Extended logistics and insurance by an innovation for the road transportation sector

- A logistical insurance case study within Datachassi AB Europe/Germany

Master Thesis
International Logistics and Supply Chain Management
Entrepreneurial Management
Jönköping International Business School
Author: Claas Bönnighausen
Riku Ässämäki
Tutor: Prof. Susanne Hertz
Ass. Tutor: Benedikte Borgström
Jönköping 06 / 2009
Acknowledgements

The authors would like to express deepest gratitude for the Datachassi AB and to thank all the representatives of the Datachassi AB, who gave an opportunity to work and learn by a close cooperation and interaction with a real life problem and scenario.

Hereby, special acknowledgements for Lars Birging and Johannes Falkeström in regards to all their support, tips and creative advices during the elaboration of this conduction. Also, the authors would like to thank all participating organizations for sharing some of their professional knowledge and expertise with the authors to conduct this research. Lastly, the authors would like to thank our tutors Susanne Hertz and Benedikte Borgström for their guidance and academic reflection through this research study.

The authors are pleased to present this thesis and hope that the results provide a valuable contribution to Datachassi AB’s aim to launch a logistical technology innovation.

Jönköping, Sweden, June 2009

Claas Bönnighausen 

Riku Ässämäki
Abstract

In the conduction of this master thesis an investigation is undertaken to observe the major impacts of a new security technology innovation for the European and in particular German road transportation sector.

To scrutinize the opportunities of this application a German road transportation business model is provided and analyzed. By doing this, the question should be raised if innovation technology and coupled with more security in the road transport is achievable. In this regards the transport insurance process is observed to figure if this can be used as leverage effect to essentially apply innovational security applications in a logistical network business model. The approach towards the research questions is structured by the major subjects of high technology innovation, secure transport chains and transport insurance in the German and partly European road transport market.

Purpose

The purpose of this thesis is to investigate what kind of opportunities can be offered by a security high technology innovation for the road transportation sector. The view of three central issues; logistical innovation, security in transports and transport insurance, is chosen to integrate the technology in an adequate network business model for the German market.

Method

In order to fulfill the purpose a qualitative study is conducted. The qualitative approach is supported by an establishment of the thesis in the surroundings of the innovation provider to observe, interact and learn. A variety of interviews and contacts with important industry contacts are used to explain the complex scenario of the sector.

Conclusions

High technology security innovations applied in a road transport network can increase cargo and driver security, as well as, road safety, to set free opportunities, which affects the whole network with a special impact by the cargo insurance.
Abbreviations

AAR - Against All Risks (policy)
ADSp - Allgemeine Deutsche Spediteurs Bedingungen
BCs - Buses and coaches, weight 3,51 to 16 tonnes
BGB - Bundesgesetzbuch / civil code Germany
CMR - Convention relative au Contrat de transport international de Marchandises par Route
CIP - Carriage and insurance paid to
CPT - Carriage paid to
CISG - United Nations Convention on contracts for the international sale of goods
CVs - Commercial vehicles, weight 3,51 to 16 tonnes
DIN - Deutsches Institut für Normung
DDU - Delivered Duty unpaid
EU - European Union
EUR - Euro
FMCW - Frequency modulated continuous-wave radar
FSR - Freight Security Requirements
GPRS - General packet radio system
GSM - Global system for Mobile communications
HBCs - Heavy busses and coaches, weight over 16 tonnes
HGB - Handelsgesetzbuch (code of commercial law Germany)
HCVs - Heavy commercial vehicles, weight over 16 tonnes
ICC - Institute Cargo Clauses
IEEE - The Institute of Electrical and Electronics Engineers
ISO - International organization for Standardization
IUA - International Underwriter Association
JIT - Just In Time
Incoterms - International commercial terms
LBCs - Light busses and coaches, weight up to 3,5 tonnes
LCVs - Light commercial vehicles, weight up to 3,5 tonnes
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED</td>
<td>Light-emitting diode</td>
</tr>
<tr>
<td>OBC</td>
<td>On Board Computer (truck)</td>
</tr>
<tr>
<td>RFID</td>
<td>Radio Frequency Identification</td>
</tr>
<tr>
<td>ROI</td>
<td>Return on investment</td>
</tr>
<tr>
<td>SDR</td>
<td>Special Drawing Rights</td>
</tr>
<tr>
<td>TAPA</td>
<td>Transported Asset Protection Association</td>
</tr>
<tr>
<td>TIR</td>
<td>Transport International by Road</td>
</tr>
<tr>
<td>TSR</td>
<td>Trucking Security Standards</td>
</tr>
<tr>
<td>USB</td>
<td>Universal Serial Bus</td>
</tr>
</tbody>
</table>
Definitions

Different backgrounds always surface misunderstandings in certain meanings. To avoid unclear terms, the important and not always commonly used terms are defined in the following.

Cabotage  Carriage of goods or passengers for remuneration taken on at one point and discharged at another point within the territory of the same country to the vessel of transport and for clearance of customs.

Cargo Insurance  Cargo insurance, as used in this work is related to the goods insurance and is differentiated to CMR- and motor liability protection.

Incoterms  International Commercial Terms. Incoterms are a uniform set of international rules, promulgated by the ICC (International Chamber of Commerce) in Paris, France for the interpretation of the terms most commonly used in international contracts for the sale of goods. Incoterms define the obligations of buyer and seller at every stage of an international sale of goods transaction. The Incoterms were first issued in 1953; they were last revised effective January 1, 2000.

Multimodal

Transport  Freight movement involving more than one mode of transport (ground, air, rail, and ocean). Also interposal transportation.

Semi-Trailer  A semi-trailer is a trailer (see also trailer) without a front axle coupled in such a way that a substantial part of its weight and the weight of its load is borne by the tractor or motor vehicle.

Transport Insurance  Transport insurance is provided by transport insurance companies. In this conduction it is a comprehensive expression for motor liability insurance, CMR insurance and cargo insurance.

Tractor  A tractor is any self-propelled vehicle traveling on the road, other than a vehicle permanently running on rails and specially designed to pull, push or move trailers, semi-trailers, implements or machines.

Trailer  A trailer is any vehicle designed to be coupled to a motor vehicle or tractor.

Vehicle  Vehicle means a motor vehicle, tractor, trailer or semi-trailer or a combination of these vehicles (please see Appendix further definition).
Contents

1. Innovational technology and the German road transport .......... 1
   1.1. Background........................................................................................................ 1
   1.2. Datachassi’s technology ............................................................................. 1
   1.3. History and development of German road transportation .................... 2
   1.4. Defining the problem .................................................................................. 3
   1.5. Specifying the purpose ............................................................................... 4
   1.6. Delimitations .............................................................................................. 4
   1.7. Disposition .................................................................................................. 4

2. Research Methodology ........................................................................... 6
   2.1. Initial research ............................................................................................. 6
   2.2. Research approach ...................................................................................... 8
   2.3. Data collection ............................................................................................. 9
   2.3.1. Primary data .......................................................................................... 9
   2.3.2. Sample ..................................................................................................... 9
   2.3.3. Interview method .................................................................................. 9
   2.3.4. Secondary data ...................................................................................... 10
   2.4. Credibility of research findings ............................................................... 10

3. Frame of reference ............................................................................... 12
   3.1. Logistical lifecycle and innovation theory .............................................. 12
   3.1.1. The lifecycle model ............................................................................... 12
   3.1.2. High – technology innovation .............................................................. 13
   3.1.3. Innovation in the logistical sector .......................................................... 14
   3.2. Secure road transportation ....................................................................... 16
   3.2.1. Benefits of a secure road transportation chain .................................... 17
   3.2.2. Costs of a secure road transport chain ................................................. 19
   3.2.3. Security partners and facilitators .......................................................... 20
   3.2.4. Enablers of interactions ....................................................................... 21
   3.2.5. Partners in the secure supply chain ....................................................... 21
   3.3. Transport insurance in the road carriage ............................................... 22
   3.3.1. Insurance and Incoterms 2000 for the road transport .......................... 22
   3.3.2. Insurance by law - CMR ..................................................................... 23
   3.3.3. Cargo insurance ................................................................................... 24
   3.3.4. Carrier - insurer relation ...................................................................... 25
   3.3.4.1. Insurer perspectives on operators ..................................................... 26
   3.3.4.2. Operators view on insurer ................................................................ 27
   3.4. The concept of a logistical business model ........................................... 28
   3.4.1. A business model framework for the Datachassi innovation ............. 30
   3.4.2. Leverage details for the business model .............................................. 32
   3.4.3. Carrier business modification .............................................................. 34
   3.4.4. Security firms business modification ................................................... 35
   3.4.5. Road transport business model – key statements ................................. 36

4. Results from empirical research ......................................................... 37
   4.1. Innovative high tech technology .............................................................. 37
   4.1.1. Datachassi innovation .......................................................................... 37
   4.1.1.1. D-Net© .............................................................................................. 38
Innovational, logistical and insurance analysis ........................................ 71
4.1.1.2. Radar .......................................................................................... 38
4.1.1.3. Sidelights .................................................................................. 38
4.1.1.4. Datachassi Gateway ................................................................. 40
4.1.1.5. On Board Computer ................................................................. 40
4.1.1.6. Focus on main features ............................................................... 41
4.1.1.7. Product integration ................................................................. 43
4.1.1.8. Potential competitors ............................................................... 43
4.2. German road logistics market .......................................................... 44
4.2.1. Truck manufacturer .................................................................. 46
4.2.2. Transportation companies ......................................................... 46
4.2.3. Truck driver’s union ................................................................. 47
4.2.4. Governmental view ................................................................. 47
4.2.5. Trends in the road freight transport ........................................... 48
4.3. Road transportation security ......................................................... 50
4.3.1. Driver and cargo security .......................................................... 50
4.3.2. Tapa Emea .................................................................................. 50
4.3.3. Thefts of cargo ........................................................................ 51
4.3.4. Damages on the vehicle and cargo ......................................... 54
4.4. Transport insurance underlying risk factors ...................................... 56
4.4.1. Incoterms 2000 in road transportation ...................................... 56
4.4.2. The general risk distribution for loss, damage or delay ............ 57
4.4.3. Liabilities and risks in the transportation process .................... 58
4.5. German transport insurance within Europe .................................... 59
4.5.1. Vehicle insurance ..................................................................... 60
4.5.2. CMR and ICC in the road transport sector ............................... 60
4.5.3. Legal interest ........................................................................... 61
4.5.4. Risks sections ........................................................................... 61
4.5.5. Types of transport insurance policies ...................................... 61
4.5.5.1. Specific single policy ........................................................... 62
4.5.5.2. Open policy ........................................................................ 62
4.5.5.3. General policy ..................................................................... 62
4.5.6. Underwriting risk factors for the transport insurance ............... 62
4.5.7. Premium determination .............................................................. 65
4.5.8. The insurer’s recourse ............................................................... 66
4.5.9. Transport liability examples ...................................................... 66
5. Innovational, logistical and insurance analysis .................................... 71
5.1. Logistical lifecycle and innovation .................................................. 71
5.2. Secure road transports ................................................................. 72
5.2.1. Tracking and tracing ................................................................. 73
5.2.2. Security advantages for actors in the road transport ............... 74
5.2.3. Costs of security improvements ............................................... 76
5.3. Cargo insurance in road transport analysis ................................... 76
5.4. Road transport business model analysis ....................................... 78
5.4.1. Cost benefit analysis ................................................................. 81
6. Conclusion and Recommendation .................................................... 82
6.1.1. Conclusions ............................................................................. 82
6.1.2. Recommendations .................................................................. 83
6.1.3. Reflections on the thesis .......................................................... 84
Figures

Figure 1: Growth of transport in West Germany 1950 – 1980. .............................................3
Figure 2: Product lifecycle. .....................................................................................................12
Figure 3: Dimensions of innovation...................................................................................14
Figure 4: Road transportation chain....................................................................................16
Figure 5: How firms should change the supply chain security approach. .........................18
Figure 6: Liability and goods insurance – CMR and transport insurance..........................23
Figure 7: Liability and cover of a German international carrier – CMR. ..............................24
Figure 8: Roles in the transport insurance.........................................................................25
Figure 9: Transport insurance premiums flow. ......................................................................27
Figure 10: Theoretical business model. ................................................................................29
Figure 11: Datachassi business model – participants............................................................31
Figure 12: Datachassi business model – participant relations. .............................................32
Figure 13: Datachassi business model – leverage.................................................................33
Figure 14: Datachassi business model – road transport network.........................................34
Figure 15: Datachassi business model – carrier business modification..............................35
Figure 16: Datachassi business model – security firm modification.....................................36
Figure 17: Datachassi business model – key statements......................................................36
Figure 18: Datachassi’s sideline application. .......................................................................39
Figure 19: Datachassi’s invisible fence................................................................................39
Figure 20: Datachassi’s LED lights......................................................................................40
Figure 21: Volume of intra EU goods transported by road (tonnes). .....................................45
Figure 22: Average size distribution in vehicles of companies. ............................................46
Figure 23: Key elements of the road transport sector. ..........................................................49
Figure 24: Tapa Emea top ten countries of incidents............................................................52
Figure 25: Sources of Tapa Emea reported incidents.............................................................52
Figure 26: Product category of incidents occurred 2007. ....................................................53
Figure 27: Product category of incidents occurred 2008. ....................................................54
Figure 28: Damaged goods after an attack..........................................................................54
Figure 29: Incidents occurred in 2007. ...............................................................................55
Figure 30: Incidents occurred in 2008. .................................................................55
Figure 31: Damaged curtain side trailers after the attack. .................................56
Figure 32: Example for national road transport in Germany. ...............................67
Figure 33: Seller’s risk in the national transport. ....................................................68
Figure 34: Example for international road transport from Germany. ..................69
Figure 35: Seller’s risk in the international transport .............................................70
Figure 36: Datachassi hi-tech-innovation within the dimensions of innovation .......72
Figure 37: Supply chain improvement - sender, carrier, insurance, customer .........74
Figure 38: Improved transport insurance premiums flow ......................................77
Figure 39: Datachassi business model - cost and benefits-analysis ......................81
1. Innovational technology and the German road transport

This starting chapter presents a discussion about why this topic is chosen as subject of this conduction by the authors. It also presents the background needed to understand the choice of research questions.

1.1. Background

The cargo transport sector in Germany is dramatically increasing even due to high gas prices. As a matter of fact high value goods are transported on the roads and are targets for illegal actions such as thefts and vandalism. Furthermore and surely, as much important, is the working environment for the driver, which is highly affected, as well.

To provide a safer workplace and a better protection for truck drivers and the transported cargo, Datachassi AB, an entrepreneurial company located in the Science Park of the University of Jönköping came up with the idea to introduce a high technology innovation for the road transport sector based on a wireless network and radar technology.

An invisible fence together with an alarm system can be activated when the truck driver has to rest and parks the vehicle or trailer in an insecure area. Further applications are added to the technology, such as a blind spot detectors and LED lamps for more safety in the road transport traffic.

Since globalisation is evolving more and more and the access of new markets is a valid fact for businesses, logistical issues can be determined as crucial tasks in transporting materials and information through the supply chain and also the road transport chain of international operating firms.

This thesis deals with the road transportation of goods in the road transport supply chain, which is considered to be an extension of the road transport physical-distribution management (Chapmann, Soosay & Kadampully 2002). Interesting to see is, that the role of logistics has changed within the last decades. Logistics had a supportive role to e.g. marketing and producing activities. But now has developed into concepts for warehousing, transportation, distribution, purchasing, inventory management, manufacturing, and customer service (Bowersox and Closs, 1996). Hence, partner and networks in every single issue is important to evaluate for logistical firms.

In this conduction the road transport per truck and trailer will be observed to essentially examine the innovative technology application, transport security and transport insurance, as a facilitator, as well as, a road transport chain networking model, in terms of cost neutralism and security issues in the German and partly European picture.

The following introducing chapters will give an overview of the technology innovation and the sector this technology is launched in. In conjunction with that, the problem of the thesis is introduced; the information will target on to an understanding of the purpose and the scoop of this conduction.

1.2. Datachassi´s technology

This brief technology insight is written to provide the reader with an overview of the Datachassi innovation and is further elaborated in the empirical research of the thesis. It
does not claim consistency and is rather noted as incomplete, since this technology innovation is widely developable and extendable.

Firstly, the European Union (EU) reports stolen goods from trucks each year in an amount about seven billion Euro (EUR) and this number is increasing (TAPA Emea, 2009). Further on, to the costs to the society and the transport industry, thefts are responsible for a highly insecure working environment for the truck drivers. Therefore, Datachassi AB came up with the idea to protect truck drivers and cargo in a unique way, linked to a high technology innovation based on a wireless network around the truck (Datachassi, 2009).

The solution helps safeguard transports from intrusion and thefts. Moreover, than just an alarm system does this product provide a wireless communication platform. In doing so the product is highly developable and will offer new opportunities to the logistic industry, as well as, various safety applications. Because of a main focus on the industry standards, Datachassi implemented their product solution as an application to the road transport sector technology. This leads to less monetary effort in adapting to for instance, Radio Frequency Identification technology (RFID), e.g. for scanning goods or other technology devices coupled with this new invention.

For the research in the area of innovation, the security of road transports and an insurance based analysis, the German road transportation sector within Europe is chosen. Thus, in the following an overview of the German road transportation sector and its development gives a basic understanding of the processes going on in this very special and competitive market.

1.3. **History and development of German road transportation**

In the early 1900’s the main transportation method in Germany was rail transportation. However, after World War II the focus from favoring rail transportation began slowly to change towards road transportation. Reasons for this reformation were that the road network was still in relatively good condition compared to the damaged rail network. Also the flexible character of the road transport and a rising concentration of the German car industry towards civilian vehicles increased road transportation. (Wolf, 1996)

Rail transportation is recognized to be a mass transportation method and because of the industrialization the need of transports with more cargo than before and for longer distances was rising. However, rail transportation began to lose its leading position on the transportation sector. Growing industrialization waves increased individual’s movement which required more flexible means of transportation than railway (Wolf, 1996). Also the central location of Germany was a factor for change. Germany has land borders with nine countries, which leveraged the upcoming changes in the German transportation sector (Invest in Germany GmbH, 2005).

During the 1960’s, road transportation began its great expansion in Germany. The growth of the road network and especially an expansion of the German Autobahn (highways) plus the decrease of rail network are reasons for it, showed in the next figure. 1960 was the decade when the share of rail transportation finally began to decrease and the share of road transportation increased.
The growth of the road transportation has been increasing during the last decade. A recent boom for the expansion of road transportation in Germany was the ratification of the EU on the 1st of November 1993 and its idea to have a European wide single market. Today, the EU is an economic and political union of twenty seven countries, which will continue their growth in the future. This means it will increase the need of transportation between the member states (European Union, 2009). Germany, as one of the most significant industrial nations in Europe and as an important transit country, because of its central location, is a logistics centre in Europe. A perfect location in the European continent makes sure that the total volume of transportation will keep increasing over the years in the future. So, benefits of the transportation in Germany do not only cease to the great location, but also to the great transportation infrastructure. In the current level, the density of the German highway network is twice as large as the average in the EU. Moreover, it will continue its expanding (Invest in Germany GmbH, 2005). With two world scale container ports, Bremen and Hamburg, German logistics operations are adapted to global logistics markets.

### 1.4. Defining the problem

Innovations in security technology applications are costly for logistical firms and require new investments. These expenses have to be amortized by cooperating with different actors in the process of the road transport chain; embedded in a logistical network. Road transport security and transport insurance as factors that have impacts on the German transport market, in a manner which cannot be neglected in this kind of competitive market, should be scrutinized for the exploration of product and a future strategy for companies developing the technology innovation.

Research questions that occurred are:

- Are technology innovations necessary in the road transport sector and who supports has to support it to develop?
- What impact does transport insurance got on the road transport chain process and what is the impact on cargo insurance for road transports when transport security is optimized with a security application?
What cost and benefit effects has an innovational business model in the sector of road transportation?

1.5. Specifying the purpose

The purpose of this thesis is to investigate what kind of opportunities can be offered by a security high technology innovation for the road transportation sector. The view of three central issues; logistical innovation, security in transports and transport insurance, is chosen to integrate the technology in an adequate network business model for the German market.

1.6. Delimitations

For an easier understanding of the complex issues going on in the security and insurance field, the use of the technology is brought to the reader’s attention but does not claim to be a comprehensive scoop but rather a view on the basis of this technology innovation.

The thesis deals with the major actors and facilitators in a road transport supply chain. For reasons of comprehensiveness these actors and facilitators are figured to be stakeholders of the road transport chain. The term stakeholder should so refer to participants with an interest in a secure road transport supply chain.

1.7. Disposition

This conduction will henceforth be disputed as followed:

Chapter 2: The methodology chapter is the following chapter and describes the empirical study of this conduction. It includes amongst more, how the study approach is chosen and which actors and facilitators are observed and why. It describes the primary and secondary data selection, before concludes with a discussion of the reliability and the validity of the data used.

Chapter 3: In the third chapter, which is the frame of reference of this thesis, we will present theory about lifecycle and innovation in the logistic sector. Further will a presentation of research in for the repeating fields of road transport chain security, transportation insurance be provided. Essentially a research about business models with the link to innovations is given to be elaborated in a logistical innovation network business model for the innovation technology introduced to earlier. These fields of interest supported the choice of interview partners and topics, as well as, support the answers of the research questions.

Chapter 4: After the frame of reference elaboration, the empirical study of the thesis is given to show the base of the study. Hereby, the main fields of the frame of reference is mirrored and extended with a German market overview to settle the location of observation. The main issues are again, innovation in the logistic sector, the road transport chain security and transportation insurance.

Chapter 5: After presenting the empirical findings the analysis part of the four major fields, innovation, security and insurance plus the business model is presented. The major empirical findings are discussed based on the models and theories shown in the theoretical framework.
Chapter 6: The last chapter of this conduction is the conclusion and recommendation part. This chapter represents the main results; the analysis has generated and reconnects with the purpose and the theoretical frame. It gives further recommendations for elaborations in the field of the study.
2. Research Methodology

This chapter represents the methodology chosen for the conduction to examine the research questions and the purpose of the study, discussed before. The selection of the methodology is illustrated, plus, the choice for the cooperating company and the data collection methodology is shown.

2.1. Initial research

The choice for the methodology of this scientific paper is based on the purpose of the study. The methodology of the research gives an approach to the complete scientific study (Collis & Hussey, 2003). Often is it discussed which research method to use, qualitative or quantitative. Sometimes there is even a contradiction when to use which one and a combination of the two methods is feasible, since it is valid that qualitative data is quantified (Ghauri & Gronhaug, 2005).

As Ghauri & Gronhaug (2005) continued in their study, in many scientific papers the quantitative method is acknowledged to be a more appropriate research methodology. The reason for that is, that quantitative methods are much more used in the scientific world than the qualitative approach. The quantitative method has its advocates because it is often based on surveys, which give the researcher concrete, critical and logical results. Such data gives an analytical way to approach the research problem, as Ghauri & Gronhaug (2005) furthermore continued. There is also the risk behind the statistical data. A quantitative research is based on surveys, observations, interviews and field research. Such statistical data is relatively easy to analyze and furthermore, is easy to use, with, for example a computer analysis. Nevertheless, the result achieved in such a way, might sometimes tempt researchers to come up with statistical information and to avoid a proper analysis of the data from the survey. (Curran & Blackburn, 2001)

In the qualitative research, the data is collected contrary to the quantitative research in which the collected data is based on statistics. This research is based on techniques, such as interviews and personal conversations or interaction. The common interviews are unstructured and semi-structured interviews, which are explained later on. (Ghauri & Gronhaug, 2005)

The data behind the qualitative research is more complicated to analyze than data behind a quantitative research, as discussed above. The analysis of the qualitative data requires that the researcher has a very good knowledge of the studied topic. Hence, the conduction includes a four months observation of the working experience in the company investigated and a deep insight in the sector of the study.

Qualitative research has no single theory behind it. Instead, it is the selection of different theories which are merged to be used in a certain research. The qualitative research begins with collecting relevant theory and with defining the research problem. When the researcher is familiar with the theory, the next phase is to build up a research question based on this theory (Neergaard & Ulhøi, 2007).

The ability of a road transportation innovation in the German and European transport sector is a viable topic for companies involved like carriers, as well as, for cargo insurance companies. The study started by assembling information in first meetings with the company representatives to ease into the working field of the entrepreneurial company.
The research went on by gathering essential papers of research related literature and a search of various information provided by official sources, such as the EU, to establish a general overview of this subject. Additionally, contacts were being established with specialist representatives from different actor firms in this sector, for instance German transport insurance firms, trailer manufacturers and carriers for being able to get expertise knowledge of this sector.

Since this study is written with a qualitative research approach, this thesis will include more information about the choice of the actual study, the conduction of information and data and an overview of the credibility, validity and generalization of data in the thesis. But before getting to the choice of the study, a brief checklist of the main characteristics of qualitative research is provided to relate this thesis in a non specific order (Creswell, 2009):

Researchers as key instrument – Qualitative researchers conduct data by themselves through examining documents, observing special behavior or interacting with participants. A protocol might be used but the researcher is the one gathering the information. Questionnaires are a rather seldom instrument in the field of qualitative research, just as in this thesis. This is done by facilitating daily work in the innovation provider and attendance in a road transport safety fair in Jönköping introduced by the Swedish police and with attendance of multiple carrier and road security firms at the 14th of April 2009. This event was used to establish important contacts and opinions in the field of study.

Natural setting – This thesis, as said, is widely conducted in the headquarter of the company of the technology provider. This is related to the theory of a natural setting and surrounding, to conduct data in the field of study but at the side to gain a real insight. Learning by observing is the key issue.

Data and multiple sources – Typically are more different forms of data collection used in the qualitative research. This thesis is build upon personal communication, observations, research literature, documents, publications, as well as, semi-structured interviews per personal, telephone and email conversation. The researchers, in a qualitative approach, examined through the data and made sense of it plus organized it into patterns and themes, namely innovation in the logistic area, security of the road transport chain, the German and European road transport market and the transport insurance influence.

Inductive approach – this conduction, patterns, categories and themes are built from the bottom up while information was organized in abstract units.

Lens for theory – Lenses are often used in a qualitative study. A study is usually written by exploring the social and political settings of this study. The authors did this in the description of the German transport market and the standards in the security of road transports. Further is the transport insurance investigated to rate the level of involvement in this sector.

Interpretive – This research form is an interpretive inquiry in which the authors made an interpretation of what was observed. It cannot be separated from the authors’ backgrounds, context and history. This leads to the fact that multiple views can occur, when taken into account that the authors and a lot of participants express data. The backgrounds worth mentioning are a logistical education plus working experience in the field of logistic teaching for adult education and a business administration education.
with a special focus on personal insurance plus working experience in the German insurance market.

A holistic account of the topic tackled– The authors tried to structure a developed and complex picture of the problem or issue under study. This involves a collection of different perspectives (carrier, insurance firms, security firms, German government), identifying a lot of factors in the particular situation and to draw a broader picture. A visual model of many perspectives of a process or a phenomenon aid is built up for this holistic picture (Creswell & Brown, 1992). All of these criteria can be related to this thesis and argue for the research approach taken.

2.2. Research approach

With the research questions introduced in the purpose of the thesis, the potential of a new road transportation innovation in terms of security and administrational benefits for a variety of actors in the German and European transport chain is observed. The authors tried to reduce the gap between the potential and the actual executed synergies in this particular sector. The ultimate result of highlighting costs and benefits of an innovation in the road transport business by relating it to the insurance sector is given in a business model. Since this topic has not been investigated in-depth there is a clear lack of empirical statistics, thus, the authors had another argument for choosing to conduct a qualitative research.

In order to investigate the research questions the authors figured it necessary to map the German road transport sector and to identify major actors and facilitators in the road transport chain. Already stated before, the research in this area is scarce and there are no known research papers that have studied incentives, potential and possibilities of innovative security network investments in this kind of road transport process. To uncover these opportunities the authors had to examine the actors and facilitators and some of their market positions and attitudes towards transport security and innovations. Subsequently, this ultimately leads to four empirical parts; logistical innovations, the German road transport market with its actors, the issue of security in the road transport and the transport insurance mapping based on secondary data and interviews and meetings with representatives in this sector resulting in primary data.

A qualitative research method is based on and characterized by the in-depth and detailed reflection of the social reality (Bryman & Bell, 2007). Due to the nature of this research challenge the authors chose to have a descriptive approach. This approach is a prerequisite for answering questions just like, who, what, where, as well as, how the sector functions and attitudes towards security innovations come from (Zikmund, 2000), which is also incorporated in the interview questions (comp. Appendix).

The study’s qualitative research method is originating from in-depth interviews with respondents, who are representatives of major actors and facilitators in the businesses involved and from an analysis of other official publications, which were provided during those interviews. The choice for these kind of interviews was based on the idea, that representatives descriptions of the reality is a proper way to develop a full understanding of the real situation (Silverman, 2007). Essentially, based on those interviews the authors were able to interpret the real situation going on this sector by respondent’s perception and answers.
Besides gaining a deeper understanding of the real situation, the qualitative method often generates theory. Although, this approach will give this deeper knowledge and awareness for constrains and limitations derived by the respondent’s answers should be highlighted. So, important is to take potential chances of specific social characteristics’ impact on the interview replies (Bryman & Bell, 2007). These specific characteristics are established through usual social contacts in the companies the respondents work in or from internal documents or internal discussions.

The authors conducted this thesis in a quality pattern. Since the company involved provided them with deeper business insights and opened up the opportunity to get in contact with the major actors and facilitators firms and their representatives.

2.3. Data collection

2.3.1. Primary data

In order to reveal the attitude towards the research question by the major actors, it was necessary to conduct primary data. Primary data is specifically gathered for the research project investigated (Zikmund, 2000). One very common method for gathering primary data is interviews. For the preparation it is of high importance to determine the optimal list of questions and formulate these in a representative way (Zikmund, 2000).

The thesis includes personal and telephone interviews plus email correspondence. Whereby telephone interviews and email correspondence were cheaper and easier to administer. But personal interviews were preferred to establish a better relation to the respondents (Brymann & Bell, 2007). The decision for both kinds was related to the timeframe of some respondents.

Further was primary data established by writing the thesis in the company’s location in the Science Park of Jönköping. Hereby a close relationship with the responsible was established and the technology and potential stakeholders were got to known.

2.3.2. Sample

The selection of actors and facilitators or hereby also called, stakeholder companies, was based on a comprehensive approach towards the innovation. Chosen were the producing company, carriers, as possible customers and state of the art developers of security advices, as well as, insurance companies to investigate the attitude towards the research questions. The European cargo sector and the German cargo insurance sector were chosen with regards to the market share for both of these sectors.

2.3.3. Interview method

Depending on the purpose of this study, the interview structure differs. With the descriptive study, the most common interview types are structured and semi-structured. Structured interviews have a list of questions that is strictly to be followed. When it comes to semi structured interviews there are only topics to be followed. The authors in most cases decided for the semi-structured interviews for the reason of flexibility in the interview. Further, does this style give the respondent an opportunity of interference to add new insights and perspectives while the interview is running (Saunders et al., 2007).
A list of email, telephone and personal interaction and interview partners and their occupation is provided in the Appendix. The authors found a mixture of the European trucking transport sector, the trucking security and the transport insurance business, as well as, security providers.

2.3.4. Secondary data

Secondary data is already gathered information. Secondary data is mostly easier and faster gathered than primary data and, hence often conducted to describe primary data (Zikmund, 2000). This data was collected in order to get a broad overview of earlier investigations of this topic.

However, when using the secondary data, there are some limitations to be considered. First of all, the quality of the data has to be examined. If the original data is gathered imprecisely, the effect to the research analyze will lack quality. Second, if the primary data is constructed inaccurately and its response rates are limited the researcher has to consider if it is valuable to use such data. Moreover, the original purpose of the collected secondary data has to be carefully evaluated. The collected data in an original research is related to a specific case or project and might not give relevant information to the ongoing project. Nevertheless, secondary data can be well used references in the academic world. By using secondary data as a reference in academic work, researchers have to do research behind the results to confirm that specific data is applicable and valuable for the current research. (Curran & Blackburn, 2001)

The theory for the frame of reference is mainly conducted based on the sources provided by the library of the Jönköping University and some German academic sources. To conduct secondary data in this thesis, authors have used scientific journals, books, course literature, annual reports, research papers, the internet and the Jönköping library databases as well as the Datachassi AB release papers. The sources used in this thesis are referred comprehensively during the paper and all the sources are collected together in the reference list in the end of this thesis.

2.4. Credibility of research findings

Reliability is the degree of consistency with which instances are assigned to the same category by different observers or by the same observer within different occasions (Silverman, 2007). The reliability of the result of the study is strongly related to the quantity of studies with a coherent score. Subsequently the reliability of a qualitative study is not seen as the most relevant, thus it should rather be seen as a way of an increase of the authors understanding of the subject. Hence the reliability aspect is not representative in a qualitative study (Silverman, 2007). The danger of a qualitative research lies in the drift of definition of the codes used or a shift in the meaning of the codes. In the case of the qualitative study authors have to find an intercoder agreement to check their validity and reliability of conduction (Creswell, 2009). It can be just another person who is cross checking the researcher’s codes. An important aspect is the logistical and insurance background of the authors. Moreover is one of the authors German, which explains some German primary and secondary data and sources used and support the credibility issue of the information used in this conduction.

Validity is the second big issue in this context and is another word for truth of the study. According to Holme and Solvang (2001), as well as, Silverman (2007) the validity of a
qualitative study is rather high due to their in-depth approach. However, when gathering information there have to be taken into account that selected respondent information is not necessary reliable or valid. In a qualitative study, the validity means that the author check the comprehensiveness of the findings by employing special procedures, whereas quantitative researcher imply, that the researcher’s approach is consistent and across different researchers and projects (Creswell, 2009). Validity is seen as the strength of this kind of study. It implies a definition if the researchers decide if the results are accurate or not from their point, the participants or the readers account (Creswell, 2009). Concerning generalization it is difficult to generalize the outcome of a qualitative study, since there can be doubts in the selection of the research respondents (Silverman, 2007).

Generalization occurs when researchers examine additional documents and generalize new findings into their own thesis. Thus, it is similar when referring to replication logic. Repetitions need good documentation and in the qualitative procedures, such as protocol for the problem in detail and the conduction of a thorough case study base (Creswell, 2009).
3. Frame of reference

This chapter describes valid literature which has been studied as a theoretical framework. The literature presented has been chosen for the foundation of the empirical study and the analysis part of this conduction. The theoretical framework is split into four major parts of innovational, road transport security, transport insurance and business model for innovation theory, which will be found as the guidelines throughout the whole thesis.

3.1. Logistical lifecycle and innovation theory

3.1.1. The lifecycle model

The dynamics of the global markets led to a higher competition for producing and logistical companies (Grassmann 1996). Those changes are fostered by shorter life cycles, which in turn show a higher demand for mature products in the transportation sector. Pioneer and growth phases of new products are quickly passed through and the mature phase is started. In addition to that, technological innovations only take place in niche applications (Eversheim, Baessler & Breuer 2002). Most companies find themselves in a classical price competition, since products concepts and applications are almost similar to other companies (Grassmann 1996).

To focus on technology innovations and its life cycle which is, among others, described by Johnson and Scholes (2002), the classic model should be shown to picture the different phases for a high technology product:

![Figure 2: Product lifecycle.](image)

This model is slightly modified to other models provided by, for example, Fox (1973).

The lifecycle of a new product is split into different phases. The phase of development is considered to be the phase of developing the product by just one or a few first companies, few actors follow and the development is leveraged. This in turn leads to the second phase, namely the growth phase. The high level of competitiveness in this phase will force some market actors to quit, since customers cannot be won and got more companies to choose from. Therefore, this phase is called the elimination phase.
After the elimination phase a market is build up, which is contemplated to be mature. This mature market will essentially lead into a saturation phase. Establishments and customers will decline, as a matter of fact, and lead to a decrease in the whole market. This decline is due to a high competitiveness. Fewer actors will share the market potential (Johnson & Scholes, 2002).

The first three phases are growth phases. Market growth is recognized even if a market player does not increase its part of the market. When it comes to the last two phases the constellation changes. The market shrinks and competitors need to gain on other player’s losses. Hence, strategies change and companies become more competitive. (Johnson & Scholes, 2002)

A special niche within the area of product innovation and product development is described as high tech innovation (Johnson & Scholes, 2002). To get an overview of the new technology innovation that is described in-depth in this conduction an insight of the topic of high tech technology innovations should be provided in the following.

3.1.2. High – technology innovation

In the 1980’s, market success came mostly from achieving quality and cost benefits compared to other companies in the same sector. Moving on to the 1990’s, competitive market positions, came from building and dominating new markets. Within this topic the main requirement is and was core competency for creating new markets. Corporate imagination and an expeditionary marketing are seen to be the key. A highly important issue is to figure needs and functionalities, rather than marketing’s more conventional customer product grid in order to overturn traditional price and performance assumptions. (Hamel & Prahalad, 1991)

To realize potential for new innovations, companies have to create core competencies and need to have the imagination to envision markets that are not yet conquered, plus the ability to stake them out, ahead of competitors. A company’s opportunity horizon shows its collective imagination of the way in which a new high tech innovation might be harnessed to create the new chance of competitive space. The viable issue in this regard is the commitment to this opportunity horizon, which does not rest on return on investment (ROI) calculation but on a more visceral sense of benefits for customer, who in the end will appear, when the pioneer effort will prove itself successful. (Hamel & Prahalad, 1991)

The term innovation defines new and myriad ideas (Chapman, et al., 2002). When it comes to the business sector, innovative solutions can be classified into three different categories namely, technological innovation, organizational innovation and market innovation (Tidd et al., 2001).

The broad sector of technological innovation is split into two dimensions. In the next figure it can be seen that the vertical axis means the extent of change given by the technological innovation and is defined by “small-step” running innovations (process innovations) to a certain type of “transformational” innovations, which are considered to be far reaching and change the functioning of society. The latter one was, for example, the innovation of steam power in the Industrial Revolution (Chapman et al., 2002). In the middle of the two border points are architectural innovations, as well as, the radical innovations to be found.
The horizontal axis shows what is changed by the innovation. The extremes of this spectrum are called product and process, although the differentiation is not always that clear. Between these two extremes the product/service mix is to be found (Chapman et al., 2002).

Additionally, innovations in the logistical sector can further be described as technological innovation or non-technological, soft, innovation. Technological innovations often create new products whereas soft innovations target on improvements of the management practice, streamline organisational structures, customise services, networking within the supply chain, improvements in the distribution channel, advancements and facilitating financial resources (Howells, 2000).

One major concern is that bolts out of the blue will always be a viable issue of doing creative high tech innovations with success, but moreover a logical process through which companies can unleash corporate imagination and identify new solutions and products to essentially consolidate control over emerging markets is seen as necessary. (Hamel & Prahalad, 1991)

### 3.1.3. Innovation in the logistical sector

Logistical firms can apply innovations to raise market performance and efficiency, as well as, essentially benefits for themselves and their customers (Hackbarth and Kettlinger, 2000). Given the dramatic changing evident in the logistical industry of today, it is of high importance for a business to think with a new business mindset. Factors that contributed successfully in the last decade might no longer be seen as the key to competitive advantages. The translucency in technology let companies think about new sources in the search of innovation. Two drivers for this seek are discussed deeper in the following- technology and relationship networks:

#### Technology

The first driver for the innovation process in the logistical sector is technology. Particularly communication technology had and still has its impact on the transport business and influences the creation of innovative services. In this regards, have continuous technological innovations and its business application resulted in changes and new models within the transport sector. (Chapman et al., 2002)
Within the innovation process based on technology shifts, the issue of networks and research and development is prevalent by external knowledge and cost-sharing. Interesting examples are, for instance, strategic alliances or purchasing groups. (Pilat, 2000).

**Relationship networks**

In such a competitive market as the logistical sector, the focus on customers needs let the firms develop a holistic understanding of the buyer’s entire value chain. In most cases this approach is beyond the capabilities of a single company. (Kandampully and Duddy, 1999)

Demanded products or services that are not in the range of one single firm’s competencies, too need to be taken care of. To the benefit of the customer and finally the firm, creating horizontal and vertical strategic alliances, internal and external relationships with firms are the key (Peppers and Rogers, 1997). Further does Manuel (1996, p. 168) claim that:

> “Networks are [the] fundamental stuff of which new organisations are and will be made”.

The interdependencies in business networks and interaction can shape the core survival strategy of future logistic firms. Operating in the global economy can give features and value to customers and to stakeholders in the supply chain. The logistics management shows a potential for growing a segment that is a critical issue in business trade. Recently, most industries have noticed the fact that cost savings are achievable to firms which can coordinate and innovate within their logistics operations – together with internal and external partners. (Chapman et al., 2002)

Since the 1970s, producing companies were challenged by competitive pressure and discerning customers. These companies were pressured to establish internal and external relationships to increase flexibility and innovativeness to be able to succeed in the business. (Chapman, et al., 2002)

According to this the concept of the value chain, initially described by Porter (1985), is connected to the idea of relationship networks. The value chain in the manufacturing business is the process of the product from raw materials to the final customer (please compare the following chapters). Observing the value chain as a whole needs a customer perspective and offering companies as establisher of the larger chain process and not only as manufacturers of specific components or provider of transport services. It is a subtle but significant change, but defines an improving in the overall value to the customer. But it requires a collective thinking of suppliers and manufacturers in the supply chain, as seekers of avenues for collaboration and not of continual competition.

The value-chain perspective itself stresses the dependence of firms in a value chain. A lot of intermediaries are supposed to become partners, who bring value to customers. Additionally, boundaries between organisations can become little more fluid, when inter-organisational processes get integrated more. This results free information flows along the channel and inter-company relationships embrace logistics management, as well as, product development. (Ernst & Young, 1999). This process requires both intra-firm and inter-firm modelling, that stresses on the linkages among different enterprises. Logistics firms are considered to place high importance on the network. There existing crucial
interactions with different firms both, up and down the supply chain and also with companies outside the supply chain. Especially inter-organisational structures are viable constraining factors for logistics innovations. A highly developed example takes place in the United Kingdom, where a lot of firms joined in partnerships both up and down the supply chain. Such an intercompany network system greatly assists innovation in logistics. Logistical companies increasingly search for supply-chain solutions rather than searching for isolated improvements. Logistical networks will certainly play a big role in the dominance of the industry. (Chapman et al., 2002)

3.2. Secure road transportation

An increasing competition in the business life has pushed firms, especially transportation companies, to find new solutions to discover how to improve customer service, reduce overall costs and to increase efficiency in production and/or services offered (Bäckstrand, 2007). Fawcett, Magnan & McCarter (2008) pointed out, the road transport supply chain is recognized as a profitable channel to affect all the factors mentioned above. To give a clearer picture of the road transport chain as a part of the whole supply chain, the following two definitions for supply chains, by Nahmias (2009) and Christopher (2005) are provided:

"...the entire network related to the activities of a firm that links suppliers, factories, warehouses, stores and customers. It requires management of goods, money, and information among the relevant players." (Nahmias, 2009, p. 311)

"The network of organizations that are involved through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services in the hand of the ultimate consumer." (Christopher, 2005, p. 17)

![Road transportation chain](image)

There are also a lot of issues to be taken into consideration when developing the road transport supply chain process. The road transport chain is a vulnerable part of the firms operations. A huge number of crimes take place during, for example, the transit from the source to the final customer (T. Ziehn, personal communication, 15th March 2009). Following the definition of risks involved in the road transport supply chain and the management of the risks given by Kogan & Tapiero (2008):

"The valuation and the management of risk which is motivated by real and psychological needs and the need to deal individually and collectively with problems that result from uncertainty and the adverse consequences they may induce"
The road transport supply chain consists of different actors and facilitators, such as suppliers, customers, employees, insurance companies, security firms and authorities, etc. All participants have an interest in how the focal firm is doing business. Some of these have stronger positions and influence on the focal firm than others in a road transport chain and are thus, called stakeholders of a secure transport chain. Further, two different kind of categories of the actors or stakeholders can be recognized, primary and secondary stakeholders. Primary stakeholders have an immediate effect on the focal firm, whereas secondary stakeholders are considered to be more of a middleman with an indirect effect. (Lawson, 2006)

Stakeholder analysis has a long history and roots in the sectors of management and business (Lawson, 2006). The ground layer of the stakeholder analysis is to be able to identify external and internal stakeholders and the interface of the stakeholders and to learn how this affects the focal firm (Belasen, 2008). Stakeholder analysis tries to identify the key players of the business and specify the interests of the different stakeholders. Also one important result of this analysis is to be able to define roles and the aims of the different stakeholders (Lawson, 2006).

In the global world, goods are produced at one location and distributed to all over the world. In a logistical point of view, the global supply chain is complex, multi tasked and long channeled (Sheu, Lee & Niehoff, 2006). The road transportation part of the supply chain is recognized as a weak point in it (T. Ziehn, Interview, 2009). A more secure supply chain enhances the benefits to the different stakeholders in a supply chain. Following up, the advantages of a secure supply chain are given to lead to a detailed observation of the trading terms and liability issues involved in the road transportation supply chain.

3.2.1. Benefits of a secure road transportation chain

This insight represents a short description of the importance of a secure road transport supply chain. Williams, Lueg & LeMay (2008) define that the roots of security come from distinctive levels in psychology and sociology. Fairchild (1944) instead defines security from a sociological point of view, thus it is a certain type of insurance against a threat. Further, security is defined as an action to decrease the probability of fear and trepidation. From the psychological point of view, security means a certain level of orderly, predictability and safety, which humans trust in (Williams et al., 2008).

In order to meet individual’s business fears, firms have to be able to change their thinking about security issues more towards cross-functional directions. The safety issue is no longer the only problem of the sporadic firm, but challenges which concern their affiliates, authorities and all the parties involved in the business sector (Closs & McGarrell, 2004).

Following, a definition of supply chain security is given by Closs & McGarrell (2004):

“*The application of policies, procedures and technology to protect supply chain assets (product, facilities, equipment, information and personnel) from theft, damage, or terrorism and to prevent the introduction or unauthorized contra-
To enhance road transport chain security, firms cannot any longer separate security from efficiency and need to focus on the business as a whole as well as on authorities. Threats to the supply chain should be seen as a whole and cooperation with parties involved is viable. Further, the following figure explains how firms should change their thinking of transport supply chain security requirements. (Closs & McGarrell, 2004)

<table>
<thead>
<tr>
<th>From</th>
<th>=&gt;</th>
<th>To</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corporate security</td>
<td></td>
<td>Cross-functional teams</td>
</tr>
<tr>
<td>Theft prevention</td>
<td></td>
<td>Theft prevention and anti-terrorism</td>
</tr>
<tr>
<td>Inside the company</td>
<td></td>
<td>End-to-end supply chain</td>
</tr>
<tr>
<td>Vertically integrated supply chain first tier suppliers</td>
<td></td>
<td>Outsourced business model second , third tier suppliers</td>
</tr>
<tr>
<td>Country or geographic focus</td>
<td></td>
<td>Global focus</td>
</tr>
<tr>
<td>Contingency planning</td>
<td></td>
<td>Contingency planning and crisis management</td>
</tr>
</tbody>
</table>

Figure 5: How firms should change the supply chain security approach.

If thefts, losses and pilferages during the supply chain can be decreased, it has a direct impact on the overall transit times of the cargo (Security director's report, 2008). Furthermore, decreased losses during the supply chain can help the inventory management. Potential savings are also achieved by preventing breaks within the supply chain, especially when customer’s production is based on just in time (JIT) philosophy (Security director's report, 2008). With more reliable shipments, excess inventories can be reduced and the probability of on-time deliveries increases. That leads to better customer satisfaction and to a better service level (Blanchard, 2006). A good service level is one of the key issues when negotiating with the new customers in many transport sectors (Saura, Francés, Contri & Blasco, 2008). A shorter lead time increases the time sensitivity of the supply chain network and shows for the need of increasing awareness of the activities and the visibility of the chain the chain facilitators (Briggs & Cecere, 2004).

With a track and trace system visibility of the road transport chain could be increased. Different parties in a road transport supply chain wish to know, for example, the location of the cargo during the transit, loading times, time of the different transportation method, and further cargo related information (Myers, 2008). Myers (2008) continued, transport chain facilitators gain from a better visibility of the chain by being able to meet better increased security demands, JIT delivery requirements and to meet more accurate information requirements of the inventory management.

When different actors and facilitators are able to monitor and follow up the transport chain activities, it increases its visibility. Increased visibility in turn means easier management and control of the road transport chain activities. (Blanchard, 2006, Francis, 2008) Furthermore, if the road transport chain visibility is increased, it gives a possibili-
ty of influencing the process deviations for the management, which instead has a direct
impact on a better process efficiency in the chain. (Blanchard, 2006) Greater visibility
means not only higher efficiency of the logistical management and the daily operations,
but is also the key to more safety and security in a road transport supply chain (Page,
2009).

Customer satisfaction is one of the main issues when firms are measuring their customer
service level and when they are promoting themselves to new customers (Blanchard,
2006, Jeffery, Butler & Malone, 2008). Transport chain management is recognized as a
good tool to improve customer service level, to be able to provide more accurate infor-
mation of the shipments and to reduce overall costs related to the road transport activi-
ties (Fawcett et al., 2008). Moreover, an improved customer service leads to higher suc-
cess of the firm. (Jeffery, et al., 2008)

When transportation companies send their fleet out to transport goods on the behalf of
their customers, it means that there is a lot of capital on the road. The fleet management
is interested in knowing where their vehicles are running at any given time. The global
positioning system (GPS) makes it possible for the transportation companies to be
aware of the locations of their vehicles (Dutton, 2009). Further Dutton (2009) continues
that it does not only give a better visibility for the transportation firms but also increases
the driver’s security. Planned routes for the given vehicles are known in advance and
deviations from the planned routes are not unrecognized, since the fleet management is
able to react on that if needed (Dutton, 2009).

For authorities a more secure chain provides a lot of benefits, as well. Decreased illegal
activities against transportation vehicles increase general social security and require
fewer resources to maintain the level of safety in society. Benefits from the business
perspective instead mean that cooperation’s with actor and facilitator firms and authori-
ties can increase the overall security of the business sector. Further improves it the rela-
tionships of different firms in the chain, lead to shorter lead times and lower operational
costs. (Williams et al., 2008)

### 3.2.2. Costs of a secure road transport chain

An increased security level in a supply chain has its downsides in inevitable costs. Secu-
rity related investments, such as for security technology, are relatively high and get even
higher by operating and maintenance costs. The execution of new systems takes time
and requires additional staff to take care of the new tasks and the responsibilities, as
well as, the training of the current personnel. (Sarathy, 2005)

When implementing new ways to organize a security system, the executer has to bear
the cost and try to get them back somehow. An advice is that firms should be able to
find ways to share these additional costs required by the new technology to meet better
security levels with transport chain partners. In the airline industry security issue have
been always crucial and further, very costly (Sarathy, 2005). This industry has found its
solution basically for increased expenses, due to higher security demands, by passing it
directly on to the consumer prices (Sarathy, 2005). This should be avoided for the high-
ly competitive road transport market.

Benefits of the secure supply chain and the costs related to it should be analyzed care-
fully by the companies looking for new security solutions. Short-term expenses should
be compared to the long-term utilities internally for firms to be able to optimize the security of a road transport supply chain (Sarathy, 2005). The pros and cons should be weighed towards the firms overall aims and requirements for the security level. (Autry & Bobbit, 2008) Further, firms should build up a model to be able to measure the costs and the benefits of the increased security in a supply chain (Sarathy, 2005).

Another solution for bearing the costs of a more secure supply chain, the supply chain network, horizontal and vertical should be observed to figure new ways and opportunities to save costs and to compensate costs by more than just one company or actor in the supply chain. Hereby, the supply chain cooperation between two or more companies should be looked upon.

### 3.2.3. Security partners and facilitators

Starting with the research of Cravens, Piercy & Shipp (1996) companies are not forced any longer to consider if relationships to other firms in a road transport supply chain should be established or not but rather how these this is done and with what kind of strategically important partners. The terminology for the interaction in a supply chain is not consistent. Bäckstrand (2007) is mentioning a three folded inconsistency:

- Words are sometimes alternatively chosen to differentiate between specific phenomenon and pieces of the supply chain (Kahn and Metzner, 1996).
- Different terms are sometimes used to describe the same issue or problem in the supply chain, just for matters of varying the language (Persson and Hakansson, 2006).
- Terms can be determined for different things and the author’s interpretation is not every time explained. As an example: cooperation and collaboration.

Within the discussion of this thesis the term road transport chain interaction will be used to determine interactions and relations between companies. For the research matter of this conduction major firms, involved in the process of delivering goods, are taken into account for the interaction. Hence the thesis does not fully follow Horvarth (2001), who stated that a strategic supply chain management demands cooperation among all participants in the chain, but rather picks up the approach of Simatupa and Sridharan (2005). This includes taking an intermediate view and determining the supply chain cooperation and interaction as a two or more members approach to create competitive advantages through information sharing, joint decisions and sharing benefits derived from greater end customer satisfaction.

When it comes to the degree of interaction within the supply chain, two actors can range in different levels of interaction. The range varies from a single, non-repeated transaction to a full merger into one organization. Following the approach of Bäckstrand (2007) three major levels can be differentiated, transaction, collaboration, as well as, integration.

**Transaction**

The transaction process is commonly known as the exchange or the transfer of services, goods or funds. This type of relations are seen to imply high competitiveness and sometimes marked by distrust, since the most important issue is expected to be the price for the transfer. (Skjott-Larsen, 1999)
Collaboration

In the definition of collaboration a jointly working and cooperating can be explored between parties in a supply chain in which the parties are not immediately tied to each other. This is happening for the mutual benefits of the shared work (Bäckstrand, 2007).

Integration

Further goes the incorporation. This means that the different key processes get integrated between actors. The interesting factor is that ownership is not a requirement for this type of interaction but could lead to it (Bäckstrand, 2007).

3.2.4. Enablers of interactions

Metzner (2001) speaks about certain enablers of interactions between companies in the transport chain. He states it as common interests, openness, mutual help, leadership, clear expectations, cooperation, trust, benefit sharing and mutual technology. It is highly important to note that without other enablers in place technology is not creating any different situation. Trust in the relationship is seen as a prerequisite, where all actors got mutual confidence in the others abilities and actions got (Sahay, 2003).

3.2.5. Partners in the secure supply chain

The supply chain is divided into different stages and can include stakeholders internal and external to a logistical firm. When it comes to security within the road transport chain, the weakest point of the chain needs special attention by the logistical companies and by partners to secure it entirely (T. Ziehn, personal communication, 14th March, 2009). Further, there should be an observation about the commitment in this issue. The number of partners, the size and their experience got impacts on the security issue. A firm in the logistical business needs to decide how much to trust and to collaborate with its partners. Especially, for the investment of security structure in the supply chain, the firm has to structure contracts and consider incentives to make partners invest in equivalent levels of security in the chain. Trust is a viable issue. It can, as a highly intangible factor, influence the selection of particular providers. (Sarathy, 2005)

Cooperation

A lot of actors are involved in the supply chain, the firm, its industry partners, governments and supply chain intermediaries. A key issue is to assign responsibilities for each of the major stakeholders. Especially governments are more concerned with the infrastructure of the logistical network in a country, whereas the logistical firm is busier with the goods, its partners and employees. Further, businesses can get advantages from the industry consortia, choosing specific technologies, influencing the industry standards and clarifying liability issues. (Sarathy, 2005)

A point with wider impact on this conduction is the insurance partnership in the supply chain. Security issues weight on the availability of transport insurance and affects supply chain contracts in terms of liability issues and risk carriage. (Rosetti and Choi, 2005). Insurance firms are capable of providing necessary cross-industry knowledge, since these companies are specialized in risk assessment. The security issue is a viable factor to get the insurance companies in the transport sector on board, to figure out me-
methods of ameliorating risks and on the merits of competing technology trends available to security risks.

With the possibilities of cooperation for a more secure supply chain in mind, the issue of the right use of a technology innovation and the right cooperation business model for the logistical sector is leveraged.

### 3.3. Transport insurance in the road carriage

#### 3.3.1. Insurance and Incoterms 2000 for the road transport

Insurance in the transport sector is also always a matter of trade terms and therefore the Incoterms 2000 used for the particular transport. In the empirical findings the trade and carriage terms, as well as, the Incoterms 2000 are more detailed. Further, a comprehensive list of Incoterms 2000 with a definition of each term is shown in the Appendix.

When examining the list of terms it tells that certain terms have its characteristics in a certain type of transportation mode, e.g. the term DEQ defines a named port of destination, which refers to sea and/or inland waterway transport. There is a certain distinction between Incoterms and particular forms of transportation. When there is a demand for multimodal transportation, it has to be known which Incoterms are applicable with any form of transport. EXW, FCA, CPT, CIP, DAF, DDU and DDP Incoterms are applicable with multimodal transport. The remaining Incoterms, FAS, FOB, CFR, CIF, DES and DEQ are applicable only for sea and/or inland waterway transport. (August, 2004)

In this context the focus lies on the three most used Incoterms to the multimodal transport, CIP, CPT and DDU. The suggestion is given by Reynolds (2007) in his article to help sellers and buyers to choose most suitable Incoterms.

**CIP**

For sellers the most convenient Incoterms is CIP. It states in its definition that the seller is obligated “…to procure cargo insurance against the buyer’s risk of loss of or damage to the goods during the carriage.”. As Reynolds (2007) points out, more than the seller is obligated to provide insurance, he instead is entitled to provide it and in addition, to charge the costs of it from the buyer. By the mandate of CIP the seller is authorized to offer extra costs for warehouse to warehouse insurance with the additional coverage clause’s against strike, war and civil commotion. (Reynolds, 2007)

**CPT**

Second most used Incoterm to the multimodal transport is CPT. In this case a seller is not obligated to offer insurance. Benefits of this term for the seller is that he or she might get issued the document before the actual loading takes place (Reynolds, 2007)

**DDU**

Third most Incoterm given by Reynolds is DDU. Hereby, the seller should agree with a single carrier to complete door-to-door delivery. Its advantage is that it will decrease the risk of the seller towards the delivered goods. Although the seller should require an add-
ing into the sales contract, they are mandated to acquire adequate insurance coverage on a door-to-door basis with expenses paid by the buyer. (Reynolds, 2007)

The three Incoterms above explain their implied insurance demand for every term. In the next paragraph insurance in the transportation on road should be more highlighted on, starting with the distinction between CMR and transport insurance.

3.3.2. **Insurance by law - CMR**

Basically two kinds of insurance are viable for the logistic sector, when it comes to the international road transport of goods – the CMR (Convention relative au Contrat de transport international de Marchandises par Route – liability insurance for the carrier) based insurance and the transport insurance. Both are described in the following more detailed and a small overview is presented in the next figure, with the law regulations for German market. The regulation is based on the general contract terms for carriers, called Allgemeine Deutsche Speditionsbedingungen (ADSp). The figure shows the two different kinds of insurance for the logistic sector, in terms of function and coverage for different issues (adapted from Voth & Fragner, 2005):

![Figure 6: Liability and goods insurance – CMR and transport insurance.](image)

Taken this into account, the CMR insurance is the first viable issue for the road goods cargo sector. As described later in detail, the CMR regulations make sure that the forwarder or the carrier company is liable for the transported goods to an amount of 8.33 SDR (Beken, 2005).

Citing the CMR standards in Art. 3:

“For the purposes of this Convention the carrier shall be responsible for the acts and omissions of his agents and servants and of any other persons of whose services he makes use for the performance of the carriage, when such agents, servants or other persons are acting within the scope of their employment, as if such acts or omissions were his own.”
The CMR insurance is a liability insurance and mandatory, such as the liability insurance for the vehicle itself. (Voth & Fragner 2005). For the CMR insurance the mandatory value of EUR 600,000,- is a requirement to transporting goods on the road by trucks and trailers (Bundesamt für Güterverkehr, 2009).

Referring to the amount of coverage that a carrier has against the claim of a seller or buyer (customer), it has to be made sure that CMR insurance is purchased to a usual extend of the market. If the carrier is responsible for a loss or damage of goods the seller / buyer can claim the value of the goods up to the agreed amount of CMR insurance. In turn the carrier is insured for the liability out of this and passes it on to its insurance company. The insurance company will either settle the claim or further protect the carrier against unreasonable claims as the second task. Thirdly, covers the insurance actions by its assured to prevent further damage or loss and/or actions that reduce the damage or loss. (Voth & Fragner, 2005)

Hereby the employment of an adequate adjuster. For instance, a German insurance contract would look like the following (adapted from Voth & Fragner, 2005):

<table>
<thead>
<tr>
<th>Seller / Buyer</th>
<th>Carrier</th>
<th>Transport insurance company</th>
</tr>
</thead>
<tbody>
<tr>
<td>The sender can claim value by the carrier up to the amount ruled in the contract (HGB, ADSP or CMR)</td>
<td>Damage or loss of goods</td>
<td>The insurance company will pay the claim and take over the liability for the carrier.</td>
</tr>
</tbody>
</table>

For example reasons the figure is put in the German surrounding and hence, the contract is based on the German commercial trade terms, the (HGB) or the ADSp. In the international road transport this is based on CMR rules. Lastly, exclusions of coverage are not part of this conduction, since these will not contribute to the research questions.

3.3.3. Cargo insurance

Cargo insurance is the coverage of losses or damages of cargo while in transport by a truck or trailer (compare: figure Liability and goods insurance). It protects the seller of the goods from heavy losses when for instance; the liability of the forwarder or carrier is not enough (CMR), such as for high technology transports. Secondly, it happens that the carrier is not responsible for the damage or loss and can prove that (higher force). In those cases transport insurance is viable to get value back, at all. Thirdly, financial losses are limited and consequential damages to the goods are not included in the CMR liability.

Cargo insurance can be arranged by the carrier, when the company got liability claimed by the seller company. Further can the carrier on its own arrange insurance when this
meets the interest of the seller. An assumption about the interest of transport insurance is enough to arrange the coverage. But an assumption is illegal, when the seller forbids the transportation insurance to be purchased or the seller is a carrier, forwarder or warehouse (Voth & Fragner, 2005).

The roles in the transport insurance differ slightly from the CMR insurance as the following figure shows (adapted from Voth & Fragner, 2005):

![Roles in the transport insurance](diagram)

Figure 8: Roles in the transport insurance.

The seller or the buyer is contracted through a carrier contract to the transportation company, whereas a further contract exists between the carrier and the insurance company. Hence, the seller or buyer is the assured in the insurance contract without being the policy holder, which in turn is the carrier’s role.

3.3.4. Carrier - insurer relation

Even though, trucking companies buy insurance protection, both parties are interested in the same thing. Logistical and insurance companies striving for fewer crashes, damages of goods and/or incidents in order to have either to pay less in insurance premiums or to be able to offer protection and policies to a lower price (B. Kupfer, personal communication, 12th of March 2009). For carrier it is not only the costs, for example of crashes or damages, but also ancillary costs that come along with a claim. Mainly costs of operating gaps cost the companies and operators a lot of money. This plus hazardous material spills and lost cargo can ruin trucking companies and will at least lead to increases in the insurance premiums. (Kahaner, 2007)

Insurance policies work in several matters. The first important issue is that the document provides insurance protection and is an evidence for the settlement of a protection agreement between the participants. Further is the insurance document an instrument to claim compensation towards the insurance company. Lastly, insurance policies sometimes play an important role when it comes to different transportation standards. For example, is it a necessary document within the paying process of the CIP transportation standards and is needed to be shown together with the transport documents while settling the payment (Schiek, 2008).

Essentially it comes to the choice of an insurer. Hereby is one of the main arguments the premium. But the observation of the market and contacts with trucking companies put a lot of emphasize on the claim settlement and service by the insurance company (D.
Guderjahn, personal communication, 2nd March 2009). It is highly important if the companies are aggressive when it comes to the settlement of claims and if money flows quickly and operations are not interrupted more than necessary. Nevertheless, is it interesting how insurance companies offer trucking operators brochures and other information to teach them how to avoid dangerous actions. (Kahaner, 2007)

3.3.4.1. Insurer perspectives on operators

For the determination of premiums by the cargo insurer, a lot of factors have an influence on the cost of insurance (compare 4.5.6 underwriting risk factors). A few very important issues should be listed here for the perspective of the insurer on the transportation company:

First of all is the cargo or better the goods are valuation criteria’s. If there is a high danger of environmental issues by for example, spilling the loading or the transport consists of high valuable technology parts, the premium is certainly higher than for the transport of cheap goods that have no impact on the environment when spilled on the street (R. Frei, personal communication 12th March, 2009). The second big issue is the driver record. A highly important criterion for the insurer is the driving record and the accident statistic of the driver. One of the most valuable criteria affecting the overall premiums is the amount of drivers with serious violations (D. Guderjahn, personal communication, 15th March, 2009).

Besides the cargo and the driver the routes are of particular interest for the company providing transport coverage. One issue is the states of operation and linked to it the liability laws in force in these states. Routes and scheduled departures for risks of delays and speeding is in this regards another factor deciding on the premiums of the insurer. Further, of high importance is where deliveries are made to. Cargo thefts and congestions, which lead to rushing to make up for lost time, are more common in metropolitan areas. If carriers and forwarders can reduce a few of these risks the insurance firm is willing to issue cover for lower premiums. Furthermore, insurance companies offer one last suggestion to cargo operators. While larger fleets usually got their own safety officer smaller firms do not. This is supposed to be a mistake and could lower premiums, as well. (Kahaner, 2007).

According to that and highly important is the factor security of the vehicle. The standards of the truck are more described on in the TAPA Emea chapter of this thesis and are huge valuation criteria to determine the premium cost for a transport, especially in certain, insecure areas (Kahaner, 2007). This is the leverage point for the research of this conduction.

Road transportation is always at risk of illegal activities, which in turn makes transportation insurance more viable. The flipside of this is the impact on the insurance when goods are stolen. Usually premiums are raised and this leads to a chain in which goods are insured and get stolen and premiums are raised, less goods get insured, since the premiums are higher. With that in mind the premium could be raised again, since the risk is split on less policyholder than before. A loose – loose situation for assumed partners – transport companies and insurance businesses – involved in the supply chain. Further is the consumer the one who is affected, since he has to pay the insurance premium in the end by purchasing the goods. (B. Kupfer, personal communication, 12th March 2009)
The next figure shows graphically the chain of events (B. Kupfer, personal communication, 12th March, 2009):

Figure 9: Transport insurance premiums flow.

A better security level of the supply chain has its affects on lower insurance premiums and deductibles for transportation companies and other stakeholders in a road transport chain. Lower insurance premiums have direct impacts on the profitability of the companies, because the amount of the money, firms are spending today to the insurance premiums are tremendously. (Security director's report, 2008) Although, it is not only the financial issue what comes to the supply chain security. When theft or pilferage occurs, the amount of the intangible work by solving certain incidents takes a lot of time and effort by the firms. That decreases the productivity of the company (Katz, 2007).

But when dealing with premium for transportation insurance it is valuable to see both sides. Further is the following a perspective by the cargo companies. The following should give a small overview about criteria important to the transportation companies in terms of choosing the right insurer.

### 3.3.4.2. Operators view on insurer

Presumably, the most valuable factor for the operators is the premium. Low premiums should lead to a high demand since premiums are costs and costs are to be cut back as much as possible in the daily business of an operator. But surprisingly or not, does research show that money is not the only purchasing argument for an operator. Another high factor is the record and experience of handling of claims and settling of the particular insurance company towards the operator. Perils can harm an operating business a lot and compensation as quick as possible is mostly very important for operators (Scania, 2009).

Furthermore do cargo companies rather deal with one settling manager than with several. Therefore, the employee turnover in the insurance company is another factor that is important for the operator. One phone call for injuries, spilled cargo and vehicle damage and a consistency in staff is a viable issue in the insurance business. The same adjuster and no need for re-explanations over and over again by the trucking operators, is an evident point of view towards the insurer. So no bailing out when the trucking sector turns cyclical down is viable to the operator concerning the insurance company (Kahan-
After referring to innovation, road transport security and transport insurance, the last part of this theoretical framework touches upon another highly important issue is the observation of the road transport chain. The business model the road transport innovation is applied to. Hereby, the focus lies on the road transport sector which in turn leads to the need of figuring the processes and interdependencies in the transport chain.

3.4. The concept of a logistical business model

The major change in technology is derived from two mentioned factors above in the innovational conduction (compare 3.1.3.). Technology and relationship networks facilitate the innovation process in a logistical network. Further, the supply chain itself offers opportunities. Hence, another important factor for the logistical firms is the business model within the new technology innovation is applied.

Firms, which are able to apply a new business model have often higher success with new ideas that establish new sources of revenues using demand and technology applications (Hamel and Skarzynski, 2001). Further do new business models give alternatives to the usual business. Hereby it is important to consider what have been done and how it has been done. Defining a business model is not easy. However, it can be defined as a solution which results in a higher efficiency. Proponents of new business models argue that a new innovation and a new business model provide the potential for organizational efficiency. Opportunities lie in subjects like value for customer and company (Porter, 1985) or decreasing transaction costs (Garicano and Kaplan, 2001). So, improving efficiency and effectiveness in business processes due to a new business model is crucial for the success of any logistical organisation. Introduction for the Datachassi business model

For a new business concept the question of how to convert a new technology into economic value must be answered (Chesbrough and Rosenbloom, 2002). Firms can capture value from new technology innovations, basically in two ways: through incorporating the technology in their current businesses or through launching new ventures that exploit the technology in new business arenas. Either way, businesses need to take technology to the market through an individually modified and specific business model. The inherent value of an innovation stays latent till the commercialization is completed. In a lot of situations the firm launching the innovation needs to create such a model to put the innovation into the right circumstances of the market opportunity. Hereby, the right business model is more or less the architecture of revenue. (Chesbrough and Rosenbloom, 2002)

Since the expression business model is used often in these times, it is seldom explicitly classified. One exception is the definition of the KMLab, Inc., a consulting company:

> „a Business model is a description of how your company intends to create value in the marketplace. It includes that unique combination of products, services, image, and distribution that your company carries forward. It also includes the underlying organization of people, and the operational infrastructure that they use to accomplish their work.“
But a more detailed and operational definition is given by the following explanation in different steps. The steps of a functional business model are:

- **Value Proposition**: The very first step is to define a value proposition of the innovation made by the entrepreneurial business. To gain customer satisfaction a business needs to present its idea or value option to the potential customer and to provide a value proposition. This position should be easy to explain and to remember. Mostly it is expressed in three to four bullet points and could be referred to in less than thirty seconds time. It represents the value by the company to the particular customer; applying the customer’s perspective (Mehrmann, 2009). The value proposition is the value created for users based on the technology innovations (Chesbrough and Rosenbloom, 2002).

- **Market segment**: The market segment is covering the users for who the technology is useful and for what purpose it can be used.

- **Structure of the value chain**: The structure means the creation and distribution of the innovation within the offering. The question is, how the distribution channels look like and who is involved in the value creation.

- **Cost and profit**: Cost and profit mean the potential of manufacturing the technology, given the value proposition and value chain structure. A direction of value creation compared to costs should be provided.

- **Network in the road transport chain**: A further complicated factor is the issue of realizing value that needs the involvement of partners, too. Both dimensions of the supply chain are emphasized on, the vertical value chain and the horizontal value network (Christensen and Rosenbloom, 1995). The position of the firm within the value network linking suppliers and customers, including identification of potential for complementary and competitors.

- **Competitive strategy**: Further is the strategy by which the innovating firm will gain and hold advantage over rivals a needed step, formulated by the firm towards the business model.

The following figure shows the framework of a logistical innovation business model applicable for high technology, for instance provided by the Datachassi AB (Chesbrough and Rosenbloom, 2002):

![Figure 10: Theoretical business model.](image-url)
Synergy: An additional detail of the business model is figured to be of higher importance to the Datachassi business model. Therefore, the framework for an innovational business model is extended by this bullet point. The power or force established by a mutual working together of selected partners or processes is called synergy. In the business world this effect is the advantage derived from a mutual approach by more than one element or more than one business to team up and to reach a higher return than the sum of the individual businesses. (Mehrmann, 2009)

Two horses pull 9,000 pounds. What if the amount of horses is doubled? The arithmetical answer is 18,000 pounds, which is wrong. Four horses can actually move over 30,000 pounds, which is derived by synergy effects.

So, a business innovation is an entrepreneurial approach to add to the current competition. Hereby, value is created and needs to be captured. In particular it means that a good idea turns into an innovational product or service, which has to be embedded into a business model to gain the most success out of it and to capture its value completely. The business model, as figured above is the mediator between the technical and the economical domains. It describes the way of how to transfer technical ideas and innovations into economical value for the particular business.

In the following an approach should be undertaken to show the potential for Datachassi AB technology in use and to find the synergy effects hidden in the development and application of this technology in reality within an adequate business model.

As figured, a technology innovation should be applied in a new created business surrounding and therefore backed up within a business model that fits into the sector the innovation is applied to. The elaboration of the business model is worked out by the idea of a technology innovation that got its effects not only on one single player in the road transport chain, but with highly synergy impacts on few major actors and facilitators in the supply chain of a road transport from A to B.

3.4.1. A business model framework for the Datachassi innovation

The Datachassi business model framework is derived by the frame of reference so far. It is created mostly for shipments of highly valuable goods and does not claim to be applicable for any road transport and motor trucking solution. Rather is it fed by the fact that valuable transports got an implied tendency to get damaged or stolen (Tapa Emea, 2009).
The Datachassi business model involves five interacting participants in the road transportation. It consists of Datachassi AB, as the provider of the new technological innovation, the firm that is sending/receiving the goods transported (transport customer), the transport insurer, a security firm and essentially the central role player – a transportation firm, herein named the carrier.

The next picture shows the relations of the actors in this network. As said the central role lies in the carrier.
A key issue, as described before, is the assignment of responsibilities for each of the major actors and facilitators in the transport cooperation (Sarathy, 2005). So, the carrier got its contract with the sender or receiver of the particular goods which have to be carried from A to B. Within this contract the carrier is assigned to get cargo insurance for the goods being transported, since the contract partner is convinced that the CMR insurance is not valid enough to cover the risk implied in the transport (goods value). Therefore, an insurance contract is agreed upon with a transport insurer. The premium is paid by the carrier, which in turn is passed on to the customer’s bill for the transport. The customer is hence, the indirect contract partner of the insurance firm by paying through the carrier for the transport insurance.

Further, a relation between the customer and the insurance firm exists in the contract itself. Herein is the customer the named assured and got a legal interest in receiving the claim settlement when a claim is articulated and settled, the carrier is seen as the contract partner and needs to be prepared for recourse actions by the insurer.

3.4.2. **Leverage details for the business model**

Starting point for this model has to be a network or mutual agreement by Datachassi AB, a security firm, which is active in the sector and got an amount of warehouses under their surveillance and a transport insurer, which is willing to take over the niche of this business model. The important issue is, to be willing to extend the share of the current transport insurance market. All of the named participants will negotiate a mutual approach to involve the carrier, which in the end needs to invest in the Datachassi technology in order to receive the benefits and to reach a level of cost neutrality in this model, since to the benefit of all parties involved, creating horizontal and vertical strategic alliances, internal and external relationships with firms are the key (Peppers and Rogers, 1997).
Further, the sender or receiver of the goods does not necessarily be involved in this stage of negotiation (compare Appendix V)

Figure 13: Datachassi business model – leverage.

To increase the security of the transport the carrier needs to be convinced to settle a contract to pay the leasing rate of the Datachassi technology innovation and to get the equipment in return. By doing so, the carrier is provided with a security application that decreases the overall loss ratio and provides a lot of further benefits, which are listed in the spreadsheet below (compare 5.4.1).

The security firm takes over the surveillance of the road transport in total. From a provider for warehouse and terminal security solutions it turns in a whole supply chain monitoring company. Passed on to the insurer, who should be interested, as well, in a more secure supply chain and with it a decreased loss ratio, the insurer is able to offer more coverage to a lower premium. Further alternative is to lower the deductible in the cargo insurance (Security directors report, 2008). This in turn leads to a lower cost for insurance for the carrier, who is paid indirectly by the customer (compare 4.5.6).

The cycle closes down on the carrier again, who is now able to offer lower transportation fees to the customer or provide better solutions to the customer and increase therefore its market share in the overall business (compare 5.4.1).
3.4.3. Carrier business modification

As described, guarantees the technology an alarm for the driver when unauthorized persons are too close to the truck and endanger the load or the vehicle. Moreover, will the Datachassi technology send a short message via internet to the named security company. The company is alarmed and will approach the driver and / or check on the vehicle, as soon as possible.

For transportation companies, main issues are the increased productivity and the efficiency in the logistical streamlining, which is essential in this particular low cost sector. Hence, increased security reduces interruptions in the deliveries, which lead to better efficiency, productivity and reliability. With better productivity and efficiency of daily operations, transportation companies will gain savings in costs and further are able to provide their offerings (to the same price, but) with extended service; derived from: customer service level increases with better reliability of the deliveries and just in time (JIT) services.

A better visibility of the supply chain helps the carrier companies to evaluate their own business and further is it able to offer customized information of shipments to the customers. Moreover, customers can focus on JIT production and decrease inventory levels, because of reliable deliveries and more accurate information.

Carriers want to be aware of where their employees and their fleet are located at any given time and if the security requirements are met at all time. With a better visibility of the supply chain carriers are able to achieve that demand. Better visibility of the supply chain increases both employees and cargo safety and security. Another aspect is that greater visibility can be passed on to the customers, since cargo tracking and monitoring services are possible. Moreover, an increased security level means fewer incidents, such
as thefts, pilferages and vandalism of the cargo and the vehicles. Additionally it will
decrease unnecessary stoppages of the vehicles.

This leads in turn to a higher market share and is facilitated by even more competitive
pricing for transports. This will amortize the costs spend for the technology investment.

<table>
<thead>
<tr>
<th>Increased security</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased arrivals</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Productivity and efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased arrivals in time</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Competitive pricing or Extended services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase market share</td>
</tr>
</tbody>
</table>

**Competitive advantage**

Figure 15: Datachassi business model – carrier business modification

As mentioned earlier, for the business model another company modification is neces-
sary. The security firm in the model needs to extend the service and must be willing to
create a new business niche for themselves.

### 3.4.4. Security firms business modification

The security firm is the second major stakeholder in this business model. The service
will change from surveiling warehouses and hubs to a surveillance of the whole supply
chain from A to B in the road transport. This is figured to be an important issue, since
the weakest point of the chain needs special attention but the whole chain needs to be
secured by partners to secure it entirely (T. Ziehn, personal communication, 14th March,
2009). The figure below will graphically support this approach:
The important issue noteworthy in this context is that the Datachassi technology in the end is paid on the account of less criminal activity and should be cost neutral to its major stakeholder. Further costs can be compensated through gains in the transportation market share of the carrier and in a niche market extension for the insurance firm, plus a whole modification in the security service (compare 5.4.1).

### 3.4.5. Road transport business model – key statements

How the theoretical framework, mentioned in the beginning, can be put in place of the Datachassi business model, summarized in its key factors, is shown in the next key statements table, derived from Chesbrough and Rosenbloom (2002) and related to the Datachassi AB:

<table>
<thead>
<tr>
<th>Business model step</th>
<th>Datachassi AB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identified market segments</td>
<td>Trucking companies and carriers, after market not manufacturers</td>
</tr>
<tr>
<td>Clear value proposition</td>
<td>Increased:</td>
</tr>
<tr>
<td></td>
<td>- security</td>
</tr>
<tr>
<td></td>
<td>- safety</td>
</tr>
<tr>
<td></td>
<td>- visibility of the supply chain</td>
</tr>
<tr>
<td></td>
<td>- productivity</td>
</tr>
<tr>
<td></td>
<td>- efficiency</td>
</tr>
<tr>
<td>Elements of value chain</td>
<td>Development of security and safety application for the road transport sector</td>
</tr>
<tr>
<td>Defined cost and profit</td>
<td>Modest profit on sales of equipment and maintenance, high profit on supply</td>
</tr>
<tr>
<td></td>
<td>chain improvements and economics of scale effect.</td>
</tr>
<tr>
<td></td>
<td>Industry standard</td>
</tr>
<tr>
<td>Positioned in the network</td>
<td>Partners embeddedness, security firms, transport insurance firms and even</td>
</tr>
<tr>
<td></td>
<td>transport customers</td>
</tr>
<tr>
<td>Competitive strategy</td>
<td>Comprehensive product skills, value adding to customers and the whole</td>
</tr>
<tr>
<td></td>
<td>network, extensions</td>
</tr>
</tbody>
</table>

Figure 17: Datachassi business model – key statements
4. Results from empirical research

This chapter presents the empirical findings conducted within this study. Again the major fields, innovation, secure road transport chains and transport insurance are referred to. Beginning with the high innovation findings and the Datachassi AB technology, multiple perspectives are included to figure road transport security. Further is information about liability and transport insurance trade terms gathered and discussed in the picture of the German road transportation sector.

4.1. Innovative high tech technology

If transportation companies are unable to think outside the current business boundaries it could easily happen that business opportunities are missed. Therefore, a company has to create awareness of the fact that in the daily work opportunities might get overseen and models to find business opportunities in terms of innovation, need to be considered. The literature speaks about three forms of establishing high tech innovation to rebuild markets and industries (Hamel & Prahalad, 1991):

The first one is the ability to add an important new function to an existing product. This is going to be the main focus for this thesis, since the authors figured this issue as very important to the technology described in the conduction (L. Birging & J. Falkeström, personal communication, March 14th, 2009). The second issue is settled in the field of developing a special kind of novel form in which a known functionality is delivered in. The last innovation finding process is built on the chance of creating a new function by an entirely new product concept. (Hamel & Prahalad, 1991)

For the high tech innovation in this conduction, the conceiving of markets in matters of needs and functionalities sounds like an obvious idea, but most companies are not able to focus on that. Even fewer companies have the necessary imagination to imply this understanding into a new innovation. Hamel & Prahalad (1991) acknowledge this by claiming that, to invent a new product the simple question of: “why does the product have to be this way?”, has to be asked to create a leverage point.

Further, the understanding of what the current product in the market cannot do for the customers and extending its function is a way to get out of the orthodoxy of common thinking (Hamel & Prahalad, 1991). To clarify this point the following description of the Datachassi innovation is given.

4.1.1. Datachassi innovation

The in the abstract mentioned technology innovation by the entrepreneurial company is based on modified sidelights of trucks and/or trailers. The innovation is developed to have a positive effect on the three areas in the road transportation sector: traffic safety, transport security and logistical streamlining. The main idea is to be able to increase the cargo security, to reduce traffic accidents and to find new, as well as, profitable functions to improve the overall efficiency of the road transport chain. To be able to launch this innovation into the current market, the product is based on standardized sidelights, but with multiple new functions which do not exist in the current area. In the following the special technology is described in detail to raise an understanding of the solutions possible with this innovation.
4.1.1.1. D-Net©

The D-net trademark is a wireless network solution based on Zigbee (IEEE 802.15.4.) technology. The network around the vehicle is created by a new type of sidelights invented by the Datachassi AB (compare figure 18). The ZigBee wireless network technology is built up by using a protocol designed by the Institute of Electrical and Electronics Engineers (IEEE) standard 802.15.4. The wireless network is based on radio frequency technology. Standardized ZigBee has a lot of benefits. It offers a wireless network to the users with a low-power and low-cost advantage. Furthermore, low power consumption makes it possible to utilize ZigBee based on application in an environment where continuous electric supply is not available and/or an availability of the current has to be assured by batteries. (ZigBee, 2007)

With D-net© it is easy to attach multiple different solutions to the trailer, which gives a lot of benefits compared to present wired systems. The benefits of the D-net© are emphasized especially in changing vehicles, e.g., when a trailer is pulled by multiple trucks during a certain period. (L. Birging, personal communication, March 13th, 2009)

4.1.1.2. Radar

Radar, the radio detection and ranging technology included in the sidelights, is able to observe stationary and/or moving objects. Radars can tell of the presence of objects, evaluate distance and speed of it and track their position. Radar technology used in Datachassi’s application is called frequency modulated continuous-wave radar, (FMCW). The FMCW radar is a commercial application, which can detect both, moving and stationary objects (Weidmann, 2004).

In the Datachassi application, radars have multiple purposes. Datachassi’s vehicle protection system use radars to detect moving objects near to the vehicle during, for example, scheduled breaks. Radars connected to the D-net© are able to observe the behavior of moving objects in a proximity of the vehicle. For instance, moving objects can be unauthorized persons trying to get too close to the vehicle. The second purpose of the radar technology is to warn the driver of objects in a blind spot during turning or on a loading terminal. The blind spots are problematic for drivers, since it is impossible to visualize if anyone or anything is near to the vehicle while turning. These two example functions increase both, road safety and the security of the driver, as well as, for the cargo. (Datachassi, 2009)

4.1.1.3. Sidelights

A substantial factor is the modified sidelights of the Datachassi solution. It is stated in the EU regulation no. 48, that all vehicles longer than six meters are obliged to have sidelights. Moreover, the following is said about the installation of the sidelights:

“In length: at least one side-marker lamp must be fitted to the middle of the vehicle, the foremost side-marker lamp being not further than 3 m from the front; in the case of trailers account shall be taken of the length of the drawbar for the measurement of this distance. The distance between two adjacent side-marker lamps shall not exceed 3 m. If the structure of the vehicle makes it impossible to comply with such a requirement, this distance may be increased to 4 m. The distance between the rearmost side-marker lamp and the rear of the vehicle shall not exceed 1 m.
However, for vehicles the length of which does not exceed 6 m and for chassis-cabs, it is sufficient to have one side-marker lamp fitted within the first third and/or within the last third of the vehicle length.” (Economic Commission for Europe of the United Nations, 2008, p. 44)

Hence, the sidelights are remodeled and will include light-emitting diodes (LED) lamps, and a radar system plus a radio technology that creates opportunities.

First of all it does enable the sidelights to communicate with each other through a radio based technology via the wireless network. Further, this network can together with the radar system be used to create an alarm system, such as an invisible fence.

The radar system can further be used to scan the dead angle and obstacles behind the truck, while going reverse. This will make the handling of a truck and a trailer or even two trailers less dangerous and less accidental probable. The use of radar technology enables the sidelights to distinguish between usual trespassing of people and objects while standing, e.g. in a parking area, and violent acts, such as unauthorized persons coming too close or trying to intrude the vehicle. As a matter of fact, the network system is able to communicate and will include strong LED’s to lighten up the surrounding around the transport vehicle to enable the driver to recognize obstacles in the way, for instance while going reverse towards a loading dock.
The traditional sidelight contains only pulp and its purpose is to give a distinctive light to the side of the long vehicle, whereas the new sidelight contains a battery which gives an independence to operate without an external power supply. The battery is needed e.g. in a situation when the trailer is left without the truck to a parking area and the trailer needs to be secured by the alarm system. (Datachassi, 2009)

4.1.1.4. **Datachassi Gateway**

The Datachassi gateway (DGW) and the Datachassi trailer gateway (DTGW) can be described as the brains of the D-net©. Both gateways are able to communicate with the D-net© and via a general packed radio service (GPRS) connection with the central server. Furthermore, the DGW is also able to communicate with the on board computer (OBC) via a universal serial bus (USB) connection. The gateway has an internal Global positioning system (GPS) receiver, which enables it to locate the vehicle. The DGW uses the truck power supply, whereas the DTGW has its own battery, which enables it to locate trailers when they are parked without a tractor. The operating time without external power supply is limited, with the current technology approximately up to three or four days. (Datachassi, 2009)

The protection of the gateway is essentials because of its importance to the system as a whole. Therefore, the gateway itself is placed into the vehicle in a secured place, where it is protected against weather exertion and human attacks. (Datachassi, 2009)

4.1.1.5. **On Board Computer**

The OBC will be extended, as well. This happens through a new setup of the OBC or via an USB extension. The wireless network will come together in the driver’s cabin and is controlled by the driver. The OBC will enable the driver with setting the alarm function by resting and connecting the alarm with other transport vehicles in the nearer
surrounding, to create a stronger alarm network. The computer enables the driver to use additional features, such as monitoring the tire pressure and/or monitoring cargo temperatures in real time (compare Appendix VI). Further will the driver be able to control the lights and the radar system through the OBC application.

4.1.1.6. **Focus on main features**

With the improved security level of driver and cargo of the truck the company combines a highly intelligent system with an advanced construction of possible and feasible new applications that are easily to connect or integrate. In the following the main features are described to give the reader an overview of the technology functions.

**Alarm system**

The main use of the sidelights is an alarm system, while the truck is on standstill having breaks. As it will be discussed later, the transportation sector is lacking secure parking areas in Europe (compare 4.2.). It means that there are several occasions when the driver has to pull over, because of the strict driving regulations, which happens then in insecure areas. With the new technology, it is possible to decrease attacks against the cargo transportation. When a driver has to rest he can activate the alarm system, further, the system can be added with a feature, which activates the alarm system itself when the driver leaves a certain area around the vehicle. When the driver returns back to the vehicle, the system will automatically deactivate it again. If the vehicle is parked in an authorized parking area, multiple vehicles can be attached to an alarm network, which makes it more efficient against criminal attacks. Furthermore, if the trailer is parked – with or without load – to wait for further transportation with or without a tractor, the alarm system can be activated. The sidelights and alarm system contain batteries which enable them, to be active up to seven days without external power supply. (Datachassi, 2009)

**Loading and unloading security**

There are also several features, which help the drivers in their daily work when the vehicle is set up with D-net©. During the loading and unloading times occur several risks. E.g. it is difficult to measure the distance to the loading dock when reversing. Plus working during the dark time of the day, might be even more challenging, because of the lack of visibility. A new type of sidelights adds a solution to this challenge. The sidelights contain LED lamps, both to the side and downwards. The downward directed lamps brighten up the side of the vehicle and help the driver by going reverse. The distance measuring feature helps the driver to determine the distance to the loading dock and to avoid a crash. The trailer can also be attached with a reversing camera, which via D-net© passes the information to the drivers monitor in the cabin (Datachassi, 2009).

**Electronic lock**

In a road transport chain, the loading docks are the points, which have not been recognized as an important link. Anyhow, loading docks and areas have an important role in a
transportation chain. Productive loading docks are the key element when increasing the efficiency of the supply chain (Swietlik, 2007).

The loading docks are the spots where a lot of accidents occur. There are several reasons, such as forklifts tipping over from the loading docks and causing accidents (Gauthier, Giraud, Bournival, Bourbonière, Richard, Daigle & Massé, 2007). Trailer manufacturers have designed new types of trailers to increase the efficiency of the road transport chain. At the same time, there has been no development in loading docks (Swietlik, 2007). That has caused the problem that current trailers do not fit anymore to the loading docks, which leads to unsafe loading operations. The loading in incompatible loading docks and trailers cause huge risks for the shipping operatives, such as trailer slipping away from the loading dock because of movements of the vehicle (Gauthier et al., 2007).

With Datachassi’s 'electronic dock lock', operatives could be warned if the gap between the loading dock and the trailer is increasing over the secure limit. Furthermore, can an electronic lock recognize and warn operatives if the engine of the truck is switched on during the loading process (Datachassi, 2009).

**Electronic door seal**

During breaks, the vehicle might be without constant surveillance by the driver. Those are the moments for unauthorized persons to enter the cargo space. The cargo space can be sealed with a disposable plastic or metal sealing. The disposable sealing is only a passive object, which can easily be broken and thrown away. If unauthorized persons want to cover a breakage, the sealing is easily replaced with a duplicate.

The technological innovation offers an electronic door seal. Transportation fleet management program passes on loading and unloading points to each trailer when a new order is given to the driver. The system reports immediately to the driver and to the fleet management system if the door seal was broken between the given loading points and times. Each seal has its own identification number. By identification number the seal and the trailer can be attached to certain cargo. It also helps to track the points and the times of door openings, as well as, the times of arrival and departure (Datachassi, 2009).

Moreover drivers are better protected against false claims in proving that the sealing is not damaged and trailer doors are not touched since the loading of the truck.

**Blind spot detector**

The sidelights and the D-net can also be used as a blind spot indicator. Blind spot indicators are needed when vehicles are changing lanes or when turning. When obstacles come in the way, such as other vehicles or a cyclist, the system will warn the driver. (Datachassi, 2009)

The technology is recognized to be challenging for the truck drivers. Especially, if the trailer is attached to the truck, problems can occur when turning with the vehicle. The United Kingdom based transportation insurance company; Norwich Union has been doing research to find sufficient solutions to help drivers to recognize objects or humans in a blind spot when driving a truck. (Weatherley, 2008) But it is not only insurance companies, which are interested in raising the visibility of the HGVs driver. The EU has required actions, with the EU directive 2003/97/EC, from the HGVs manufacturers to
come up with system(s) to extend the visibility of the drivers. (Weatherley & Barnett, 2008)

**Installation of the D-net©**

Due to standardization and flexibility of the D-net©, there are several future applications which can be attached to the vehicle, so data from the applications can easily be transmitted by the wireless network to the OBC and via GMS or GPRS to the transportation company, as well as, to other stakeholders in a road transport chain.

In conclusion, the wireless communication platform enables the communication between the OBC located in the driver’s cabin with the cargo trailer or even trailers. Since it is wireless it can easily communicate with further devices. Shipping companies and the receiver will have the chance to monitor their vehicle and their goods at every time of the transporting process.

### 4.1.1.7. Product integration

The product can be easily be integrated in the vehicle. The very first time when the sidelights and the gateway are installed, it has to be done by service employees of the maintenance. The physical installation does not ask for any special requirements, since Datachassi’s sidelights follow the standard of Scania and Volvo trucks. The standardized sidelight is easy to in- and uninstall because there is no need for special tools to complete it. To make a replacement of the sidelights as easy as possible, an adapter is providing, which needs to be fixed on to the vehicle. (P.O. Näfverborn, personal communication, 24th February, 2009)

To connect the sidelights to the gateway, it requires additional knowledge and work. Each sidelight must be configured one by one to the system. Furthermore, it has to be provided with certain communication information to the gateway, such as a GSM number or numbers which are obliged as users of the vehicle. (J.I. Mancha, personal communication, 25th February 2009) The D-net© uses standardized communication protocols and is therefore compatible with most computers in the market. If a vehicle already contains an OBC, it can be used for data processing. (Datachassi, 2009)

### 4.1.1.8. Potential competitors

Under this header similar applications to the Datachassi technology will be discussed, available in the present market. Since there is no system provider in the market at the moment who is able to offer such an overall product as Datachassi AB, available applications are divided as the main features by the new technology innovation:

#### Alarm system

Alarm systems for trailers have been a challenging issue for the trailer manufacturers. In the transportation sector, trailers are mostly targets of thefts in the road transportation sector. Anyhow, so far there has been no sufficient alarm system available for trailers. (‘Volvo Buys Interest’, 2008)

In the current market, there are different kinds of alarm system available, which are based on movements of the trailer or if the back doors are opened. But curtain side trailers are the challenging ones. The curtain side trailers are widely used because of the
benefits it has for loading and unloading of different kinds of cargo. The curtain side trailers are increasingly vulnerable to thefts. The tarpaulin can be easily destroyed with a knife and the TIR cord can be cut to get access to the trailer. (Banner, 2008)

There are manufacturers, which provide sounded alarm for the TIR cord protection. But as discussed above, these are also so called passive alarm systems without a connection to the fleet management or to a security company.

**Electronic door seal**

There are multiple applications available in the market for an electronic door sealing. Characteristic of all of these applications are that they are more or less passive systems. By passive system is meant that the present electronic door sealing system have no constant data sharing capability with a driver and/or fleet management. These applications make it more difficult to replace sealing, but do not provide online information if the seal is broken by unauthorized person during the transportation corridor. (Johnston, 2006)

**Blind spot detector**

There are a lot of different kinds of solutions - such as blind-spot mirrors, ultrasonic detectors - to help the driver detect people or objects in a blind spot, for example when the truck is turning (Weatherley & Barnett, 2008). The blind spot mirrors increase drivers visibility, as it was discussed by Weatherley and Barnett (2008). But such blind spot mirrors and current detectors give only a limited detection. Present detectors are set only to the truck cabin. That means, if the trailer is attached to a truck, there are no indicators in a trailer to warn the driver if there are people or objects near by the trailer when it turns. Furthermore, blind spot mirrors have the same limitation and cannot give hundred percent visibilities to the truck driver (Weatherley, 2008)

### 4.2. German road logistics market

Historically, the trucking business has been working in a very narrow business area, basically with providing services as transporting goods from point A to point B. During the last decade there have been major changes in the trucking business. The first one was that transportation firms began to offer additionally services, as warehousing and handling of goods. The second one was the reformation phase towards more service in general, such as taking care of information, related to the flow of goods and other value-adding actions (Deutsche Bank AG, 2008). These changes have redesigned the overall type of traditional transportation business towards an overall logistics service providing by tailoring services to match the exact needs of customers and to include a value-adding form to provided services (Persson, 1995).

As stated, the trucking industry has a strong overall position in Germany compared to other European countries. There is a high demand for services that the trucking industry is offering, because of the highly developed industrial and service sectors (Deutsche Bank AG, 2008). Germany’s position in the global economy, as one of the world’s largest exporter is also leveraging its trucking industry to higher grow. Even though, there have been major changes in the industry, still traditional transportation companies, whose focus is providing traditional transportation services, play a major role in the
overall logistics business in Germany. Thus, is it generating over the half of the total logistics annual revenues (Deutsche Bank AG, 2008).

The importance of the trucking business in Germany has made it tempting for foreign players to enter the German market. The free market idea of the EU made this possible for firms from the EU-15 countries in the year 1998 (Deutsche Bank AG, 2008). To enable a more effective use of the transportation resources, the EU gave a mandate for freedom of cabotage to the member countries (Ecorys Nederland BV, 2004). Therefore, it has been a long tradition for foreign firms to enter the German domestic market. This has had several affects of the freedom of cabotage. It has increased competition among the players in the German transportation market and also increased the domestic freight traffic in Germany during the last ten years annually by an average of 3.7% (Deutsche Bank AG, 2008). Risen traffic on the other hand has its impact on environment and on the road network. Increased traffic is straining the environment by rising air pollution. Another negative factor of increased traffic is the noise pollution. Traffic is recognized as one of the main sources of noise pollution (Pathak, Tripathi & Mishra, 2007).

Currently is the German logistics sector the largest in Europe and generated a revenue of 190 EUR in 2007 (Deutsche Bank AG, 2008). Just to provide a European overview of the locations the goods transported in tonnes in the reference year 2005 the following figure is broad up. It shows that 56 percent of the total volume is considerably intra EU 15 road transport, 34 percent is phare-EU 15 transport, 9 percent is phare-EU 15 transport (phare hauliers) and just 1 percent is phare-EU 15 (EU 15 hauliers) transport.

![Figure 21: Volume of intra EU goods transported by road (tonnes).](image)

The rapid growth of vehicle usages, especially usage of freight transport is causing a tremendous burden on highways (Sorensen & Taylor, 2006). The road network needs a constantly maintaining, which requires huge financial assets. In the research paper by Invest in Germany GmbH (2005) it is estimated that the German government will spend an average of 15 billion EUR annually on maintaining transportation infrastructure. Because of that, the German government wants all road users to take part in funding maintaining. That means, that all over twelve tonnes heavy vehicles drivers must pay highway toll by each kilometer they are using German highway network (Sorensen &
Taylor, 2006). This will also have an impact on the further development of the German transport sector.

4.2.1. Truck manufacturer

Germany is one of the strongest players in the truck manufacturing industry. The world’s largest truck manufacturer Daimler and the fourth biggest MAN are from Germany (Economist, 2009). The truck market structure is divided in two different categories, light trucks, as well as, medium and heavy trucks market. The light truck segment consists of all light commercial vehicles (LCVs) and light busses, as well as, coaches (LBCs). The medium and heavy truck segment contains all commercial vehicles (CVs), buses and coaches (BCs), heavy commercial vehicles (HCVs) and heavy busses and coaches (HBCs) (Datamonitor, 2008).

In this study the focus lies on HCVs, since the market objective of Datachassi AB concentrates in first place on that segment. There are six major heavy-duty-truck manufacturers in Europe: Daimler, Paccar, MAN, Iveco/Fiat, Volvo and Scania. In the Appendix IV a more focused description of truck manufacturers and selected manufacturers of trailers, as well, as their development and market position in the German market is provided.

4.2.2. Transportation companies

This section discusses the market leaders in the European road transportation sector. The market leaders in Europe are DB Schenker with a 3,0% market share, DHL (2,0%), DSV (1,5%), Geodis (1,2%) and Dachser (1,2%) (Deutsche Post, 2009). As the market share per cent illustrates, the road transportation market in Europe is broadly fragmented. In many perspectives, DB Schenker is the major player in the road transportation market in Europe, but still, its market share is only 3,0% of the total market volume.

In general it can be said that the European market got a tension to consist of small enterprises. This shows the next figure, the share of different size companies is represented for the year 2004 (IRU, 2006):

![Figure 22: Average size distribution in vehicles of companies.](chart.png)
The figure shows that only 1% of the companies working in the European market got more than fifty vehicles in the daily process of work. A lot of enterprises are single entrepreneurs with just one vehicle (34%) or got between eleven and fifty vehicles and most of the enterprises got two to ten vehicles in the transport sector (51%).

In the Appendix IV an insight of the firms involved in the transportation sector in Germany is given. The major market player are shortly summarized and briefly described.

4.2.3. Truck driver’s union

The general aim of the truck driver unions is to improve truck drivers working conditions, safety and security in the work, as well as, to develop and to promote the work-related professional training. Truck driver unions work closely with the transportation companies and with other stakeholders in the field to improve the driver’s position in the transportation sector. Unions in the transportation sector are well organized and the number of members is high. There are several issues that driver unions want to improve to have better working conditions in the industry. One of the most important issues at the moment is the driver’s safety at work. That includes both work safety and security towards external fears, such as thefts. The safety in the work can be increased by different kinds of technical devices in vehicles as it was discovered in the survey done by International Road Transport Union (IRU) (IRU, 2008).

Furthermore, secured parking areas for the truck drivers are also an important issue in the industry at the moment. The amount of the secure parking areas has to be increased in whole Europe (IRU, 2008). The aim of the drivers unions is to make sure that parking areas will be free of charge for the truck drivers (Ralph Meyer, personal communication, 9th, April 2009).

Ralph Meyers (2009) continued, that driver’s education is also the third viable issue at present. The aim is to increase the stature of the truck driver’s profession and to achieve higher safety at work by training. Working hours and rest periods are highly regulated in the EU. Governments and especially the EU play a major role in developing driver’s education. Furthermore, unions want the EU to take a more active role in developing the trucking industry in general. (SETPOS, 2009)

Truck driver unions are also participating actively in different kinds of projects, which aim to improve the whole transportation sector. The International Union of Professional Drivers (UICR), for example, is participating in an EU financed project - Secured European Truck Parking Operational Services (SETPOS). The aim of the project is to determine basic standards for secured parking areas and to measure and validate the basic regulations for the different parties involved in parking areas. Furthermore, the aim of the project is to construct secured parking areas especially in trans-border regions and in regions which lack parking areas at present. Also the object is to maintain parking areas, establish the reservation system and provide information, as well as, guidance of parking areas. (SETPOS, 2009)

4.2.4. Governmental view

As discussed above, the German logistics sector has a very important role for the German economy. The logistics sector employs today over 2.6 million people in Germany,
which makes it one of the biggest labor markets and at the same time the most dynamically developing industry (BMVBS, 2009). This sector with over 190 billion EUR turnover, e.g., in the year 2007, makes it the largest in Europe (Deutsche Bank AG, 2008). The logistics sector has always been underestimated, but taken into consideration the factors above, its importance and its significant role as a driver of economic growth is understandable (BMVBS, 2009).

There is also an increasing need to monitor and control traffic and road users. The aim of controlling and monitoring is to spread the load of transport more evenly to reduce congestion and to decrease the pressure of high-volume highways. Also by monitoring transportation the government tries to decrease the amount of unnecessary freight miles. By decreasing unnecessary mileage the government wants to increase the efficiency of the logistics operators and to decrease the impact on the environment (BMVBS, 2009).

To support the aim of increasing the efficiency of transportation, the German government is aiming to increase the amount of secured parking areas for HGVs. A lack of secure parking areas is a big challenge for transportation companies operating in Germany. HGV drivers working and driving hours and rest periods are regulated by EU Regulation 561/2006/EC. This regulation concerns vehicles over 3.5 tonnes maximum weight - including the weight of any trailer drawn, which are used for the carriage of goods in commercial purposes (Appendix II). (Lowe, 2008)

It is estimated that there is a demand for an additional 11,000 parking spots. To take into consideration the driver's and cargo safety, a most convenient location for new parking areas would be next to service stations (BMVBS, 2009). But that is not possible in all locations (Ekwall, 2009). Germany is already recognized as a logistics hub in Europe, as pointed out in: “Invest in Germany – Germany: Europe’s Logistics Hub” there are still issues the German government search to develop. One of these is to establish a country wide freight transport and logistics network. The aim is to connect other stakeholders, as industry, transport sector and trade associations already in the planning phase to gain results more rapidly and to assure German's voice is heard by the executive boards of the EU. Moreover its aim is to parent Germans profile as a leading logistics centre in Europe. Third issue is that the government wants to find improvements in the security of freight transport and logistics industry. The holistic aim is to find solutions to increase the transport chain security against crime and terrorism (BMVBS, 2009).

4.2.5. Trends in the road freight transport

Due to the special financial developments in the market the transport sector is affected, as well as, many other sectors. But still are trends to be recognized and should be overviewed in the following.

The contract logistic is probably the fastest growing sector within the transportation business. There is a trend towards system solutions out of a single hand instead of transporting goods from here to there (Deutsche Bank, 2008). Further labor costs play a big issue in the business, not only rising costs of fuel but, especially the costs of drivers and workers in the logistic field force companies to restructuring actions. Since price is a viable issue in this business, competition is basically won by the lower price offers and margins are comparable low. (Deutsche Bank, 2008). But still is the trend for more services considered to be a plus. Extra services are quality controls, payment manage-
ment or even warehouse prerequisites in order to secure the transported goods more. System solutions play an important role and transportation companies need to focus more in this to avoid too rough of competition. (Deutsche Bank, 2008).

RFID technology is one of the future trends. Many opportunities are connected with this new technology. Barcodes shall be a product of the past when following the plan of RFID based logistic companies. RFID technology is assumed to involve the greatest potential of rationalization in the logistic sector. Cutting costs by improved transport processes and warehousing can offer a potential of savings. (Progtrans, 2007). Further technology innovations are assumed in the communication and supply chain tracking sector. This is a matter of, even though financing problems still exists, the European satellite location system GALILEO application, which is assumed to take over the transport sector soon. The same is valid for the technology of telematics. (Progtrans, 2007). Coming to the goods side of the transportation business are the key elements the Full truck load (FTL), Part Loads (LTL), Groupage and courier, parcel and express services (CPE) shown in the next figure.

![Figure 23: Key elements of the road transport sector.](image)

Four markets are the key areas and environment trends in the road logistic sector. The forwarder’s segments are FTL, a full truck load sent to a destination. Further LTL or better more than 2,500 kg up to a full truck load and the groupage sector, which means 30 kg goods until 2,500 kg. The latter key segment is the CPE parcel network segment which consists of delivering courier services, parcels and express sending under 30 kg. (Kaiser, 2007)

The groupage and CPE sectors will be the main field of interest from those four sectors in the future, as elaborated in the freight transport and logistics master plan by the German government (2009). Optimizing those types of logistical services is one of the key issues in the future. An improvement of the logistical operations contains the need of developed transportation infrastructure to meet future demands. Moreover the need exists to be able to combine shipments from the two sectors to decrease unnecessary transportations in the future. Studies show that those developments decrease congestions and droved ton-kilometers, which will have positive effects on the environment. When congestions on the highways are decreased, the overall road transportation per-
formance efficiency increases. Transportation companies are able to plan routes better to meet certain demands and to allow truck drivers to reduce needs for breaks on the road and rather complete their working day back in the company’s terminal. That would have a huge impact on the driver’s security and on their working conditions (BMVBS, 2009).

4.3. Road transportation security

Starting with the economic sub-loan crisis in the United States in late 2007 with all its impacts on the economy, financial systems are struggling to find a way to fight the recession that is going on. For security professions it does mean a lot of work. Cost-cuttings and layoffs become more or less the case and affect businesses and people. In the past, in many countries the effect of inflation and illegal acts are proved as been as correlated. (Bunge, Johnsson & Balde 2005). It reveals that there is an increase of first time offences when the economy is down. Facing this fact and acknowledging the business reality, security is far from being out of business. Hence, this is a matter, which transport businesses and cargo deliveries have to see and recognize. (Cooreman, 2008) In the following the driver and cargo security is investigated in the current business of goods transportation.

4.3.1. Driver and cargo security

There is a lot of the high-value and dangerous goods transported every day on the road. All the way in the history of the transportation sector the vulnerability of road transportation has been recognized (ECMT, 2002). Especially the moments when heavy goods vehicle driver have to have statutory breaks, the loading is vulnerable for unauthorized persons to approach. As it is discussed above, at the moment there is a lack of secure parking areas for truck drivers, which decrease the cargo and drivers safety, as well (compare 4.2.3.).

When it comes to loss figures, in the US, for example, it is estimated that the shipping industry suffers $15 billion to $30 billion losses annually because of cargo thefts and Europe has to face comparable numbers (Phillips, 2009). That amount of annual losses forces different stakeholders in the industry to increase their co-operations, as Phillips (2009) continues, during the last years, insurers, trucking companies, shippers and representatives of government have increased their collaborating to meet the challenges crime gangs are causing into the industry. A special association within this field of research is the Transport Asset Protection Association (TAPA). It focuses on the security problems of the supply chain within the transportation industry and is therefore a huge influence on the sector. Within this TAPA a regional limitation is made in the European, Middle East and African countries to American countries (Emea), hence a more particular focus lies here in this conduction.

4.3.2. Tapa Emea

TAPA’s major mission is to deal with protection of cargo round the globe. It is a unique forum that unites global manufacturers, freight carriers, law enforcement agencies and other stakeholders with the common aim of reducing losses from international supply chains. Emea considers Europe, Middle East and Africa and shortens the regions operated in down. (TAPA Emea, 2009)
With a rapid development of new high technology products during the years of the 1990’s deliveries got more desirable for illegal events like thefts and vandalism. As efforts to protect these valuable products in factories and in the warehouse became more and more sophisticated a shift to target the products in the transport was noticeable.

In the year 1997, TAPA was formed in North America when security managers from manufacturing companies decided to share their knowledge and to build intelligence. Later on major distributors and transportation providers joined the association. This led to the launch of the new international association in Emea in the year 2000. One of the most notably innovations of the TAPA was the introduction of the globally recognized risk management tool for Freight Security Requirements (FSR). It is a qualitative standard of best practices to enable different levels of classification according to threat levels for high technology products and assets. This practice is used by several multinational manufacturers and distributors to include it in their contractual agreements and transport companies refer to it globally as a benchmark. As a best known method it can be adopted by companies of any size while it evolves to address new challenges and its scalability. The FSR standards are established to secure asset protection throughout the whole supply chain. Further determine these standards which actions have to be taken to secure the standard. One example of the FSR is the introduction of the Trucking Security Requirement standards (TSR). Launched in the year 2006 was the major concern to reduce losses on the road transport.

Further do TAPA members report incidents against their operations to the Incident Information Service (IIS). This system has developed into a highly regarded database and analytical tool (TAPA Emea, 2009). The essence of this service is to find the information needed for manufactures, logistic companies and other stakeholders of the supply chain of high valuable goods. The concern is to collect data about freight crime and give advice and solutions for a prevention of these incidents. With this system prevention is facilitated and stolen goods are more probable to recover. Further does this system enlarge the awareness of the freight crime on regional, national and international bases (TAPA Emea, 2009).

4.3.3. Thefts of cargo

In 1993 the members of the EU created a borderless single market. The intention was to set up a business environment without customs in which the business could flourish (TAPA Emea, 2009). Additionally it created a situation in which cross border crime could flourish, too. Criminals were faster than many businesses in exploring the new opportunities going along with this introduction. Besides just high profile areas as drugs transports or smuggling, consumer technology loading thefts in the cargo business were seen as a lucrative area. (Peter Conway, personal communication, 14th, February, 2009)

Cargo thefts are a huge problem worldwide, especially towards the road transportation sector (Ekwall, 2009). Recent studies show that globally 85 percent of all cargo losses are related to the road transportation. EU wide, cargo thefts against road transportation caused over 8 billion EUR losses in the year 2007. Furthermore, one of six truck drivers in the EU has faced criminal actions in the workplace (Reuters, 2008). As these figures show, the cargo theft problem is a huge challenge and cost of the business. (EC, 2003)

Pilfering has been seen as the most costly and the most irritating causes of cargo thefts and therefore the prevention of the pilferage is one of the primary functions in th-
dustry. Thefts of vehicles are difficult to prevent and hard to prove, but simultaneously, it cannot be ignored, because thefts of cargo are increasing constantly. (Fennelly, 2004)

<table>
<thead>
<tr>
<th>Country</th>
<th>Average loss value € per incident</th>
<th>Number of reported incidents</th>
<th>Ranking Top 10 (# of incidents)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NETHERLANDS</td>
<td>180,499</td>
<td>183</td>
<td>4</td>
</tr>
<tr>
<td>UNITED KINGDOM</td>
<td>104,570</td>
<td>974</td>
<td>1</td>
</tr>
<tr>
<td>SOUTH AFRICA</td>
<td>86,279</td>
<td>44</td>
<td>10</td>
</tr>
<tr>
<td>FRANCE</td>
<td>72,617</td>
<td>169</td>
<td>5</td>
</tr>
<tr>
<td>GERMANY</td>
<td>68,128</td>
<td>318</td>
<td>2</td>
</tr>
<tr>
<td>BELGIUM</td>
<td>60,366</td>
<td>69</td>
<td>7</td>
</tr>
<tr>
<td>SPAIN</td>
<td>58,511</td>
<td>203</td>
<td>3</td>
</tr>
<tr>
<td>SWEDEN</td>
<td>52,903</td>
<td>55</td>
<td>8</td>
</tr>
<tr>
<td>ITALY</td>
<td>37,940</td>
<td>141</td>
<td>6</td>
</tr>
<tr>
<td>CZECH REPUBLIC</td>
<td>9,709</td>
<td>44</td>
<td>9</td>
</tr>
</tbody>
</table>

Figure 24: Tapa Emea top ten countries of incidents.

The figure above shows that Germany is one of the special regions for the TAPA Emea since the amount of incidents compared with the average loss value per incident makes it the second place in the top ten of crimes in the years 2005 until 2008. To provide an insight in the information gathering the figures are derived from different sources as the next figure shows:

Figure 25: Sources of Tapa Emea reported incidents.

Most of the incidents from January till May 2007 are reported by manufacturers in the supply chain. These are followed by the carriers, Tapa’s Incident Information System (IIS), the local enforcement agencies (LEA), which include the police or other executive institutions and lastly an insurer. In the year 2008 it changed to the majority of reported incidents by LEA, followed by TAPA IIS, the carriers, manufacturers and the insurer.
When it comes to attacks to the trucks, most attacks are towards unattended vehicles (Phillips, 2009). Unattended vehicles are wanted by thefts because trucks are parked in unsecured parking areas and vehicles are equipped with insufficient alarm systems or are without any alarm system. Especially trailers are often the target since these usually do not have any alarm system. In addition, the convenient type of trailer, curtain side trailers are vulnerable. The curtain is easily cut while the trailer is parked (Reuters, 2008). Crime gangs have even gone so far that they are employing members inside of the company to get insight information. By using insight information they are able to choose most valuable targets and are able to accurately monitor transportation operations plus follow the transportation fleet from the point of loading until the drivers stops. This moment is used to take over the vehicle and the cargo. (Phillips, 2009)

The figure below shows the most common products stolen from trucks and trailers in the years 2007 and 2008.

Unspecified items are the majority of stolen goods reported in the year 2007. To focus on goods that are defined, the lens lies on the three most stolen goods after these items. Consumer electronics like DVD-players, game consoles or mp3-players are second place when it comes to reported stolen goods in the year 2007. These items are followed by food and beverages as well as clothing and footwear.

By listing the most stolen goods of the following year just one shift is to be observed. After, again unspecified items, consumer electronics, food and beverages are the most frequently stolen goods. But the third big issue is metal in the year 2008.
Losses of cargo and/or vehicle are very costly for the industry, but there are also other measurements that have to be considered. If the driver is present when thefts attack, the mental impact on the driver can be very fateful. Such incidents might affect the driver so badly that he is not able to continue working anymore in the industry (Sheppard, 2008). There are several incidents of truck drivers who have faced attacks by criminals.

One of the incidents was pointed out by Sheppard (2008) in his article of highway robbery in which he took a closer look to the case of a truck driver in his late fifties, faced with a criminal attack in the year 2008. After this attack he was tied up and kept as a prisoner for more than three hours during thefts were unloading his vehicle. He tried to go back to work weeks after the incidents but he could not stay longer than one night shift. He was diagnosed suffering migraine, nervousness and high blood pressure after the attack for a long time. (Sheppard, 2008)

**4.3.4. Damages on the vehicle and cargo**

TAPA is, as described, an independent organization which works towards more secure global transportation. In this thesis, the TAPA Emea annual report from year 2008 is worked out to give an overview of the different incidents the transportation sector most commonly has to face.
The 2008 TAPA Emea Incident Information Service (IIS) annual report contains information of member companies and criminal activities, which were ongoing during the years 2007 and 2008. The most common incidents based on information of this survey were thefts from the vehicles. Second most incidents were thefts of the vehicles itself. In following figures the eight most common types of incidents are visualized:

![Graph showing incidents in 2007](image)

**Figure 29:** Incidents occurred in 2007.

In 2007 thefts from the vehicle were the most occurred incidents with 2,023 reported occasions. Thefts of the whole vehicle follow with 803 situations and thefts of goods from the truck and trailer with 426. Those are the big issues the transportation companies have to face today. Robberies, facility thefts, hijacking, fraud and burglary are comparably minor to it. (TAPA IIS, 2008)

![Graph showing incidents in 2008](image)

**Figure 30:** Incidents occurred in 2008.

In the following year the reported incidents decreased but the first two situations stayed still the same. Thefts from the vehicle (1,619) and thefts of the vehicle (423) were the most incidents. Thefts decreased a lot and were exchanged on the third place by thefts from the warehouse (TAPA IIS 2008).
In percentage it means, as the result of the TAPA Emea survey, theft from the vehicle is the majority of all incidents, having a share of over 56% of total incidents in 2007 and over 66 percent in 2008. Thefts of vehicles were also significant types of incidents, but still was its’ share much lower than thefts from the vehicle, counting up to 22% in 2007 and a share of 17% in the year 2008. Direct vehicle hijacks were remarkable low and counted only for around 2% in both years from total incidents. The survey shows clearly that most critical type of incidents to find solutions for, are the thefts from the vehicle. (TAPA IIS, 2008)

The European conference of ministers of transport (ECMT) report shows the same result as the survey by TAPA Emea. Theft of commercial goods transportation vehicles and the cargo from the vehicles is a major problem. The ECMT report is researching information from twenty countries in Europe. Because of the variations of usable data between different countries, there was no detailed percentage given for cargo thefts from the vehicles and stolen vehicles (ECMT, 2002). The next picture shows different cargo crime scenes for the visual support of this topic:

![Figure 31: Damaged curtain side trailers after the attack.](image)

With the benefits of a secure transportation chain in mind the next header is about the international trade and road transportation to provide the reader with a broad understanding of the risks involved and the risk allocation in the transit, starting with a description of the Incoterms 2000 used in this sector.

### 4.4. Transport insurance underlying risk factors

To extend the view on opportunities for transportation companies by applying innovation technologies and creating new business models, the sector of trade terms and risks in the road transport should be investigated. Starting with the Incoterms 2000 and the liability and risk aspect, CMR and cargo insurance.

#### 4.4.1. Incoterms 2000 in road transportation

Incoterms have a long tradition in the international business. The history of Incoterms began in the year 1936, when the Paris-based International Chamber of Commerce (ICC) created the terms (Gooley, 2000). Today, Incoterms are still administrated by the ICC and the latest version is called Incoterms 2000. There are totally thirteen different terms for seller and buyer to voluntary choose when they want to enter into the commercial treaty.

Incoterms are agreed on by the major trading nations of the world and are building up for the purpose of the seller and the buyer to agree on terms of the commercial contract.
Incoterms were implemented to build up common terms or better to have a common language to define terms of commercial contracts and to ensure that in every case, both, the seller and the buyer know exactly the aim of each party. Further is the purpose of the terms to express the responsibilities of seller and buyer for arranging necessities as export/import licenses, insurances and custom formalities. They also state at which point of the supply chain risk of damages and/or loss passes from the seller to the buyer. By applying the Incoterms the seller and the buyer will have a mutual understanding of the costs, rights and obligations, despite of the different cultural, linguistic and business backgrounds. (Gooley, 2000)

4.4.2. The general risk distribution for loss, damage or delay

One of the basic elements of road transportation is the distribution of risk, so as further deals with the problem and danger of thefts and security. Thus, risks occur and lead to costs. The distribution of the risk is therefore a central issue of the supply chain. The first issue to be solved is the seller and buyer situation. Unless there is a concluded arrival or destination contract, the risk must be carried by the buyer. This particular responsibility starts at the moment when the value is handed over to the carrier for the transportation process, as explained in the regulations of the United Nations Convention on contracts for the international sale of goods (CISG) (CISG Art. 67.1 or F and C Incoterms 2000, 2009). The party to bear the risk usually drags the carrier into responsibility and for compensation if the goods damaged or lost. Important here is the amount to which the carrier is responsible for the goods. The basis of liability is, under the strict responsibility in the CISG terms reduced to a limited the liability of due care, which means that there is a presumed fault or neglect in play. An exception is impediments beyond control. Unless the buyer has agreed with the carrier to declare a particular value of the goods the carrier has a limited sum of risk to carry. When it comes to road transportation, expressed in the Special Drawing Rights (SDR), this is the value of 8.33 SDR per kilo of freight. SDR is a certain currency issued by the International monetary fund (IMF). Since is 1981 the value determined by an evaluation of five different currencies – French, German, Japanese, US-American and Great Britain, since these countries are the leading exporting countries of goods and services. By introducing the EURO in 1999 the French and German currency were exchanged to the Euro. The value is daily evaluated by the sum of the single currencies on the base of the London exchange rate. The value of one SDR on the fourth of March in 2009 was for example EUR 1.161260. (IMF, 2009) Compared to the value of goods transported today (e.g. CPU) this amount does not seem to be appropriate and is the moment when the insurance coverage is needed.

But not always are the risk distribution and the point of risk division simply allocated. Especially since transport insurance is mostly dealt with ad hoc and is related to a particular shipment (Ramberg, 2004). It is comparatively easy when the seller or the buyer is bearing the risk of transit entirely. This is the case when the contract is based on EXW- or DDP Incoterms indicating the seller’s and buyer’s premises as delivery point. If so, the parties can arrange “warehouse to warehouse” – terms insurance. (August, 2004).

In other cases the risk allocation becomes more complicated since there are intermediate points, where risks are transferred from a party to another. Ad hoc insurance must be set up to bridge the points when the seller gets rid of the insurability interest and the buyer
does not have any insurable interest before this special point. Particularly important to see is that the seller may not be able to rely on a "warehouse to warehouse" insurance solution taken out by the buyer since the latter got no insurable interest until this point. However, if the seller has not applied for insurance cover in terms of land risk, it is difficult to get compensation out of the buyers insurance, unless what is mostly present, the “warehouse to warehouse” insurer does not bother to look into the distribution of the risk by seller and buyer or just refrains from invoking the defense of insurable interest (Ramberg, 2004). An exception is made by commodity trades. Hereby, insurance is usually based on a yearly policy, called general policies. Sales of goods are arranged within the transit and by a transition of the bill of lading and the cargo insurance policy to the buyer (Ramberg, 2004).

Moving on to the frequently used Incoterm CIP for example, where insurance is defined. Here the responsibility for insurance is on the seller although the transit is at the buyer’s risk, though it would seem easier when every party at risk would buy their needed insurance at the point of risk individually. Additionally it has to be said that the seller is only forced to arrange the minimum insurance standards. This is ratified by the ICC issued by the London Underwriters (IUA) variant C. It results from the suggestion that the seller does not know what kind of insurance the buyer wants. An extended insurance needs to be arranged by the buyer itself or must be included in the contract between the parties according to e.g. CIP. (Ramberg, 2004)

When choosing insurance coverage, seller and buyer should have an eye on the statistically most common incidents when it comes to cargo. Not every risk is insured under every clause. Thefts, pilferage, exposure to water or condensation, breakage or contamination is only covered under the ICC A (Ramberg, 2004). Further is it viable that according to ICC there is no coverage for damages, losses and expenses attributable that are to willful misconduct of the assured or vice of goods, such as improper packing or preparation of the freight for the transit. Moreover are a delay and a default of owners, managers, charters or operators of the vessel not insured, even though delay is caused by a risk insured against.

### 4.4.3. Liabilities and risks in the transportation process

Basically there are two different types of insurance necessary to look at in the transportation sector to investigate the liabilities and risks of transits. The first one is the former described CMR insurance (3.3.2). It settles the liability of the carriers (Beken, 2005). Through the CMR regulation, the carriers liable to 8.33 SDR (approximately EUR 11,71)\(^1\) when the transition is done through them. If the value of the loading is lower than 8.33 SDR the actual goods value is the basis for liability. (Schmitthoff, 1986)

The liability issue starts with the handing over of the goods by the seller to the transportation company and ends with the handing over to the buyer or another transportation company, or even a warehouse which is not run by the carrier company (Ramberg, 2004). Within the CMR standards the carrier can make liable for (Beken, 2005):

- The total and partial loss of the goods, if it occurs between collection and delivery

---

\(^{1}\) Rate at 2009-03-30 Lloyds Underwriting
- Exceeding the delivery time
- Loss or misuse of freight papers
- Errors in connection with collected freight and delivery (= cash on delivery)

As described above the carrier is liable to a certain amount. The maximum amount for land transport is 8.33 SDR per kilo (Ramberg, 2004). So, if the general policy of the CMR does not cover the specific risk for the transit an expended insurance can be negotiated. Recently, as described in the beginning of the thesis, thefts of cargo go more and more along with the theft of the vehicle (4.3.4.), therefore several CMR clauses are modified in several member states, like the Netherlands, Belgium and France. (Beken, 2005)

The second insurance that is viable to explore is the transport insurance, which insures the cargo against the risk of the transport by the mode used within the transport. The sales contract is defining the necessity and payment for cargo insurance purchase. When different commercial traders are entering the purchase or sale of goods, they can individually negotiate terms of their contracts, such as price, quantity and characteristics of the goods (Beken, 2005). Incoterms, as earlier explained, define which party pays the transport in each segment, who is responsible for the loading and unloading of the goods and who is bearing the risk of losing the goods at any time of the cross nationwide transit (Ramberg, 2004).

4.5. German transport insurance within Europe

The history of the transportation insurance can be dated back to the Babylonian traders who assumed the risks of the caravan by loans, which were repaid with rates of interest. However, only after the loading arrived safely. The Phoenicians and the Greeks applied an equal system to their maritime trade. First ones developed a concept called: “sharing the risk through general average” which was 3.000 years ago. Those whose cargo sustained a journey were assessed and paid the ones, who lost the cargo within the transport under the principle of “general average”. This history went on to the 14th century when even Europe’s maritime nations widely used transport insurance. (Rowland, 2009)

And still today insurance is a viable issue in the whole logistics and transportation sector. Damages on other traffic participants and on the own vehicle, as well as on the cargo are more or less covered through insurance policies. Transports are a viable issue in today’s economy but still are there a lot of risks to be faced. Liability is regulated by national and international law, but still does it vary in terms of different transportation modes and at different stages of the transit. Carriers, forwarders and cargo handlers have a choice of many insurance solutions depending on the transport. Road transportation is linked to risk and needs insurance to compensate for special incidents occurred to cargo and vehicles, herby is security a necessity and goes beyond physical damage. (Cvitanovic, 2005).

As already mentioned are there three main areas in the transportation related to the vehicle – traffic insurance, to the liability of the carrier – CMR and to the goods that are transported – the cargo insurance. Cargo insurance covers the goods while in transit against loss and damage and offers cost advantages if managed well (Cvitanovic, 2005). In the following the need of traffic insurance and the background of the CMR insurance
is a bit more investigated to figure out, who needs that kind of insurance at what point of time.

4.5.1. Vehicle insurance

An important fact is to distinguish between liability and comprehensive insurance within the traffic insurance. Hereby should the next headers provide a brief insight of the vehicle transport insurance touching upon the different kinds of traffic and cargo insurance necessary in the current market of the German transport sector from two different perspectives.

Liability insurance

A compulsory insurance for driving any motor vehicle in Germany and Europe is the vehicle liability insurance. There is no possibility of legally driving on publicly used streets or placers without this kind of insurance. Basically does this insurance protect other drivers and actors in the traffic from getting damaged or injured and not receiving compensation. The policy is used to compensate others in the case of an accident. There is no compensation to the own car within this policy. (Voth & Fragner, 2007)

Partially comprehensive and fully comprehensive insurance

In case of accidents with trucks a comprehensive insurance is a way to get compensation for own damage. It protects the truck owner from losses related to the truck itself. This insurance is an optional model that is widely used in the private sector, as well as, in the commercial sector. Transportation companies usually are at least insured on a partially level. A difference in the comprehensive levels of partially and fully is the coverage and the premiums for the policies. Partially coverage is cheaper to acquire but does not cover every damages to the car, as for example, vandalism. Whereas a fully comprehensive insurance for the truck is used to cover that, as well, but is more expensive to purchase. (Voth & Fragner, 2007)

4.5.2. CMR and ICC in the road transport sector

There is a distinction to be made in transportation law when it comes to domestic and international transportation. Often in the global markets, road transportation does not take place only in national territory. Herby, it is important to realize that different a law is in force. For example goods are usually protected by CMR when it comes to international road transportations. Nationwide for the German market the Transportzweck reformgesetz (TRG) is the common law for the road logistic (Wieske, 2008).

The CMR was signed in Geneva on May 19th, 1956. All parties involved in the CMR act are European (Schmitthoff, 1986). In the picture of CMR it is of high value to see that this belongs to every contract for the carriage of goods by road when the place of taking over the goods and the point of arrival are in to different countries. At least one has to be a contracting party or has ratified the convention. Further does the CMR apply when goods are carried out by a state or a government institution. (Schmitthoff, 1986)

When it comes to road transport insurance a main overview is established by the Institute Cargo Clauses (ICC) by professionals called International Underwriter

2 this includes trailer and semitrailer Art. 1(1)
Extended logistics and insurance by an innovation for the road transportation sector

Association (IUA). The association issued clauses for insurance of transit contracts (Cvitanovic, 2005). The Clauses are A, B and C as well as covering different protections for the transport insurance. Clause A is covering the most extended protection and is called an all-risk protection. Whereas Clause B provides coverage by a named peril principle, which covers in advance specified risks. Clause C is the least expanded coverage and gives a basic protection. (Transport Information Service, 2009)

4.5.3. Legal interest

The legal terminology for a shipment of a consignment of goods is named adventure or venture. Important is that a company is buying insurance when it got an insurable interest, that means that it benefits from a safe arrival to the point of destination of the goods being in transportation. Different stakeholders in this process could have insurable interest at different times of the goods at risk. Decisive, to recover under a policy, is that the person or company is interested at the time of loss. Although the most common form is ownership in insurable interest, the time at which the title switches from seller to buyer can be somewhat sophisticated. However, the terms of sale governed by the sales contract are to be investigated. Those sales terms start when the cargo is moved and is ruled by the Incoterms 2000. (Cvitanovic, 2005)

4.5.4. Risks sections

Risks closely connected to transportation need a special compensation or security. So, insurance risks are separated into four groups (Cvitanovic, 2005):

First ones are elementary risks, such as traffic accidents, explosions or fire, thus, named perils. Those risks represent the minimum coverage. Second, are the additional risks. Those describe the risks which are possible while transported, stored or manipulated. Coverage which provides protection against the first and the second risk classification are considered to be Against All-risk (AAR) coverage. Special risks are the third category for the risk sections. Those risks arise from the character of goods itself. Heating, sweating rejection, blowing etc. are the main risks in this class. In AAR this is not covered and insurers need to issue additional clauses to the purchaser for the special or specific risks. Lastly are the strike and war risk and issue in the insurance of transporting goods. Risks of war and war like actions, as well as, strikes in particular countries of operation need to be insured by the special clause.

4.5.5. Types of transport insurance policies

Trucking insurance companies insure cargo against a lot of incidents. Therefore, insurance protection is documented in a certain insurance policy. Thus, there is a distinction to be made in single policies and general policies. In the case of the single policy the protection is based on a single transport of a particular cargo or particular goods. In the general policy the carrier is in most cases able, within a master agreement, to provide coverage itself with protection up to a certain amount of cargo value or money, under the supervision of the insurance firm (Schiek, 2008).

The different types of policies within the topic of transportation insurance are facultative policy, open policy and general policy. The contract can be concluded for domestic, as well as, international transport (Cvitanovic, 2005).
4.5.5.1. Specific single policy

This policy is also known as the “one-off” or voyage single policy. It can be applied in domestic and in international transports but is bordered by just one shipment. This policy is more a process that fits companies or even persons with the need of insurance randomly. The cover for the specific shipment is negotiated individually and separately, as well as, a premium is agreed upon the type of cargo, packaging, destination, the mode of transport, individual experience, and value of goods shipped and covers (see Risk factors). As a matter of fact this process is very time consuming and therefore not applicable for frequently transport. (Rowland, 2009)

4.5.5.2. Open policy

This policy is a more general approach and transports are usually insured against all risks (AAR). Once arranged all transactions of goods are covered under this “umbrella” of insurance, as long as it is in the scope of insurance. It is suggested to be the most frequently used form of policies in the transport sector. Evidenced by a special certificate of insurance every individual shipment is issued. Thus, details must be declared once the shipment gets recognized. It can happen that a transit commences before the exporter gets aware of it. So it is automatically insured. This process is called the “sleep-easy” factor and creates convenience for insurance buyers and coverage issuing companies (Cvitanovic, 2005). Important to obey is the fact that the assured is obliged to inform the company issuing the insurance about every transmission falling under this open policy. Even though, when the transit is done already and the goods are delivered undamaged. (Rowland, 2009)

4.5.5.3. General policy

The general policy is created to provide maximum freedom for the assured. It allows the settlement of premiums periodically, monthly, and quarterly or even annually upon assured accounting data. The insurance can be purchased through a carrier or a freight forwarder or directly by the insurance company. Usually will the amount of insurance be shown in the sales contract or in the letter of credit. But quiet often it is limited by the amount of 110 percent of the value being carried, this is what the current Incoterms 2000 define (Schmitthoff, 1986). The underwriter must determine the premium by the requirements of the anticipated loss of the fleet and the expenses of the client. Further must clauses are added to meet the requirements of the cargo and the operation. (Cvitanovic, 2005)

But nevertheless the most important criteria for the insurance companies are the risk factors, which directly affect the premiums to be claimed from the assured.

4.5.6. Underwriting risk factors for the transport insurance

This section is written to illustrate the many-faceted nature of the underwriting process for a road transport insurance company, when it comes to the special risk of cargo. A certain risk analysis belongs to the core activities for the cargo insurer and is characterized by the apparent contradiction between universal objective factors and individual experience and subjective interpretation (Transport-Information Service, 2009). This task distinguishes transport insurance from most of other insurance forms within a collective agreement. Taken this into account and acknowledging that it is hard to decide which is the essential information for the transport insurer an underwriting process is
impossible to standardize. Hence, this section will concentrate on some common risk factors in the cargo insurance business and provide a list of the most important of these. An impact on the premiums cannot be provided directly. The following factors are derived from the transport insurance association in Germany and will give an overview of the viable information for the insurance firms (Transport-Information Service, 2009):

**Policy holder**

The first issue for an insurer is the policy holder. Information as legal form, employees, and a description of the business and a position of goods in process (retailer, wholesaler, exporter or producer) is important to the insurer. Furthermore does it make a difference if the customer is new or already known and got an incident record. Sometimes an enquiry to previous insurers with customer's consent is made. Hereby are information as insured amount, amount of claims and number of claims interesting issues. Furthermore are information about the size of company and employees viable for the insurer.

**Cargo type**

Another issue for the provider of coverage of losses, damages or delays is the cargo type that is in transport. Raw, semi finished or finished products or rather foodstuff, liquid transports, dangerous or bulky goods are interesting factors to evaluate the transportation risk.

**Cargo properties**

Besides the cargo properties are of importance to the insurer. What kind of cargo is the carrier dealing with is necessary to know. Hereby can be differentiated between for example, new or used goods, the state of aggregation, size, centre of gravity, hazard chances, sensitivity in terms of handling or time and especially the risk of theft.

**Insured transport and storage operations**

When it comes to risk calculation the insured transport and storage operations need to be declared as imports, exports, purchases, shipments, returns, own transports, in-house transports, intermediate or processing transport.

**Route and duration of the transport**

For an ongoing policy, the scope and the connections are important and for individual policies the point departure and delivery is to be declared. Furthermore, is to be questioned if the insurer is dealing with a house-to-house transport or if it covers terminal-to-terminal transportations. A schedule of the process and the infrastructure of the logistic and the country of operation is valuable to the insurer. Concerning the country of operation, governmental rules, administrative conditions and the information of pre-carriage, main carriage and onward carriage is interesting. Moreover is climate information a matter of interest to cover transports.

**Storage**

Another issue is the planned or transport determined storage. Differences can be made between intermediate storage, customs warehouse procedure, the duration of storage and the warehouse size and security. Further own or third party facilities inside or outside storage and the type of storage by product is decisive.
Means of transport and service providers

Third party or own means of transport make a difference for the insurance company. Besides, the suitability of the service provider is of special interest to the insurer, as well, for instance, the subcontractors involved. Direct or interrupted transports and the vehicle itself can be a factor for the underwriter. Is the transit done by just either one vehicle or is it a multimodal transit.

Packaging

More and more interesting becomes the factor packaging for the transportation insurance industry (D. Guderjahn, personal communication, 12th March 2009). An impact on the premium can have if the goods are packed by own or third party company and if it is fit-for purpose packaging, standardized and tested packaging or disposable packaging. Further is the outer and inner packaging highly interesting. Outer packaging is classified by different materials or containers, whereas marking is done by standards (DIN 55402 or ISO 780).

Packing, stowage, cargo handling, unpacking

When it comes to cargo handling, again, is there a difference in own and third party handling of the goods transported. Handling types, cargo securing, equipments and aids, the fulfillment of regulations and guidelines and inspections of means of transports, for example are highly interesting.

Policy maximums, insurance value, expenditure and costs

When it comes to the policy itself, the maximum of insurance is a stable factor to evaluate the premium. Means of transport maximums, warehouse maximums, segregated for fire risks, are decisive in this process. Further is it important to decide the insurance value on commercial value, notional profit, included of added value, customs, freight and taxes or duties. Lastly does this issue include insurable expenditures or costs, such as consequential losses arising from damage to goods and financial losses, clean up, rescue costs, express or cleaning costs.

Insurance cover

Moreover is the cover important to determine the insurance costs for road transportation. The first difference is to be made between full or restricted coverage. DTV (Deutsche Transport Versicherung) conditions, clauses and special conditions are decisive for the evaluation. Moreover exists a distinction between contingency insurance (Difference in condition – DIC / Difference in insurance limits - DIL) and the agreement of deductibles.

Loss prevention measures / recommendations

In terms of loss prevention is it valued by the insurer, when experts, internal or external, are taken into the process of loss prevention. Packaging advices are followed and monitoring of the transport process is provided.

Vehicle prerequisites
One of the most important issues for the truck transportation of goods is the vehicle itself. As described in the earlier, trucking technology exists to make a transit of goods more secure. Formost especially when it comes to high value transportation, such as flat screens or mobile phones. Not only are premiums affected by certain standards, like TAPA Emea TSR, but prerequisites are asked for by the seller. Unless those requirements are not fulfilled by the forwarder (and then by the carrier), the seller is not willing to assign the carrier with the task of transportation. Certain standards like, tracking, special sealing, GPRS contact can influence the agreement between seller and forwarder and the assigned carrier and is viable for the purchase of adequate insurance (B. Kupfer, personal communication, 12th march 2009).

For special goods in the road transportation, carriers can only purchase transport insurance if special requirements, like for example a second driver, no stops or an alarm system is installed (D. Guderjahn, personal communication, 26th March 2009). Such goods are high technology, tobacco, alcohol or pharmaceutics. Therefore are technology enhancements favored by insurance companies. Every application, which reduces the risk and affects the loss ratio in the end, is of high value to the transport insurance sector (R. Frei, personal contact, 31st march 2009).

Miscellaneous

Other factors are delivery terms and Incoterms which are in use for the individual transit. Countries with restrictive practices can be a further factor for the insurer to consider higher premiums. Lastly, legal provisions, certificate of origin and custom rules can have an impact on the premium. (Transport Informations Service, 2009).

All these risk factors will influence the premium for the coverage. Every insurance company determines by itself the premium for the risk taken over (B. Kupfer, personal communication, 14th March 2009). This is a strong deviation from other forms of insurance, such as car insurance, within also different premiums exist, but are standardized by certain factors such as ”no-claim bonus” (Kravag AG, personal contact 31st march 2009). Premiums are totally free in calculation by the individual company on the market. This makes it rather impossible to set a range or an average for certain transport insurance pricing.

4.5.7. Premium determination

The pricing of insurance has a special kind of pricing model. One procedure that can be focused on is the risk factors mentioned above. In that case an insurance company demands the assured company of a business report in which business activities of the carrier is named and a risk assumption is being derived. Risk factors plus the description of the company are related to the gross turnover of the year and the price for the transport insurance is often expressed in per mille of the annual gross turnover of the assured plus the tax for the coverage determined by the country of origin, in Germany for example 19%. Insurance means to split the risk on many assured. But often is the premium calculated individually. So, the insurance company determines every assured on its own premium payments and amount of claims payments per year. The result is the loss ratio. By considering the premium payments with hundred percent, the claims settlements are a percentage fraction of the premium. (Voth and Fragner, 2007)

Simplified example:
Premium inflow: EUR 40.000 annually
Claim settlements: EUR 20.000 annually

**Loss ratio**

\[
\text{Loss ratio } 100 \times \frac{20.000}{40.000} = 50 \%
\]

If this ratio increase above a defined number, the insurance company will demand more security means by the company that is assured, such as improvements in the warehousing, more security issues for the goods in transit or basically more control in the points of delivery. By increasing the number of 65% most insurance companies will raise the premiums for the particular customer (D. Guderjahn, personal communication 2
\textsuperscript{nd} March 2009). An example for higher premiums:

<table>
<thead>
<tr>
<th>Loss ratio</th>
<th>Increased premium</th>
</tr>
</thead>
<tbody>
<tr>
<td>65 – 80%</td>
<td>25%</td>
</tr>
<tr>
<td>80 – 100%</td>
<td>40%</td>
</tr>
<tr>
<td>&gt; 100%</td>
<td>special arrangement and negotiation</td>
</tr>
</tbody>
</table>

For the completion of the premium negotiations it has to be defined that premiums can be reduced when the quote of claims was lower than expected (Voth and Fragner, 2007).

**4.5.8. The insurer’s recourse**

Nearly every carrier covers his own liability through liability insurance. Hence, the risk distribution will become in the end a competition between the different insurance companies. After a claim payment is made to the holder of the insurance, the assured, all rights to act against the carriers, bailees or third parties are assigned to the insurer with a letter of subrogation. This is ruled by the Institute Cargo Clauses (ICC), which also secure the insurer’s right to seek recourse. With a special clause, the ICC stipulates that the insurer shall not inure to the benefit of forwarders or third parties (“not to inure clause”). According to that the ICC provided strict rules to forbid contract terms that allow carrier to benefit from their customers insurance, since this is seen as a deviation from the mandatory law. (Ramberg, 2004).

**4.5.9. Transport liability examples**

To draw a picture of the way transport insurance is working today, the following overview is given. The three most common used Incoterms in road transportation in the European sector are graphically and verbally described for a better understanding where and when transport insurance is needed during the transit. The overview is conducted with a certain focus on the liability regulations in every part of the transit starting from Germany, as an example, to show domestic regulations, as well. For the comprehensiveness of this description it has to be noted that reality knows more complex situations, which cannot, for capacity reasons, be explained all in this conduction. Hence, the overview concentrates on road transportation domestic and international with the CIP, CPT and DDU Incoterms 2000 in the European road transportation sector starting from Germany as the example seller’s location.
The figures show that the seller sends its goods to the buyer and uses a goods forwarder. The contract between seller and buyer is based on the German civil code (BGB §§433-453 sales contract, plus the standard business terms of the seller and buyer). Further exists a transportation contract between the forwarder and the seller. The basis for this contract is set up by the special clauses for forwarders included in the code of commercial law (HGB §§ 453 – 466). The liability is shifted to the forwarder for losses, damages or delays up to 8,33 SDR per kilo of the cargo from take over of the goods to delivery. Through standardized business terms a corridor of liability can be agreed upon between 2 and 40 SDR per kilo. Individual agreements can be made with unlimited liability, as well. (Transport Informations Service, 2009).

Usually the forwarder is the contract partner of the seller, but is not the one who is actually transporting the goods, but rather deals with transport documents and insurance. The company that provides the transport is called carrier. Thus, a further contract exists between the forwarder and the carrier to ensure the details in liability and duties of the parties in the transit. This is again based on the commercial law terms §§ 407 ff. (Gesamtverband der deutschen Versicherung, 2009). In this contract liability is passed on to the carrier with the same liability. With the difference that a vehicle insurance has to be subscribed for a truck over 3,5 tonnes. Relating this to the Incoterms 2000 used in the transport sector. The next figure gives an overview of the three most used Incoterms in the business.
The figure above describes different phases of the national transport and how these three selected Incoterms 2000, CPT, CIP and DDU differ in terms of the risk transferred. The first three risk stages are to be bared by the seller. These are the points of loading, when export duty payments are done or when the goods are transported to the point of export.

The following three stages are still the duty of the seller in all selected Incoterms. When the truck is unloaded; when changing the vehicle; when landing charges are completed at the point of origins or in the point of goods being transporting to the buyer’s port. Further, the next three stages can differ, when landing charges at the port of the buyer has been completed, when goods are unloaded or when goods are transported to the point of destination the risk is bared by the seller only by DDU Incoterm. The risk is transferred to the buyer in CPT and CIP. Moreover, the insurance risk is at the side of the buyer only in CPT Incoterm. (Reynolds, 2005)

When using CPT, the risk transfers from the seller to the buyer, when the seller hands out the goods to the carrier named by the seller and further pays for transporting some goods to the named destination. The basics of the Incoterm CIP are the same as the CPT standards, but CIP requires the seller to acquire necessary insurance to the benefit of the buyer. When the seller and the buyer decide to use Incoterm DDU, the risk transfers from the seller to the buyer, when the goods are handed out to the use of the buyer (or to a legal person named by the buyer), duty unpaid in a named place and time, but without unloading. The seller bears all the risks during the transport. (August, 2004)
This figure shows a complex scenario of contracts between the different parties. Again is the basis to start from the agreement of the seller and buyer through a sales contract, based on Incoterms 2000, United Nations sales law and CISG plus the individual standard business terms of the companies. Again exists a transportation contract between the forwarder and the seller. The basis for this contract is legislated by the special clauses for forwarders included in the code of commercial law (HGB §§ 453 – 466). The transporting company has again a contract with the forwarder to ensure details of liability and duties between the different parties in the transit (terms of freight law §§ 407 ff.). Liability is again shifted to the forwarder for loses, damages or delays up to 8,33 SDR per kilo of the freight from take over of the goods to delivery. Standardized business terms corridor the liability between 2 and 40 SDR per kilo. Still individual agreements can be arranged with unlimited liability. (Transport Informations Service, 2009).

For matters of comprehensiveness, in this figure are a first forwarder and a second receiving forwarder added. Further are two warehouses/terminals included to show the special terms for the international context. Between the first and the second forwarder a contract has been agreed upon on the basis of the national law of every nation operated in and the company standardized business trades. Another interesting fact is the interdependence in the moment of transporting goods from the first warehouse/terminal to the next one by the carrier. The carrier and the first forwarder have an agreement based on the international CMR terms. Hereby, does the liability issue start again with the takeover of the goods until the delivery to the warehouse / terminal. The value of liability is again 8,33 SDR and can be extended by declaration of the good value and the legal interest. By taking over the goods from the warehouse the second forwarder needs to have a contract with the second carrier. In this situation each national law of the countries operated in, is the basis for liability and insurance issues. (Gesamtverband der deutschen Versicherung, 2009).
The figure above shows the different stages of the international transport chain and how these three selected Incoterms 2000, CPT, CIP and DDU differ from each others in terms of risk transferring. During the first three stages the risk is to be bared by the seller. That is in the point of loading, when export duty payments are done or when the goods are transported to the point of export. In the following three stages the risk is still the seller’s in all three Incoterms; when the truck is unloaded, when landing charges are completed at the point of origins or in the point of goods being transporting to the port of import.

Moreover, the next three stages can vary, when landing charges at the place of the buyer has been completed, when goods are unloaded from the vessel to the truck or when goods are transported to the point of destination the risk is bared by the seller only with the DDU Incoterm. The risk is transferred to the buyer in CPT and CIP. Lastly the risk of insurance is to be bared by the seller in CIP and DDU but not in the CPT Incoterm. Import custom clearance and the import taxation is never the risk of the seller in the three selected Incoterms. (Reynolds, 2005)

When using DDU, the responsibilities and the risk of the seller are widely spread. This means, when using DDU, the seller should be very aware of the risks and needs of handling full service transportation until the named destination. (Reynolds, 2005)

The next part of this conduction will compare the theoretical findings with the empirical research within the innovational, the secure transport chain and the transport insurance analysis; to essentially investigate and evaluate the logistical innovation business model, introduced before to answer the research questions stated in the purpose.
5. Innovational, logistical and insurance analysis

This chapter presents an analysis of the main findings, reflecting on the research problem and the research questions: How elaborated is the security standard and innovational technology in this sector for goods and cargo? What impact does the transport insurance got on the road transport chain process and how does cargo insurance work? How does the German and partly the European road transportation sector functions? And what cost and benefit effect has an innovational business model in this sector? To help the reader, this chapter is structured similar to the frame of reference beginning with an innovational analysis, an analysis towards secure road transports and cargo insurance before finally ending in the business model analysis of the road transportation.

5.1. Logistical lifecycle and innovation

As described in the frame of reference part the dynamics of the global markets lead to a higher competition for transport firms. Those changes are fostered by shorter life cycles, which in turn show a higher demand for mature products in the transportation market (Grassmann 1996). A lot of transport companies find themselves in a classical low cost surrounding and price competition, because the services are almost similar to their competitors (Grassmann 1996). Referring this to the German transport sector shows that this is the reality of the daily operations of carriers. Hence, the market is very highly fragmented with a lot of different service provider, which are vaguely equipped with more vehicles (compare figure 22).

The technology described in the conduction is pictured to be in the development phase of the product lifecycle model introduced in the frame of reference (Johnson & Scholes, 2002). Technology innovations are considered to be valid contributions to the security and the comprehensiveness of the road transports. Carriers and drivers are in the need of cargo and personal protection in the road transport sector (compare 4.2.2.). The technology innovation described in the conduction is hence supposed to impact the road transport sector in a significant way, even before it starts to turn into the growth phase of its lifecycle. By relating the technology to innovational theory it is to be found in the niche of high technology innovation (Hamel & Prahalad, 1991) and is a myriad idea (Chapman et al., 2002). One of the major advantages for the company providing this technology and the actors involved is the creation of a new network in the business (compare 3.4.1.). Hereby, as figured are corporate imagination and an expeditionary marketing to be seen as the key (Hamel & Prahalad, 1991).

This technological innovation (Tidd et al., 2001) has the potential to secure the transport chain for road transportation and to derive a business model out of it that modifies two major actors businesses in this process in a cost neutral way (compare chapter model). Plus it is able to provide beneficial solutions to the actors and facilitators in the road transport chain (compare chapter model).

Because of the comprehensiveness of the technology innovation (4.1.1.) and the demand for it (compare 3.2.) the product implies the potential for a radical change in the transport sector and lies within the process area of an innovation (Chapman et al., 2002).
Logistical companies are able to apply technology innovations to raise market performance and efficiency and increase benefits for themselves and their customers (Hackbarth and Kettinger, 2000). This is derived by firstly the technology benefits and new opportunities with it, communication technology influences the creation of innovative services (Chapman et al., 2002), as well as, relationship networks. Latter ones are valid in the competitive market of road transports in Germany and Europe (compare 4.2.). Further, can these networks focus on customer needs let the firms develop a holistic understanding of the buyer’s entire value chain, which is impossible for a single firm (Kandampully and Duddy, 1999). Logistical firms designing new business processes and structures, as well as, relationships within the road transport. This happens in order to create benefits like knowledge and improved communication, while improving their coordination (Chapman et al., 2002). New internal and external network relationships could be used to extend and facilitate logistical and innovational processes in this sector. These processes are mostly based on new technologies and are considered to be in line with the business model of the logistical companies. To be able to fully evaluate the high technology innovation for the road transport sector an analysis in terms of secure road transports needs to be established.

5.2. **Secure road transports**

Road transportation networks have a lot of vulnerable nodal points to be solved, as it was discussed. Kogan & Tapiero (2008) divided the valuation and the management of risk to real and psychological fears. Real risks in a road transportation network are for example thefts, pilferages, vandalism and terrorism as discussed in the empirical findings by the TAPA Emea (2009) report. Secure road transportation chain does not only concern transportation companies but also all major stakeholders in a chain as well as authorities (Williams et al, 2008, Tapa Emea, 2008).

Road transportation chain networks can be improved in several ways. Strategic management of a supply chain is investigated to be one efficient way to improve the overall performance of a supply chain. The literature provides a lot of theoretical benefits by the strategic management. Hence, a few examples from the literature should be given in the following. During the research for this study, it was found, that by strategic supply chain management, firms are able to increase their inventory turnover and revenues and reduce their logistics cost, make products easier available, cut down an order cycle time,
utilize capital more efficiently, be more responsive and last but not least, are able to provide products faster to the market. (Fawcett, Magnan & McCartner, 2008)

Fawcett et al. (2008) provided also a literature review of the strategic barriers of the road supply chain management. In their study they listed barriers as poor planning of management, lack of vision, poor understanding of the supply chain management, lack of trust within the supply chain partners and external and internal obstacles, as well as, a lack of supply chain measurement given. With an innovation, such as Datachassi AB is providing, the firms in a road transport chain could improve their performance by supporting and finding solutions to the barriers discussed. Thus, security is one crucial issue in a road transport chain.

By scrutinizing the positive impacts of a secure road transport chain and improvements by the innovational technology, another major stakeholder is to be taken into consideration. The customer is the one who finances the transport chain by paying for the received product in the end. Hence, one example of improvements is the lead time. The lead time is one of the important measurements for the customers when evaluating suppliers customer service level (Blanchard, 2006). So, customer satisfaction is one of the main issues when firms are measuring their customer service level and when they are promoting themselves to new customers (Blanchard, 2006, Jeffery, Butler & Malone, 2008). The supply chain management is recognized as a good tool to improve this and to reduce its overall costs related to the single activities. This in turn will end up it, as described above, to a greater success of the firm (Jeffery, Butler & Malone, 2008).

5.2.1. Tracking and tracing

The track and trace of cargo and the transportation fleet gives a lot of impacts on the actors involved in a supply chain. Following improvements of the increased visibility of the road transport chain was discussed by Myers (2008). Firms who base their production on just in time (JIT) philosophy, want to be aware of where the cargo is located at any given time. Firms who are sending and/or receiving, as well as, transporting valuable goods want also to know the current location of the goods in transit. Further, transportation companies are not uninterested in increasing safety and the security of driver, too (Dutton, 2009). Dutton (2009) continued, by realizing the current location of the driver and the vehicle through the use of GPS, the fleet management knows if the driver is still on planned route. If deviations from the perceived route occur, the driver can be immediately contacted and it could be confirmed that the general safety requirements are met and the route deviation is planned. Additionally can be the tracking technology used to monitor, for example, to locate parked vehicles (Myers, 2008).

In the long-term, firms are able to improve the security, decrease pilferage and “out of stock” situations. An increased visibility of the supply chain gives the possibility to estimate accurately the needed inventory level and to develop operations by increased information of the supply chain in action.

The analysis of the different actors in the road transport chain is given under the following header.
5.2.2. Security advantages for actors in the road transport

Advantages for the different stakeholders are analyzed based on the studied literature and the informative interviews. The benefit analysis is divided to three different categories:

1. transport security
2. traffic safety
3. logistical streamlining

These factors classify the main benefits by the technology innovation in use. The following figure shows the main improvements and benefits for goods senders, carriers, insurance companies and customers as discussed in the chapter 3.2.1.

Figure 37: Supply chain improvement - sender, carrier, insurance, customer.

In following paragraphs road supply chain improvements are discussed, as reflected from the theoretic part in chapter 3.2.

Goods senders and receivers

Tangible benefits for the goods sender emerge especially in category one and three. Increased transport security intends that the reliability of the delivery increases, as Page (2009) pointed out (compare 3.2.1). A better logistical streamlining stands for a better visibility of the supply chain and less mistakes during it. Saura et al. (2008) pointed out that with a better transport security and logistical streamlining the sender may achieve a better customer service level and the efficiency of the daily operations increase. Further it was found by Blanchard (2006) that better customer service levels give tools for the marketing to promote businesses and to find new customers. All in all, these improvements will lead to shorter delivery times and moreover, will help firms with the inventory management, as written in the Security director's report (2008). Additionally under 3.2.1, better inventory management helps firms to execute JIT philosophy in their pro-
duction. Moreover improves it the reliability of deliveries and impacts again the customer service level (Blanchard, 2006).

Further helps it the firms with inventory management, as it was discussed in the Security director's report (2008). Such improvements raise the reliability of deliveries and customer service levels.

**Carrier and forwarder companies**

For carriers and forwarders all three categories are important when developing business, as already referred to in 3.2. Dutton (2009) points out that with the increased visibility of the transportation chain an improved management of the transportation fleet is facilitated. With a better management of the daily operations firms are able to increase their overall efficiency, as Blanchard (2006) and Francis (2008) see, which is viable to the transportation companies. A main issue for the business of the transportation companies is efficiency in the logistical streamlining, which is very essential (Blanchard, 2006, Francis, 2008). Dutton (2009) continued this point by saying, that transportation companies want to be aware of where their employees and their fleet are located at any given time and if the security requirements are met at all time. As in 3.2.1 elaborated, Myers (2008) discussed in his article, that with better visibility of the supply chain transportation companies are able to achieve that demand. Safety and security of the employees and the fleet are also important issues for the firms. Better visibility of the supply chain increases both employees and cargo safety and security as it was also discussed by the Page (2009). Another aspect is that greater visibility can be passed on from the transportation companies to the customers and hence, cargo tracking and monitoring services are possible. Moreover, an increased security level means fewer incidents, such as thefts, pilferages and vandalism of the cargo and the vehicles. Additionally, will it decrease unnecessary stoppages of vehicles. Increased visibility of the road transport chain helps also forwarders to follow up transportation they are involved in. With better knowledge of the transportation forwarders are able to provide more accurate information to customers (Jeffery et al., 2008).

Further does it mean that liability issues between the principal and the transportation company get more clear as well as the road traffic safety is increased and in the long term it also will lead to a better image of the road transportation market (4.4.2.). Last but not least, all improvements discussed earlier, can be used as a selling argument with carrier’s current and new customers.

**Truck drivers**

Truck driver’s safety and security in the road transport chain are essential issues, because it directly affects their daily work on the road. Attacks against vehicles do not only mean financial losses to transportation companies and other transport actors involved, but impact the driver crucially (4.3.3). Insecure working conditions have an immediate impact on the drivers work efficiency, comfort and the motivation (Sheppard, 2008 and IRU, 2008). Banner (2008) discussed in his article, that with new technical safety devices in vehicles, drivers are not tied that much to secured parking areas. Instead drivers are able to plan their daily driving schedule more flexible and have statutory breaks when ever required. Further, during the breaks drivers could leave the vehicle without constant physical supervising and increase their social life, as well as, find other activities.
The authorities - government

A often unconsidered issue is the impact on the authorities. Even though this is figured to be a major stakeholder in the road transport sector, too. The government is the example of the authority stakeholder in this conduction and is observed.

Congestions are the universal problem for governments of countries with high transport density (Kahaner, 2007). Every improvement in the logistical streamlining leads to improvements in the traffic and further, for instance, to a decrease in traffic jams and increase traffic safety, as figured by Williams et al. (2008). Kahaner (2007) continued, in turn, higher fluency of the traffic means less traffic accidents. As it is discussed in the theory part, the achievement of less traffic accidents is not only in the interest of the road users and insurance companies, who settle claims, but also in the authorities’ interest.

Further on, a better visibility of the road transport chain increases the authorities knowledge of the cargo transported inside the country. Especially, when dangerous goods are transported on the road, the awareness of the authorities about the transported cargo is crucial. In general, it is elaborated by the Closs & McGarrell (2004), that authorities should be strongly involved in transportation security issues by developing it with the transportation chain stakeholders. Further gain authorities by increased security and safety efforts, since being able to prevent accidents and also to be better prepared when a disaster occurs. That is not only because authorities want to prevent accidents, but also to be better prepared when a disaster occurs (Closs & McGarrell, 2004). Lastly, borderlines between the EU and non-EU countries are still roadblocks for an efficient logistical streamline.

5.2.3. Costs of security improvements

As discussed in the frame of reference (3.2.2.), the major actor firms benefit from an increased security level in the road transport supply chain. But more valid is the assumption that firms need to measure the impact of pros and cons of the advantages. Obvious costs of the increased security in a road transport chain should thus, not be an obstacle for firms when evaluating the improvements, as also figured by Sarathy (2005). Sarathy (2005) continues, that firms should rather be able to measure benefits, both in a short-term and in a long-term perspective. Further should actors of the transport chain be able to estimate the probability of the consequences linked to security and its comparison to the expenses required, meeting new security standards (Sarathy, 2005). Here it has to be taken into consideration that a cost sharing, as Sarathy (2005) also continues, should be negotiated with other stakeholders. This requires also that firms are able to show their partners how security has been improved and how to provide tangible results from it, such as less thefts and pilferages, during a certain time of period after implementation of the new technology.

5.3. Cargo insurance in road transport analysis

As figured in the earlier part of this conduction the road transportation sector is a huge sector in Europe and especially Germany. Cargo insurance plays an important role in this sector. Especially in the three introduced Incoterms.
An example is the term CIP, which is considered to be the most convenient for sellers in the transportation process. It states that the seller is obligated to take care of cargo insurance against the buyer’s risk of loss of or damage of the goods. As Reynolds (2007) points out, the seller is obligated to buy insurance through the carrier or forwarder or on its own. In turn the payment of the premium is made by the carrier or by the forwarder but passed on to the seller as the transportation customer.

Since the impact of the CMR and vehicle insurance for the business model provided in chapter 3.4. are not evaluated as potential enough the focus in the following will lay on the cargo insurance. Relating the high technology innovation and a secure road transport to the insurance potential the situation of the in figure 9 introduced event chain can be turned around:

![Figure 38: Improved transport insurance premiums flow.](image)

Transport insurance, goods and premiums are highly correlated with the security of the transports as the earlier part of this conduction shows (3.2.). For this reason a joining approach between a road transportation insurance company and carriers are feasible to turn the transport insurance premiums flow around and explore benefits for both parties.

Stolen goods and damaged vehicles decrease, which impacts the premiums of cargo insurance, since the loss ratio decreases, as well. With lower costs of insurance, the demand can be increased and the greater customership can lower the premium again. In the end even the consumer of the road transports is affected, since road transports get more secure and less expensive.

A leverage issue is seen in a concentrated interest in secure transports, as figured in the mutual interest of carriers and insurance companies. Carrier and insurance companies striving for fewer crashes, damages of goods and/or incidents in order to have either to pay less in insurance premiums or to be able to offer protection and policies to a lower price (B. Kupfer, personal communication, 12th of March 2009). This mostly is even of higher interest by the carriers, since it is not only the costs of crashes or damages, but also ancillary costs that come along with a claim plus operating gaps (Kahaner, 2007).

Additionally to that the factor security of the vehicle is a viable key issue. Not only as a risk factor (compare 4.5.6) but as a prevention factor can it be used as a huge valuation criteria to decrease premiums in a transport chain, especially in certain, insecure areas (Kahaner, 2007). Hence, a better security level of the road transport chain has its impact on insurance premiums and deductibles for carriers and in turn for transportation insurer, as well. Again is the carrier the central player, when better insurance premiums im-
Extended logistics and insurance by an innovation for the road transportation sector

Impact its’ profitability, because the costs of insurance premiums can be significant to the size of the company. (Security director's report, 2008)

But once again for the carrier and the transport insurance perspective, a mutual conclusion can be drawn. In the end insurance comes down on how safe the operator is (Kahaner, 2007). Every application, which reduces the risk and affects the loss ratio in the end, is of high value to the transport insurance sector (R. Frei, personal contact, 31st March 2009).

After analyzing the innovational aspect of the high technology in the road transport sector and the impact on a more secure road transportation chain, the above cargo carrier and transport insurance analysis provide the base for a conclusion that the transport chain innovation should be applied in a unique business model within the sector.

5.4. Road transport business model analysis

The business model consists of a network in a road transport chain between. As Bäckstrand (2007) points out a collaboration as a jointly working is an opportunity to extend logistics and insurance in a road transport chain, through an innovational high technology. This can be used to create benefits for all major actors and facilitators in the road transport supply chain. This is important since the sector operated in is a highly competitive low cost sector. The business model requires an immediate networking between parties, that had not worked together in this kind of constellation before (e.g. security firms for the whole supply chain).

Even though this business model does not follow fully Horvarth’s approach (2001), who figured a strategic supply chain management with an embedded cooperation model among all participants in the chain. But again the business model rather picks up the vision of Simatupa and Sridharan (2005), who took an intermediate perspective and defining the chain interaction as a two or more actors approach to create competitive advantages. This is created through an information sharing in the visibility and security, as well as, insurance benefits sharing, joint decisions for an innovational security technology and the advantages of greater transport customer satisfaction.

The important issue noteworthy is not to neglect risks in this business model. One viable fact is that e.g. Metzner (2001) states that, it is highly important to note that without other enablers in place technology is not creating any different situation. Hence, the collaborative approach is needed to emphasized again. In order to start an overall leverage to realize the synergies in the road transport chain, a road transport network of trusted partners has to be building up (compare 3.4.).

Innovation

For the first research question it is valid to add that benefits lie in the cost saving potential of the business model for carriers and transport insurer. Further is the innovation used with the described business model a way to coordinate and innovate logistic operations with internal and external partners (Chapman et al., 2002). Plus, adding a more secure working field for drivers and carrier firms. By implementing this new innovation to the logistical sector, ways of amortizing the expenditure is needed to be explored. The business model is an approach to find ways of sharing costs and gaining mutually from benefits by meeting better security levels with transport chain partners. Trust is a
Secure road transport chain

A road transport chain is divided into different stages and can include a variety of actors, facilitators or other stakeholders internal and external. To analysis the opportunities to introduce a logistical technology innovation in a business model that creates benefits for the actors, the security issue plays an important role.

The secure transportation process is the leverage effect for this business model. As figured is security a major issue of the road transport for a variety of stakeholders, not only limited to the one that sends the goods. The weakest point of the chain needs special attention by the logistical companies and by partners to secure it entirely (T.Ziehn, personal communication, 14th March, 2009). Especially, for the investment in security structures in the transport chain, companies have to restructure contracts and consider incentives to make partners invest in equivalent levels of security.

In the carrier business modification of the business model, the technology innovation has further impacts on the road transport process. Increased security in this particular insecure area of highly valuable goods is interesting (compare chapter 4.3.2). Further, higher standards in productivity and efficiency change

Transport insurance

A point with wider impact on this conduction is the transport insurance partnership in the road transport chain. Security issues are directly correlated with the insurance premiums, as well as, the availability of cargo insurance. The optimized transport insurance cycle in figure 38 shows the potential to create a positive cycle to gain on security by the security innovation. Insurance firms the ones capable of providing necessary cross-industry knowledge, since these companies are specialized in risk assessment.

Business model

Following Porter (1985) and his concept of a value chain, the business model stresses the dependency of companies in the transport chain. This in turn means that a lot of intermediaries become partners and bring value to the business model. A needed issue is the decrease in boundaries between the participating organizations, hence, information flow along the channel and inter-company relationships embrace logistical activities and management (Ernst & Young, 1999).

As figured the carrier is a central role player in this logistical model and works with a link to the network (chapter 3.4.). But the main issue is that the business model facilitate crucial interactions with different actors and facilitators both, up and down the transport process (Bäckstrand, 2007). For the business model of the technology, such an intercompany network of technology provider, security firm and insurance company (compare 3.4.) greatly assists innovation in logistics. (Chapman et al., 2002)

For the perspective of the model beneficial criteria are given for the carrier which led to a higher return on investment than the technology costs the criteria are derived from the Datachassi technology innovation description in chapter 4.1.1-4.1.8:
1. Road safety
2. Increased vehicle and goods security
3. Driver security
4. Higher productivity with a more visible supply chain and easier handling
5. More efficient transports
6. Cost saving, less business interruptions
7. Cost advantages by reduced insurance premiums or deductible (derived by chapter 3.2)

Besides the increase business opportunities for the carrier the security firm is the second major actor directly gaining from the model (compare 3.4.1.). A new niche of service can be created by introducing the model to the insecure sector of road transports, which in turn can be leverage for further innovational technology applications (Hamel & Prahalad, 1991).

To draw a picture of the costs and benefits that goes along with this business model a cost-benefit-analysis spreadsheet is created in the following:
### 5.4.1. Cost benefit analysis

<table>
<thead>
<tr>
<th>Participant</th>
<th>Costs</th>
<th>Monetary benefits</th>
<th>Soft benefits</th>
<th>Intangible</th>
</tr>
</thead>
</table>
| Carrier           | Maintenance, Drivers training, Leasing rate for technology | - Less business interruption  
                   |                                                             | - Less damages to vehicle, vandalism  
                   |                                                             | - Better fleet management  
                   |                                                             | - Selling argument, more assignments  
                   |                                                             | - Less effort for internal investigation  
                   |                                                             | - Productivity  
                   |                                                               | - Driver working conditions  
                   |                                                               | - Network contacts  
                   |                                                               | - Deliveries on time  
                   |                                                               | - Underwriter contact  
                   |                                                               | - Visibility of the supply chain  
                   |                                                               | - Insurance relationship  
                   |                                                               | - Customer relationship  
                   |                                                               | - Security relationship  
                   |                                                               | - Trusted partner  
| Transport customer| None                                       | - Insurance premiums, deductible decrease  
                   |                                                             | - Deliveries on time, shorter lead times  
                   |                                                             | - Less goods losses  
                   |                                                             | - Better inventory management  
                   |                                                             | - Less claims to be filed  
                   |                                                             | - Less administrative work, new transport  
                   |                                                             | - Less mistakes  
                   |                                                             | - Better inventory management  
                   |                                                               | - More reliable transports  
                   |                                                               | - Better negotiation position with carrier  
                   |                                                               | - Visibility of the supply chain  
                   |                                                               | - Better customer service level  
                   |                                                               | - More stable pricing  
                   |                                                               | - Better customer service level  
                   |                                                               | - CIP payment facilitation  
                   |                                                               | - Carrier relationship  
                   |                                                               | - Insurance relationship  
                   |                                                               | - Security relationship  
                   |                                                               | - Trusted Partners  
                   |                                                               | - Reliability  
| Insurance company | Less margin                                 | - USP  
                   |                                                             | - New niche of market  
                   |                                                             | - Lower loss ratio  
                   |                                                             | - Less administrative effort  
                   |                                                             | - More demand of insurance  
                   |                                                               | - Network contacts  
                   |                                                               | - More logistical insight  
                   |                                                               | - Carrier relationship  
                   |                                                               | - Customer relationship  
                   |                                                               | - Security relationship  
                   |                                                               | - Trusted partnership  
                   |                                                               | - Industry reputation  
| Security firm      | Software updates, Basic equipment, Business operation costs | - More assignments  
                   |                                                             | - New niche of the market  
                   |                                                               | - Network contacts  
                   |                                                               | - Improved service  
                   |                                                               | - Carrier relationship  
                   |                                                               | - Customer relationship  
                   |                                                               | - Trusted partner  
                   |                                                               | - Trusted service  
                   |                                                               | - Industry reputation  
| Drivers            | None                                       | - None  
                   |                                                               | - Work safety and security increases  
                   |                                                               | - Better working conditions  
                   |                                                               | - Increased working comfort  
| Authorities        | None                                       | - Less crime related work  
                   |                                                             | - Less traffic accidents  
                   |                                                               | - General social security increases  
                   |                                                               | - Less traffic jams  
                   |                                                               | - Less crime related rehabilitation  
                   |                                                               | - More clear custom procedures  

Figure 39: Datachassi business model - cost and benefits-analysis
6. Conclusion and Recommendation

This chapter highlights the main results and findings of the analysis. Reconnecting to our problem and the research questions, further recommendations and fields of research are stressed.

6.1.1. Conclusions

The purpose of this thesis was to investigate which kind of opportunities can be offered by a security high technology innovation for the German and partly European road transportation sector. Again the three central issues are logistical innovations, security in transports and transport insurance.

From an innovational point of view the road transport sector in Germany and partly in Europe are in endangered by criminal activities. Business costs because of damages, losses and stolen goods arise frequently. Further more, social costs derived from end consumer impacts and drivers at risk increase the necessity to improve the security standard in this transport sector. Logistical innovations are seen as a viable key to secure the reliability of transports and to raise cargo and personal protection in this sector. Whole processes need to be improved and aligned with partners in the road transport chain. Not only horizontal and vertical partners need to be figured and contacted but other stakeholders of the road transport, such as facilitators, as insurance companies, can lead to higher outcomes in the seek of security innovations. Moreover can this facilitate further development, such as in the field of RFID, which is seen to be the upcoming topic for the transport sector.

The second research question raises the necessity to evaluate the security in the transport chain by the innovation. As shown, if the security innovation is introduced in the road transportation sector it will have certain impacts on cargo security. With the variety of new security solutions in the transporting vehicles the security and safety of the cargo and truck drivers increase. Security requirements, as for example, Tapa Emea has listed, are met, even if there are no secured parking areas available.

Interesting is the fact that not only security issues are touched upon but the entire supply chain is affected by the improvements. So, with increased cargo security reliability of the transportations rise, which in turn means that lead – times are decreased. This moreover helps firms to facilitate a better inventory management plus helps meet the demand of the customers. Concluding, it increases the customer service level.

As figured out in the empirical part and within interviews with representatives of the sector, transport insurance is a service factor, interesting for carriers and forwarders, plus transport customers. The introduced technology is a valid approach towards the road transport sector highly at risk of damages, losses and stolen goods.

The cargo insurance premiums determination is highly correlated to the loss ratio and the security equipment of the transportation company. Surely, is the cargo, packaging and loading security of high relevance, as well, but the factors of total loss ratio and vehicle thefts prevention is directly related to the security of the transport. Therefore, the transport insurer gains on a more secure transport chain by having fewer claims to settle and less administrative work. This advantages need to be passed on to the premium determination and the insurance cycle in figure 9 can be turned around. Transport
insurance can gain in a joint approach on less illegal actions and a more secure supply chain, provided by the high technology innovation and an adequate business model structure.

Last research question is applied to the business model for the sector and refers further to the applicability of the innovation and the opportunities bringing along with it.

The role of the shown business model for the innovation is to assure that the technology gets embedded in the economical surroundings of the business and the industry level (Chesbrough & Rosenbloom, 2009). As seen in the cost-benefits-analysis and in the feature-area table this network of logistical, security and insurance partners in the road transport sector implies a huge potential and is further cost neutral (if not excessive).

This cost neutral model can be build upon if the road transport network figures a way to mutually tackle the problems of an insecure road chain. Transport insurance, security firms and innovation technology providers need to find a consensus in their field of business to offer a carrier the possibility to equip their fleet with the security advices. By doing so a win-win situation is created, which is highly innovative for this sector and industry, just like the comprehensive technology application the model is based upon.

Since a perfect prognosis is impossible to express, it can be said that a high probability is in place that the benefits derived from such a business model, outweighs all costs that can be measured in advance. The business model is elaborated to improve logistics and insurance in the road transportation sector and to embed a new technology innovation, which is highly developed and further applicable. The requirements and an agenda are given (Appendix V) to apply this kind of business model for the technology innovation. Not every outcome can be evaluated in advance but the outlook is promising for benefits, which could be exploited, never been set free before.

Moreover, it has to be mentioned that the further applicability of the product going along with the higher demand and trend towards RFID technology solutions is a viable gateway to new technology innovations for the future. The highly compatible technology of Datachassi AB makes it feasible to link new innovations easily to the existing technology in the vehicles and trailers.

6.1.2. Recommendations

In general it can be derived from the study that the road transport sector needs security improvements. The awareness of the policyholders and transport insurance companies of the scale of the problem and the solution to it should be increased. Technology innovations, especially for the security of the transport chain should be more developed and scrutinized by more actors and facilitators in the road transport chain. Besides a positive social effect by the improvement for truck drivers and their personal security, road safety and cargo security is highly advantageous for a variety of stakeholder in and as facilitators for the road transport chain.

A few thoughts came to mind by conducting this thesis in terms of transport insurance companies. The establishment of an information model to provide information through an international association of insurers on a regular basis with numbers of insurance claims for attacks on drivers and the load stolen. Just like the TAPA Emea Incident In-
formation System. Hereby would should be a telephone reporting hotline Europe wide be helpful. The evaluation of this report would increase the awareness of the security issue in this special transporting sector.

Moreover is the need of instructions for drivers and transport companies by the transport insurer figured. Insurer companies have to create and benefit the advantage of a secure chain. Hereby are recommendations towards security applications (importantly, not as a marketing event for technology providers) for the carriers and for security firms interesting.

The overall recommendation is to explore the potential in a business network by technology provider, security firms, carriers and transport insurer. A higher security can be achieved by a cost neutral investment in security innovations if all actors and facilitators show commitment and trustfully team up.

Cost-benefits analysis should be highlighted and elaborated and the cost of new technology is the key issue in this low margin sectors and therefore costs of increased security level in road transport chain should be analyzed and further distributed among the different actors in a chain. With such cross-functional thinking different stakeholders in a chain could not only increase the security of the chain but further increase the cooperation between the members as well as learn from each other to develop further.

6.1.3. Reflections on the thesis

During the process of writing this conduction a variety of questions have arisen, which the authors tend to believe would be of high relevance to investigate further, a few should be highlighted here.

The first idea was that it might be beneficial, in a longer time aspect, to repeat to do a follow-up study. This study should have the same qualitative approach but would be focused on the achievements of the company, described as the technology provider. Moreover would be the network issue and the applied business model for the study of higher importance. What trends have been followed and is the security issue still highly relevant to carriers and insurer in the particular sector? And have attitudes towards innovational technology changed.

Another highly interesting factor is the evaluation of the networking model and the benefits going along with it. If the resources had been wider, the highly complex issue of determining monetary amortization by applying the technology and model by a carrier and its facilitators should have been studied. Hereby, the calculation of insurance premiums would have been investigated more and a case could have been built. The case is figured to include an international medium sized carrier. Necessary would have been a consideration of the amount of vehicles and trailers in the fleet, the amount of transportations in a particular year, the amount of cargo insurance paid, as a percentage of turnovers, the loss ratio for that year and a description of the losses that occurred. With a subjective assumption and comparison of technology innovation preventative incidents a new loss ratio would have been able to calculate and related to the cargo insurance paid. Though, subjective (because of the prevention of the incidents) but important amortization calculation would have been possible. This idea was first planned to execute in this conduction, but was surrendered by the fact that the time and the informa-
tion of cargo insurance paid was not received. Transport companies are not willing to show their figures in this highly sensitive area of transport insurance.
Reference


Chapman, R.L., Soosay, C. and Kadampully, J. (2002). *Innovation in logistic services and the new business model - A conceptual framework*. InCITe Research Group, School of Management, University of Western Sydney, Penrith South DC, Australia


Chesbrough, H. and Rosenbloom, R.S. (2002). *The Role of the Business Model in Capturing Value from Innovation: Evidence from Xerox Corporation’s Technology Spinoff Companies*


Cvitanovic, N. (2005).*Transport risks and transport/marine insurance cargo insurance in world trade*. Slovenica Insurance Company Ltd., Seminar Paper, University of Ljubljana


Extended logistics and insurance by an innovation for the road transportation sector


Katz, J. (2007). The great supply chain robbery – Manufacturers are leveraging the latest advances in security technology to stay one step ahead of the bad guys. Supply Chain Management


Extended logistics and insurance by an innovation for the road transportation sector


Extended logistics and insurance by an innovation for the road transportation sector

The Economist. (2009). Business: A long haul; The truck industry. The Economist. 390(8618), 73


Reference of figures


Figure 3: Adapted from: Tidd et al. (2001) - Dimensions of innovations.

Figure 4: Bäckstrand, J. (2007). Levels of interaction in supply chain relations. Chalmers, Göteborg


Figure 6: Adapted from Voth, M. und Fragner, R. (2007). Leistungsprozesse. Informationshandbuch Spedition und Logistik. Bildungsverlag EINS

Figure 7: Adapted from Voth, M. und Fragner, R. (2007). Leistungsprozesse. Informationshandbuch Spedition und Logistik. Bildungsverlag EINS

Figure 8: Adapted from Voth, M. und Fragner, R. (2007). Leistungsprozesse. Informationshandbuch Spedition und Logistik. Bildungsverlag EINS

Figure 9: Own figure

Figure 10: Chesbrough, H. and Rosenbloom, R.S. (2002). The Role of the Business Model in Capturing Value from Innovation: Evidence from Xerox Corporation’s Technology Spinoff Companies

Figure 11: Own figure

Figure 12: Own figure

Figure 13: Own figure

Figure 14: Own figure

Figure 15: Own figure

Figure 16: Own figure

Figure 17: Own figure

Figure 18: Datachassi AB (2009). Secure transport – a bright future. [Brochure]. Jönköping: Datachassi AB

Figure 19: Datachassi AB (2009). Secure transport – a bright future. [Brochure]. Jönköping: Datachassi AB

Figure 20: Datachassi AB (2009). Secure transport – a bright future. [Brochure]. Jönköping: Datachassi AB
Extended logistics and insurance by an innovation for the road transportation sector

Figure 21: IRU. (2006). Selected recent statistics on road freight transport in Europe. [Research]. Geneva: IRU.

Figure 22: IRU. (2006). Selected recent statistics on road freight transport in Europe. [Research]. Geneva: IRU.


Figure 32: Own figure


Figure 34: Own figure

Figure 35: Adapted from: Keilimetals AG (2009). Retrieved March 19th 2009 from http://www.keilimetals.net/system_files/library/138.jpg

Figure 36: Adapted from Tidd, J., Bessant, J. and Pavitt, K. (2001), Managing Innovation: Integrating Technological, Market and Organizational Change, John Wiley & Sons, New York

Figure 37: Own figure

Figure 38: Own figure

Figure 39: Own figure
Appendices

Appendix I

(Semi) **Structured interview topics and questions** for different actors and facilitators in the road transport sector

<table>
<thead>
<tr>
<th>Carriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>• What kind of cargo thefts your company has faced during the last years?</td>
</tr>
<tr>
<td>• What kind of efforts has your company done to prevent /decrease cargo thefts?</td>
</tr>
<tr>
<td>• What kind of technical solutions/methods your company look for to prevent/decrease cargo thefts?</td>
</tr>
<tr>
<td>• What about investments/developments in cargo security so far?</td>
</tr>
<tr>
<td>• Weakest point of the supply chain in the point view of the cargo thefts?</td>
</tr>
<tr>
<td>• How as a freight forwarder do you see the importance of the Incoterms 2000?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Forwarders</th>
</tr>
</thead>
<tbody>
<tr>
<td>• What kind of cargo thefts has your company faced during the last year?</td>
</tr>
<tr>
<td>• Weakest point of the supply chain in terms of the cargo thefts?</td>
</tr>
<tr>
<td>• How do you see the role of the forwarders to find solutions to decrease the cargo thefts?</td>
</tr>
<tr>
<td>• What kind of challenges do you see as a forwarder to decrease cargo thefts?</td>
</tr>
<tr>
<td>• How do you see the importance of the Incoterms 2000 as a forwarder?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transportation customers</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Has your company faced cargo thefts during the transit from the supplier to your premises?</td>
</tr>
<tr>
<td>o If yes, what kind of cargo thefts?</td>
</tr>
<tr>
<td>o How did it affect to your company's service preparation and readiness for the customers?</td>
</tr>
<tr>
<td>• What kind of side effects has your company faced because of stolen cargo from the deliveries?</td>
</tr>
<tr>
<td>• Weakest point of the supply chain for cargo thefts?</td>
</tr>
<tr>
<td>• Can you connect certain Incoterms 2000 to the frequency of cargo thefts?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transport Insurance companies</th>
</tr>
</thead>
</table>

96
Extended logistics and insurance by an innovation for the road transportation sector

- Usual arrangement of cargo insurance for carriers or forwarders
- Incoterms 2000 and cargo insurance premiums
- Most valuable underwriting criteria
- Technology affecting liability insurance or cargo insurance premiums
Appendix II

Regulation 561/2006/EC

To apply the rules as required and appreciate their implications it is necessary to understand the definitions of certain words and phrases used as follows:

- 'Vehicle' means a motor vehicle, tractor, trailer or semi-trailer or a combination of these vehicles, defined as:
  - a 'motor vehicle' is any self-propelled vehicle traveling on the road, other than a vehicle permanently on rails, and normally used for carrying passengers or goods;
  - a 'tractor' is any self-propelled vehicle traveling on the road, other than a vehicle permanently running on rails and specially designed to pull, push or move trailers, semi-trailers, implements or machines;
  - a 'trailer' is any vehicle designed to be coupled to a motor vehicle or tractor;
  - a 'semi-trailer' is a trailer without a front axle coupled in such a way that a substantial part of its weight and the weight of its load is borne by the tractor or motor vehicle.

- 'Driver' means any person who drives the vehicle, even for a short period, or someone who is carried in a vehicle as part of his duties to be available for driving if necessary

- 'Break' means any period during which a driver may not carry out any driving or any other work and which is used exclusively for recuperation

- 'Other work' means All activities which are defined as working time in Article 3(a) of Directive 2002/15/EC except 'driving', including any work for the same or another employer, within or outside of the transport sector.

- 'Rest' means any uninterrupted period during which a driver may freely dispose of his time.

- 'Daily rest' means the daily period during which a driver may freely dispose of his time and covers a 'regular daily rest period' and a 'reduced daily rest period':
  - 'Regular daily rest period' means any period of rest of at least 11 hours. Alternatively, this regular daily rest period may be taken in two periods, the first of which must be an uninterrupted period of at least 3c hours and the second an uninterrupted period of at least 9 hours;
  - 'Reduced daily rest period' means any period of rest of at least 9 hours but less than 11 hours.

- 'Weekly rest period' means the weekly period during which driver may freely dispose of his time and covers a 'regular weekly rest period' and a 'reduced weekly rest period':
  - 'regular weekly rest period' means any period of rest of at least 45 hours;
'reduced weekly rest period' means any period of rest of less than 45 hours, which may, subject to the conditions laid down in Article 8(6) [i.e. relating to compensated rest], be shortened to a minimum of 24 consecutive hours.

'A week' means the period of time between 00.00 hrs on Monday and 24.00 hrs on Sunday.

'Driving time' means the duration of driving activity recorded:
- automatically or semi-automatically by the recording equipment as defined in Annex IB of Regulation 3821/85/EEC; or
- Manually as required by Article 16(2) of Regulation 3821/85/EEC.

'Daily driving time' means the total accumulated driving time between the end of one day rest period and a weekly rest period.

'Weekly driving time' means the total accumulated driving time during a week.

'Maximum permissible mass' means the maximum authorized operating mass [i.e. weight] of a vehicle when fully laden.

'Multi-manning' means the situation where, during each period of driving between any two consecutive daily rest periods, or between a daily rest period and a weekly rest period, there are at least two drivers in the vehicle to do the driving. For the first hour of multi-manning the presence of another driver or drivers is optional but for the remainder of the period it is compulsory.

'Driving period' means the accumulated driving time from when a driver commences driving following a rest period or a break. The driving period may be continuous or broken.

Driving limits given under the Regulation 561/2006/EC:
- Goods vehicle drivers are restricted in the amount of time they can spend driving before taking a break and the amount of driving they can do between any two daily rest periods (or a daily and weekly rest period), in a week an in a fortnight. The maximum limits are as follows:
  - Maximum driving before a break: 4½ hours
  - Maximum daily driving normally: 9 hours
  - Extended driving on 2 days in week only: 10 hours
  - Maximum weekly driving: 6 daily driving shifts (4x9hrs plus 2x10hrs=56hr)
  - Maximum fortnightly driving: 90 hours

Source: Lowe, 2008, p. 82 – 84
## Appendix III

### Incoterms 2000 – Trade Terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXW, Ex Works (… named place)</td>
<td>The seller fulfils his obligation to deliver when he has made the goods available at his premises</td>
</tr>
<tr>
<td>FCA, Free Carrier (… named place)</td>
<td>The seller fulfils his obligations to deliver when he has handed over the goods, cleared for export, into the charge of the carrier named by the buyer at the named place or point</td>
</tr>
<tr>
<td>FAS, Free alongside Ship (… named port of shipment)</td>
<td>The seller fulfils his obligations to deliver when the goods have been placed alongside the vessel on the quay or in lighters at the named port of shipment</td>
</tr>
<tr>
<td>FOB, Free on Board (… named port of shipment)</td>
<td>The seller fulfils his obligations to deliver when the goods have passed over the ship’s rail at the named port of shipment</td>
</tr>
<tr>
<td>CFR, Cost and Freight (… named port of destination)</td>
<td>The seller must pay the costs and freight necessary to bring the goods to the named port of destination, but the risk of loss or damage to the goods, as well as any additional costs due to events occurring after the time the goods have been delivered on board the vessel, is transferred from the seller to the buyer when the goods pass the ship’s rail in the port of shipment</td>
</tr>
<tr>
<td>CIF, Cost, Insurance and Freight (… named port of destination)</td>
<td>The seller has the same obligations as under the cost and freight term but with the addition that he has to procure marine insurance against the buyer’s risk of loss of or damage to the goods during the carriage</td>
</tr>
<tr>
<td>CPT, Carriage Paid To (… named place of destination)</td>
<td>The seller pays the freight for the carriage of the goods to the named destination. The risk of loss or damage to the goods, as well as any additional costs due to events occurring after the time the goods have been delivered to the carrier, is transferred from the seller to the buyer when the goods have been delivered into the custody of the carrier</td>
</tr>
<tr>
<td>CIP, Carriage and Insurance Paid To (… named place of destination)</td>
<td>The seller has the same obligations as under the carriage and freight term but with the addition that he has to procure cargo insurance against the buyer’s risk of loss of or damage to the goods during the carriage</td>
</tr>
<tr>
<td>DAF, Delivered at Frontier (… named place)</td>
<td>The seller fulfils his obligation to deliver when he has made the goods available, cleared for export, at the named point and place at the frontier, but before the customs border of the adjoining country</td>
</tr>
<tr>
<td>DES, Delivered Ex Ship (… named port of destination)</td>
<td>The seller fulfils his obligation to deliver when he has made the goods available to the buyer on board the ship, unclear for import, at the named port of destination. The seller has to bear all the costs and risks involved in bringing the goods to the named port of destination</td>
</tr>
<tr>
<td>DEQ, Delivered Ex Quay (duty paid) (… named port of destination)</td>
<td>The seller fulfils his obligation to deliver when the goods have been made available to the buyer on the quay (wharf) at the named port of destination, cleared for importation. The seller has to bear all risks and cost including duties, taxes and other charges of delivering the goods thereto</td>
</tr>
<tr>
<td>DDU, Delivered Duty Unpaid (… named place of destination)</td>
<td>The seller fulfils his obligation to deliver when the goods have been made available at the named place in the country of importation. The seller has to bear all the costs and risks involved in bringing the goods thereto (excluding duties, taxes, and other official charges payable upon importation) as well as the costs and risks of carrying out customs formalities. The buyer has to pay any additional costs and to bear any risks caused by his failure to clear the goods for importation in time</td>
</tr>
<tr>
<td>DDP, Delivered Duty Paid (… named place of destination)</td>
<td>The seller fulfils his obligation to deliver when the goods have been made available at the named place in the country of importation. The seller has to bear all the costs and risks, including duties, taxes, and other charges of delivering the goods cleared for importation</td>
</tr>
</tbody>
</table>

International business law: text, cases and readings, 2004, 598-599
Daimler AG

Daimler AG is a German company and got its headquarter in Stuttgart, Germany. The Daimler truck division had in the end of the year 2008 79,415 employees in 35 different facilities in Europe, the NAFTA North American Free Trade Agreement region, South America and Asia. The Daimler company had the largest market share in year 2008 with 42,70% in CVs in Germany. Their total global unit sales were 516,000 units. The largest markets in 2006 were the NAFTA region (35% of unit sales), Western Europe (20%), Asia (27%) and Latin America (7%). The Daimler group itself develops, manufacturers, distribute and sells different kind of automotive products, mainly passenger cars, whereas, the Daimler AG is concentrating only on trucks. The truck group develops, manufactures and sells its products under Mercedes-Benz, Freightliner, Sterling, Western Star, Thomas Built Buses (TBB) and Mitsubishi Fuso brand names (Datamonitor, Medium and heavy trucks industry profile: Germany, 2008).

Paccar Incorporation (DAF)

DAF Trucks N.V. is originally a Dutch company, but became a wholly owned subsidiary of a USA based company called PACCAR Inc. in 1996. Nevertheless, DAF is nowadays part of PACCAR Inc. it still has its headquarter in Eindhoven, Netherlands, where it also got its main activities, such as the engine factory, the component plant, a press shop and a final assembly line as well as the DAF Technical Centre. DAF got in total 7,750 employees in its Eindhoven and Westerlo facilities and in approximately 700 subsidiaries (DAF Trucks N.V., 2009).

Paccar is a multinational truck manufacturer company, which manufacturer trucks under Kenworth, Peterbilt and DAF brand names. Paccar’s main operating areas are North America – main markets for Kenworth and Peterbilt brands - and Western Europe, where DAF is their main brand. The DAF’s market share in Germany in the year 2008 was 10,90% (Datamonitor, Medium and heavy trucks industry profile: Germany, 2008).

Man AG

The MAN AG is a German company and has its headquarter in Munich, Germany. The MAN group employed over 51,000 people in the end of the year 2008. The largest division of the MAN group, MAN Nutzfahrzeuge (MAN) employed 36,251 people in the end of the same year (MAN AG, 2009). MAN manufactures trucks and buses and its market share of the German medium and heavy truck market was 15,70% in year 2008 (Datamonitor, Medium and heavy trucks industry profile: Germany, 2008).

Iveco / Fiat

Iveco was founded by the Italian vehicle manufacturer Fiat in 1975. Iveco manufacturers designs and sales light, medium and heavy vehicles for both road and off road purposes. In year 2007, Iveco employed over 26,400 people in eighteen different countries.
The market share in 2008 in German market was 8,6% (Datamonitor, Medium and heavy trucks industry profile: Germany, 2008).

**Volvo**

The fifth largest truck manufacturer is Volvo. In year 2008 Volvo accounted total 7,1% market share in Germany. During the year 2008 Volvo increased its market share in Western Europe in the heavy truck sector by 0,5%, but in the German market its share decreased by 0,6%. A market share of medium heavy trucks in year 2008 in Germany was 3,2% (increase from year 2007 0,9%) (AB Volvo, 2009). The Volvo group develops and manufacturers also vehicles under the Mack and Renault brand names (Volvo group, 2009).

**Scania**

With the smallest market share in Germany of these six truck manufacturers, there is Scania. In the heavy trucks market it is closely following Volvo by accounting in year 2008 a share of 6,9% in the German market. In Scania’s traditional market areas, in Europe, Scania’s deliveries declined by 4 % during the year 2008 comparing to year 2007. Whereas in Scania’s new market areas in Asia and the Middle East its’ deliveries increased from year 2007 to year 2008 by 11%. Totally, including all market areas, deliveries declined by 3% during the year 2008 (Scania AB, 2009).

**Selected trailer manufacturer development**

There are a number of different kinds of cargo trailer manufacturers in the market. Some of them have concentrated on the break bulk sector and some on the heavy goods sector. The following was chosen to take a closer look to the three different trailer manufacturers, which have concentrated on their knowledge in the break bulk trailers. These manufacturers are all important players in the European market and have origins in Germany.

**Schmitz Cargobull AG**

Schmitz Cargobull AG is German based company founded in the year 1892 in Altenberge, Germany. Today Schmitz Cargobull AG is an international company having production facilities in Germany, England, Latvia and Spain, as well as, sales representatives globally on every continent. With 5,360 employees, Schmitz Cargobull is the biggest trailer manufacturer in Europe. Schmitz Cargo AG is not only a trailer manufacturer but recognizes itself as a full serviced trailer house offering services to their customer, such as finance, full-service contracts, trailer telematics, service partners, spare parts and special solutions. With wide variations of services, Schmitz Cargo AG wants to see itself as a partner to customers rather than merely a trailer manufacturer. (Schmitz, 2009)

As mentioned above, Schmitz Cargo offers trailer telematics solutions to increase the visibility of different functions concerning trailers, e.g. instant tire pressure monitoring, monitoring of function of refrigerator and axle loads. Also, with telematics solutions, transportation companies are able to follow constant location of trailers and if a certain delivery corridor is completed as planned. A delivery corridor is completed if the door sealing is not broken between the planned loading and unloading points by unauthorized persons. All this information can be forwarded wireless from the trailer to the trucking
company or e.g. to authorities via SMS and GPRS systems. Instead the information technology in the trailer today is carried out by wired data transfer. That will give certain restrictions to have some additional features in a trailer and to couple it with different trucks in a supply chain. (Schmitz, 2009)

In the present system all the information from the trailer is forwarded to the driver via SMS from the transportation company's control centre. There can be found some vulnerable spots, e.g. if current driver information is not updated to the control center, if the driver's mobile is currently out of order or if the driver is out of GMS-provider coverage area. In such situations urgent information from the trailer to the driver might be delayed or not forwarded at all. That might expose cargo and/or trailer under unwanted safety and/or security risks. (Schmitz, 2009)

**Fahrzeugwerk Bernard Krone GmbH**

Fahrzeugwerk Bernard Krone GmbH, later Krone, began to produce commercial vehicles thirty years ago in Ermsland, Germany. After thirty years of growth, Krone has facilities in four different locations in Europe today and employs totally around 1,900 people, as well as, produces approximately 50,000 vehicles annually. (Fahrzeugwerk Bernard Krone GmbH, 2009)

With telematics solutions Krone is able to offer transportation companies a possibility to monitor and utilize information as pulled kilometers, loading and unloading times, continuous monitoring of temperatures and operating data plus documentation of collected data for two years, automated door sealing, surveillance of the area around parked trucks and GPS positioning to follow trailers. With the TControl system, Krone has implemented a system for companies to use online information of the trailers. By this information transportation companies are able follow the status of the trailer, the position of trailer, and the cargo temperature. The TControl system is not only transmitting information from the trailer to the transportation company, but also, if wanted, will evaluate received data. (Fahrzeugwerk Bernard Krone GmbH, 2009)

**Kögel Fahrzeugwerke GmbH**

Kögel's history began in the year 1934 in Burtenbach, Germany, where they still have their headquarter today. In Burtenbach and in two additional production facilities in Chocen, Czech Republic and Stargard, Poland work around 1,500 people producing approximately 30,000 vehicles annually. Kögel's main business area covers designing and producing semi trailers and vehicles for the carriage of goods. (Kögel, 2009)

Kögel does not currently offer such cargo and trailer safety and security solutions as its competitors. They have been more concentrating on developing cargo securing solutions to increase the efficiency of loading and unloading, as well as, road safety itself by providing more reliable cargo securing systems for different kind of cargo types. (Kögel, 2009)

**Logistic companies**

**DB Schenker**

DB Schenker is a German based transport and logistic company, which has been part of the Deutsche Bahn since 2007. Deutsche Bahn has two major business units, DB
Schenker logistics and DB Schenker rail. In this study we will give an overview of DB Schenker logistics, since the road transportation, is controlled by that unit. During the year 2007, DB Schenker land transport division counted totally EUR 5.700 million turnovers with 23.000 employees in 700 different locations (DB Schenker, 2009). With a wide network of own facilities and subsidiaries on all continents, it is able to offer global road transportation services to its customers. In the road transportation sector, DB Schenker offers full-truckload, part-truckload and less-than-truckload services to its customers.

**DHL Freight/forwarding**

DHL freight/forwarding is part of the Deutsche Post logistic concern. Freight/forwarding business unit main task is to provide full-truckload, part-truckload and less-than-truckload services to its customers. Further, the DHL offers combined transportation services, such as road-rail-road, road-sea-road services with a close cooperation with its other business units. The DHL freight/forwarding units had around 11.000 employees in year 2008 in 53 different countries. In Germany DHL has a strong position because of its relation to the Deutsche Post. (Deutsche Post, 2009)

**DSV**

DSV is a global logistics service provider. DSV has divided its operations in to three different business units, DVS road, DSV air & sea and the DSV solutions. During the year 2008, the DSV road accounted 19.806 million DKK turnover with 10.147 employees. The road transportation unit provides door-to-door transportation services, with full-truckload, part-truckload and transport of mixed cargo to its customers all over the Europe. Total truck fleet, owned by DSV and by its subsidiaries, was 8.100 trucks in year 2008.

**Geodis**

Geodis full truckload division is operating under Geodis BM banner. It accounted 585 million Euros revenue in year 2007 and employed 3.400 people. The specialization of the division is to provide transportation services to its customers. The vehicle fleet size in 2007 was 4.253 trucks.

**Dachser**

Dachser is family owned and founded 1930 in Germany. Today Dachser is a global logistics firm and operates in 297 locations worldwide. In year 2007 it employed around 17.000 people accounting EUR 3.5 billion turnover. With 7.665 transport units, they completed in 2007 totally 39.1 million shipments or 25.8 million tonnes. In the transportation sector, Dachser provides to its customers full-truckload and part-truckload services, as well as transportation services for perishable products.
Appendix V

Requirements for the business model and the network agenda

Requirements for the implementation of the business model are given below. A major emphasize lies in the network approach on the carrier, but further insight is given by every single major stakeholder of the model.

Datachassi perspective

The Datachassi perspective is roughly to classify. The innovation is made and the market background shows a defined potential for the demand of the product. An issue that is needed to be tackled by the Datachassi AB is the network establishment between the different major stakeholders of the supply chain in a road transport.

Security firm perspective

The security firm which is already responsible for the terminal security needs to agree on the mutual approach and sets it service to the Datachassi technology. A promising extension of the market share is the basis for further negotiations between the security firm and the carrier chosen.

Insurance perspective

As a huge requirement is the involvement of a transport insurance business seen. A major requirement is the fact that the insurance company is willing to agree on a reduction in the premium for the coverage of goods or a deductible in the road transport.

Carrier perspective

A trustworthy carrier is to be engaged in this project. The carrier needs to be a middle till big player in the road transport market since insurance premium reductions are depended on a economies of scale factor (premiums amount).

Transport customer perspective

The perspective of the transport customer has to be evaluated, as well. The transport customer is a major leverage in this aspect. The customer is the one that will benefit directly. One alternative is that the customer pays a smaller premium in the transport insurance through direct cost reductions by the carrier or it can be attracted by an enlarged service, including higher safety, security and productivity.

The next paragraph will deal with the schedule to implement this business model into reality. An agenda should list the major processes needed to be tackled to establish the network and the Datachassi business model.
Network agenda

- Datachassi AB notification of the innovation
- Test runs with a pilot carrier
  - Data collection for further insurance approach
- Establishment of viable contacts for the network
  - Volvo could be a further leverage
- Insurance company involvement to be secured
  - Brokers like AON and Marsh a further leverage
- Security firm involvement to be secured
- Carrier involvement to be secured
- Transport customer involvement to be secured
- Colloquium of the major stakeholders
  - Presentation of Datachassi Technology
  - Security firm actions
  - Presentation of insurance potential
- **Contract details negotiation**
  - Expected insurance premium potential – Carrier/Insurance contract
  - Carrier price reduction – Transport customer/ Carrier contract
  - Carrier service increase – Transport customer/ Carrier contract
  - Datachassi AB price (leasing rate) – Datachassi/Carrier contract
    - Installation details
    - Maintenance details
  - Security firm compensation – Carrier contract
Appendix VI

Datachassi Feature – area-benefit table and Datachassi features and product portfolio
## Extended logistics and insurance by an innovation for the road transportation sector

<table>
<thead>
<tr>
<th>Feature</th>
<th>Benefit area</th>
<th>Hard benefits</th>
<th>Soft benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wireless network / radar /alarm</td>
<td>• Security</td>
<td>• Less thefts</td>
<td>• Logistical improvements</td>
</tr>
<tr>
<td></td>
<td>• Safety</td>
<td>• Less damages to vehicle, vandalism</td>
<td>• Delivery information and reliability</td>
</tr>
<tr>
<td></td>
<td>• Information</td>
<td>• Better fleet management / Information</td>
<td>• Drivers working conditions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Traffic safety</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Visibility of the supply chain</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Connectivity truck and trailer (wireless)</td>
<td></td>
</tr>
<tr>
<td>Modified side-lights</td>
<td>• Wireless communication</td>
<td>• Cargo space security</td>
<td>• Logistical improvements</td>
</tr>
<tr>
<td></td>
<td>• Radar technology</td>
<td>• Cabin security (driver &amp; truck)</td>
<td>• Delivery information and reliability</td>
</tr>
<tr>
<td></td>
<td>• LED’s</td>
<td>• Reversing safety</td>
<td>• Drivers working conditions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Additional features</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Vehicle and cargo monitoring</td>
<td></td>
</tr>
<tr>
<td>Electronic fence</td>
<td>• Vehicle, trailer, driver and goods security</td>
<td>• Less goods stolen and vehicles</td>
<td>• Delivery information and reliability</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Less vandalism, invaders</td>
<td>• Drivers working conditions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Internal and external alarm (driver/security firm)</td>
<td></td>
</tr>
<tr>
<td>Electronic sealing (custom facilitation)</td>
<td>• Cargo security</td>
<td>• Goods protection</td>
<td>• Easier procedure for international trans-ports</td>
</tr>
<tr>
<td></td>
<td>• More reliable deliveries</td>
<td>• Internet follow-up, truck and goods tracking, tracing</td>
<td>• More evidence for drivers</td>
</tr>
<tr>
<td></td>
<td>• Information (customs included)</td>
<td>• Customs facilitation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Vehicle /cargo identification</td>
<td>• Goods and vehicle identification</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Visibility of the supply chain</td>
<td></td>
</tr>
<tr>
<td>Blind spot detector</td>
<td>• Traffic safety (truck and other traffic)</td>
<td>• Less accidents in turning</td>
<td>• Drivers work facilitation</td>
</tr>
<tr>
<td>Electronic Lock</td>
<td>• Loading dock security</td>
<td>• Less accidents loading dock</td>
<td>• Loading/Unloading staff safety</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Goods safety</td>
<td>• Driver work facilitication</td>
</tr>
<tr>
<td>Secure parking / linked alarm</td>
<td>• Driver and vehicle security</td>
<td>• Less thefts</td>
<td>• Driver security</td>
</tr>
<tr>
<td></td>
<td>• Goods security</td>
<td>• Less damages to vehicle, vandalism</td>
<td>• Better working conditions (efficiency)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Less lost goods and vehicles</td>
<td></td>
</tr>
<tr>
<td>Further applicability</td>
<td>• Terminal security</td>
<td>• Vehicle and cargo security</td>
<td>• Delivery information and reliability</td>
</tr>
<tr>
<td></td>
<td>• RFID add-ons</td>
<td>• Vehicle and cargo safety</td>
<td>• Drivers working conditions</td>
</tr>
<tr>
<td></td>
<td>• Cargo and tire information / monitoring</td>
<td>• Visibility of the supply chain</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Road pole communication</td>
<td>• Possibility of linkage to light poles and surveillance cameras (terminal)</td>
<td></td>
</tr>
</tbody>
</table>
Datachassi Product portfolio overview