport Geography*, 22, 96-108
- Levitt, T. (1960). Marketing Myopia. *Harvard Business Review*, 38(4), 45-56
- Leviäkangas, P., Lehtinen, J., Thomchick, E. & Spychalski, J. (2007). *Business Models for Rail Freight, Topology Formulation Based on Rail Freight Evolution in the US and Europe*. In: NOFOMA Conference Proceedings, 2007.
- Ludvigsen, J. & Osland, O. (2009). Liberalization of Rail Freight Markets in the Old and New EU-Member States. *European Journal of Transport and Infrastructure Research*, 9(1), 31-45
- Macharis, C., Caris, A., Jourquin, B. & Pekin, E. (2011). A Decision Support Framework for Intermodal Transport Policy. *European Transport Research Review*, 3(4), 167-178
- Makadok, R. (1998). Can First-Mover and Early-Mover Advantages be Sustained in an Industry with Low Barriers to Entry/Imitation? *Strategic Management Journal*, 19(7), 683-697
- Markides, C. (1999). *All the Right Moves*. Boston: Harvard Business School Press
- Martin, P. & Rogers, C. A. (1995). Industrial Location and Public Infrastructure. *Journal of International Economics*, 39(3), 335-351
- Mattsson, L-G. (2007). *Railway Capacity and Train Delay Relationship*. Dordrecht: Critical Infrastructure: Reliability and Vulnerability, Springer-Verlag, 2007

- McFadden, D. (2007). University of California, Berkeley: Lecture at the Opening Ceremony of the 11th World Conference on Transport Research, WCTR, June 2007
- McMullin, E. (1985). Galilean Idealization. *Studies in History and Philosophy of Science*, 16, 247-273
- McMullin, E. (1978). Structural Explanation. *American Philosophical Quarterly*, 15, 139-147
- Mentzer, J. T. & Kahn, K. B. (1995). A Framework of Logistics Research. *Journal of Business Logistics*, 16(1), 231-250
- Murillo, D. G. C. & Liedtke, G. (2013). A Model for the Formation of Colloidal Structures in Freight Transportation: The Case of Hinterland Terminals. *Transportation research*, 49(1), 55-70
- Mäkitalo, M. (2010). Market Entry Barriers in Finland's Rail Freight Transport. *World Review of Intermodal Transportation Research*, 3(1/2), 181-195
- Mäkitalo, M. (2009). "The Rise of Competition in Finland's Rail Transport", in Hilmola, O.-P. & Korovyakovsky, E. *North-European Logistics in the Era of Global Economic Turmoil, Fifth International Railway Logistics Seminar*. Lappeenranta: Research Report 213, 101-109, Department of Industrial Management, Lappeenranta University of Technology, 2 June
- Nash, C.A. (2008). Passenger Railway Reform in the Last 20 Years – European Experience Reconsidered. *Research in Transportation Economics*, 22, 61-70
- Nilsson, J.-E. (2003). *Restructuring Sweden's Railways: The Unintentional Deregulation*. VTI
- Nowaczyk, J. (11 April, 2014). (D. Jelcic, Interviewer.)
- Näslund, D. (2002). Logistics Needs Qualitative Research – Especially Action Research. *International Journal of Physical Distribution & Logistics Management*, 32(5), 321-328
- OECD. (1993). *Germany – Country Review*. Retrieved on 30 April, 2014, from <http://www.oecd.org/env/country-reviews/2448059.pdf>
- OECD. (2005). *Structural Reform in the Rail Industry*. Retrieved on 18 March, 2014, from [www.oecd.org/dataoecd/7/14/35911008.pdf](http://www.oecd.org/dataoecd/7/14/35911008.pdf)
- Osterwalder, A. (2004). *The Business Model Ontology - A Proposition in a Design Science Approach*. Lausanne: Doctoral Thesis, University of Lausanne
- Osterwalder, A. & Pigneur, Y. (2009). *Business Model Generation*. Amsterdam: Modderman Drukwerk. Retrieved on 23 February, 2014, from [http://www.businessmodelgeneration.com/downloads/businessmodelgeneration\\_preview.pdf](http://www.businessmodelgeneration.com/downloads/businessmodelgeneration_preview.pdf)
- Oxford Online Dictionary. (2014). *Model*. Retrieved on 01 February, 2014, from <http://www.oxforddictionaries.com/definition/english/model>
- Pas, E. I. (1990). Is Travel Demand Analysis in the Doldrums? In: Jones, P. (ed.) *Developments in Dynamic and Activity-Based Approaches to Travel Analysis*, 3-27



- Patel, R. & Davidson, B. (2003). *Forskningsmetodikens Grunder: att Planera, Genomföra och Rapportera en Undersökning*. (3., [uppdaterade] uppl.) Lund: Studentlitteratur.
- Pehrsson, A. (2009). Barriers to Entry and Market Strategy: A Literature Review and a Proposed Model. *European Business Review*, 21(1), 64-77
- Pehrsson, A. (2004). Strategy Competence: A Successful Approach to International Market Entry. *Management Decision*, 42(6), 758-768
- Rabianski, J. S. (2003). Primary and Secondary Data: Concepts, Concerns, Errors, and Issues. *The Appraisal Journal*, 71(1), 43-55
- Rail Freight Portal. (2014). *Single Wagon Load*. Retrieved on 30 April, 2014, from <http://www.railfreightportal.com/Single-Wagon-Load,213>
- RailwayPro. (2010). Deutsche Bahn Reciprocity to European Countries in Opening National Markets. Retrieved on 18 March, 2014, from [www.railwaypro.com/wp/?p=2163](http://www.railwaypro.com/wp/?p=2163)
- Rotter, H. (2004). New Operating Concepts for Intermodal Transport: The Mega Hub in Hannover/Lehrte in Germany. *Transportation Planning and Technology*, 27(5), 347-365
- Ruesch, M. (2001). *Potentials for Modal Shift in Freight Transport*. In: Conference paper STRC 2001, 1st Swiss Transport Research Conference, Monte Verità Ascona.
- Simola, M. & Szekely, B. (2009). *The Liberalization Process in Europe, Market Entry Barriers versus Competition Stimulation – Cases of Germany and Hungary*. Helsinki: Publications of the Finnish Rail Administration
- Skoglund, M. & Bark, P. (2007). *Tunga Tåg*. Stockholm: TFK – TransportForsk AB
- Soliman, A. H., Gadi, A. M. & Wyatt, D. A. (1991). Interprovincial Rail/Truck Competition in the 1990s. *Transportation Planning and Technology*, 16(2), 105-115
- Statistisches Bundesamt. (2014). *Foreign Trade*. Retrieved on 30 April, 2014, from <https://www.destatis.de/EN/FactsFigures/NationalEconomyEnvironment/ForeignTrade/ForeignTrade.html>
- Steer Davies Gleave. (2012). *National Case Studies*. Retrieved on 29 April, 2014, from <http://ec.europa.eu/transport/modes/rail/studies/doc/2012-06-ia-support-study-era-appendix-a.pdf>
- Stenvall, H. (2014, 11<sup>th</sup> of April). Regeringen Bäddar För Tyngre Lastbilar. *TransportNet*. Retrieved on 08 May, 2014, from <http://transportnet.se/nyheter/regeringen-baddar-for-tyngre-lastbilar/>
- Strategic Management Insight. (2013). *PEST & PESTEL Analysis*. Retrieved on 01 March, 2014, from <http://www.strategicmanagementinsight.com/tools/pest-pestel-analysis.html>
- Stöhr, M., Yngström, L., Nyblom, M., Eliasson, U., Andersson, T. & Wadman, P. (2011, 26<sup>th</sup> of April). Avregleringen Banade Väg För Miljövänliga Transporter. *Dagens Industri (Debatt)*
- Svejenova, S. & Vives, L. (2011). Business Models: Towards an Integrative Framework. *Management Research*, 9(1), 230-242

- Timms, P. (2008). Transport Models, Philosophy and Language. *Transportation*, 35(3), 395-410
- Trafikanalys. (2011(a)). *Bantrafik 2010*. Stockholm: Trafikanalys (Statistik 2011:24)
- Trafikanalys. (2011(b)). *Internalisering Av Trafikens Externa Effekter – Nya Beräkningar För Väg Och Järnväg (PM 2011:16)*.
- Trafikanalys. (2013). *Transportarbete 1950-2012*. Retrieved on 07 May, 2014, from <http://www.trafa.se/Statistik/Transportarbete/>
- Trafikverket. (2011). *Järnvägsnätsbeskrivning 2013, Kapitel 5, Tjänster*. Retrieved on 25 April, 2014, from [http://www.trafikverket.se/PageFiles/59269/kap\\_5\\_jnb\\_2013.pdf](http://www.trafikverket.se/PageFiles/59269/kap_5_jnb_2013.pdf)
- Trafikverket. (2012). *Järnvägens Partikelutsläpp*. Retrieved on 24 April, 2014, from <http://www.trafikverket.se/Privat/Miljo-och-halsa/Halsa/Luft/Jarnvagens-partikelutslapp/>
- Trafikverket. (2014(a)). *Järnvägstermer*. Retrieved on 07 May, 2014, from <http://www.trafikverket.se/Privat/Vagar-och-jarnvagar/Sveriges-jarnvagsnat/Jarnvagstermer/>
- Trafikverket. (2014(b)). *Sveriges Järnvägsnät*. Retrieved on 07 May, 2014, from <http://www.trafikverket.se/Privat/Vagar-och-jarnvagar/Sveriges-jarnvagsnat/>
- Trafikverket. (2014(c)). *Så Sköter Vi Järnvägar*. Retrieved on 24 April, 2014, from <http://www.trafikverket.se/Privat/Vagar-och-jarnvagar/Sa-skoter-vi-jarnvagar/>
- Trafikverket. (2014(d)). *Trafikstyrningssystemet ERMTS*. Retrieved on 07 May, 2014, from <http://www.trafikverket.se/Foretag/Bygga-och-underhalla/Jarnvag/Trafikstyrningssystemet-ERTMS/>
- Transport Intelligence. (2008). *The European Road Freight Sector under pressure*. Retrieved on 01 May, 2014, from <http://www.transportintelligence.com/market-reports/report-european-road-freight-2008/221/>
- TransportNet. (2010, 15<sup>th</sup> of April). Karlshamns Hamn Välkomnar Sydostlänksatsning. *TransportNet*. Retrieved on 07 May, 2014, from <http://transportnet.se/nyheter/karlshamns-hamn-valkomnar-sydostlanksatsning/>
- Transports' Friend. (2014). *Germany*. Retrieved on 30 April, 2014, from <http://www.transportsfriend.org/int/country-germany.html>
- Transportstyrelsen. (2010). *Branschanalys Av Järnvägsföretag 2008-2009 (PJ 10 002)*. Borlänge: Transportstyrelsen.
- Transportstyrelsen. (2011). *Nyckeltalsanalys Av Järnvägsföretag 2009 (PVJ11 010)*. Borlänge: Transportstyrelsen.
- Transportstyrelsen. (2012(a)). *Klimat och Energi*. Retrieved 24 April, 2014, from <https://www.transportstyrelsen.se/sv/Jarnvag/Miljo-och-halsa---jarnvag/Klimat-och-energi/>
- Transportstyrelsen. (2012(b)). *Nyckeltalsanalys Av Järnvägsföretag 2010 (PVJ12 001)*. Borlänge: Transportstyrelsen.

Transportstyrelsen (2014(a)). *Bruttovikter För Fordon*. Retrieved on 07 May, 2014, from <https://www.transportstyrelsen.se/sv/Vag/Yrkestrafik/Gods-och-buss/Matt-och-vikt/Bruttovikter-for-fordon/>

Transportstyrelsen. (2014(b)). *Buller*. Retrieved on 24 April, 2014, from <https://www.transportstyrelsen.se/sv/Jarnvag/Miljo-och-halsa---jarnvag/Buller-och-vibrationer/>

Transportstyrelsen. (2014(c)). *Dimensioner*. Retrieved on 07 May, 2014, from <https://www.transportstyrelsen.se/sv/Vag/Yrkestrafik/Gods-och-buss/Matt-och-vikt/Dimensioner/>

Trip, J. J. & Bontekoning, Y. (2002). Integration of Small Freight Flows in the Intermodal Transport System. *Journal of Transport Geography*, 10(3), 221-229

Tsamboulas, D., Vrenken, H. & Lekka, A.-M. (2007). Assessment of a Transport Policy Potential for Intermodal Mode Shift on a European Scale. *Transportation Research Part A: Policy and Practice*, 41(8), 715-733

TX Logistik. (2014). Retrieved on 25 February, from [www.txlogistik.de/en](http://www.txlogistik.de/en)

Udikas, M. (2012, 29<sup>th</sup> of August). Det Är Högst 40 Ton Som Gäller, Säger Polisen. *Transport Nytt*. Retrieved on 07 May, 2014, from <http://transportnytt.se/nyheter/item/244-danska-akare-upprorda-over-svenska-maxvikter>

UIC. (2013). *DB and Partners Establish Eco Rail Innovation Platform*. Retrieved on 27 April, 2014, from [https://www.uic.org/com/article/db-and-partners-established-eco?page=thickbox\\_enews](https://www.uic.org/com/article/db-and-partners-established-eco?page=thickbox_enews)

UN/ECE. (2001). *Terminology on Combined Transport*. New York and Geneva: United Nations (UN) & Economic Commission for Europe (ECE).

Vierth, I. (2012). *Uppföljning Av Avregleringen Av Godstrafiken på Järnväg*. Linköping: VTI

Vierth, I., Mellin, A., Hylén, B., Karlsson, J., Karlsson, R. & Johansson, M. (2012). *Kartläggning av Godstransporterna i Sverige*. Linköping: VTI

Wajzman, J. & Nelldal, B.-L. (2008). *Överföring Av Gods Från Lastbil till Järnväg*. Stockholm: Kungliga Tekniska Högskolan, KTH.

Weill, P., Malone, T. W., D'Urso, V., Herman, G. & Woerner, S. (2006). *Do Some Business Models Perform Better than Others? A Study of the 1000 Largest US Firms*. MIT Center for Coordination Science Working Paper No. 226

Wimsatt, W. C. (2007). False Models as Means to Truer Theories. *Re-Engineering Philosophy for Limited Beings*. Ed. W. C. Wimsatt. Cambridge, MA: Harvard University Press, 2007, 94-132

Zachrisson, P. (11 April, 2014). (D. Jelcic, Interviewer.)

Åkerman, J. (2011). The Role of High-Speed Rail in Mitigating Climate Change – The Swedish Case Europabanan From a Life Cycle Perspective. *Transportation Research Part D: Transport and Environment*, 16(3), 208-217

## **8 Appendix**

### **8.1 Appendix 1**

#### **Interview: Thomas Andersson, Managing Director, TX Logistik AB, Sweden**

##### **Value proposition**

What are the services/products provided by TX Logistik in Sweden?

Are services customized or standardized?

Why should customers choose TX Logistik instead of other companies?

How do you offer your services in order to fulfill customer needs?

Which customer needs is TX Logistik satisfying?

Which one of TX Logistik's customer's problems is TX Logistik helping to solve?

How does TX Logistik work with innovation, i.e. how often do you innovate your services, how are you doing when evaluating what to innovate, etc.?

##### **Customer (target) segments**

What is your target segment, i.e. B2B or B2C?

What are customer groups/industries?

Who are the most important customers and why?

Is there any segmentation within your target segment(s) like volume being transported, type of products, type of industry, departure and destination point, one time deliveries vs. continuous deliveries, etc.?

##### **Distribution channels ("Distribution Channel" is defined as means of reaching the customers (similar to marketing channel))**

Can you describe the selling process, from A-Z, when selling your services/products to customers?

How does TX Logistik sell their value proposition to its customers?

##### **Awareness**

How does TX Logistik raise awareness about its company's products and services? How do customers know about you? E.g. flyers, logistic magazines, exhibitions, web sites, google ads

##### **Evaluation**

How does TX Logistik help customers evaluate TX Logistik's value proposition that is offered? Connected to the question "Why should customers choose TX Logistik instead of other companies?"

##### **Purchase**

How does TX Logistik allow customers to purchase specific products and services?

## **Delivery**

How does TX Logistik deliver a value proposition to customers?

## **After Sales phases**

Does TX Logistik have any after sales activity? E.g. questionnaire about the perception of the service provided by the company or warehouse solution if the customer is not able to collect the products delivered at the moment or some other activity.

Track and trace (connected to the value proposition)?

## **CRM**

How do you use information about customers in order to improve your services?

How do you establish long term relationships with your customers? What kind of activities is performed before deciding the level of relationship with a customer?

How does TX Logistik manage to keep customer relationships? What kind of activities is performed?

Frequency of interactions with customers, i.e. how often you get in touch and how?

What types of interactions does TX Logistik use with its customers? E.g. e-mail, go directly, questionnaire, telephone, newsletter, automated interactions in order to exchange information, exhibitions.

What type of relationship does each of TX Logistik's customer segments expect TX Logistik to establish and maintain? E.g. truck load and less than truck load. What is important for you? Stable flow

## **Value configuration**

What activities and processes (both internal and external) are necessary for TX Logistik to carry out in order to create value for its customers? (Connected to key activities, Supply Chain Management, IT-systems)

## **Capability (Resources)**

Physical – Locomotives, terminals, wagons, rail stock

Intellectual – ICT (Information and Communication Technology) (brand patents, copyrights) How do customers recognize TX Logistik? What is TX Logistik doing that gets recognition in the industry?

Human – Locomotive drivers. Structure of the staff, i.e. operators, administration, etc.

Financial – How do TX Logistik AB loan vs. lending money between the subsidiaries in the corporate group of TX Logistik? Can TX Logistik AB transfer and/or receive revenue from other

What does TX Logistik need to be able to perform in order to create value for its customers? E.g. road haulage, terminal handling, etc.

Does TX Logistik outsource part(s) of the business? If yes, which activities and why?

## **Key partners**

Who are TX Logistik's key partners and why? How is information from these partners linked to TX Logistik's business process?

Who are TX Logistik's key suppliers and why? How is information from these partners linked to TX Logistik's business process?

Which key resources does TX Logistik acquire from partners?

Which key activities do partners perform and why?

### **Cost structure**

What are fixed costs?

What are variable costs?

What are the most important costs inherent in TX Logistik's business model?

Which key resources are the most expensive?

Which key activities are the most expensive?

### **Revenue stream**

What are sources of income?

What is the structure/distribution of revenue? Like renting locomotives or other assets, interest income, etc.

### **Additional Questions**

Is Sweden, overall, a suitable country for intermodal transportation?

Is there anything that can be done in order to compete with road?

You compete with trucks, however, you need to collaborate with them since they offer services to and from the terminals, how is this going?

What kind of advantages do trucking companies offer than you?

The time factor, is it an advantage for trucking or intermodal companies?

Looking from the legislation's point of view and stable legislations, is Sweden a good country for this business?

What about social and environmental aspects? Intermodal services are greener than road services, but cause maybe a higher level of noise, so it may not be convenient for surrounding inhabitants, so do you have some concerns about social environment?

Do you receive any complaints from society that somehow harms your business?

Do you think that companies that belong to the government have some kind of favor position for the competition compared to private companies?

Negotiation position: e.g. Green Cargo that is a way larger company (and governmentally owned) than TX Logistik, should have a much stronger position than you have for example when negotiation with partners, suppliers, etc.

How about time slots?

What kind of factors can bring you bigger profits in this market?

Do you think it is possible to make intermodal transport more attractive to customers?

Why can't you run two trains a day in your current situation since that would be attractive to customers? Customers have to generate some volume in order for two departures to be possible, is it too risky nowadays to have two departures?

Would you as an intermodal company try to push the government to invest in having double tracks?

## 8.2 Appendix 2

**Interview: Jörg Nowaczyk, Division Manager TXCARGOSTAR Intermodal, TX Logistik AG, Germany and Per Zachrisson, Product Manager Intermodal, TX Logistik AB, Sweden**

### **Value proposition**

What are the services/products provided by TX Logistik in Germany?

Are services customized or standardized? (Distribution of customized/standardized services)

Why should customers choose TX Logistik instead of other companies?

How do you offer your services in order to fulfill customer needs?

Which requirements of customers is TX Logistik satisfying?

What kind of extra value can TX Logistik offer their customers? E.g. helping with refilling of diesel tanks, repairing broken trailers/wagons, etc.

How does TX Logistik work with innovation, i.e. how often do you innovate your services, how are you doing when evaluating what to innovate, etc.?

### **Customer (target) segments**

What is your target segment, i.e. B2B or B2C?

What are customer groups/industries?

Who are the most important customers and why?

Is there any segmentation within your target segment(s) like volume being transported, type of products, type of industry, departure and destination point, one time deliveries vs. continuous deliveries, etc.?

**Distribution channels (“Distribution Channel” is defined as means of reaching the customers (similar to marketing channel))**

#### **Awareness**

How does TX Logistik raise awareness about its company’s products and services? How do customers know about you? E.g. flyers, logistic magazines, exhibitions, web sites, google adds

#### **Evaluation**

How does TX Logistik help customers evaluate TX Logistik’s value proposition that is offered? Connected to the question “Why should customers choose TX Logistik instead of other companies?”

#### **Purchase**

How does TX Logistik allow customers to purchase specific products and services? E.g. booking systems, phone, depending on the agreement with the customer, etc.



## **Delivery**

How does TX Logistik deliver a value proposition to customers?

## **After Sales phases**

Does TX Logistik have any after sales activity? E.g. questionnaire about the perception of the service provided by the company or warehouse solution if the customer is not able to collect the products delivered at the moment or some other activity.

Track and trace (connected to the value proposition)?

## **CRM**

How do you use information about customers in order to improve your services? In order to establish a long term relationship, do you make any special offer for a customer in order to keep them?

How does TX Logistik manage to keep customer relationships? What kind of activities is performed?

Frequency of interactions with customers, i.e. how often you get in touch and how?

What types of interactions does TX Logistik use with its customers? E.g. e-mail, go directly, questionnaire, telephone, newsletter, automated interactions in order to exchange information, exhibitions.

What type of relationship does each of TX Logistik's customer segments expect TX Logistik to establish and maintain? E.g. truck load vs less than truck load.

## **Value configuration**

What activities and processes (both internal and external) are necessary for TX Logistik to carry out in order to create value for its customers? Infrastructure provider, licenses, policy makers, Supply Chain Management, IT-systems (Connected to key activities)

## **Capability (Resources)**

Physical – Locomotives, terminals, wagons, rail stock

Intellectual – ICT (Information and Communication Technology) (brand patents, copyrights) How do customers recognize TX Logistik? What is TX Logistik doing that gets recognition in the industry?

Human – Locomotive drivers. Structure of the staff, i.e. operators, administration, etc.

Financial – How do TX Logistik AB loan vs. lending money between the subsidiaries in the corporate group of TX Logistik? Can TX Logistik AB transfer and/or receive revenue from others.

What does TX Logistik need to be able to perform in order to create value for its customers? E.g. road haulage, terminal handling, etc.

Does TX Logistik outsource part(s) of the business? If yes, which activities and why?

## **Key partners**

Who are TX Logistik's key partners and why? How is information from these partners linked to TX Logistik's business process?

Who are TX Logistik's key suppliers and why? How is information from these partners linked to TX Logistik's business process?

Which key resources does TX Logistik acquire from partners?

Which key activities do partners perform and why?

### **Cost structure**

What are fixed costs?

What are variable costs?

What are the most important costs inherent in TX Logistik's business model?

Which key resources are the most expensive?

Which key activities are the most expensive?

### **Revenue stream**

What are sources of income?

What is the structure/distribution of revenue? Like renting locomotives or other assets, interest income, etc.

### **Additional Questions**

Is Germany, overall, a suitable country for intermodal transportation? Why?

Is there anything that can be done in order to compete with road?

You compete with trucks, however, you need to collaborate with them since they offer services to and from the terminals, how is this going?

What kind of advantages do trucking companies offer than you?

The time factor, is it an advantage for trucking or intermodal companies?

Looking from the legislation's point of view and stable legislations, is Germany a good country for this business?

What about social and environmental aspects? Intermodal services are greener than road services, but cause maybe a higher level of noise, so it may not be convenient for surrounding inhabitants, so do you have some concerns about social environment?

Do you receive any complaints from society that somehow harms your business?

Do you think that companies that belong to the government have some kind of favor position for the competition compared to private companies?

Negotiation position: e.g. state-owned companies may be larger than TX Logistik, do you think they have a much stronger position than you have, for example, when negotiation with partners, suppliers, etc.

How about the distribution of time slots between state-owned companies and private companies?

What kind of factors can bring you bigger profits in this market?

Do you think it is possible to make intermodal transport more attractive to customers?

In Germany, can you use the same locomotives, drivers and/or wagons between the different divisions? E.g. can the same locomotives and drivers drag wagons for intermodal services as well as for car wagons?

If yes, how do you manage to share these resources among the divisions?

### 8.3 Appendix 3 Logistics Regions in Germany



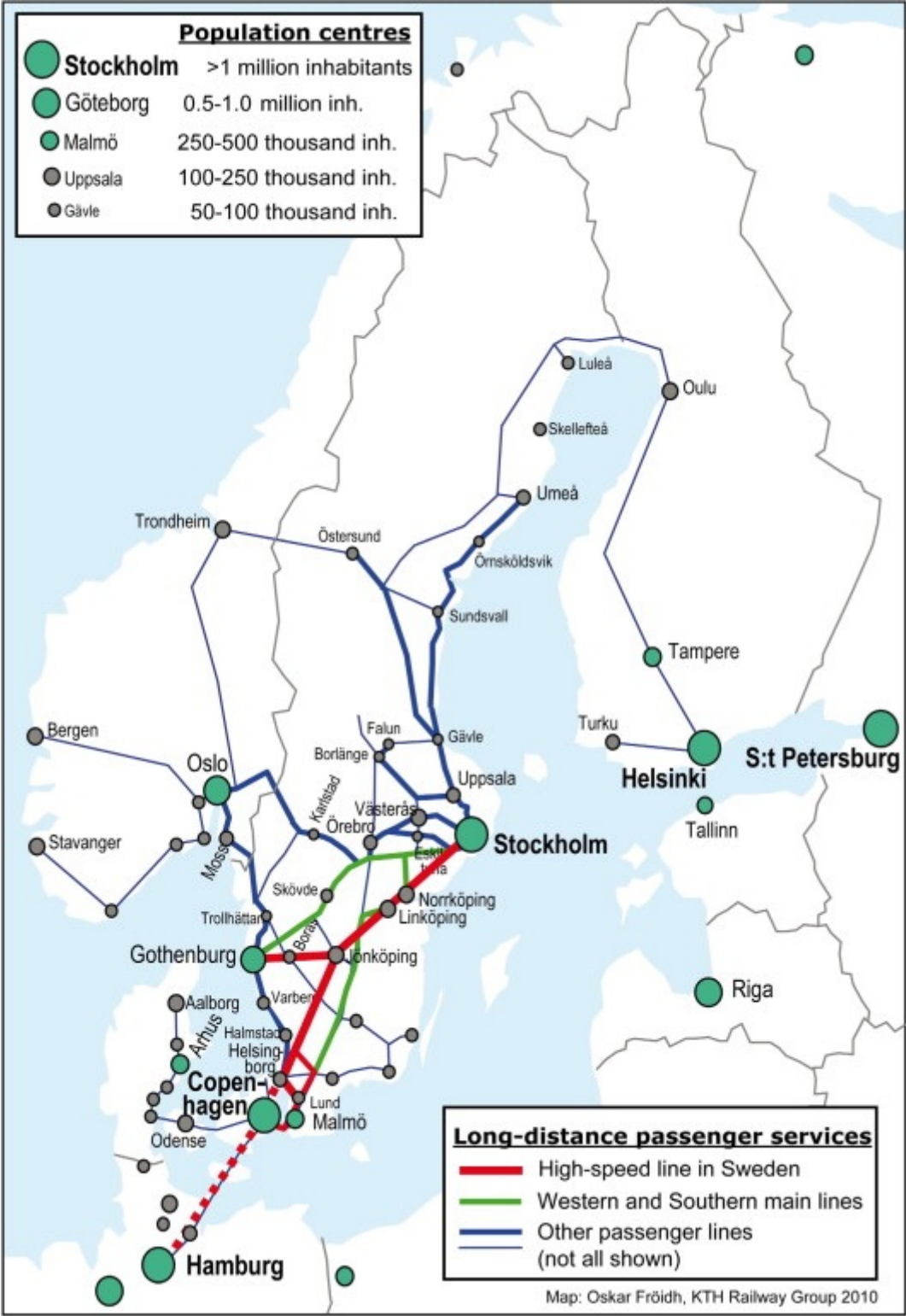
Logistics regions in Germany (GTAI, 2010 p 2)

**8.4 Appendix 4 Germany's Main Truck Flow**



German's main truck flows (Transport Intelligence, 2008)

### 8.5 Appendix 5 Europabanan



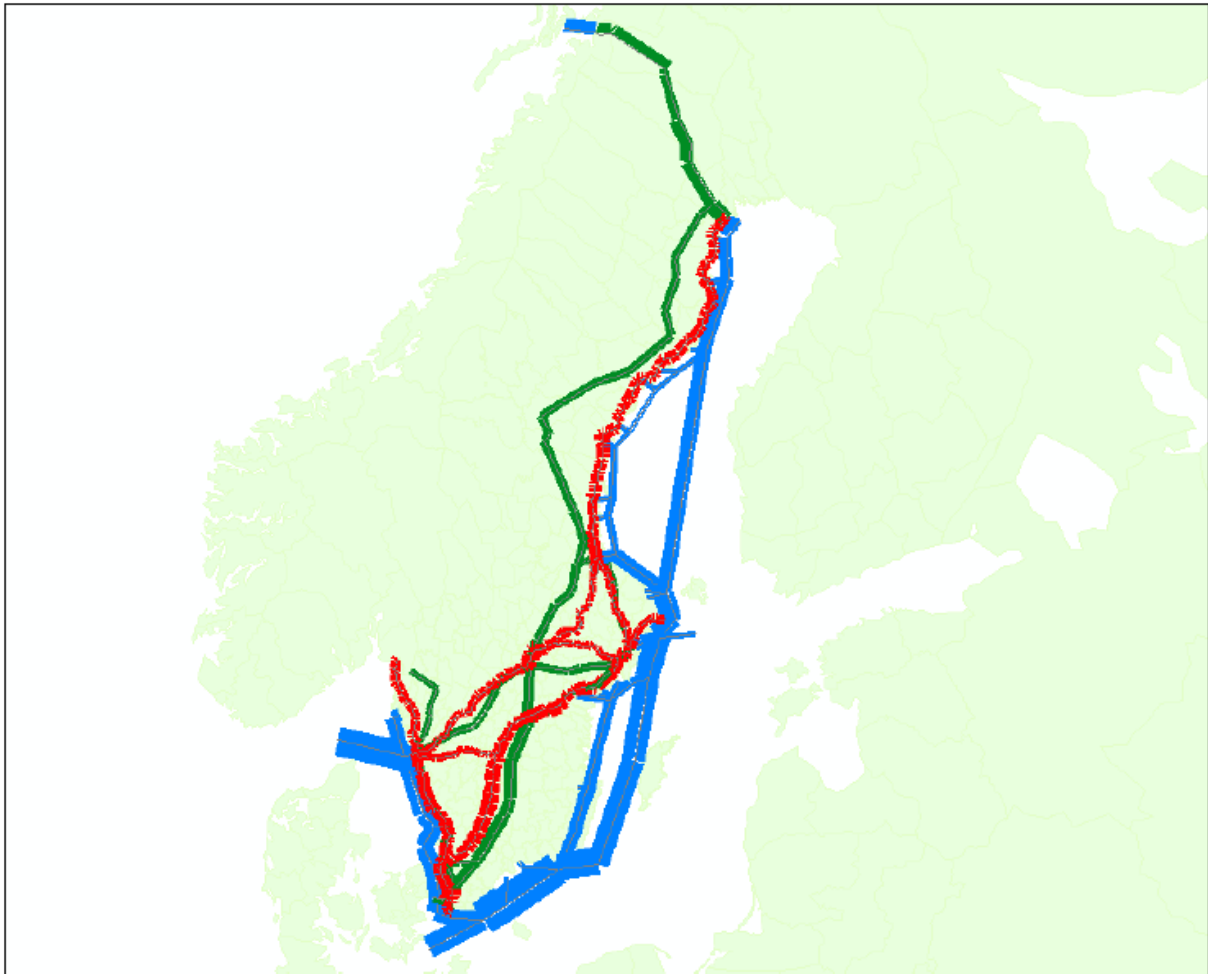
The proposed high-speed lines connecting Stockholm to Gothenburg and Malmö via Jönköping (Åkerman, 2011)

8.5 Appendix 5 Sydostlänken



Sydostlänken (Gröndahl, 2012, p 64)

## 8.6 Appendix 6 Main Corridors



Main corridors for cargo transports in Sweden 2010 (amount of goods on corridors). Calculations based on Samgodsmodellen (red = road, green = rail, blue = sea) (Vierth et al., 2012, p 39)

### ***Main Corridors***

**Corridor 1:** A north-southern land based corridor from Luleå via Mälardalen to Malmö/Trelleborg with extension to the continent.

**Corridor 2:** Shipping along the Baltic Coast.

**Corridor 3:** Gothenburg-Stockholm (mainly European route E20, Highway 40, European route E4 and railroad Western Main Line) with extensions from Gothenburg westward and eastward from Stockholm.

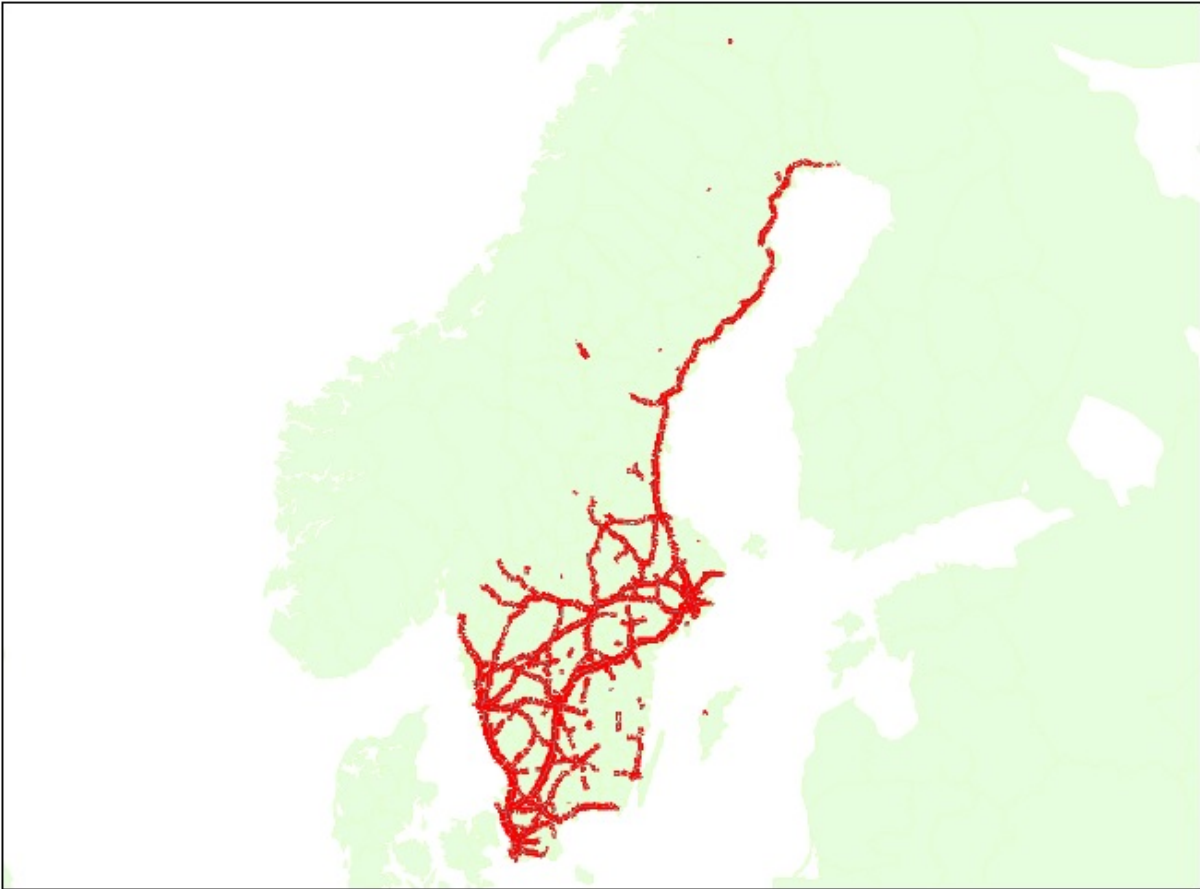
**Corridor 4:** From Norrland via Hallsberg to Gothenburg (including railroad Bergslagsbanan, freight line through Bergslagen, European route E18 and Highway 67).

**Corridor 5:** Along the west coast Norway-Gothenburg-Malmö-Svinesund-Trelleborg, railroad West Coast Line with continuation in Norway.

**Corridor 6:** Railroad Malmbanan with shipping services from Narvik (Norway).



**8.7 Appendix 7 Truck Flow**



Truck Flow (Includes all trucks with a gross weight of  $\geq 3.5$  tons. Only flows in excess of 100,000 vehicles per year and direction are included.) 2010 (Vierth et al., 2012, p 40)

**8.8 Appendix 8 Cargo Train Flows**



Cargo train flows 2008 on the main corridors (Vierth et al., 2012, p 41)