BACHELOR THESIS

THE MAKE-OR BUY DECISION FOR MANAGING AND MONITORING OUTBOUND DISTRIBUTION

Reviewing the outsourcing decision of transport management at a company in a strategic and cost-based perspective

Industrial Engineering & Management

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The Make-or Buy Decision for Managing and Monitoring Outbound Distribution

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Bachelor project thesis on the outsourcing decision of transport management within a company: *a strategic and cost-based perspective*

Final version
- PUBLIC -

Due to the confidential nature of this research, the company name, as well as names of partner companies, employees, and business units have been made anonymous. Any contextual information that allows a reader to identify the company or its partner companies, employees and business units has been left out.

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Preface

For the past months, I was provided the opportunity to perform my bachelor's thesis research at this company, on a subject that I did not know much about prior to starting this. With great interest, I have been learning about the more strategic decisions involved in businesses, and I was able to do so at a beautiful, innovating, and representative company. I would therefore like to express my gratitude to my company supervisors for giving me this opportunity, as well as all their advice regarding leadership and business performance, and all the fun and joyful moments during my internship.

I also would like to thank my first supervisor at the University of Twente, Petra Hoffmann, for all her flexibility and great feedback that she gave, despite the endless questions and requests that I had. I also would like to thank Sandor Löwik, my second supervisor at the UT, for his support and feedback.

While writing these acknowledgements, I think back of a great period in which I performed my final work as a bachelor's student. Going forward, this period has given me unprecedented insights in my motivation as a student, as well as my productivity and planning skills. Next to my supervisors, I finally want to express my sincere gratitude to all my family and friends who have supported me during this period, and helped to increase my performance skills, as well as the quality of this research, to a higher level.

Wishing you, as a reader, the best of luck and fun reading this thesis,

Teun Evers
October 2018, Enschede

Executive Summary

INTRODUCTION

As part of a strategic supply chain reorganisation, the company has outsourced their logistics operations, including warehousing, outbound distribution, etc. Outbound distribution is divided into two activities: the operational transportation, performed by carriers, and transportation management, usually performed by logistic network orchestrators. For the company, transport management is performed by two logistics service providers (LSP), that also perform warehousing operations, and either perform transport via a subsidiary, or outsource it.

RESEARCH

This research provides a review on the outsourcing decision of the transport management. As the company experiences problems within the internal process that is the tangent with the transport management process of the LSP. This decision is reviewed for 4 business units that have seen their logistics operations outsourced, to 2 different logistics service providers.

PROBLEMS

The problems found were on one side caused by the LSP's not maintaining agreements, such as the *provision of transport costs*, or the *provision of track & trace information*. However, many other problems occur that are too diverse to find an exact cause for in terms of agreements, therefore it is assumed that the outsourcing configuration is erroneous. Literature research provided that these diverse problems can be characterized in *opportunistic and self-interest behaviour of the LSP*, and the *lack of proper agreements.*

CAUSES

The literary research provided a theoretical explanation for this behaviour, and the lack of agreements and proper contracts. Not only is the opportunistic and self-interest behaviour caused by the complex nature of the transport management activity due to the high asset specificity, but also the wrong contract configuration allows them to act in an opportunistic way. The company should have set up detailed and multiple contract provisions for each activity that it outsources.

The contract configuration is 1) not detailed and enough as it should be regarding the complexity of the activity (transport management is an advanced service level logistics activity), explaining the lack of agreements and the ease in which they can be breached. Secondly, the *contract duration* does not foster long-term relationships and mutual investments and dependencies, causing unwillingness from the LSP to solve issues, as well as risk-aversion.

SOLUTIONS

Problems caused by the *nature of the relationship* can be prevented by contract improvement. However, the *nature of the transaction*, or the complexity of the transport management activity, does not change. Therefore, improving agreements and contracts does not guarantee problem prevention. Based on the theory on core competencies, we have concluded that the activity of transport management should be *in-sourced.* Although not a core competency, outbound distribution adds significant value to market success in terms of perceived customer benefit, therefore it should be *outsourced,* however while maintaining control of the process. This process control implies that managing outbound distribution, or *transport management,* should be insourced. This solution prevents the problems occurring as a result of an external transaction with an asset that is highly complex and advanced, and needs monitoring and internal control in order to be successful in the market. This solution is thus effective as the transaction is now internal, where risks of opportunistic behaviour, contract breaching and thus increased transaction costs do not occur. Next to the prevention of problems, control of the process also implies improved performance of outbound distribution as escalations can be solved quicker or can even be prevented (due to the short communication chain).

COST ANALYSIS

Our proposition and assumptions regarding opportunistic behaviour was strengthened by a cost -analysis performed on tariffs imposed by one of the LSP's. Insourcing transport management, therefore negotiating tariffs with third-party carriers *directly* rather than via a LSP, will decrease the two-month costs of transport for one of the business units with 20,7%, or €20,147.02. Projecting these cost-savings onto the other business units, as well as on a yearly basis, yields an estimation on annual cost savings of €365,584,-, by avoiding LSP margins and higher tariffs. Furthermore, one extra employee should be hired to oversee and implement the transport management process within the company, accounting for €65,000.00 per year, totalling costs savings that were calculated on €300,584,- per year, by insourcing transport management. Tariff reduction and personnel costs are the only *incremental costs* accounted for.

RECOMMENDATIONS

As a result of this research, and in order to adapt the solution of insourcing transport management, we have recommended contract improvement for any contracts regarding third-party carriers and other LSP contracts. These improvements incur switching to *outcome-based contracts*, where fee is based on the outcome of transport and performance rather than baseline tariffs as are imposed currently. Also, contract duration should be long-term (10-15 years rather than 2-4 or 1-2 years) to improve mutual investments and benefits, and the contracts should approve the performing of audits, in order to maintain control of the process and prevent opportunistic behaviour. Furthermore, the integration of the transsmart brokerage system is recommended, where carriers can be selected, and communication and control can be maintained. The integration and maintenance of the system should be performed by one extra hired employee in order to operate the in-sourcing of transport management.

Finally, the company is recommended to consider the centralization of the order-desk department in order to streamline communication, prevent escalation errors and to prevent BU-specific adjustments of agreements (inconsistency).

In case the company chooses not to adapt the insourcing of transport management, recommendations are provided that optimize the current situation by means of contract improvement, and the eventual replacement of a logistics service provider.

Table of Contents

Reader's Guide

This report on reviewing the make-or buy decision for the managing of outbound distribution contains 7 chapters of research, which will shortly be introduced below. The final chapter, chapter 8, contains the conclusions on this research and the recommendations as a result of it.

Chapter 1 - Introduction

This chapter provides an introduction to the context and situation in which the research takes place, and furthermore an introduction on the concepts used in this research. Also, the core problem is defined here, along with other experienced problems that we aim to solve throughout this thesis.

Chapter 2 - Research Design & Methodology

This chapter follows on the definition of the core problem, as it provides the research design (what are we going to research), and the research methodology (how are we going to research it, and how are we going to solve our problems).

Chapter 3 - The Initial Outsourcing Agreements

The third chapter provides a reference to the agreements that were made regarding the outsourcing relationship between the company and the logistics service providers.

Chapter 4 - The Current Situation

In this chapter, for each business unit the outbound ordering process is described, and the problems experienced within this process resulting from LSP behaviour are identified. Furthermore, this chapter researches to what extent all problems are caused by agreements not being maintained, or if the cause of the problems lies within the outsourcing configuration.

Chapter 5 - Literary Research

This chapter discusses several theories that help conclude on the best situation for the company within this outsourcing context. First, different theories are provided that aid in the make-or buy decision and how an outsourcing relation should be structured. Second, theory regarding the different levels of outsourcing in logistics, different LSP's and the outsourcing spectrum in general is discussed.

Chapter 6 - Total Cost of Ownership

In this chapter, several cost drivers from the total cost of ownership approach are extracted, and used for a cost-analysis on the different solutions possible for the outsourcing configuration.

Chapter 7 - Solutions

This chapter concerns the solution generation in order to optimize the current outsourcing relation between the company and its logistic service providers. First, we approach the diverse problems encountered in chapter 4 via theory, after which we provide the two solutions possible for the company: either insourcing transport management, or retaining transport management outsourced.

Terms and Definitions

TCO
Total Cost of Ownership.

SOP
Standard Operating Procedure.

LSP
Logistic Service Provider. The two logistics service providers concerning this research will be named LSP 1 and LSP 2 for confidential purposes.

Incoterms
International Commercial Terms, standard sets of trading terms and conditions designed to assist traders when goods are sold and transported. Each incoterms rule specifies the obligations of each party (e.g. who is responsible for services such as transport; import and export clearance), as well as the point in the journey where risk transfers from the seller to the buyer (IncotermsExplained, 2018).

ERP (system)
Enterprise Resource Planning, refers to the systems and software packages that tie together and define a plethora of business processes and enable the flow of data between them. Examples of these business processes are accounting, procurement, project management and manufacturing (Oracle, 2018).

BU
Business Unit, referring to the different business units that the company comprises. The four business units concerning this research will be named BU 1, BU 2, BU 3, and BU 4 for confidential purposes.

EDI
Electronic Data Interchange, a system that is used for data exchange and management between several parties within a supply chain. In terms of logistics, it serves as a tool for exchange of data sets containing relevant information such as purchase orders, package dimensions, date of delivery, quantities etc. EDI systems are usually integrated into ERP systems.

1. Introduction

1.1. RESEARCH CONTEXT

1.1.1. COMPANY INTRODUCTION

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*Figure 2: The company's headquarters **[LEFT OUT]***

This figure has been left out due to confidentiality agreements

*Figure 1: Organisational chart of the company **[LEFT OUT]***

1.1.2. THE SOURCING DEPARTMENT & PURCHASING FUNCTIONS

The sourcing department within the company acts as a facilitator for the operational purchasing functions of each business unit. The figure below shows the purchasing process (van Weele, 2007), where the tactical side of the purchasing process is differentiated from the operational (supply) side. The tactical purchasing process can best be described as the exploratory work within procurement. This is when for example new suppliers have to be found and contracted, or when new products have to be ordered at suppliers. Within the company, this 'facilitation' is thus the task of the sourcing department. The business units each have purchasers that are responsible for the 'buying part', or the operational supply ordering, the day to day order process.

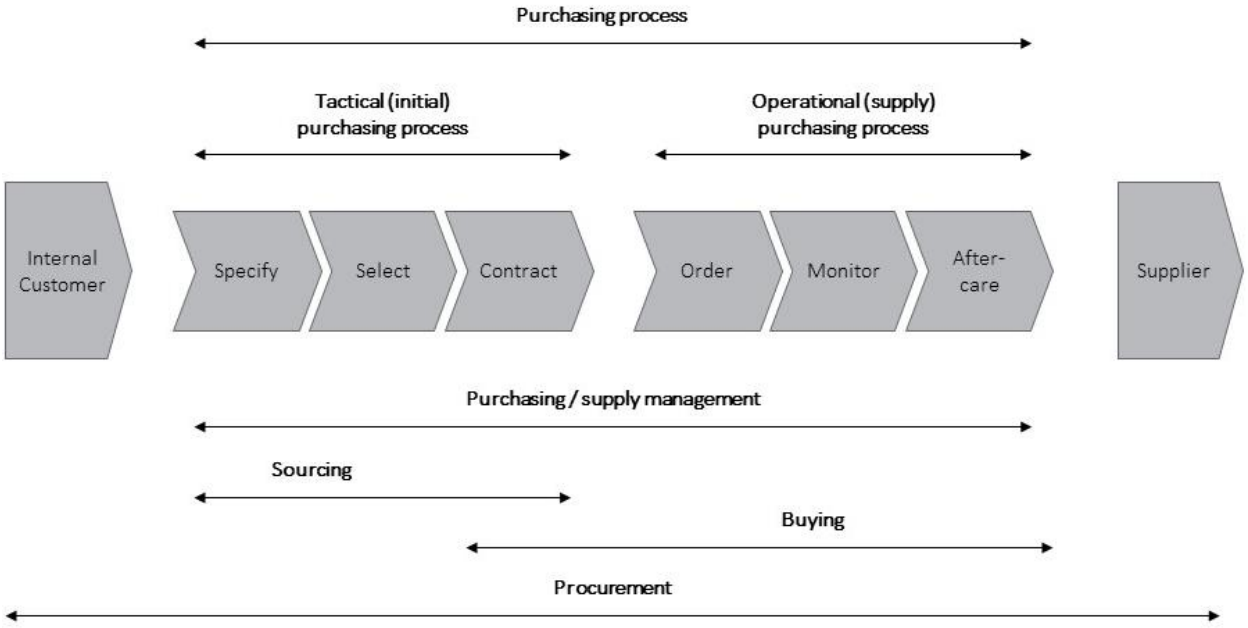

Figure 3: The purchasing process

The establishment of the sourcing department within the company converged with the reorganisation of the supply chain, which included the outsourcing of the physical distribution part of the logistics (warehousing & transport). The supply chain reorganisation is seeing production and logistics operations outsourced largely to external partners and wound down as internal the company functions as a result of strategic development. This strategic development holds that the main goal for the company is to focus on activities that represent high added value per employee, i.e. creating and marketing new concepts of products. This means that one reason for outsourcing the supply chain is that the transport & logistics management is not their core business. Furthermore, the company 'predicts' the advantage of lower costs of sales of its products thanks to the purchasing power and scale of the logistic service providers (LSP's) they outsource to, which is the second reason for outsourcing, that is that outsourcing would be more inexpensive than managing in-house. The LSP's to which the company has outsourced their logistics activities will be discussed in the next section.

1.1.3. LOGISTIC SERVICE PROVIDERS

Logistic service providers act as external facilitators that manage and controls a company's logistics services, such as warehousing and transport. The LSP's contracted by the company are LSP 1 and LSP 2, which are both proven multinational logistic operators. LSP1 serves the warehousing and transport of BU 1 and BU 2, and LSP 2 is under contract of BU 3 and BU 4. Other business units' logistics operations are either not yet – or in the process of being – outsourced, or these business units do not produce physical products, only software.

LSP 1

This section has been left out due to confidentiality agreements

LSP 2

This section has been left out due to confidentiality agreements

1.2. PROBLEM CONTEXT

The focus of this thesis lies on the outsourcing decision of one specific logistics activity, namely transport management. Transport management – in short - implies the monitoring of - and the communication with carriers, that execute the transport of the physical products of the company from the LSP warehouses (transport *to* the warehouses from suppliers is arranged by suppliers themselves), and furthermore the selection of these carriers when ordering transportation. This is now performed by the logistics service providers, as the *assumption* of outsourcing this activity has been that transport management is a *core competence* of the LSP, and not of the company, and that lower costs of transport tariffs could be realised due to the economies of scale of these logistics service providers. Outsourcing logistics activities, and therefore transport management, would then unburden company employees and would enable them to focus on the core competencies of the company (1.1.2).

1.2.1. EXPERIENCED PROBLEM

The problem experienced by the company's responsible employees is that they still have to put lots of effort in tasks that were supposed to be the responsibility of the logistics operator. For instance, clients with complaints still reach out to the company's personnel. As a result, the company's employees spend a considerable amount of time 'troubleshooting', for activities that the logistical operator is getting paid for. Consequently, the company suspects that it pays a lot of money to external parties for work that realistically is still performed in-house.

The second experienced problem within the company, is that the sourcing department and the operations managers of each business unit do not have insights in the price calculation of the LSP's. Tariff calculations and invoices sometimes seem not to be consistent, transparent or in line with the market. Not having proper insights leads to the suspicion that the LSP's are sometimes more expensive than when the transport would be managed in house.

The company reckons that above experienced problems particularly influence the total cost that is incurred when outsourcing transport management. Hence, they formulated the following research question:

Based on the total cost of ownership, has outsourcing the transport management been the right choice for the company?

In the following sections, we will assess whether answering this question literally would provide a workable solution in the future.

1.2.2. PROBLEM DEFINITION

The experienced problems in the previous section are the motivation of this research, as they raise the first questions whether outsourcing the transport management has been a good choice or not. In researching the causes of these problems, we will account for either causes in the outsourcing relationship or outsourcing configuration (which is a general term for the composition of the outsourcing relationship, i.e. contract forms, governance forms and services offered by the LSP), or causes that are inefficiencies in the process in which the company's employees are involved. The latter would occur when problems are perceived, but are not actually occurring. The problem perception is then caused by process inefficiencies. In the subsection below, we will use a problem matrix to find our core research problem and causes of the experienced problems.

Problem matrix

As seen in the problem matrix ('Probleemkluwen') of figure 4 below, the orange highlighted area is the research question as formulated by the company:

Based on the total cost of ownership, has outsourcing the transport management been the right choice for the company?

This problem is clearly a yes/no question, or a knowledge problem (Heerkens & van Winden, 2012). The first step to construct our problem matrix is therefore to convert this into an action problem, which would be:

Opposite to expectations, the Total Cost of Ownership seems to be worse with the transport management outsourced.

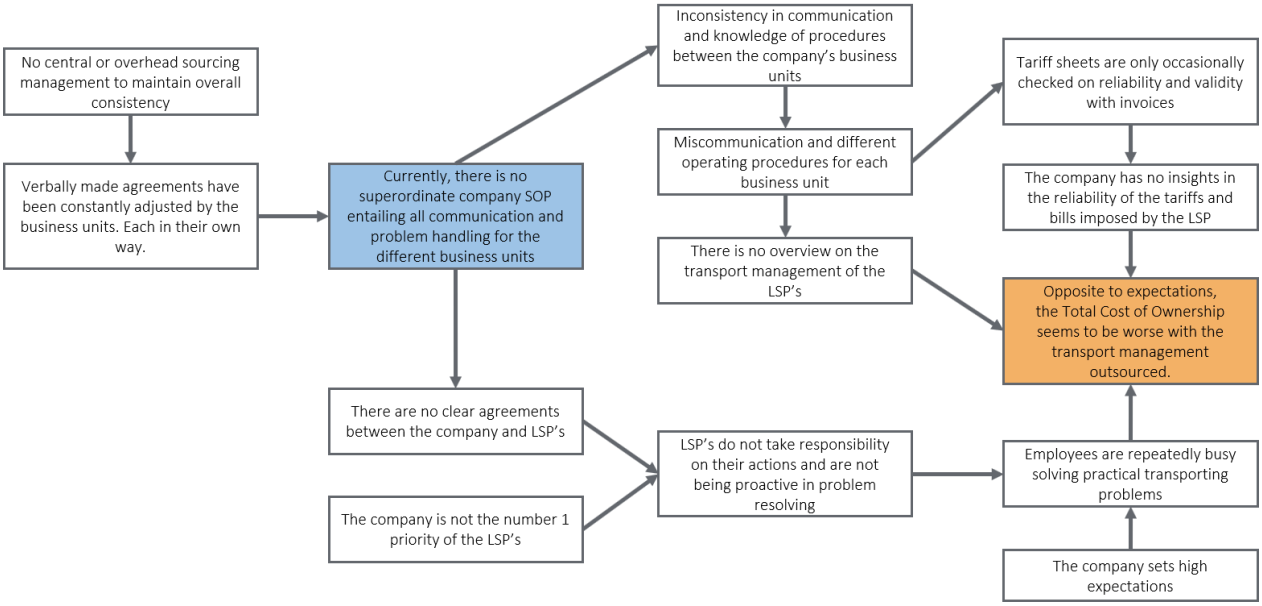

Figure 4: Problem matrix of the current situation. Orange marked is the problem as imposed by the company, whereas the blue marked box is the core problem, which is to be investigated and solved in this thesis.

The other text boxes in the problem matrix mark the causes of the experienced problem by the company, linked with the arrows. The matrix shows that the experienced problem is caused by three other problems. These are the aforementioned two problems of *employees still spending time on trouble solving*, and the managers *not having insights in the reliability of the tariffs and bills imposed by the LSP*. The third cause is that *there is no clear overview on the transport management of the LSP's*.

Miscommunication, as well as different operating procedures of each business unit (each business unit has its own specific product and operations managers) causes both the problem of lacking overview in procedures and handling, as the problem of missing insights.

The cause of this miscommunication, the *'inconsistency in communication and knowledge of procedures between the company's business units'*, lies in that business units mostly operate independently.

The third direct cause of the problem as experienced by the company, namely the employees that are repeatedly solving practical transporting problems, is caused by the LSP's behaviour. *The logistic service provider forsakes to take responsibility and directs problems immediately to the company's personnel*. This behaviour is, firstly, caused by the fact that *the company is often not the first priority of the LSP* (as they have much bigger clients). Secondly, *there seem to be no clear agreements between the company and the LSP's.*

The latter, along with the inconsistency in communication and knowledge of incoterms, leads us to the problem marked in blue (figure 4). All problems originate from this one, given the lack of a superordinate standard operating procedure that entails all communication, and problem handling for the different business units. Not only the separate business units all have their own manner of handling problems or ERP administration, but also the LSP interpret the made agreements differently (if any). This gives us the following core problem:

Currently, there is no superordinate Company SOP entailing all communication and problem handling for the different business units.

An issue that we encounter here is that all of the problems originate from this one, but that this cannot be the core problem as it has two more prior causes (Heerkens & van Winden, 2012). However, if we take a closer look at the problems that cause the fact that there is *no superordinate SOP*, we can conclude that these are mistakes that were made in the past. It would be very straightforward to claim that the entire problem is solved by appointing one person overseeing all transport management operations, but that would not solve the problems caused by the lack of a SOP. It is therefore not a core problem. Next to that, the problem marked in blue can, in some way, also be seen as a cause of lacking central sourcing management. That is because, if there is no process to maintain, there is no use for appointing a manager to do that. Now one could argue that appointing a manager would lead to this manager to construct its own process, but that step is too risky for the company to take before it knows whether it is actually profitable or not. Therefore, the problem with the highest solving priority is our core problem of the lacking superordinate SOP.

This preliminary research shows that the question regarding *total cost of ownership*, that was originally imposed by the company, is no sufficient research question, as it does not provide causes of the problems that occur. Furthermore, two other problems that have no clear causes should also be addressed. These are 1) '*the company is not the number 1 priority of the LSP's*' and 2) '*the company sets high expectations*'. Whereas the core problem is a clear cause of most of the problems experienced by the company: namely that there are no clear agreements (or a lack of agreements), the two problems of high expectations and priority have no clear causes that can be found with solely preliminary research. Also, the problem of *no insights in transport management of the LSP's* is also difficult to declare with just the argument of *no clear agreements.*
The causes of these latter problems, of which evidence is difficult to obtain, should be considered within theory regarding outsourcing decisions and governances, which will be discussed later in this research.

In chapter 2, we will provide a research framework which will elaborate on a strategy to solve the core problem, and furthermore the problems that are difficult to understand and get a grip on.

1.2.3. DEFINITION OF CONCEPTS & SCOPE

Alongside the already provided description of *transport management*, there are some other definitions and concepts that one should be familiar with to consistently read through this research. Next to that, the extent to which we will research transport management within the company is discussed.

Logistics

The concept of logistics is captured in figure 5 below. Logistics is composed of two separate but integrated branches; materials management and physical distribution. Material management involves all activities related to the production of parts and finished goods, whereas physical distribution defines the activities related to making these parts and finished goods available for consumption. The latter has strong emphasis on the transportation and warehousing of these goods (Rodrigue, 2017).

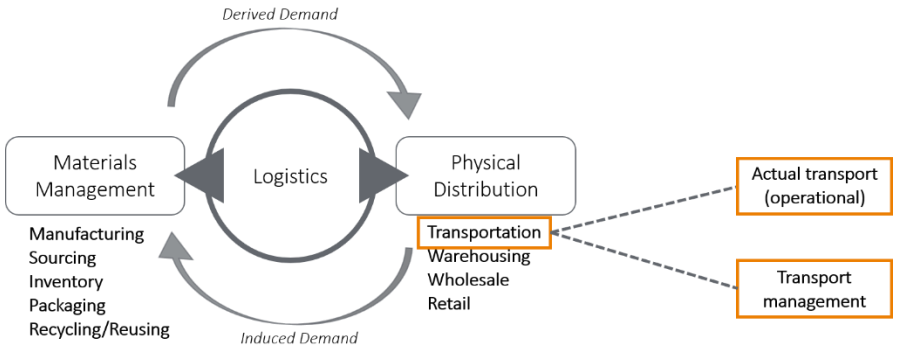

Figure 5: The logistics concept (Rodrigue, 2017), alongside the division of transportation as used in this research.

When discussing the overall term 'logistics' within this research, we mean the services that cover all aspects depicted in figure 5. The *scope* of research on the logistic service providers however, will focus on the transportation part (marked orange). This transportation part can also be called the outbound logistics, which is the physical distribution of goods to the customer. Within transportation, we differentiate between *operational services* provided by carriers, such as cross-docking and the transportation itself, and the management of the transportation, thus the management and monitoring of the carriers that execute transport. A more detailed description on the actual transportation (outbound logistics) process, that is thus currently *managed & monitored* by the LSP, can be found in Appendix A: Operational Transportation Process.

Scope: although transportation also includes *inbound* transportation (i.e. transportion of products from manufacturers to the LSP warehouses designated for the company), we will not consider this within our research, as inbound transportation is arranged by the suppliers of the company. All inbound products come from these suppliers, as the company also had its production facilities outsourced, and thus does not have own manufacturing facilities.

Transport management by the LSP

Both LSP's have different types of subsidiaries according to the nature of a task. Transport management and warehousing operations are performed by a subsidiary, and is thus the part of the LSP where logistics activities are outsourced to. There are furthermore transport subsidiaries, for air, sea, and road shipments. All three subsidiaries compete with each other. In other words, once transportation has to be arranged by the LSP (=transport management) for the company, the orchestration subsidiary decides which carrier is most suitable to execute the transport, mostly based on costs and destination. Whenever some third-party carrier is cheaper than the road subsidiary for instance, the orchestration subsidiary will allow a third-party carrier to execute the transportation. This division in subsidiaries is important to understand, as it implies that LSP 1 and LSP 2 not only transportation themselves, but also frequently outsource. In fact, the road transport subsidiary performing transportation commissioned by the orchestration subsidiary could also be seen as outsourcing.

Incoterms

The way of transportation from the warehouses of the LSP's to the company's customers is depending on the incoterms set by the company when placing a transport order. Incoterms (IncotermsExplained, 2018) stand for International Commercial Terms, and are a set of trading terms and conditions that specify the obligation of each party involved in the distribution process. An overview of the 2010 Incoterms can be found in Appendix B: Incoterms 2010 overview. In total there are 11 types of Incoterms, of which 7 are used for all types of transport, and 4 are only used for sea freight and inland shipping. Of the 7 regular Incoterms, the most common used by the company are Ex Works (EXW), Delivered at Place (DAP) and Delivered Duty Paid (DDP). Simplified; Ex Works shipments are to be picked up by a third party contracted by the customer, and are therefore no longer the company's responsibility from the moment that the products are packed and loaded onto the warehouse dock. Delivered at Place (DAP) and Delivery Duty Paid (DDP) both oblige the seller (the company) for arranging carriage and delivering the goods at the place named by the customer, available for unloading. The difference between these incoterms is that with DDP, the seller is responsible for import clearance and other import duties, whereas with DAP, this is on account of the buyer (customer).

Scope: We will only focus on the transport management of the shipments for which the company and therefore the LSP are responsible, therefore shipments designated as DDP or DAP. These could be either pallet shipments, or parcel shipments. Other shipments are arranged by the customer, which holds that no transport management is involved and is therefore not within the scope of this research.

Business units

Logistics of the following business units (Figure 1 [LEFT OUT]) has been outsourced: BU 1 (LSP 1), BU 2 (LSP 1), BU 3 (LSP 2), and BU 4 (LSP 2).

2. Research Design & Methodology

In this chapter, we will mainly elaborate on the design of the research and the methodologies used for the solution approach and the solving of the core problem. The form of research design is based on Verschuren & Doorewaard (2010), who state that designing research involves two separate sets of activities: the *conceptual design* and the *technical research design*. The first one involves determining everything you wish to achieve through the research project. The latter one is concerned with how to realise all of it during the implementation stage. What follows is first the research objective, the research framework, and the research questions, which together form the conceptual design. Consequently, in the methodology part of this chapter, the technical design will be elaborated on. This comprises the research strategy & material, where we elaborate on *how to realise* the research, the types of research and the methods used. It is therefore adressed as the methodology.

2.1. CONCEPTUAL RESEARCH DESIGN

2.1.1. RESEARCH OBJECTIVE

The objective of this research is to explore and present the possibilities on how the current transport management outsourcing relationship and the relating process *within* the company can be optimized, given the problems as pointed out with the problem matrix in section 1.2.2. Identifying the more detailed nature of the problems enables us to provide a solution to either improve the outsourcing relationship, but improving the process efficiency, or to revalidate the outsourcing configuration when the problems appear to be the result of an erroneous configuration.

2.1.2. TYPE OF RESEARCH AND APPROACH

Solving the core problem involves two steps: first we should create more insights in the current problems. The first part of this thesis therefore comprises more *exploratory research* towards the detailed determination of problems and their causes. No hypotheses will be tested here, and the findings will not have much relevance outside the researched domain, as an internal company process is researched. With the current process that has to be researched, we mean the process that is the tangent with the transport management process of the LSP, namely the outbound ordering process.

In the second part, we attempt to 1) provide the best solution for the company in this outsourcing context, and 2) determine whether the current situation is workable and if problems arise due to an erroneous outsourcing configuration. The latter could be the case if not all problems, elaborated on in the problem cluster and in the first part of the research, can be explained with the core problem as a cause. Other causes could be explained by theories on outsourcing. Consequently, a literature review will be performed in the second part of this research.

Next to achieving the objective by presenting operational alternatives to the current transport management situation, we should also be able to give an answer to the main question that the company has imposed to some extent, namely whether outsourcing the transport management has been the right choice or not.

2.1.3. RESEARCH QUESTIONS

Below, we will define the set of research questions that need to be answered in order to accomplish the earlier described research objective. The first step, mentioned with the research objective, is creating insights in the current problems and defining the norm. Acknowledging a core problem means that there is a discrepancy between norm and reality, which is the gap that needs to be closed in order to solve the problem. A core problem is always an action problem, that means that something is not going the way you want it to go, which is in this case the problem causing transport management. The first step in solving the core problem - *'There is no superordinate company SOP entailing all communication and problem handling for the different business units'* – is thus to define the norm of the problem. In this case, that will be finding out what basic agreements have been made regarding communication and problem handling at the initiation of the outsourcing procedure, and what the expectations of the company are:

Research question 1

What have been the agreements and expectations regarding the communication and problem and customer handling between the company and the logistic service providers?

Answering above question sets the norm. And now that the norm is set, the current situation – or reality – has to be measured. This implies creating insights in the process where most problems occur, which is also the process for which the agreements of question 1 were made for, and next identify the problems within this process. These problems can be 1) problems as a result of not keeping agreements discussed at the first research question, therefore process inefficiencies, and 2) problems that are continuously encountered without having a proper explanation by means of agreements or contracts.

Research question 2

Which problems are experienced by the employees involved in the transport management process?

- *2.1 What does the process look like?*
- *2.2 What are the problems experienced in this process, and where are they experienced?*

Next, we step back and consult literature about several outsourcing theories, and outsourcing within logistics. First, we will try to use this *theoretical approach* to explain the problems of which we were unable to find a direct cause at the first two research questions (which is a more *practical approach*), where after we will use these findings and theory to construct the best option for the company in this outsourcing context.

Research question 3

What would strategically be the best options for the company regarding in- or outsourcing its transport management?

As mentioned previously, we will answer question 3 by performing a literature review on various different topics regarding in- or outsourcing. But by answering research question 3, we will only have insights in what would be the best option for the company from a strategic and theoretical point-of-view. Research question 3 will provide us answers to what the best options are for the company regarding in-or outsourcing its transport management, whereas research question 4 will review and consider these options using Total Cost of Ownership:

Research question 4

What is the TCO of the best options provided by outsourcing literature?

Following the determination of the best strategic options and corresponding costs, we will start building a solution for a new design of the transport management configuration. This process will be conducted under research question 5, where one sub-question provides the solutions possible, whereas the second sub-question considers which is the best option for the company. The consideration of the best option will be based on literature on outsourcing decisions and configurations, and the total cost of ownership, to the extent that calculation of all cost-drivers per solution is possible.

Research question 5

What is the best outsourcing option for the company in this context?

- *5.1 What are the alternative solutions for the company's transport management given the current problems and theoretical recommendations on these problems?*
- *5.2 Which solution is the best option for the company, based on TCO and literature?*

The outcome of this question should yield a recommendation to either switch outsourcing configurations, or for instance improve the current configuration. Next to this recommendation, we will also recommend on methods to maintain consistency within communication and problem handling within this process, in order to prevent our core problem from occurring again in the future. Depending on the solution we are able to answer the question whether outsourcing transport management has been a good choice or not.

2.1.4. RESEARCH FRAMEWORK

Above questions are used to provide answers and solutions to respectively the questions and problems of the company. On the next page, in figure 6, a framework is provided that extracts the three main items from the problem matrix, and depicts how the research questions can be used as *guidelines* to solve these problems. Instead of only solving the core problem, the research questions are formed in such a way that they will also help us solve the other problems depicted within the problem matrix (1.2.2). In Appendix B: Incoterms 2010 overview, an enlarged figure can be found, including the methodologies used to solve the research questions (elaborated on in paragraph 2.2). Below figure 6, the research framework is shown as a single figure.

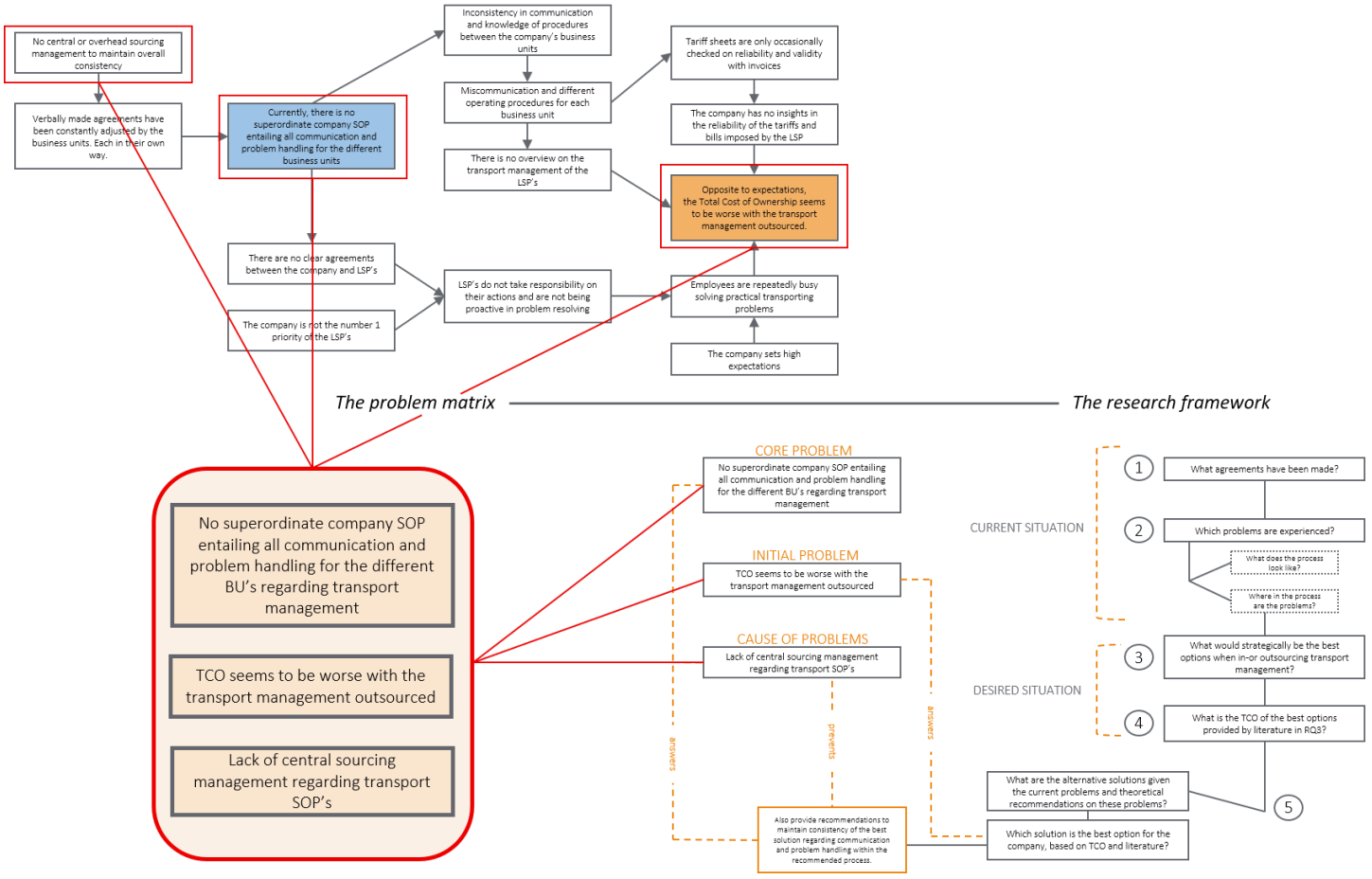

Figure 6: The problem matrix (upper left) and the research framework (lower right) combined. The three main items/problems to be considered in this research are extracted from the problem matrix, then positioned into the research framework. The research framework consequently shows how the research questions are used to solve these problems.

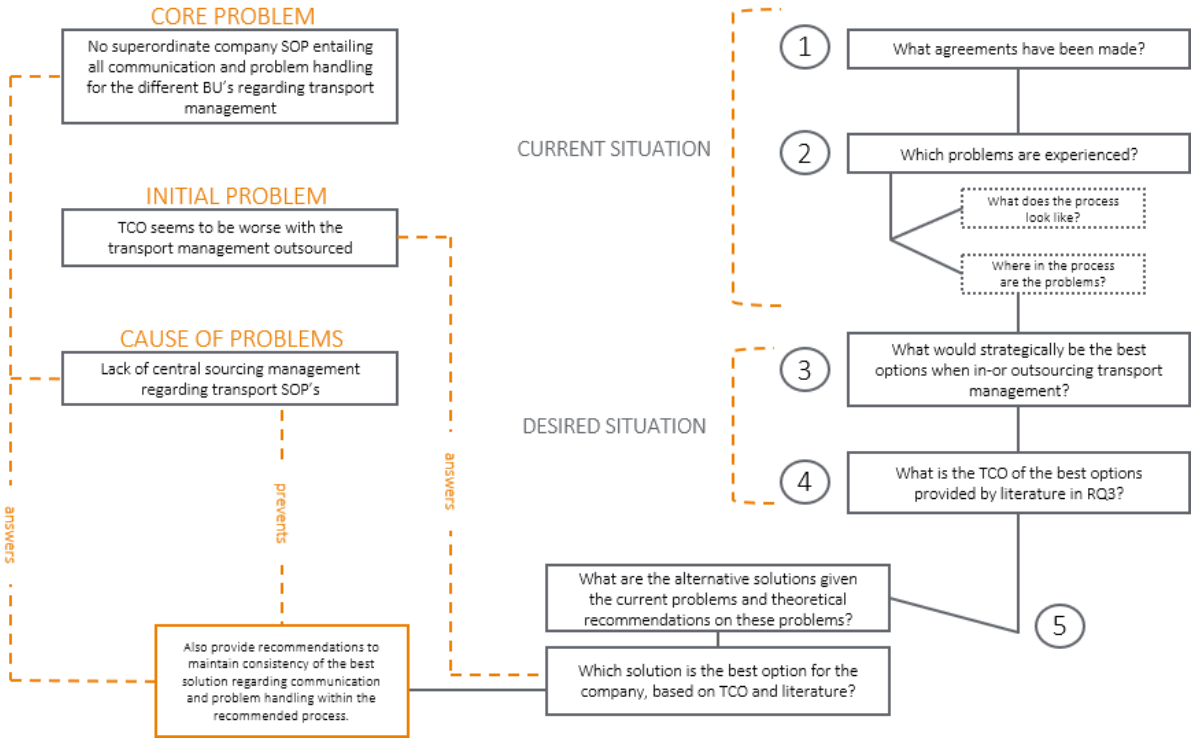

Figure 7: The research framework accounting for the three main problems/issues, and the research questions used for solving these.

2.2. METHODOLOGY

Below, we will for each research question discuss *how* we are going to eventually provide an answer to the research goal. In Appendix C: the Problem Matrix & Research Framework, the complete research framework including the methodologies per research question is depicted.

Research question 1 – *What agreements have been made?*

Research question 1 is all focused on determining the agreements made between the logistic service providers and the company. We will conduct main research on the agreements made per business units regarding transport management, to see whether one of the two parties is just lacking to preserve them. Agreements regarding transport management are set in the operations manuals, or standard operating procedures (SOP) between the logistics service providers and the business units. Prior to that, we will give a short introduction about the overall transport process, as *transport management* is focused on managing and monitoring this process. After the agreements have been reviewed per business unit, we will provide a comparison between the agreements.

Research question 2 – *Which problems are experienced?*

Prior to identifying the problems in the transport management process, we will visualize the process about which the agreements have been made, or should have been made. As the actual transport management process is outsourced, executed at the LSP internally, we will focus on the process at the company which overlaps, or is the tangent, with the transport management process of the LSP. This process is the outbound ordering process. A process flowchart will be constructed, and we will perform semi-structured interviews with the employees of each business unit that are assigned to this process in order to determine the problems occurring. These employees include the order desk employees, and the internal sales employees (responsible for customer contact). Semi-structured interviews enable us to collect more and better varied information, which might not be possible in a structured interview (Cooper & Schindler, 2014).
As a result of this discussion and discrepancies between the process and the corresponding agreements, and other problems brought up by the employees regarding the process, a list of problems can be provided that will be the basis for our solution generation by means of literature or other practical solutions. As mentioned earlier, two kinds of problems could arise here. Firstly, problems that are discrepancies between norm and reality as a result of not preserved agreements, which are therefore practical to solve. And secondly, problems with great diversity and no obvious cause, of which the cause should be considered within literature.

Research question 3 – *What is strategically the best option when in-or outsourcing transport management?*

The third research question will be answered by conducting a *systematic literature review* on strategic-based outsourcing decisions. What would be the best situation for the company to implement, while regarding the company's structure and way of operating? The first step within solving this question is providing theories that support the decision whether to outsource or not, and to what extent or in what form. These theories should also be applicable to logistics outsourcing or a specific activity of logistics outsourcing, namely transport management. We will also perform a literature review on service levels that logistics service providers can offer within the outsourcing continuum and different types of LSP, as the type of LSP could also be of influence on the problems that are experienced.

Research question 4 – *What is the TCO of the best options provided by literature in RQ3?*

Research question 4 concerns the financial aspect of the desired situation. As the company has imposed on us their main question: '*Based on the Total Cost of Ownership, has outsourcing the transport management been a good choice or not',* we will try to answer that question here to the extent that this is possible. This will be done by analysing the impact on total cost of ownership by implementing the better options with regard to the current process design and costs. The tool of Total Cost of Ownership enables us to recommend specific solutions on a cost-basis, rather than theory only. We believe that this is necessary in order to show a company not only theoretical improvements, but also *projected* practical improvements such as the costs.

Research question 5 – *What are the solutions?*

After gathering all the information with the previous research questions, we will balance out our findings regarding the current situation and the desired situation. The first part of the question concerns the best options that will both provide solutions to our problems: both general problems found in the problem matrix as well as practical and general problems that are encountered at research question 2. The second part of this research question discusses the best alternatives based on the effort of implementation, total cost of ownership, and the best theoretical option. To give an example of the latter: it could occur that several general problems encountered at research question 2 are caused by the wrong process design in terms of the outsourcing configuration. We will consequently provide some outsourcing configurations, ranging from completely insourcing transport management to fully outsourcing transport management. Theory on the decision of outsourcing as a whole will then help us argue which is the best option, whilst other theory helps us how to design the process or outsourcing configuration.

The recommendation of the best solutions will be as objective as possible, however still need to account for the limitations imposed by the company. The latter is at least the refusal of recommendations that need the *entire logistics function* insourced, and for instance the start-up of a logistics subsidiary. These limitations can all be derived to our scope, that lets us solely research the outsourcing decision of *transport management*, without regarding the other outsourced logistics activities.

2.3. INTRODUCTION TO REMAINDER OF THIS THESIS

So far, all context surrounding the problems, the experienced problems, and some of the causes of these problems have been discussed. Furthermore, a framework on how to achieve the research objective is provided. This objective is to present an optimization or new solution for the current outsourcing situation. In the following two chapters, the process and agreements are mapped out, after which we are able to present solutions to current practical problems and process inefficiencies. However, some problems remain of which we are unable to find a direct cause. We will investigate these problems further using theory, and test whether or not the current situation is workable in the future if the company would want to prevent problems from occurring again.

3. The Initial Outsourcing Agreements

3.1. INTRODUCTION

This chapter documents the agreements and transport-related procedures from the *standard operating procedure documents* or *operations manuals* between the company and the LSP's.

The agreements per business units have been left out due to confidentiality agreements

Goal

The intention of the research on the made agreements is to explore the discrepancies between the agreed situation and the current situation, in order to conclude to what extent all problems are caused by agreements that are not maintained by the logistics service provider or by the lack of these agreements. Providing a clear overview of the extent towards agreements that are lacking or not maintained, is also essential for our solution generation, as we need to consider solutions that prevent these failures in the future.

3.2. AGREEMENTS PER BUSINESS UNIT

3.2.1. BU 2

This section has been left out due to confidentiality agreements

3.2.2. BU 1

This section has been left out due to confidentiality agreements

3.2.3. BU 3

This section has been left out due to confidentiality agreements

3.2.4. BU 4

This section has been left out due to confidentiality agreements

3.3. COMPARISON & CONCLUSION

When taking a look at all 4 operations manuals we observe a difference in the degree of detail. The two operations manuals of BU 1 and BU 2 (both LSP 1) are better structured. Yet, the agreements made between BU 1, BU 2 and LSP 1 are also much more general compared to the agreements with LSP 2, and are therefore open for all kinds of speculations or misuse / opportunistic behaviour in terms of the agreements.

Despite the differences in level of detail, the nature of agreements is similar. The reason for this is that firstly, the company wants all procedures to be as overlapping and general as possible, so that switching LSP's would not be a complex operation. Second, in the beginning of the outsourcing procedure, the sourcing department intended to create a standardized overview for the warehousing & transport process, in order to simplify eventual process changes. Whether the latter is still holding, we will research in the next chapter.

In

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Table 1 [LEFT OUT] on the next page, we summarized the agreements made between all business units and LSP's as mentioned in the operations manuals, as well as whether the agreements were relevant concerning the transport management process. Some remarkable differences concern the providing of the costs of transport, track & trace information, the active monitoring of subcontractors and the option for the company to decide on mutual code communication. Moreover, any checkbox that is not filled in does not immediately imply that the LSP does not provide such a service, but it might be that a specific subject is not mentioned in the operations manual.

As the responsibility of the entire communication and operating processes were handed over to each business unit by the sourcing department at the end of the outsourcing procedure, each business unit carries *own responsibility* of maintaining the process and agreements. This could cause shifts in agreements, or shifts in *tolerance* on the extent that agreements are kept by the LSP, eventually increasing the possibility of different processes or inconsistency between the business units. We should be able to prove this, if we compare the internal processes of each business unit with each other.

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Table 1: Comparison of the made agreements at the beginning of the outsourcing procedure [LEFT OUT].

4. The Current Situation

4.1. INTRODUCTION

In the previous chapter, we have performed reviews on the operations manuals and standard operating procedures set up at the beginning of the outsourcing period for each business unit. In this chapter, we will for each business unit identify and describe the outbound ordering process, and identify the problems experienced within this process.

Goal

The outbound ordering process is the tangent process with the internal transport management process, which is executed within the LSP. Therefore, we have no reliable information regarding the transport management process *within* the LSP. However, in order to research the inefficiencies and problems that occur as a result of misbehaviour by the LSP, or agreements not being maintained, we should research the process where the results of these mistakes occur as problems, thus the outbound ordering process. Furthermore, by comparing the processes per business unit, we are able to find out whether any major inconsistencies exist, and whether these are a cause of the problems.

Eventually, problems or inefficiencies found of which causes cannot be found in unclear or improper agreements, can be used in the second part of this research. Here, we will attempt to find out whether the root of this causes lie in failures within the outsourcing relationship.

Scope

The outbound ordering process (Appendix D: Overview of the Order Process [LEFT OUT]) starts where the company's order desk employees order product transportation from the warehouse where the product is located, to the customer. From this point on, some part of the process mentioned also concerns warehousing operations on the side of the logistics service provider, which we did not intend to research. However, these procedures remain in overlap with procedures regarding the transport management of the LSP, and process failures within the warehousing process (picking & packing) have influence on the efficiency of the transport management process. For these reasons, we will not leave these parts of the process out of account.

Layout

In the next paragraph, we will provide a process flow of the outbound ordering process that is generic for each business unit in terms of *structure*. The *demonstrable differences* in processes between the business units only concerns the place in time where a process is executed, and the person responsible for the process. We will start by describing the generic process, and subsequently identify the differences for each business unit compared with the generic process that is provided, in paragraph 4.3. Thereafter, we will identify the parts in this process where problems most frequently occur, and review whether this is the same for each business unit. In the final paragraph we will attempt to identify the nature of the problems. The reliability of the process research and data collecting methods will be discussed at the beginning of each paragraph where data is collected.

4.2. THE OVERALL OUTBOUND ORDERING PROCESS

Introduction

Appendix D: Overview of the Order Process [LEFT OUT], provides the complete overview of the outbound ordering process, which is also depicted in figure 9 [LEFT OUT]on the following page. Here, the process is split into 5 parts, based on the EDI message that it represents. The first part is the placement of the order by the order desk employees. After this, warehousing operations are initiated at the logistics service provider, until the package is ready to be shipped. From this moment on, the transport management process is initiated, which performance has influence on parts 4 and 5, that are discussed further in this paragraph.

Parts 2 and 3, which are warehousing operations at the LSP, are depicted in the overall process on the next page for the sake of overview, but will not be discussed in the process description in the following sections and in the differences per business unit due to the scope of this research. Moreover, there is no indication of poor performance within these warehousing parts that are of influence of the performance of the transport management process, or parts 4 and 5 in the outbound ordering process. Part 1 however is necessary to address as it shows how the *outbound ordering process* initiates the *transport management process*. The overlap between these two processes is discussed in the subsection after the process overview (4.2.2).

Figure 10 [LEFT OUT] shows the first part as split up from the entire process, where the order desk of a business unit starts the EDI communication. A legend of the shapes used in the process flow charts can be seen below in figure 8 [LEFT OUT].

Data collection

The process flowchart is retrieved from a process flow database of the company, regarding communication and data transfer with the logistics service provider. The process flows were set up prior to the outsourcing transaction in order to allow an effortless transition of electronic communications. For this research, we have edited some parts within the process that either do not occur, or were placed wrong within the timeline.

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Figure 8: Legend of the Process Flow Shapes [LEFT OUT].

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Figure 9: Overview of the complete outbound ordering process split up in 5 parts, that will each be discussed further in this paragraph. A second complete overview is found in Appendix C [LEFT OUT].

4.2.1. PROCESS DESCRIPTION

Phase 1: Placing the shipping order

The outbound order process starts at the moment that the employee at the order desk of a business unit receives the confirmation of a customer order. He or she then creates the order in the ERP system, specifying the product number or ID, quantity, delivery date, customer location, incoterm and restrictions, etc. All this information is logged into the ERP system and automatically send as one EDI message to the logistic service provider. The EDI communication is designed in such a way that all outbound orders are only send to the LSP a few days before the order has to be shipped to the customer. For example, a business unit might receive a customer order of a big project delivery one year in advance. The order specifications are then already put into the ERP system, as a 'draft', but only automatically send out (usually) two workdays prior to the shipment date. The LSP then has two workdays to pick and pack the products (parts 2 and 3, order response and order picking).

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Figure 10: Part 1 of the outbound order process: the company starts the order

Transport management process initiated

From the moment that the order is received, the LSP warehouse personnel had 2 workdays to pick and pack the products that have to be shipped. The communication within these phases are depicted in the overall process of figure 9 [LEFT OUT] as 'order response' and 'order picking'. At the end of these two workdays, the order is ready to be shipped. When the incoterm of the order is Ex Works, the customer arranges transport by themselves, and the LSP's job is ended. In any other situation where the company, therefore the LSP, is responsible for arranging transport, the transport management process is initiated. The LSP employee responsible, now knows the dimensions of the package and is able to select the carrier that is most appropriate of the shipment in terms of package dimensions, destination, and price. It can occur that the company indicates has a *preferred carrier* for a specific client or destination, for instance with sea transport, which is then signed in on by the LSP. Subsequently, the package is picked up by the carrier, and transported to the customer (Appendix A: Operational Transportation Process).

Phase 4: Forwarding of delivery costs

When the shipment is loaded into the truck of the specific carrier, the transport costs are known and sent to the company. The time that it takes for the LSP to provide the company the delivery costs of the shipment differs per business unit, which will be discussed in the next paragraph. The arranged time is that this happens on the same day that the shipment leaves the warehouse (see paragraph 3.3), so that the company is able to invoice the shipping costs on the same invoice as the products (figure 11 [LEFT OUT]).

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Figure 11: Part 4 of the outbound order process: after the order has been prepared, the LSP forward the costs of shipping to the company

Phase 5: Shipping confirmation

The dashed line in figure 12 [LEFT OUT] marks the transition to moment of transportation of the shipment. During this phase, the only EDI interaction is the shipping confirmation that the LSP sends to the company. After that, the LSP sends an email with track & trace information of the shipment, usually only to the customer.

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Figure 12: Part 5 of the outbound order process: the shipment has left the warehouse: the LSP provides track & trace information

4.2.2. TANGENT WITH THE TRANSPORT MANAGEMENT PROCESS

Although no aspects of the activities of the transport management process is shown in the process described, almost all activities within the process depicted are influenced by failures in the transport management process. Clearly, as it is outsourced, the latter is executed at the logistics service providers, whereas the outbound ordering process is executed at the company.

We previously defined the activities of transport management as the monitoring of-and communicating with the carriers that execute transport, as well as the selection and contracting of these carriers. Here, selection means both selection in the initiation of a partnership, as the selection of a specific carrier to execute the transport of a product.

When the transport management process at the LSP is initialised *after* the order is placed by the company, and the package is ready to be shipped, process failures at the LSP will influence phases 4 and 5 within the outbound ordering process. Examples are the delaying of a shipment due to delay in carrier selection, or delay in delivery costs provision to the company due to inefficient processes at the LSP. Furthermore, the communication with the carriers and the monitoring of the shipment could cause problems when not performed adequately by the LSP. It leads to delayed or even no handovers of track & trace information, or delay in delivery of the product in case a shipment is missing. Failing communication can occur when the LSP decides to outsource transport to a third-party carrier, who subsequently might also outsource their transport.

These are all examples of failures or misbehaviour in the transport management process that cause problems within the company. In the next sections, we will examine to what extent these problems occur, and what the exact causes are. First, we will address the differences between the four business units regarding the outbound ordering process.

4.3. ADDRESSING THE DIFFERENCES

Introduction

In this paragraph, we will compare the previously discussed overall outbound ordering process with the individual processes of each business unit. Note that the discussed process flow at paragraph 4.2. is not completely the process as is agreed upon according to a standard operating procedure, which was discussed in chapter 3. The process flow in paragraph 4.2. is currently the same mode of operating for all business units, where only the timeframe and person responsible differ for each business units. This paragraph focusses on these differences in time and employees responsible by analysing the business units per sub-paragraph. At the end of the following four subparagraphs, we will conclude on the differences in the *current* processes of each business unit.

Data collection

Following on the use of the process flow in the previous paragraph, which was made available for this research by the company, we have performed semi-structured interviews with the employees responsible for the outbound ordering process per business unit. The results of these interviews were the employee division regarding the different phases, and the moment in time were the execution of that phase occurs. The employee division is solely based on these interviews. The moment in time were phases occur is on one hand based on interviews, in which we discussed the phases one by one while asking how long it generally takes before a phase is executed.

On the other hand, these answers were cross-checked when information was available. With BU 3 and BU 4, we made use of a portal, where shipment details and some track & trace information are presented to the user (the company). Although this system is not actually used by the business units, the data log is reliable. We used this system to cross-check the time-difference between the order placement (phase 1) and the shipment confirmation (phase 5). This was not possible for BU 1 & BU 2 as LSP 1 does not offer such a system. The amount of time it takes between the order sending and receiving of the corresponding delivery costs has been observed through the interviews, and by checking email communication, which is the medium in which the order-desk employees receive the costs.

4.3.1. BU 1 PROCESS

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Figure 13: Timeline and work-balance of the outbound order process BU 1 (LSP 1) [LEFT OUT].

4.3.2. BU 2 PROCESS

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Figure 14: Timeline and work-balance of the outbound order process of BU 2 (LSP 1) [LEFT OUT].

4.3.3. BU 3 PROCESS

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Figure 15: Timeline and work-balance of the outbound order process of BU 3 (LSP 2) [LEFT OUT].

4.3.4. BU 4 PROCESS

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This figure has been left out due to confidentiality agreements

Figure 16: Timeline and work-balance of the outbound order process of BU 4) [LEFT OUT].

4.3.5. CONCLUSION ON THE DIFFERENCES

By studying the outbound order process for each business unit, we have found some remarkable differences between the business units themselves. The differences can on one hand be explained by the difference in LSP, but even the business units with the same LSP show some mutual differences. Concluding on these differences in this section enables us to depict the inconsistencies between the business units, next to the problems each experiences. This inconsistency is one of the problems that we discussed in section 1.2.2: *miscommunication and different operating procedures for each business unit,* which leads to a lack of overview on the transport management of the LSP.

In the following subsections, we will discuss the mutual differences for *each* business unit. Thereafter, we will depict the business units per LSP, so that we can discuss the differences between LSP 1 and LSP 2.

Differences per business unit

Figure 17 [LEFT OUT] on the next page frames the processes per business unit, along with the LSP that the business unit works with. Again, the strokes within the process timelines do not represent the time it takes to perform one phase. It is clear that for every business unit, there are two days between the ordering of the shipment and the moment that the shipment leaves the warehouse (phase 5). Except for BU 3, where this takes one day longer.

Also, the way in which the business unit divide the work is remarkably different. Both BU 1 and BU 3 have two designated employees, whereas BU 2 has three throughout the entire process. This may lead to more difficulties in solving problems, as for one order, there are two or three different employees to communicate with. For the other business units, one employee is responsible for all phases for *a single order*.

The BU 2 process seems to be the most remote compared to the other business units, as it also takes significant time to receive the transportation costs. Regarding transportation costs, only LSP 1 at BU 1 comes close in meeting the agreements made regarding the provision of these, whereas BU 2 and LSP 1 have no agreements whatsoever.

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Figure 17: The timeframe and workload balance in relation to the contracted LSP of each business unit [LEFT OUT].

Differences between the LSP's

A second aspect to conclude on is the difference that we can observe within the behaviour of the LSP. For this, we have to compare the similarities of BU 1 and BU 2 with the similarities of BU 3 and BU 4 (figure 17 [LEFT OUT]). First, we can observe a longer time in the sending of the shipment and therefore the receiving of the shipping confirmation. At BU 3, this takes one day longer as compared to LSP 1. However, LSP 2 responsible for BU 4 yields the same results as LSP 1.

The most significant difference between the two LSP's, in terms of the outbound ordering process and transport management, is the provision of transport costs. At the business unit where agreements regarding transport costs have been made, namely BU 1, LSP 1 is able to provide transport costs the same day the shipment leaves the warehouse, whereas LSP 2 only provides these at the end of each week, which is contrary to agreements that the costs would be send the day that the shipment leaves the warehouse. We discuss the extent to which agreements are maintained in this process in paragraph 4.5

4.4. ADDRESSING THE PROBLEMS

Within this paragraph, we will first summarize the problems that occur at the business units within the *outbound ordering process*. These problems that occur are both found while interviewing the employees, as well as reviewing inconsistencies in the process. Consequently, in paragraph 4.5, we will research to what extent these problems are caused by agreements that are not being maintained.

For all business units we were able to identify two problems based on the reviewed timelines of the processes in the previous paragraph, and two *additional* problems within the process based on the interviews with the employees. The two problems based on the timeline are:

1. The LSP does not provide the transportation costs in time;
2. The inconsistency in BU-specific division of responsibilities per employee.

The two problems based on further conversations with the employees at each business unit are:

3. The LSP does not provide regular or sufficient track & trace information to both the customer as well as the company;
4. Escalations as a result of errors in the transport management process are extremely time-consuming and occur frequently.

In the following subsections, these problems are *explained in more detail*.

Transport costs

The provision of the transport costs is the responsibility of the LSP within phase 4 of the outbound ordering process. As can be seen in the overviews given in the previous paragraph, it differs per business unit when the costs of a specific shipment are provided by the LSP. The consequence of the delayed provision of transport costs is that the business units are not able to invoice the transport costs on the product invoice. Consequently, this causes double communication effort to the client, and delay in earnings. The latter will not be very dramatic if the delay is a few days, but in the case of BU 2 this delay could lead up to several weeks. The biggest disadvantage in the delayed provision of the transport costs is however the double work that employees have to perform, as they often have to invoice twice. This issue only seems to not exist at BU 1, where transport costs are provided on a daily basis.

Inconsistency

One problem that we addressed in section 1.2.2, states that inconsistency in communication and knowledge of procedures between the company's business units cause miscommunication, and a lack of overview of the transport management process of the LSP. This problem is indeed one problem that we are able to identify and proof by reviewing the processes for each business unit, and the inconsistency is depicted in 4.3.5. However, as opposite from the other problems regarding the outbound ordering process, this problem is not caused by LSP behaviour. It was caused as each business unit was given own responsibility for communication with the LSP, and no internal communication or superordinate agreements were set up since then. This is however all addressed in section 1.2.2, yet now proven by process review.

Track & Trace

In case a shipment is not sent via a parcel service (UPS for example), the LSP employees lack in providing track & trace information to the company, except for the LSP employees responsible for handling products of BU 1. Lacking track & trace information results in clients contacting the company's employees about the whereabouts of their shipment, whereas the outsourcing of transport management was intended to let these kind of issues be solved by the LSP. However, the LSP sometimes lacks to send track & trace info along with the shipping confirmation. Consequently, this means extra trouble-shooting work for the company's employees.

Escalation

The overall outbound ordering process depicted in Figure 9 [LEFT OUT] shows multiple events where *escalation* occurs in case something in the process goes wrong. The problem according to the employees of the business units is that these escalations are very time-consuming and are frequently caused by LSP misbehaviour such as a missing shipment or bad communication towards the end customer. Although caused by the LSP, we already stated in 1.2.2 that they do not take responsibility for their actions, and what follows is therefore time-consuming communication to solve the problem. Any smooth error handling is being hindered by the many parties or employees involved in a conflict. When a LSP assigns a third-party carrier to handle the transport, four levels of communication exist (the company – LSP – third-party carrier – customer). Within BU 2, this error handling is the worst, as the company element within the communication chain is again split up in three employees.

To make matters worse, the nature of the products of BU 2 require high coordination efforts regarding transport and time-management. In case of any error, it is not only challenging to solve the problem within a specific time frame (especially when the shipment is already en-route), but also to locate the problem as the entire chain of communication has to be walked through. This problem seems to have the highest impact within BU 2, but is also a significant issue at the other business units.

Although above problem cannot be fact-checked within communication systems or by reviewing the process-timeline, it is highly assumable that escalations take a significant amount of effort to solve due to the inconsistency between business units, LSP behaviour (1.2.2), and no agreements regarding escalation (3.3).

In the next paragraph, we will determine which of the above problems are caused, or solvable by the agreements (or a lack of them) as discussed in chapter 3, and which problems are not, and that are therefore accounted for in literary research.

4.5. REVIEWING THE PROBLEMS AND AGREEMENTS

In the following sections, we will review the problems stated in the previous paragraph and attempt to determine the causes, *based on the agreements discussed in chapter 3.* Furthermore, we will discuss other agreements that do not lead to problems that we found in this research, but that could lead to problems in the future. Finally, we will summarize the problems that are left, of which we did not find a cause within the agreements as discussed, and that will consequently be subject to literary research in the following chapter.

4.5.1. PROBLEM CAUSES

For the problem of provision of transport costs, we can quickly conclude that it is caused by agreements not being met. This also holds for the problem regarding track & trace information.

Transport costs

The transport cost problem causes difficulties at each business unit except for BU 1. In the operations manual between BU 1 and LSP 1 however, it is agreed upon that transport costs are to be send to the company *before* the shipment is loaded into the truck, whereas this now happens at the end of each day. All in all however, this does not lead to any problems and perhaps even does lead to a better overview for the employees.
In case of BU 2, where the delay in receiving transport costs is a big and time-consuming issue, we observe that there are *no* agreements related to this, which is obviously the cause of the trouble.

BU 3 and BU 4 have an almost identical agreement list, where we can see that LSP 2 has to provide transportation costs for each shipment on the day that it leaves the warehouse. This is obviously not the case, therefore the cause of this problem at BU 3 and BU 4 is also agreements that are not being followed. Furthermore, in the same agreement line, we see that LSP 2 intends to set up an EDI interface for transport costs communication, that allows instant invoicing of the transport costs on the product invoice.

Track & Trace

The track & trace issue again seems not to be of any problem at BU 1, as earlier discussed, where its LSP (LSP 1) provides track & trace information to the customer each time it arranges transport (when parcels are shipped, provided by parcel deliverer). This is also in accordance with their agreements, even though this agreement was that LSP 1 would only supply track & trace when requested.
At BU 2, the same agreements have been made regarding track & trace as with BU 1, namely the supplying of track & trace information on *request*.

Considering BU 3 and BU 4, we see that the agreement is that the company receives track & trace information for every shipment. Reality is that LSP 2 only provides track & trace information when transport is executed by their own transport subsidiary, not when transport is outsourced by them and executed by a third-party carrier. As stated earlier, BU 3 and BU 4 use a logistics portal, where each shipment can be viewed and followed. However, suitable track & trace information is frequently missing here, or incomplete. Track & trace is therefore available with LSP 2, but not used as it only provides limited information, and is difficult to share with the company's customers.

The problems of inconsistency within the business unit processes and escalations are both difficult to link to agreements not being followed-up by the LSP. The first one, inconsistency, is however caused by lacking superordinate agreements for all business units and set procedures. This is however beyond the scope of the agreements as addressed in chapter 3.

Escalations

There is one agreement between BU 1, BU 2 and LSP 1 that would make escalations less time-consuming, that is not being followed. The agreement states that the company's customers are allowed to contact LSP 1 regarding freight related issues. The reality is however, that in case of error, escalation, or other questions, the customer first contacts the company's employees. This is understandable in the customers perspective however, but the remarkable issue is that if LSP 1 is being approached with questions by the customer, they forward the customer to the company. Consequently, the company's employees are involved in questions and escalations for which the LSP is responsible, agreements have been made and for which the company is paying the LSP in order to be relieved of these issues.

No further agreements or contracts exist regarding the behaviour of the LSP, or procedures and responsibilities in case of escalations or errors within the transport management process or the outbound ordering process. Of course, we are then able to state that the lack of agreements is the cause of these problems. Yet, it also lets us assess whether the root cause of the problems, that are probably too diverse to cover with agreements and contracts, could be in the configuration of the outsourcing relationship, as we defined to be the subject of the second part of this research in 1.2.2.

4.5.2. OTHER AGREEMENTS

This section has been left out due to confidentiality agreements

4.6. SUMMARY OF RESEARCH

The research that we have performed until now comprised the exploratory research on inefficiencies in the process, and the problems and causes within it. We were able to find 4 problems by reviewing the *outbound ordering processes* for each business units. These are:

1. The LSP does not provide the transportation costs in time;
2. The inconsistency in BU-specific division of responsibilities per employee;
3. The LSP does not provide regular or sufficient track & trace information to both the customer as well as the company;
4. Escalations as a result of errors in the transport management process are extremely time-consuming and occur frequently.

Problem 1 and problem 3 were demonstrably caused by agreement not being met by the logistics service providers, whereas problem 2 is caused – as earlier stated in 1.2.2 – by the lack of subordinate agreements. The problem of escalations was assumed partly caused by the lack of agreements and procedures regarding communication and problem handling (of which none exist according to chapter 3). However, solving this is hindered by the second problem of process inconsistency, and LSP behaviour. Based on this chapter, we are therefore able to verify our core problem, that is that *process inefficiencies* are caused by lacking agreements and non-maintained agreements.

Outsourcing configuration

The LSP behaviour, which includes lack of responsibility, and the reason that the LSP's do not maintain agreements, will be subject to further research, as clearly not all problems can be solved by adjusting agreements or setting up more. *Process*-related problems, such as problems 1 and 3, can be solved by this, but we should further research the *outsourcing relationship* in order to provide a better understanding in the root cause of these problems and lack of agreement maintaining, and eventually provide solutions for it that prevent the experienced problems from happening in the future.

In addition to literary research on the outsourcing relationship, while regarding escalations and the behaviour of the LSP in terms of not following agreements, we will also take some other problems regarding the outsourcing relationship into account, that were first addressed in subsection 1.2.2. These are:

- *The company is not the number 1 priority of the LSP's;*
- *There is no overview or transparency on the transport management of the LSP's;*
- *The company has no insights in the reliability of the tariffs and bills imposed by the LSP.*

All these issues can be regarded as LSP behaviour within the relationship, whereas the escalations and agreements could be regarded as the form of the outsourcing relationship, or configuration. These will be subject of research in the following second part of this thesis, namely the literary research, after which we are able to construct solution to optimize the current situation. Literature that we will focus on will thus regard outsourcing decisions and governance, and the levels of outsourcing within logistics.

5. Literary Research

5.1. INTRODUCTION

In the following chapter we will discuss several scientific papers and theories that will help us conclude on the best situation for the company, concerning in- or outsourcing transport management. The first paragraph of this chapter will elaborate on the different outsourcing theories that help us later to conclude on what configuration would be best for outsourcing the company's transport management. Later in the first paragraph, we will provide information regarding the different levels of logistics outsourcing, along with the outsourcing spectrum in general and the types of logistics service providers.

5.2. SELECTING OUTSOURCING THEORIES

Perunović & Pedersen (2007) provide us with a literature study of research papers relating outsourcing. A selection of 25 papers was made that all describe one or two theories used in the make-or buy decision of firms. The conclusion of the research is that at the beginning of outsourcing arrangements usually a cost stage ocurs, which is grounded in *Transaction Cost Economics (TCE)* and *Agency theory* (Gottschalk & Solli-Saether, 2006). After several years within the outsourcing process, the focus shifts into the resource stage, where *Resource-based view (RBV)* and *core competences* are the most important explanatory theories. At the end, which implies the evaluation stage or stage of partnership, explanations are sought in relational view, social exchange, and the stakeholders theory.

A vast amount of research has been performed on outsourcing decisions, and many theories are used. However, further research on literature reviews within outsourcing decisions learn us that several authors reinforce the conclusion of Gottschalk & Solli-Saether. The use of theories depends on the context of the organisation considering outsourcing, where the 3 central theories are *Transaction Cost Economics (TCE), Resource-based view (RBV) and Relational View* (Elmokrini et al., 2015).

Hsiao et al. (2010) also identify *TCE* and *RBV* as the two major approaches, furthermore naming *Supply Chain Management Theory.* Also, Fadile et al (2018) state in their research that *TCE* and *RBV* are the theories most generally discussed in the literature.

As existing literature reviews mostly refer to the *Transaction Cost Economics Theory* and the *Resource Based View Theory*, this provides us enough confidence to further elaborate on these theories in detail in the next sections in order to eventually review the company's outsourcing decision. Furthermore, we decide to consider a third theory, namely the *Agency Theory,* as we argue that this theory is best able to explain the different aspects of the outsourcing relationship. In the following sections, we discuss these theories in more detail.

5.3. TRANSACTION COST ECONOMICS THEORY (TCE)

The transaction cost economics theory (TCE) is one of the prevailing theories in management studies regarding outsourcing. According to Coase (1937 *in Ivanaj & Masson Franzil (2006)*, every company will expand as long as the company's activities can be performed cheaper within the company, than by outsourcing the activities to external providers. The costs of performing these activities (i.e. logistics activities) are referred to as transactional costs.

Above described foundations of TCE theory have been repeatedly enhanced by Williamson (1975, 1985a), who writes that "a transaction may thus be said to occur when a good or service is transferred across a technological separable interface". This transaction may create costs that are the result of *friction* within the economic system. Williamson (1985a) consequently calls these costs 'transactional costs', that can be used to outweigh in-or outsourcing costs as described above. Transaction costs can be divided into three categories:

- Information costs, that correspond with seeking information on a potential partner;
- Bargaining costs, related to negotiating and establishing contracts where all possible situations in future transactions are considered;
- Enforcement costs, costs to enforce control performance, resolve conflicts and renegotiate contracts.

Transactions are furthermore characterized by three major dimensions: *asset specificity, uncertainty,* and *frequency* (Williamson, 1985a).

Asset specificity

Asset specificity is a very important determinant for TCE in the field of logistics (Paché and Sauvage, 1993 *in Ivanaj & Masson Franzil (2006).* Asset specificity relates to the fact that the activity of physical distribution, or in our case the management of physical distribution, may sometimes require special handling depending on the non standard products or market it adresses. This incurs that assets with a high specificity have great value within an exchange relationship mostly due to contractual exceptions, and are therefore of little value outside of this exchange. One example could be specially trained employees. Six types of asset specificity are defined, regarding the nature of the asset: *site specificity, physical asset specificity, human asset specificity, brand name capital, dedicated assets, and temporal specificity* (Williamson, 1991b).

Due to irrecoverable costs of investments made by logistics service providers due to the asset specificity of their clients products, risks of *opportunistic behaviour* by the LSP are almost inevitable (Ivanaj & Masson Franzil, 2006). This situation has been reinforced by multiple other reseraches in the field of logistics (Aertsen, 1993; Beier, 1989; Maltz, 1993, 1994; *in Ivanaj & Masson Franzil, 2006*). This situation of increased opportunism by LSP's as a result of asset specificity and poor contract complexity will be discussed further up in this chapter.

Uncertainty

The second important dimension of transaction costs, uncertainty, is the general description of *environmental uncertainty* and *behavioural uncertainty*. Environmental uncertainty considers the circumstances surrounding an exhange, which in logistics outsourcing can be demand, supply and technology uncertainty (Huo et al., 2018). Behavioural uncertainty reflects the ability of performance verification (Rindfleisch & Heide, 1997). We argue that within this research, *behavioural uncertainty* is more relevant to explore further, as *environmental uncertainty* considers uncertainty regarding products and supplies rather than increased transaction costs as a result of behaviour. Considering the main problem of this thesis, we assume that an increase in costs of outsourcing as compared to insourcing is caused by behaviour of the LSP, and to a lesser extent caused by environmental uncertainty, as environmental uncertainty would also occur when managing transport would be executed in-house.

The negative impact of behavioural uncertainty on transaction costs is associated with negotiating, monitoring and executing arrangements (Schoenherr, 2010), which are subjected to *bargaining transaction costs* and *enforcement transaction costs*, as two of the three main transaction cost categories.

Frequency

The third transaction dimension is *transaction frequency*. The higher the transaction frequency of a certain product or service, the more firms should look for a hierarchical governance form (see next subsection) (Williamson, 1985a). However, empirical research regarding the effects of transaction frequency on transaction costs is scarce (Rindfleisch & Heide, 1997). Also after 1997, we were not able to find literature that was deemed sufficient for us to consider it in our research.

Governance structures

The different levels of above described transaction features require different governance structures of the transaction concerned. There are three main governance structures: *market governance, hierarchy governance*, and *hybrid governance* (Williamson, 1985a). Market governance relates to spot transactions, where relationships and identity of the transacting parties is not relevant. The transactions within a market governance are governed by formal terms and characterized by 'hard bargaining' (David & Han, 2004).

Hierarchy governance, or internal organization, is a governance structure within a transactional relationship where disputes are resolved internally, as opposite to market governance. It can be regarded as close to vertical integration (figure 18). Parties work out differences themselves or submit any unresolved issue to entities higher in the *hierarchy* (David & Han, 2004).

In-between market governance and hierarchy governance are *hybrid governance* forms, where parties maintain autonomy as with market governance, however maintain a mutual dependency. Hybrid governance forms are supported by a more elastic and adaptive contract law compared to classical contract law. Logistics outsourcing relationships may be seen as hybrid governance, where each outsourced activity (such as warehousing or transport) accepts different contract provisions. Some examples of hybrid governance structures are: licensing, contracts (figure 18), franchising, or joint ventures.

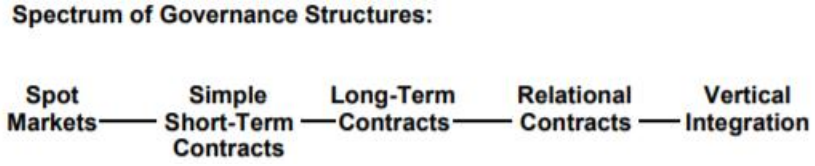

Figure 18: The spectrum of governance structures (Pint & Baldwin, 1997)

Opportunism

The Transaction Cost Economics theory states that increased transaction costs give rise to opportunistic behaviour such as whithholding critical information, unfulfilling promises, and contract breaching. When the status or performance of a certain service is difficult to track, logistics service providers could exploit the information asymmetry (Huo et al., 2018). Specific assets create a lock-in situation with high switch costs, increasing transaction risks and therefore opportunism, where the investing party (in our case the company), will be vulnerable to the invested party.

Bounded Rationality

Bounded rationality is the assumption that someone does not know everything that he or she should know in order to make an optimal decision. In other words, most transactions occur with limited information (Williamson, 1985). Furthermore, bounded rationality limits the capability for market governance and simple contracts (hybrid governance) to handle asset specificity, as the parties involved in a transaction cannot foresee and contract all possible emergencies or contingencies (Pint & Baldwin, 1997).

5.4. RESOURCE-BASED VIEW THEORY (RBV)

The Resource-Based View theory can be considered in outsourcing decisions regarding certain resources that a company may or may not possess. It differs from the earlier discussed TCE theory in the sense that RBV focuses on *resources, capabilities* and *competences* of a firm rather than *transactions*. In this perspective, RBV could be seen as a tool that can be used to justify *strategic* outsourcing decisions. In strategic outsourcing, the outsourcing arrangement emerges when firms identify their existing capabilities not sufficient enough to be of significant added value to the supply chain, and search for partners able to complement these capabilities in order to increase this added value.

Most research tends to discuss the RBV as a tool to assess competitive advantage of a firm. For that, the RBV rejects two hypotheses of Porter stating that sustaining competitive advantage depends on the position of the markets and products (Espino-Rodríguez & Padrón-Robaina, 2006). According to the RBV, this determining factor of sustainable competitiveness is however caused by the imbalance in the possession of resources and capabilities between companies, which causes differences in performance over time (Wernerfelt, 1984).

Within outsourcing decision-making, the RBV considers an organisation able to exploit resources by means of agreements with the market instead of extending the boundaries of the company. In other words, it helps to decide which resources are suitable to be exploited by market contracts (outsourcing), and which resources should be kept in-house (Silverman, 1999; *in Espino-Rodríguez & Padrón-Robaina, 2006*). This exploitation most likely occurs when tangible or intangible resources are specific and idiosyncratic. Idiosyncratic resources are valuable, rare, inimitable, and non-substantiable, which are the determinants of a firms performance (Barney, 1991).

Core competences

As a decision framework on underexploited resources and the outsourcing of those resources is more related to resources in production, we try to explore another approach that will help us better review the outsourcing of a specific function. In our case, the function of transport management within the outbound distribution of a company. One of the most used frameworks that can be used to explain or decide on outsourcing that is based on RBV is the *core competences* approach.

The approach states that an organization has to invest and focus on resources and activities that are core competences, and outsource or purchase any other activities (Prahalad & Hamel, 1990).
Three tests can be applied to identify the core competencies within a company:

1. A core competence has the potential to provide access to a wide variety of markets
2. A core competence has to be an important contribution to the perceived customer benefits of the end product
3. A core competence needs to be difficult for competitors to imitate

Above three tests can aid a firm to decide on whether to outsource a certain product or not. Although the tests are more related to a product or innovation rather than a service (i.e. logistics), we still assume that the tests are of significant importance for *our* decision regarding a specific service. Moreover, one of the reasons for the company to outsource transport management has been that it was not their core business.

Additionally, it is still a very straightforward move to outsource the logistics function because for any logistics service provider, logistics *is* a core competence, therefore also transport management. The failure however lies within the fact that the outsourcing of the logistics function has not been considered in different parts, but as a whole. We see however, that the smaller part of the logistics function, namely transport management, does present some resemblance with a core competency, as the success and quality of outbound distribution plays a significant part in perceived customer benefits and the added value to the company's image of high quality. The control of this outbound distribution is the transport management; therefore transport management performance is critical in order to be successful.

Although there is few to no literature available that considers core competencies and the outsourcing decision. The decision matrix below (Ogorelc, 2007) provides a general inside in the make-or buy decision based on whether logistics is a core competency and whether logistics is a critical success factor in the market. If we assume that replacing *logistics* with *outbound distribution* yields the same results in figure 19, we see that if outbound distribution is not a core competency, but still a critical success factor in the market, it is advised to outsource functions, but maintain control of the process. Concerning *outbound distribution* for the company, this would imply outsourcing operational functions such as transportation, but maintain control of the process. Control of the *outbound distribution process* is done via transport management, which means that this matrix suggests to maintain transport management in-house.

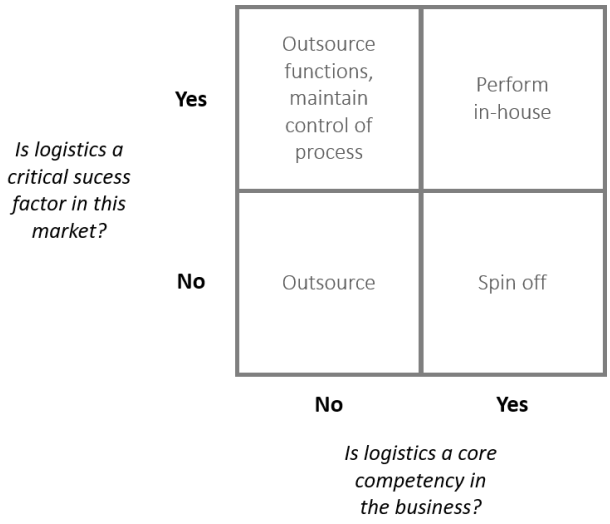

Figure 19: Logistics outsourcing decision model (Ogorelc, 2007)

Contradicting the outsourcing of non-core competencies

As traditional theories about outsourcing decisions are already discussed for a long period of time, naturally, arguments and empirical researches arise that contradict these theories. In case of the decision to outsource processes that are not a core competency of a business, some authors have begun to argue to also account for contextual factors inside and outside the company (Ogorelc, 2007). In addition to this, Stojanović (2012) defines six paradoxes in logistics outsourcing research. One of these, namely the fourth paradox, is of significant use for this research when discussing the make-or buy decision based on core competencies. The research states that pertinent literature typically suggest to outsource activities not recognized as core activities. However, some authors (Langley (2010), Wilding & Juriado (2004), Aas et al. (2008) *in Stojanović (2012)*) argue that practical experiences have shown the imporance of keeping control and in-house expertise on outsourced activities. This leads companies to regocnize the need of outsourcing arrangements and contracts. This holds extremely true for logistics, so is argued, as it remains critical for managers to have a comprehensive view and knowledge of the logistics process, next to a high level of competency, regardless whether it is outsourced or not. This emphasises our discussion on the transport management function of logistics being a core competence. As we earlier mentioned, the process of transport management shows some similarities with a core competency due to the contribution of perceived customer value.

5.5. AGENCY THEORY

Agency theory is the final theory that we address within this theoretical framework. The Agency theory is, as opposed to TCE and RBV, a theory that can be used to evaluate or solve problems when a certain product or service is already outsourced. It is usually considered later in the later stages of the outsourcing phase, for instance when reconsidering or managing relationships (Perunović & Pedersen, 2007).

Agency theory addresses and resolves the different problems that can arise within an Agency Relationship. An Agency Relationship occurs when one entity – the Principal – hires or contracts another entity – the Agent – to act on its behalf. This relationship also occurs within outsourcing, where the firm that outsources an activity is the Principal, and the firm that the activity is being outsourced to is the Agent.

The most common reason for an issue to arise within the agency relationship is when the agent, or provider, does not make decisions that are in the interest of the principal, the user. This in spite of the fact that agreements are often made between the two parties to serve the interest of the principal, otherwise the principal would not bother to initiate the relationship in the first place. Reframing the latter in the situation of this thesis: the company would outsource their transport management with the expectation that the LSP would satisfy their interests, otherwise there would not have been any contract at all. The problem occurs however, when this decision that is against the interest of the principal, does provide benefits for the agent itself, thus at the expense of the principal (figure 20).

The previous problem can also be amplified when the principal, or user, is not able to control or verify what the agent, or provider, is doing. The agent is then simply not transparent about its processes or decisions. Costs or losses that arise as a result of agents acting in their own interests is called *agency loss*. This is one problem that arises within the agency relationship. Another problem occurs when the agent and the principal both have different opinions or attitudes towards risk. Different actions related to the outsourced service could be taken as a result of this difference in risk perspective.

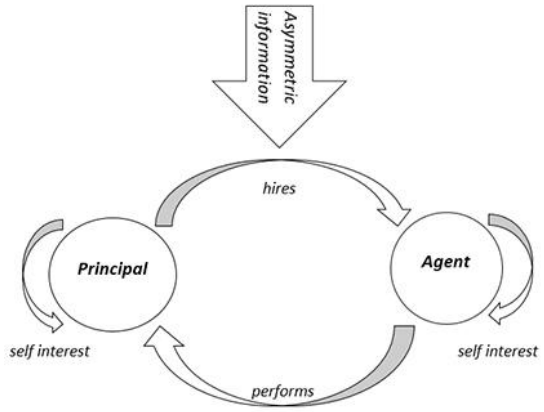

Figure 20: Conflicts within the Agent-Principal relationship

There are various methods to improve this outsourcing – or agency relationship by means of *contract improvement* (Logan, 2000). Agency costs – which could be seen as the costs that cause *agency loss* – include costs of "structuring, monitoring, and bonding a set of contracts among agents and principals with conflicting interests. They also include the value of output lost when the cost of enforcing the contracts exceeds the benefits of the contracts" (Fama & Jensen, 1983; *in Logan, 2000).*

Contract improvement

Contract improvements focus on either rewarding the *behavioural performance* or the *outcome performance* of the agent (supplier) (Eisenhardt, *in* Logan (2000)). *Outcome based contracts* align the goals of the agent with that of the principal, and the risks involved are shifted to the agent. An example of outcome based rewarding could be flat rate fees based on delivery or customer satisfaction. Another one could be a rewarding scale based on KPI performance, although the latter would be rather sensitive for misuse due to the problem of information asymmetry. *Performance based contracts* (behavioural performance) shift the risks involved towards the principal, as the agent is paid based on performance and effort rather than outcome. This means that the agent is paid regardless of the results, which could lead to lack of motivation to get the job done, as reward will be there anyway. Examples of performance based rewards are payment in hours or miles. Furthermore, performance/behaviour based contracts are in line with hierarchical governance, whereas outcome based contracts in line with market, or spot governance. Considering above, the agent will probably be more likely to act in the interest of the principal when a contract is based on outcome instead of performance (Eisenhardt, *in* Logan (2000)).

In addition to the contract forms, there are some propositions to control agent opportunistic behavior, which has the potential to occur when agents know more thatn the principal (Sharma ,1997; *in Logan, 2000)*. Some of these that are applicable to this thesis are:

- Use community reputation and third-party consultant evaluation to audit the agent
- Require the agent to make investments that are specific to this contract or outsourcing exchange
- Engage in long-term relationships

Next to proper contract complexity, audits and a conforming organizational/governance form are essential in order to prevent opportunism (Arif et al., 2018). Furthermore, asset specificity, performance measurement difficulties, and uncertainty require contractual complexity in order to reduce opportunism and improve control on LSP performance (Williamson, 1991; *in Arif et al., 2018*).

5.6. LEVELS OF OUTSOURCING LOGISTICS

When reviewing research on decision-making on logistics outsourcing, one needs to account for the different service levels, that are based on the requirements of firms that are outsourcing. The services of outsourced logistics has been extensively studied by Fadile et al. (2018), wo analyzed twelve previous studies on this issue, ranging from 1996 to 2016. Consequently, the logistics services were decomposed into *three* categories:

- Category 1: refers to **basic logistics services**, such as transportation and warehousing. Activities at this level are outsourced to a large degree in companies;
- Category 2: refers to **value-added logistics services**. Examples are re-labelling and re-packaging, or final product customization;
- Category 3: refers to **advanced logistics services**, such as inventory and transport management, or distribution network design and road carrier selection. Activities at this level are less common to be outsourced than the previous levels.

An overview of the exact activities per service level, according to the analysis of twelve studies by Fadile et al. (2018), can be found in Appendix E: Categorization of Logistics Activities into Service Levels. Later in this research, we will use this overview to determine to what extent the company has outsourced their logistics activities.

5.6.1. LOGISTICS SERVICE PROVIDERS

The term logistics service provider has been used numerous times already within this thesis. Furthermore, existing literature defines the term in numerous ways. We define a logistics service provider to be "an external provider who manages, controls, and carries out logistics services on behalf of a firm (the service user)" (Hertz & Alfredsson, 2003).

Logistics service providers are classified in all sorts of ways within existing literature, according to the level of logistics services that they offer. However, the most frequent and conventional classification based on offered services happens through the distinguishing of the six main families of logistics service providers present on the market. These are 1PL, 2PL, 3PL, 3PL+/LLP, 4PL, and 5PL. We will adapt this classification in our research, as logistics service providers themselves also use this classification in practice, to indicate the level of service they offer to firms. For interpretation, figure 21 on the next page provides a schematic overview of the LSP 'families' and their tasks, along with a view of proactive or reactive behaviour per type.

1PL, or first party logistics, is the terminology used for companies that have their logistics in-sourced. The company owns all the logistic assets and performs all logistics operations in-house.

2PL, or asset-based logistics companies, manage the simple execution of traditional logistics functions such as transport, material handling, and warehousing.

3PL, is what most conventional LSP's are classified as. 3PL evolved from 2PL as LSP's started to integrate the traditional logistics operations that were provided separate beforehand. 3PL logistics providers can provide value added operations such as cross-docking or inventory management.

In 3PL, the relationship between the firm and the LSP can be described as logistics alliance or strategic alliance, that is a close relationship between and outsourcing company and a logistics provider under long-period contract (Skjøtt-Larsen, 2000). 3PL, or thus third-party logistics providers, both carry out the transportation of customer products themselves, or outsource transport to third-party carriers.

3PL+, or LLP (Lead Logistics Provider), is a type of LSP that offers the same logistics services as 4PL LSP's but differ in the means used. A 3PL+ is a mixed-assets provider, as it carries out its customers logistics services by using both own assets and those of other LSP's. An LLP or 3PL+ could therefore be considered as a 4PL that *has* assets such as trucks and warehouses, whereas the 4PL *has not* (figure 21).

4PL, (Fourth Party Logistics) is the next evolution of logistics services providers and developed on the basis of 3PL. Fourth party logistics providers differ from the other providers in the sense that they have no tangible assets (trucks or warehouses), but rather provide engineering services. It integrates resources of itself and other service providers to design and manage complex supply chains. Overall, a network orchestrator (=4PL) takes over coordinative and administrative responsibility for their customers, and takes over responsibility for the effectiveness and efficiency of the logistics system of its customer (Delfmann et al., 2002).

Complementing the orchestration responsibility of fourth party logistics providers, we distinguish three levels of *network orchestration* (van der Vorst et al., 2007; Bijman et al., 2006). First, horizontal orchestration, which incurs that all logistics activities from or to a (single) company are orchestrated. For example, coordinated transport from multiple suppliers/manufacturers of semi-products to the final assembly factory. Second is vertical orchestration. This implies that all logistics activities of multiple stages within a certain supply chain are centrally orchestrated, which could be the activities from primary producer to end customer, including the in-between located stages (warehousing). Last is network orchestration, which implies the combination of the two above, as it is the orchestration of activities over multiple suppliers, multiple customers and therefore multiple supply chains.

5PL, finally, is a new concept developed to serve the e-commerce market. 5PL providers manage all parties of the supply chain in the conjunction with e-business, and the major focus of a 5PL is to offer automated and intelligent systems able to improve the performance of the supply chain and the key of success of this is the integration of information technologies and computer systems.

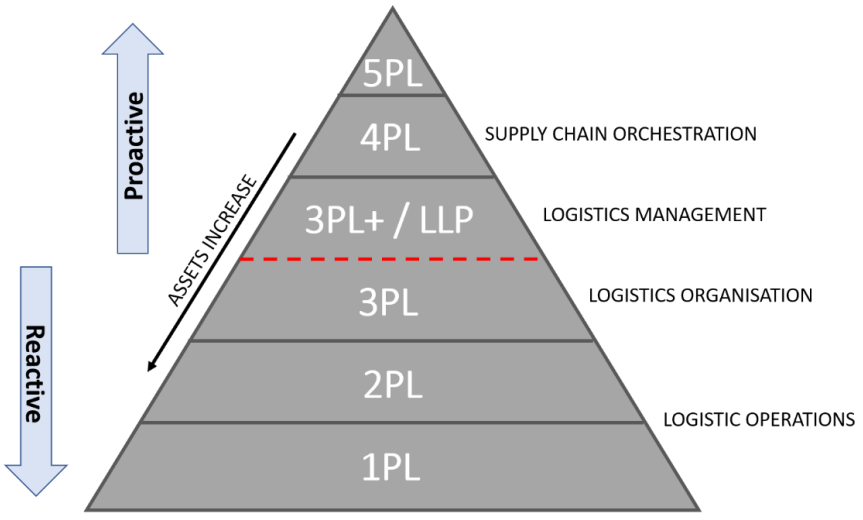

Figure 21: Categorisation of the LSP families, and the nature of their tasks.

5.6.2. THE OUTSOURCING CONTINUUM

In addition to the levels of outsourcing that we discussed in the previous subsection, figure 22 below presents the outsourcing continuum within logistics, that is based on the degree of asset management of a firm that outsources (Rushton & Walker, 2007). Within this abstract, firms can choose to position themselves at any point on this continuum. Although it is rather difficult to compare the abstract below with the levels of outsourcing logistics activities discussed in section 5.6, as the abstract focuses on *asset possession of firms* rather than the *services that LSP's have to offer,* we attempt to relate these topics using the extremes of both.

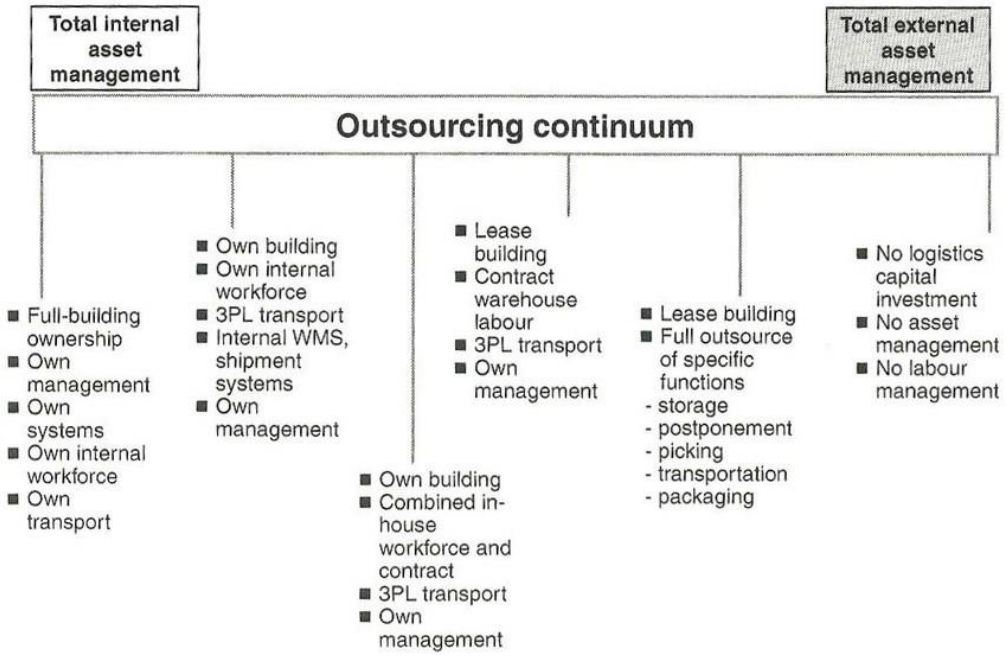

Figure 22: The logistics outsourcing continuum (Rushton and Walker, 2007)

At one side of the spectrum there is total internal asset management, where companies keep all logistics operations in-house, similar to 1PL companies. On the other side, a firm may pursue total external asset management, where companies outsource all of its logistics operations and undertakes no capital investment, asset management or workforce management (Rushton and Walker, 2007). The latter can be compared to outsourcing on a category 3 level, to for example 3PL or 4PL/LLP logistics companies. In real terms, the two extreme positions (on the left and right hand of the spectrum) are quite rare, with most large firms trying to achieve a balance of internal and external assets for strategic reasons (Coe & Hess, 2013).

6. Total Cost of Ownership

6.1. INTRODUCTION

Literary research on the topic of *total cost of ownership* enabled us to conclude that the question initially proposed by the company: "*Based on total cost of ownership, has outsourcing transport management been a good choice or not"*, is not the right question to provide an answer to the outsourcing decision. The reason for this is that Total Cost of Ownership is a tool to determine *all costs* associated with a product, during its entire *lifecycle*. When determining Total Cost of Ownership within an outsourcing relation, or service, several transactional costs should be accounted for that are not possible to measure. Examples are maintenance costs or costs of field failures.

In Appendix F: Literary Research on Total Cost of Ownership, the entire literary research on Total Cost of Ownership models and elements is provided. Below, we will in short summarize the findings, and the elements of this approach that we use in order to calculate the cost differences in the new solutions.

Components and cost drivers

The TCO model that we partly use fits a customer service model by Lalonde & Zinzer (1976) into the TCO concept (Ellram & Siferd, 1993). The view bases the elements of TCO on the order in which costs are incurred, namely *pretransaction*, *transaction*, and *posttransaction*. Examples of components that should be accounted for when determining costs of each transaction phase are:

- Pretransaction costs: identifying need, qualifying sources, and educating both internal employees as the employees of the supplying company;
- Transaction costs: price of product/service, delivery, tariffs, inspection, follow up and correction;
- Posttransaction costs: field failures, customer goodwill/reputation of firm, cost of repair parts.

Within this thesis, we could therefore determine for instance posttransaction components of the transport management transaction as *customer goodwill, firm reputation,* and *costs incurred when maintaining these.* However, this shows the difficulty to approach the outsourcing decision by TCO, as the costs of these components are 1) not measured by the company, and 2) very difficult to quantify as they are abstract variables. Also, pretransaction costs were never recorded.

Total Cost of Relationship

Above comments about the difficulty of determining TCO in this context are reinforced by further literature research regarding TCO and logistics outsourcing (Maltz & Ellram, 1997). Logistics outsourcing, or transport management as being a part of the logistics process, is fundamentally different from component outsourcing as it involves acquiring a *process* rather than a discrete quantity of parts or products. Therefore, a modification of TCO is proposed, which is called Total Cost of Relationship (TCR). However, although this literature provides a valid point about the lack of services consideration in conventional TCO methods and components, it also states that the quantification of the added costs in TCR (such as customer benefits and monitoring) is uncharted territory and very complex. Therefore, we will not consider a TCR approach to justify and review the outsourcing decision in logistics, but above discussed information can still be useful in determining which cost drivers we will consider when evaluating the outsourcing decision. This consideration will be elaborated on in the next paragraph.

6.2. COST CALCULATION IN THE TRANSPORT MANAGEMENT PROCESS

In this paragraph, the cost drivers (within the three previously mentioned cost component phases) that we will focus on in this research, are determined. When using TCO, or any other cost analysis within the make- or buy decision, it should be approached as an *incremental cost analysis*. In other words, only the costs that are added, or increase/decrease as a result of the in-or outsourcing should be regarded (Ellram, 1995). This can be summarized as follows:

1. What current costs will be eliminated?
2. What additional costs will be added?
3. What current costs will change?

We will take above statements into account when considering the cost drivers that we deem possible to calculate. We have previously mentioned cost drivers within the pretransaction and posttransaction phases that are not possible to calculate, as they were 1) not recorded, and 2) some are too abstract to quantify (i.e. customer satisfaction). The costs that are however relatively easy for us to compute and access, within the given time frame of this research, are the costs of *price (tariffs)*, and *personnel costs.* The reason that for example tariff costs are relatively easy to determine is that costs in the new situation are, to proper extent, known *beforehand*, by retrieving tariffs from third-party carriers. Costs such as customer satisfaction are only measurable *after* switching to a potential new outsourcing configuration.

Other *incremental transaction costs* that could be regarded are the costs of communication, invoice checking and EDI costs. However, also due to the complexity of the determination of these costs, we have decided not to take these smaller transactional cost drivers into account, but rather focus our time on the biggest cost drivers, namely tariffs and personnel costs.

Evidently, *tariffs* can only be regarded to be incremental when *insourcing* the transport management function. When outsourcing, tariffs are negotiated by the LSP, who has presumably more economies of scale, but rather charges a management fee for arranging the transport. When insourcing transport management, the company has to negotiate its own tariffs and appoint some personnel to do the negotiation of these tariffs and the orchestration of the transport. In the latter case, all shipments and orders are handled by the LSP as being Ex Works shipments. The appointment of extra in-house personnel to orchestrate transport subsequently influences *personnel costs*, which will be discussed in section 6.2.2.

Consequently, we will calculate the *tariff costs* based on the two situations of completely insourcing transport management, and retaining the current situation. The calculation is provided and elaborated on in the following section.

6.2.1. TARIFF ANALYSIS

One of the main drivers for the company to assign this research was the suspicion that the tariffs provided in datasheets by the logistics service providers are sometimes more expensive than the tariffs that the company would have by contacting a transport party directly (= transport management in-house). Both logistics service providers, LSP 1 and LSP 2, provide tariffs for the company regarding European road transport, which is the most common type of transport and destination in terms of frequency. Here, a difference should be made between pallet and parcels. Parcel shipments are (usually) executed via UPS, whereas the decision for a transport party is most often done by the LSP.

In order to investigate whether contracting transport parties in-house would be more cost-beneficial than outsourcing this to the LSP, we will compare the charged tariffs for all non- Ex Works transport of one business unit over a two-month period, to tariffs offered directly to the company by third-party carriers Dachser, KLG and HST and the transport subsidiary of the other LSP. The reliability of this dataset follows from the fact that transports for this BU equal over the months, as no seasonal demand is involved.

Actual tariff comparison has been left out due to confidentiality agreements

Figure 23: Invoice sheet of shipments, of which transport is managed by a LSP [LEFT OUT]

Figure 24: Part of the tariff comparison with third-party carriers and the LSP [LEFT OUT]

Not all countries are offered by all other transport parties in this figure, hence some empty cells in the tariff columns of one of the four competitors. In the complete spreadsheet, we only show the shipments of which *at least one* of the other LSP's transport subsidiary, Dachser, KLG, and HST offers tariffs, in order to consequently determine the lowest price that is offered. Note again that the tariffs of Dachser and KLG include an estimated 6% charge for fuel and customs clearance, that is comparable to the LSP concerned. This is estimated, as negotiations have a big influence on these charges.

The tariff calculations enable us to conclude on the tariff differences that would be if the company would arrange transport themselves (= insourcing of transport management), or the LSP would continue to do this. The amount of *pallet transport costs* that were compared to other shippers equals €54,374.44, of the total two-month amount of €97,111.48 transport costs (thus including *parcels, €86,987.74 excluding parcels)*. What we are able to calculate based on the cheapest tariffs that either one of the five shippers have to offer, is an amount of €36,353.41. The difference with the previous amount equals €18,021.03, which accounts for a decrease of 33,1% of total compared pallet shipments, and a 18,6% decrease of total shipment costs in two months (when solely calculating pallet savings).

Parcel comparison

The comparison of the *parcel transport costs* was executed different from the *pallet transport costs* in the previous section. Where the *pallet transport costs* were compared with actual charged costs on the one hand and offered tariffs on the other hand, we will compare the *parcel transport costs* with only offered tariffs. In this, we compare the tariffs for parcels that one LSP charges for UPS transport, and the tariffs that the company gets from UPS. In other words, in case the LSP does not apply a margin, we compare rates that the LSP gets from UPS with rates that the company gets from UPS. Logically, we would expect the LSP -UPS rates to be fairly lower because the volume and therefore the economies of scale that the LSP could exploit. We compared tariffs for the following transport options: *standard, express-saver,* and *express* as these are the most used by the company.

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Figure 25: Overview of the parcel tariff comparison [LEFT OUT]

This figure has been left out due to confidentiality agreements

Figure 26: Increase (green) or decrease (yellow/red) of tariffs for parcel shipments [LEFT OUT].

Considering all three transport options most used by the company, again *standard*, *express-saver*, and *express*, we summarized the average difference in percentages per destination region (columns) versus the different transport options (rows), in the figure below.

Standard	17,8%	-15,8%	-16,3%	-25,0%	-34,5%	-7,9%		-15,9%	-34,1%	2,4%				**-14,4%**
Express-Saver	11,6%	-25,5%	-43,1%	-43,2%	-25,8%	-26,8%	-26,4%	-14,4%	-13,2%	-14,2%	-14,9%	-13,4%	-13,5%	-13,5%	**-19,7%**
Express	12,1%	-28,0%	-44,7%	-45,4%	-28,6%	-26,0%	-26,0%	-22,3%	-25,8%	-26,9%	-26,5%	-26,5%	-27,8%	-79,5%	**-30,1%**

Figure 27: Summary of the parcel tariff decrease

Although there do not seem to be special patterns or included margins in the tariffs, we are able to conclude that the company has significant lower *parcel transport* tariffs than the LSP has. In case the company would insource transport management regarding parcel shipments, tariffs would decrease **14,4%**, **19,7%**, and **30,1%** for respectively the *standard, express-saver,* and *express* transport option. As *standard* transport accounts for 25% of total parcel transport, *express saver* 50%, and *express* 25%, the average reduction in tariffs becomes 21%. Of the total amount of **€10.123,74** of *parcel shipments* from the BU over two months, this incurs a saving to **€7.997,75**, or a difference of **€2.125,99**

Sea-and Airfreight margins

In another comparison with 'intercepted' offerings from HST directly to one of the LSP's, and the actual price that the LSP would charge to the company for that same HST shipment, we were able to find out that the LSP at all times charges a 30% margin (rather than the 5% management fee) on top of the charged amount by HST to the LSP (accounted for in the pallet tariffs comparison). This is proved by 4 offerings, and calculated through on each HST shipment in the two-month period. This incurs that HST shipments offered directly to the company are 23% cheaper than arranging it through the LSP. Which means that the total amount that the LSP shipped through HST, which equals **€29,759.19**, can be brought down to **€22,891.68** in two months by contacting HST directly through the company. Note that the total amount of transport costs in the period of two months equaled **€97,111.48**. This incurs that a simple switch – no longer arranging HST transport through the LSP but by the company directly – could save 7% per two months, or on average **€3,433.76** per month, for just one BU (only regarding HST transport).

It could be very well true that the LSP also includes a margin on *all* overseas shipments, not only for HST, but for other third-party carriers that perform transport overseas. However, we do not have proof of this. Yet, if we estimate that above holds true for all sea and air shipments, we could also make a calculation that excludes 30% margin from each of these shipments. This would hold when the company decides to perform every oversea shipment via HST directly. We are then able to conclude that the total amount of transport costs regarding air and sea shipments in the two months, equals **€57.769,38**, which accounts for 59,48% of total transport costs (= €97,111.48). 30% excluding this amount equals **€44,437.98** or a decrease of 23%. This incurs that the total – projected – amount of savings on air and sea freight by excluding these margins, could equal **€13,331.40**, or 13,73% of total two-month transport costs of this BU.

The first calculation of HST is part of the calculation of total *pallet transport costs savings*, whereas the second calculation on all other sea-and airfreight is not, as these are just presumptions. However, the first proven margin addition of 30% on top of sea-and airfreight is a perfect example of opportunism by logistics service providers as discussed in subparagraph 5.3, where this specific example tends to fall under *contract breaching*, as the agreements were that the LSP could charge an additional 5% management fee instead of 30%. We will elaborate on these opportunistic examples in the next chapter.

6.2.2. PERSONNEL COST ANALYSIS

Insourcing transport management

When insourcing the transport management, the responsibility of selecting appropriate carriers for transport and the responsibility of contact with these carriers is transferred from the LSP to the the company's business unit or the central sourcing department. This means that extra work has to be performed, as for each shipment an additional carrier has to be selected, and in case of transportation failures, the problem has to be resolved. The advantage over keeping this communication and control in-house is that eventually, escalations would take a less amount of time due to the reduce in actors along the chain of communication. However, this would mean that extra time has to be performed by a company employee, which is (currently) not possible without hiring extra workforce.

Besides the carrier selection and management and control of the contracted carriers, it is also optional for the company to do the order entry of the transport themselves. This implies requesting the transport from a specific carrier and starting up all communications. However, the company does not want to do this as it takes a lot of time and effort without significantly adding value to their process, as errors are unlikely to occur here. This work can still be done by the LSP, whereas the company only *orders the LSP at which carrier to do the order entry.*

Transsmart

To properly and efficiently carry out carrier selection and management, the company has already started to implement a transport broker system in the outsourcing process of another business unit, that is not yet incorporated in this thesis. This system allows the user to select, and manage and control a carrier for each shipment, after it is selected based on which carrier operates best and with the lowest cost per country. This means that while ordering transport, of which the process is described in paragraph 4.2., the order-desk employee only needs a very short operational procedure that would select the appropriate carrier and orders the LSP to enter the order to that specific carrier consequently. The control and management of the carriers is done by the company via this system.

This incurs that when insourcing transport management, no additional operational employees have to be hired. According to the sourcing department, the amount of work for management and monitoring of carriers, the rate negotiation, and importing these rates and carriers into the system would account for 1 full-time employee, that furthermore preserves the system and will be the main contact person for transport-related issues within the company. The annual cost for the company for such an employee will be €65.000,-. This information has been retrieved through the sourcing department of the company based on internal experiences, therefore this remains an assumption, and no more accuracy of estimation can be provided. We also assume, based on these experiences, that the extra work for operational employees whilst selecting the carrier for a shipment is negligible.

6.3. SUMMARY OF RESEARCH

In the second part of this research, we have performed a literary research on theories regarding outsourcing decision and relations. Furthermore, a basic cost-analysis has been performed based on cost drivers within a Total Cost of Ownership approach, although not using the approach as intended in the beginning of this research (6.1).

Literary Research

The literary research comprehended the *Resource-based View theory,* and the *Transaction Cost Economics theory* on the decision whether or not to outsource (*core competencies*), and in what form (*governance structures*). Furthermore, the *Agency theory* was discussed regarding issues to be accounted for *during* an outsourcing relationship, which aspects are also useful for consideration prior to setting up agreements (*contract complexity and improvement*).

Also, research was performed on the various *service levels* that LSP's offer, the *different kinds of logistics service providers* and their job responsibilities, and the degree of *asset management* applicable within logistics outsourcing.

Above theories will be considered in the next chapter in order to evaluate the current outsourcing configuration and explaining the problems of which we have not yet found a cause. Next to evaluation, we will propose a solution to the current situation based on these theories.

Cost analysis

For the analysis of *incremental costs* regarding in-and outsourcing transport management, we made use of the TCO-approach by calculating costs that were easy to determine and to simulate. In case of oversea transport, we have found an example of opportunistic behaviour as discussed in paragraphs 5.3 and 5.5.

The cost analysis will be used when balancing off the different solutions possible, that will be proposed in the next chapter.

7. Solutions

7.1. INTRODUCTION

This chapter concerns the solution generation in order to optimize the current outsourcing relation between the company and its logistic service providers. The previous four chapters were dedicated to answer our first four research questions (2.1.3) that helped us guide to what the current problems are, how they are caused, and how we should be able to solve them.

In the first paragraph of this chapter, we will apply the theory that we reviewed throughout chapter 5 to the problems that we summarized in paragraph 4.6. These were the problems that were very diverse and detailed in nature, and of which we were unable to find the cause in the agreements not being maintained. Logically, as our core problem indicates, most issues are caused by the fact that there are *no agreements at all*, but we intend to explore the root cause of these issues within the configuration of the outsourcing relationship.

In the second paragraph, two solutions are drafted based on the theoretical research performed and the problems existing in the current solution. One solution is in-sourcing the transport management function, as theory suggests this is the best option within this context. The other solution is retaining transport management outsourced. This incurs retaining the current situation, however under different contractual regulations and possibly LSP type. Cost estimations are provided for both solutions as far as possible regarding the collection of information within this timeframe (chapter 6).

In the final paragraph, a decision analysis is provided on the best solution.

7.2. APPLICATION OF THEORY WITHIN THE CURRENT SITUATION

The issues that we have summarized in paragraph 4.6 are categorized under opportunism, contract breaching (non-maintaining agreements), lack of agreements, and self-interest behaviour of the logistics service provider. The theories that place these aspects within the context of an erroneous outsourcing configuration are *Transaction Cost Economics theory* and *Agency Theory*. These theories will be used to further explain the problems that arise within the outsourcing relationship between the company and its logistics service providers.

7.2.1. AGENCY THEORY

In fact, opportunistic behaviour is an act motivated by the maximization of economic self-interest and occasioned loss of the other partners, thus self-interest behaviour and opportunism go hand-in-hand. The loss of other partners mentioned here was earlier defined as *agency loss*, as the loss that arises as a result of agents (LSP) acting in their own interest. The self-interest of the LSP is undoubtedly maximizing profit. Especially within the transport management activity, as the margins on other LSP activities such as warehousing are considerably small.

We have already demonstrated the breaching of agreements in chapter 3 and 4. A clear example of opportunistic behaviour is given in section 6.2.1, where the inclusion of margins on oversea shipments is shown. Next to the breach of an agreement, as the management fee should account for 5% rather than 30%, this shows self-interest behaviour as it maximizes revenue for the agent on the expense of the principal.

A second example of opportunistic behaviour is the unwillingness of the LSP to solve problems regarding transportation on behalf of the company, which is what they are paid for. This results in agency loss as the company's employees are repeatedly busy solving these issues while the LSP is agreed to be paid for doing this. In the figure below, an example of this is shown [LEFT OUT]. It depicts the system used between one of the LSP's and the company, where transport related issues are noted. This system has only been used for a short amount of time, as it did not solve the incidents. It shows that the problems are recognized by the LSP as their fault, yet they are not willing to pay for extra expenses as a result, and most often let the company solve the problem.

This figure has been left out due to confidentiality agreements

Figure 28: This figure and its description have been left out due to confidentiality agreements [LEFT OUT].

According to the theory, the problem of self-interest behaviour is amplified by the fact that the company is not able to control or verify what the agent, or LSP, is doing. We have already mentioned in 1.2.2 that the LSP is not transparent about their transport management process and their tariffs. Especially when benchmarking of the transport market is not done by the company, there is no insight in what tariffs are regular for transportation, and as a result, the LSP can exploit this information asymmetry.

Contract complexity

The unwillingness of the logistics service providers to show transparency regarding their operations can be placed in context with improvements that agency theory suggests regarding opportunistic behaviour and lack (and breaching) of agreements. As the company has only agreed upon short-term contracts with both LSP's (LSP 1 2-4 years, LSP 2 1-2 years), this incurs that the current outsourcing relation is a short-term relationship, that agency theory defines as a reason for the unwillingness of agents to operate in the interest of both parties, or to take risk.

7.2.2. TRANSACTION COST ECONOMICS

Transaction cost economics provides us explanations of LSP behaviour (agreements breaching, opportunism) while concerning the *nature of the transaction*, rather than the *nature of the relationship* (agency theory). The subject of transaction within this thesis is transport management, which is a rather abstract definition instead of a product or item that is subject to transaction.

The explanations below are structured in the same way that we have discussed the TCE in paragraph 5.3, namely the transaction dimensions (asset specificity, (behavioural) uncertainty) that contribute to the increase of the different transaction costs (information, bargaining and enforcement). Furthermore, the current governance form is evaluated, as it allows us to conclude on the cause of lack of agreements.

Asset specificity

We assume that asset specificity can be applied to the products or items that the company produces for which transport has to be orchestrated. Although the operational handling of products with a high degree of specificity does not fall under transport management - as these are the responsibilities of the shipper – the selection of a specific shipper able to accommodate for these requirements *is* part of transport management. We can therefore deduce that because the items to be transported usually have a high degree of specificity or requirements (especially products of BU 2, paragraph 4.4), the selection of appropriate carriers therefore is of high specificity too. The high asset specificity leads to increased effort for logistics service providers while managing transportation, for which they are not paid additionally. Opportunistic behaviour then occurs as the LSP wants to benefit within the outsourcing relation as well, for example in the form of extra tariffs discussed in the previous section.

Behavioral uncertainty

A second aspect discussed by the TCE is *behavioural uncertainty*, which is the uncertainty in ability of performance verification. This inability leads to increased *bargaining*-and *enforcement transaction costs* on the side of the company. We have earlier discussed the cause of this behavioural uncertainty within the context of *agency theory*, where the theory suggests the engagement in long term relationship and mutual investments. TCE approaches this problem via governance structures, which will be discussed in the next section.

Governance structure

TCE recommends several governance structures of the outsourcing relationship depending on the extent of asset specificity and uncertainty within the transaction. As discussed within the chapter of our literary research, governance structures range from *market governance* to *hierarchical governance*, with *hybrid governance* in between. The current market governance form in the outsourcing relation between the company and the LSP's is the hybrid governance form, or contracts governance to be more specific. Contracts governance is one of the ways to establish hybrid governance, along with for instance joint ventures or franchising (not applicable in this relationship, but in retail).

The aspect that makes the company have a contract governance form are the different contract provisions, of which one for example includes warehousing, and the other distribution or price agreements. What we have observed however, is that because transport management was provided within the logistics outsourcing agreement, no separate contract has been set up for transport management, instead it was only represented to a small extent.

The latter, which can be regarded as the underestimation of the transport management function, for which therefore no proper contracts were made, is the cause of lacking agreements.

7.2.3. SERVICE LEVELS

The nature of the transaction of the service, which knows a high asset specificity and high behavioural uncertainty, incurs a governance form that has a tendency towards hierarchical governance, or *vertical integration*. Not only the nature of the transaction advises a high attention toward contracts and agreements, but also the type of service that transport management. Below, we have summarized all activities provided by Fadile et al. (2018) as discussed in paragraph 5.6. Duplicates and irrelevant activities within this outsourcing context were removed from the whole activity set that is also provided in Appendix E: Categorization of Logistics Activities into Service Levels. All activities below are thus performed by either the company, or are outsourced to the LSP. The **bold activities** are outsourced by the company, and either performed by the LSP, such as *logistics planning*, and *shipment consolidation*, or outsourced by the LSP to a third-party carrier, such as *distribution* or *customs brokerage*. Anyhow, they are not performed within the company. The orange marked activities are still performed within the company, and the ***bold and marked activities*** are the activities regarding Transport management.

Basic logistics services	Value-added logistics services	Advanced logistics services
customs brokerage	**cross-docking**	***carrier negotiation and contracting***
customs clearance	customisation	***carrier selection***
distribution	documentation	demand forecasting/planning
domestic transportation	**freight payment**	EDI
emergency transport	**import/export**	import/export management
fleet management	installation	**information systems**
freight brokering	**inventory administration**	**inventory management**
freight forwarding	**invoicing**	inventory replenishment
inbound traffic control	**order entry**	***logistic system design***
international transportation	**order picking**	**management reports**
line haul	**order processing**	***rate negotiation***
logistics planning	**pick and pack**	shipment planning
merge-in-transit	product assembly	supply chain design
network based transport	**product packaging/labelling/marking**	**warehouse management**
outbound traffic control	value-added services	web-based linking
port services		
shipment consolidation		
shipment management (aanmelden)		
storage		
tracking & tracing		
transportation (inbound & outbound)		
warehouse operations		

OUTSOURCED BY COMPANY TO LSP
PERFORMED BY COMPANY
TRANSPORT MANAGEMENT ACTIVITIES

Figure 29: Division of logistics services along the service levels within the outsourcing relationship

This division enables us to conclude that the activity of *transport management* is in fact an advanced logistics service, which – along with the high asset specificity and behavioural uncertainty – should incur a highly detailed governance form. Either by *vertical integration*, or by very detailed contracts in the *hybrid governance form*. The latter is more applicable in logistics outsourcing than vertical integration however, as mentioned earlier.

Yet, wat we have seen in our research on the agreements, is that they are *not detailed* and *often breached*, furthermore, the outsourcing of *transport management* has been regulated within the entire logistics outsourcing contract as a small section. This instead of being regulated by an *own contract*, or a more detailed contract that would comply the complex nature of the activity (transaction).

Logistics service providers

In the subparagraph in which we discussed the service levels of outsourced logistics activities, we also reviewed the different levels of logistics service providers, ranging from 1PL to 5PL. Rather than defining a level by our own estimations, we are able to determine the type of LSP's responsible for the company's transport management by studying the company descriptions of the LSP's. LSP 1 defines itself as a 3PL, where LSP 2 positions itself within the 3PL+ family. 3PL is similar to what we defined as LLP, or Lead Logistics Provider, which is the category between 3PL and 4PL. As 4PL companies usually do not hold transportation or warehousing assets but rather orchestrate them, LLP or 3PL+ providers hold the assets of a 3PL and offer services of a 4PL.

7.2.4. CONCLUSION

In chapter 4, we have discussed problems that occur within the outbound transportation process such as the delayed provision of transport costs and the lack of track & trace information. The cause of these problems is the breaching of agreements by the logistics service providers. However, we have also discussed the problems of the frequent escalations within the process as a result of LSP behaviour, and furthermore the problems of lack of insight, transparency, and reliability of LSP operations. All the latter problems were characterized under LSP misbehaviour, which along the breaching of agreements, is their self-interest behaviour. Of this self-interest and opportunistic behaviour, we have seen some clear examples such as margin calculation (6.2.1).

Above, we clearly observe the context of our core problem, namely the lack of agreements. The beginning of this research showed a tendency to explain LSP behaviour by this lack of agreements, but previous sections have showed us that the LSP behaviour should be approached via the *nature of the transaction* and the *nature of the relation*. The nature of the transaction provides explanation of LSP behaviour as a result of the complexity of the activity that is outsourced, whereas the nature of the relation provides explanation of LSP behaviour as a result of the wrong configuration, or governance form. The latter is what we also expected to be the cause of other problems. Moreover, it is the cause that no proper agreements were made.

Nature of transaction

The transport management activity that is outsourced is characterized by a high asset specificity, which makes opportunistic behaviour by the LSP inevitable as this party intends to maximize profit as well. These factors lead to an increase in transaction costs (information costs, enforcement costs, bargaining costs). The Transaction Cost Economics theory suggests a governance structure with high level of control, such as hierarchical governance, or at least contracts governance (hybrid) but with appropriate complexity and different contract provisions for each outsourced activity. Furthermore, the advanced service level in which transport management belongs, implies a detailed attention towards the outsourcing contract regulating transportation management. This is not the current situation however, as we depicted in chapter 3 and 4.

Nature of relation

The opportunistic behaviour as a result of the nature of the transaction is allowed because the lack of contract complexity. This was stated in the previous subsection, and is also funded by the agency theory that explains this behaviour through the wrong type of relation, as the LSP *is allowed* to engage in this behaviour due to contract-related failures. failures. Not only is there a lack of *diversity* in contracts, but also the contract *complexity* and *duration* cause the LSP to show risk-averse and opportunistic behaviour.

Thus, we see that opportunistic behaviour and breach of contracts occur due to the lack of detailed contracts in proportion to the complexity of the outsourced activity, but also due to the nature of the activity subject to transaction. The latter is however even more amplified through contract-related failures.

7.3. FINAL SOLUTIONS

The previous paragraph provided a theoretical explanation for the LSP behaviour that has been causing problems as discussed throughout this research. Not only is the opportunistic and self-interest behaviour caused by the complex nature of the transport management activity, but also the wrong contract configuration allows them to act in an opportunistic way. The contract configuration is 1) not detailed and enough as it should be regarding the complexity of the activity, explaining the lack of agreements and the ease in which they can be breached. Secondly, the *contract duration* does not foster long-term relationships and mutual investments and dependencies, causing unwillingness from the LSP to solve issues, as well as risk-aversion.

Above statements allowed us to conclude that the root cause of problems is indeed the outsourcing configuration, implying contract complexity and governance structure. However, also the nature of the transaction provides a clear cause for these problems, for which we should account when we decide to consequently in-or outsource the transport management activity.

In the following paragraph, we will explore the possibilities for the solutions, and provide the best solution for the context of this research.

7.3.1. POSSIBILITIES

In section 5.6.2, we discussed the outsourcing continuum that is originally used to depict the position of a firm within the *logistics outsourcing continuum* based on *asset management*. However, as transport management is only a small part of the entire logistics spectrum (1.2.3), we are not able to simply choose a spot within this spectrum. We assume that for transport management, a company solely has two choices: entirely insourcing or entirely outsourcing. What we mean with transport management here is what we discussed throughout this research and defined in section 1.2.3, and that is the orchestration/monitoring and selection of subsequent transport companies or carriers to transport goods from the LSP warehouses to the customer. If the company would insource the transport management, the configuration would be as discussed in section 6.2.2. This means that one central employee would be responsible for setting up the Transsmart system, and preserving its up-to-date status. The employee furthermore is responsible for communication and contact in case of escalations, and performance monitoring of the carriers that are selected to perform transport for the company from the LSP's warehouse, thus responsible for the transport of all business units.

The other configuration that is possible is to maintain outsourcing of the transport management. This means that the LSP keeps assigned to select and monitor carriers to which it outsources transport, and that the company's employees only have to send the transportation order to the logistics service provider. This entire process is more extensively discussed in paragraph 4.2 and 4.3.

What is evident, however, is that the current situation is not compliant enough to prevent problems as discussed throughout this thesis. Therefore, the solution that elaborates on the retaining of outsourcing transport management will be focused on improving the relation and preventing problems, while still outsourcing transport management. Following the two solutions, we will decide what is the best one for the company, indirectly providing an answer to their question whether outsourcing transport management has been a good choice or not.

7.3.2. IN-SOURCING TRANSPORT MANAGEMENT

We begin explaining the decision of insourcing transport management by means of the *resource-based view*, through which we are able to motivate the *initial* outsourcing decision and to some extent the degree of outsourcing. Consequently, we will use the other theories that we discussed previously to reinforce the in-sourcing configuration, after which we will provide some other solutions of process-related problems to maintain efficiency and prevent failure of the configuration in the future.

Resource based view and core competences

We consider the RBV theory and its perspective on idiosyncratic resources, along with the core competencies of a firm, as they are similar in the way that both determine a company's performance on the long term. Idiosyncratic resources are, as mentioned in 5.4, valuable, rare, inimitable, and non-substantiable resources. We can compare some of these aspects these with the characteristics that Prahalad & Hamel (1990) describe of core competencies: the potential to a wide variety of markets, an important contribution to the perceived customer benefits, and difficult to imitate. The transport management function, or in the bigger picture, outbound distribution (transport), is neither performed by valuable or special employees, nor is it difficult to imitate. Furthermore, it is by far more of a core competence of the LSP than that it is of the company. However, the nature of the the company's products of which the transport has to be orchestrated by the transport management team does ring some bells regarding rareness (asset specificity) and contribution to the perceived customer benefits.

The proper fulfilment of outbound distribution and orchestration, for which transport management is responsible does in fact has a significant contribution to the perceived customer benefits of the product (5.4). This makes us doubt whether to designate outbound distribution, and therein transport management as a core competence or not, but fortunately this decision does not have to be as binary as it may sound. We consult the logistics outsourcing decision matrix provided to us by Ogorelc (2007).

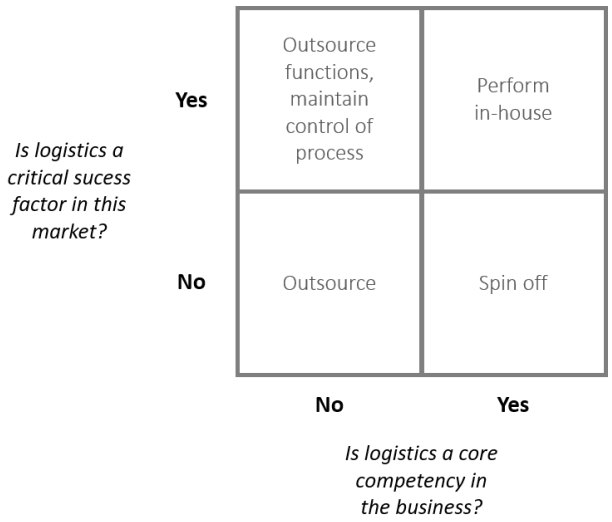

Figure 30: Logistics outsourcing decision model provided by Ogorelc (2007) in 5.4.

In order to use the matrix in the figure above in a persistent way, we should consider the *outbound distribution activity* within this matrix. The model in fact extracts the characteristics of perceived customer value contribution out of the characteristics of core competences. Because of this, in this figure, we can conclude that outbound distribution or transport is *not* a core competence obviously, however it does have a significant contribution to the perceived customer value, as one of the only logistics functions, which is inherent to market success. Therefore, the control of the process should be maintained in-house. The control of the process of outbound distribution is transport management (1.2.3), therefore transport management should be maintained in-house.

TCE and governance form

We earlier discussed that the current governance form of the relationship between the company and the LSP are of the *hybrid* governance form, using *contracts*. This is also the best way to govern a logistics outsourcing relationship according to theory. The mistake however was made that the logistics function was seen as a single aspect rather than smaller parts, resulting in lack of agreements and detailed contracts with the focus that would be in proportion with the complexity of transport management. This solution does not need contracts regarding transport management with the LSP as it is now in-sourced. However, this does not imply that the current form of contracts suffices to the complexity of the entire outsourcing configuration. Even with the transport management in-sourced, work is still performed by logistics service providers by means of picking & packing, and entering the transport order to the carrier selected by the company. Contracts regarding these processes therefore need to be extended in order to prevent opportunistic behaviour in other outsourced activities, but further implementation regarding this is beyond the scope of this research.

Although the main opportunistic behaviour lied in the tariffs and margins, which do not have to be accounted for when insourcing transport management, the company still needs to negotiate agreements and rates with the carriers that it will outsource transportation to. The use of the Transsmart system that offers up-to-date tariffs of all qualified suppliers for a specific shipment characterizes *spot transactions*, as *market governance form*. This will benefit the decrease of costs for each shipment, but is contradicted by the TCE that states that the more asset specific and uncertain a transaction is, the more a *hierarchical* governance form should be used. In other words, the relationship requires a continual and permanent governance that is not regulated by the market, but by means of internal agreements.
The latter is however a significant challenge when dealing with multiple carriers and rates, therefore we recommend to maintain a *hybrid* governance form, between *spot transactions* and a *hierarchical* governance form. This, in order to prevent uncertainty and opportunistic behaviour to one extent, but still remain flexible and reduce negotiation effort on the other side. Further recommendations regarding contracts are discussed in the next section.

Agency theory and contract complexity

When insourcing the transportation management, the agency theory supports our recommendations regarding prevention of opportunistic behaviour and the fostering of carrier-and LSP performance by means of contract improvement. It would be straightforward to say that when insourcing transport management, there is no need for any contracts regarding this, however new agreements have to be made with the LSP and new negotiations and agreements have to be set with carriers that the company will outsource transport to. In this section we focus on these two kinds of contracts.

Although the possibilities of opportunistic behaviour by the LSP whilst in-sourcing the transport management have not been researched, this can be prevented using a specific reward system. New contracts and agreements with the LSP should incur *outcome-based* rewards, which means that whenever a form of fee or margin on tariffs is incurred, these should be variable and set on the outcome of a specific activity. The idea behind outcome-based contracts are the shift of risk towards the agent (LSP) and the alignment of the agent's interests with those of the principal, of which one is the proper fulfilment of order entry by the LSP to the carrier on behalf of the company. As examples of outcome-based rewards are fees according to delivery performance and customer satisfaction, in which third-party carriers play a bigger role than the LSP, the third-party carriers should also have agreements and contracts with the company that are *outcome-based*, rather than *performance-based* (payment in hours or kilometres), to the extent that this is possible. Furthermore, clear agreements have to be made with the carriers about the payment of duties and transport costs that exceed the prior set tariffs of transport.

Another contract recommendation for both the LSP and carrier agreements is investing in long-term relationships. We saw that the current contracts with the LSP are relatively short-term (2-4 and 1-2 years), which leads to the reluctancy of LSP's to take risks or make investments. Negotiating long-term contracts will therefore not only benefit LSP and carrier behaviour in general, but will also lower the threshold for LSP's and carriers to engage in *outcome-based contracts.*

Furthermore, in order to maintain these agreements and proper performance, audits should be taken at both the LSP concerning the proper fulfilment of the order entry on the company's behalf, as well as frequent audits with carriers in order to maintain a sustainable relationship and prevent opportunistic behaviour, which although should be prevented by better agreements and contract complexity in the first place.

Further improvements

The process inefficiencies that we researched in paragraph 4.4 and summarized in 4.6 should also be taken into consideration while insourcing the transport management. The first problem of delayed transport costs will no longer exist, as the Transsmart system supports integration with the ERP system of the company, which allows order-desk employees to invoice the transport costs of a product with no extra effort. The second aspect of track & trace is also accounted for while using Transsmart, as the system provides proper track & trace information of every carrier that uses it. However, to what extent this performs better than current LSP information systems has not been researched in practice.

The final part of the solution regards the employee division regarding the ordering of transportation. In the beginning of this research we have concluded that one of the main causes of general problems to occur within the outbound distribution process (of which transport management is part) has been the lack of central sourcing management at the beginning of the outsourcing period (1.2.2). The agreements that were made in the first place were provided to each business unit, that would subsequently take over the responsibility. Clearly, this can be argued by the fact that all business units were outsourced one-by one, but now that most business units are outsourced and this solution advocates for the insourcing of transport management, we are able to recommend decisions as they were at the beginning of an outsourcing period. The solution in this case to prevent BU-specific adjustments is to either appoint the employee responsible for the Transsmart system and carrier contact as responsible for the entire outbound distribution process on the company part, or to centralise the order desk sections of each business unit. The latter would prevent BU-specific adjustments and provide positive influence on the communication between carriers and problem solving in moments of escalation. Consolidation of BU-specific shipments would however not be possible, as long as the business units are assigned to different warehouses of different logistic service providers. This could, and should, however be subject for further research within the sourcing department.

Cost-saving

Insourcing transport management implies a cost saving by tariff and fee reduction, however extra costs regarding personnel. In section 6.2.2 we argued that the sourcing department indicated that insourcing transport management would call for one extra employee who executes carrier negotiation and selection, and is responsible for the communication, controlling, and monitoring of the subsequent carriers. However, no extensive research has been performed on the detailed structure of job responsibilities, as well as the exact amount of hours that it would take to perform them. We therefore take over the estimation from the sourcing department that *one full-time employee* is needed extra when in-sourcing transport management. The costs of this employee will be €65.000 on a year's basis.

The tariff reduction as discussed in 6.2.1 while in-sourcing transport management would incur a two-month save of €18,021.03 for pallet shipments, and a two-month save of €2.125,99 for parcel shipments. Totalling a €20,147.02 of savings per two-months on total shipments for one BU, which was the only business unit for which representative data was available. This amount incurs a decrease of two-month transport costs of 20,7%. However, given the fact that all business units within the company do not deal with seasonal demand, we could assume that a two-month saving of €20,147.02 incurs a yearly saving of €120,882.12 in tariffs, for 1 business unit.

Continuing the projection, we also intend to provide cost-savings for the other business units. However, *we do not have reliable data and comparisons for this*. To give a rough estimation however, we consult the data that we do have. This are the *total transport costs* for each business unit over the year 2015. Although the total transport costs are no-longer up-to date, as the transport for the 4 business units has increased tremendously ever since, the ratios are still somehow reliable.
By accounting for these ratio's while extrapolating the savings of one BU onto all business units, we can estimate yearly savings on **€365,584,-**. ***The ratios per business units are left out due to confidentiality agreements****.

The limitations of this estimation are however significant! The tariff reduction is based on a two-month calculation with carriers that offered tariffs for shipment types regarding one BU, thus not accounting for extra charges that the nature of the products of the other business units might incur. The two-month reduction is also regarded as representative for yearly reduction as the company does not deal with seasonal demand. Moreover, the extrapolation from yearly savings from one BU accounts for a ratio of the business units based on the total costs of transport each year.

The yearly savings estimation is therefore only regarded to be relevant when considering in-or outsourcing regarding the dimensions of cost savings.

7.3.3. OUTSOURCING TRANSPORT MANAGEMENT

Preserving the outsourcing of the transport management could be a solution second to insourcing, if the company decides that only the core competence theory and tariff reduction are not sufficient for starting an entire negotiation process and therefore needing to hire an extra employee. This second solution is however not necessarily less viable than insourcing transport management. That is because the current outsourcing configuration could also be improved by some of the same theories used in the previous subparagraphs. Only the core competence theory is not relevant here, however the type of LSP discussed in theory in 5.6.1 is.

TCE and Governance form

Similar to the solution discussing insourcing of transport management, the company should retain the *hybrid* governance form by means of *contract governance*. However, each outsourcing activity should accept different contract provisions rather than one single contract that treats an advanced logistic service as 'optional'.

Agency Theory and Contract improvement

Contract improvements regarding this solution are very similar to the contract improvements proposed with the previous solution. The difference is that here, contracts have to be made with less parties, and only existing contract bases have to be improved. These improvements should similarly hold the attaining of outcome-based contracts that are set for the long term in order to improve the transactional relationship, prevent opportunistic behaviour, shift risks towards the agent and align the interests of the agent (LSP) and the principal (the company).

Other than the fact that the same contract improvements have to be accomplished as with the first solution, existing inefficiencies and misfits within the current contract have to be solved. Some of these are tariff improvement and the contractual prevention of raising margin on transport without the awareness of the company (6.2.1), and the shifting of financial responsibilities to the logistics service provider. Unforeseen costs have always been calculated onto the company by the logistics service providers, allowing them to take more risk and improve their profit. The latter should be prevented by not only hard agreements regarding financial responsibilities, but also by long-term contracts designed to foster sustainable relationships. Furthermore, *outcome-based* rewards should also be linked to the provision of proper information such as track & trace and transport costs. Recommended is to set similar agreements as with BU 1, that always receives the transport costs of shipments each day the shipments are send, or the day after.

Type of LSP

The solution above has so far provided contract improvements and maintaining the current governance form. However, another theoretical aspect should be accounted for when considering remaining the transport management insourced, which is the *type of LSP*. Changing the type of LSP from 3PL to 3PL+/LLP or 4PL is assumed to prevent risk-avoiding behaviour and behaviour in the self-interest of the LSP, as LLP's or 4PL's are generally considered to be more proactive in responsibilities and the fostering of long-term sustainable relationships (5.6.1). It would largely deal with the issue that the LSP does not take responsibility for some actions and shifts the financial responsibility to the company. It is not implied that this does not occur when outsourcing to a 3PL+/LLP or 4PL, but switching to a low-scale 3PL+/LLP where the company's logistics hold for a significant part of total operations of that logistics service provider, would foster a sustainable relationship and boost mutual investments.

This would prevent agency-problems, that we argued are causing the most problems within the current relationships with the company and its LSP's. A concrete solution would therefore be to maintain the relationship with LSP 2, as it is a 3PL+/LLP, however to switch to a long-term contract whilst taking the other contract improvements into account, and maintaining contractual benefits that LSP 2 already offers. Furthermore, we suggest to heavily consider the termination of the LSP 1 contracts, and re-assigning BU 1 and BU 2 logistics to either LSP 2 or a second 3PL+/LLP for risk considerations. Outsourcing logistics to a 4PL provider could also be possible, but only if this logistics provider has warehouse assets. However, this research does not provide sufficient information to solely decide to terminate an existing LSP contract. Prior to this decision, further research should be done and a selection process should be restarted, of which the costs are not included in the cost-benefit analysis of this solution.

Further Improvements

In order to decrease communication errors and difficulties from the side of the company we suggest to – similar to the previous solution – centralise the order-desk departments to streamline the flow of communication internally. This centralisation holds that the order-desk employees of all business units are located next to one another, with one supervisor from the sourcing department. This also, as mentioned earlier, prevents the BU-specific adjustments that will be made after the new agreements have been set. The reconsideration of the outsourcing configuration via this solution will namely generate new contracts for both existing LSP relationships and possibly for new LSP relationships. Centralising the part of the process where the company communicates with the LSP (4.2) will prevent making the same mistake again that lead to our core problem, namely the lack of superordinate agreements.

7.4. DECISION ANALYSIS

This paragraph will provide a decision analysis for the best solution, of the two that we have discussed in the previous paragraphs. We will provide scores to criteria that have to be accounted when adapting each of the solutions, as well as a motivation behind these scores.

The criteria and the score scale that will be used are as follows:

- Implementation and coordination effort (1 = very high, 5 = very low) is the amount of time and effort that it takes to for processes involved in adapting the new implementation and internal structuring. For example, tendering, investigating, negotiating;
- External control retaining (1 = very low, 5 = very high) is the extent to which control is maintained over the process of outbound distribution whilst adapting one of the solutions, as it is key to prevent problems;
- Cost (1 = very high increase in costs, 5 = very high decrease in costs) is the reduction or increase in either personnel costs or tariffs, as these are the only costs that we were able to reliably simulate;
- Transaction costs (1 = very high transaction costs, 5 = very low transaction costs) are the costs resulting from bargaining, enforcing or information gathering due to high asset specificity or behavioural uncertainty of the external partner;
- Bounded rationality risk (1 = very high risk, 5 = very low risk) weighs the risk that because a contract needs to be detailed and complex according to the solution, not every situation can be accounted for and therefore can never be staunch.

The score scale attained to each criterium is set up in such a way that the higher the score, the more suitable the solution is.

Weights

Each criterium is assigned a weight from 1 to 3 that reflects the importance of the criterium through the perspective of theories and problems discussed throughout this research. *The company that this research is accomplished for, may perceive different weights for the different criteria.*

Implementation and coordination effort is assigned a weight of **1**, as a better solution should not be prevented by the effort that it takes to implement.

External control retaining is assigned a weight of **3**, as it is an important condition for the prevention of errors, and the performance of the outbound distribution, and therefore the perceived customer value.

Cost is assigned a weight of **2**, as transport costs are mostly charged onto the customer who buys the product, however, the company also cares about customer satisfaction, that could be increased when costs of transport decrease.

Transaction costs is assigned a weight of **3**, as the costs are revealed within personnel effort on solving problems that should not occur, and restrain employees to add value to the core competency of the business.

Bounded rationality risk is assigned a weight of **1**, as the risk of incomplete contracts is a disadvantage, however contracts could be quickly adjusted after errors are discovered.

Scores and motivation of insourcing transport management

Below, each criterium is discussed for the solution of insourcing transport management, and a score is assigned. Consequently, Table 2 summarizes the scores per criterium, and the total weighted score.

- Implementation and coordination effort: the solution of insourcing requires a significant amount of re-bargaining because of new carrier negotiation and selection. Furthermore, one extra employee must be hired, and the transsmart system has to be rolled out within the business units. Finally, accordance with the logistics service provider must be achieved. This criterium therefore receives a score of 1.

- External control retaining: insourcing transport management implies insourcing the control and direction of the outbound ordering process. The number of actors within the communication chain decreases as no second party is involved in-between the relation of the company and a carrier, therefore keeping escalation solving effort to a minimum. This criterium therefore receives a score of 5.

- Cost: with insourcing transport management, costs are decreased by a rough estimation of €365,584,- on an annual basis. However, one extra employee worth €65.000 must be hired. Nevertheless, a cost reduction of €300,584,- could be obtained. However, as this projection has high limitations and is only reliable under some circumstances, a score of 4 is given, rather than the highest score.

- Transaction costs: the transactional costs of gathering information and enforcement are kept to a minimum as the company retains control of the situation, and the transsmart system offers a transparent cost overview of the different carriers available. However, enforcement costs could be high as a result of tariff negotiation with the third-party carriers. This criterium therefore receives a score of 4.

- Bounded rationality risk: the novel contracts that have to be set up with the third-party carriers are characterized by low complexity and are similar for all transactions. Furthermore, outcome-based contracts should decrease the intention for a third-party to breach agreements. The impact and risk of improper contracts is therefore low, and this criterium receives a score of 4.

Scores and motivation of retaining transport management outsourced

Below, each criterium is discussed for the solution of retaining transport management outsourced, and a score is assigned.

- Implementation and coordination effort: retaining transport management outsourced requires re-bargaining of contracts with a logistics service provider based on the recommendations of this research regarding contract improvement. However, communication structures and procedures are retained, although some effort is needed to improve these according to recommendations. This criterium therefore receives a score of 4.

- External control retaining: retaining transport management outsourced also retains the control of the outbound distribution process with an external party. However, control of outbound distribution can be regarded as more of a *core competency* for any logistics service provider than the company itself, and with proper agreements resulting from the recommendations of this research this control can be improved. This criterium therefore receives a score of 3.

- Cost: retaining transport management outsourced does not chance anything regarding costs as far as this research has investigated. Therefore, this criterium receives a score of 3.

- Transaction costs: transaction costs of retaining transport management outsourced should be reduced compared to the current situation according to the contract improvement recommended by this research. However, the nature of the asset remains specific, and also remains outsourced, which leads to behavioural uncertainty and opportunistic behavior. Although this situation is improved with better contracts, a risk remains. Therefore, this criterium receives a score of 2.

- Bounded rationality risk: renewed contract provisions as a result of recommendations of this research should be highly detailed and complex due to the complex nature of the outsourced activity and the high risk of opportunism and behavioural uncertainty. As the performance of this solution has *a high dependency* on contract improvement, the contracts should be extended and detailed. This increases the risk significantly that not every aspect or problem is accounted for. However, this thesis suggests contract improvements that should cover these risks to a certain extent. It therefore receives a score of 2.

Total score

In the table below, all scores and weights of the different criteria are accounted for into a total score.

	INSOURCING TRANSPORT MANGEMENT	OUTSOURCING TRANSPORT MANAGEMENT
Implementation and coordination effort (1)	1	4
External control retaining (3)	5	3
Cost (2)	4	3
Transaction costs (3)	4	2
Bounded rationality risk (1)	4	2
Total score	**18**	**14**
Total weighted score	**40**	**27**

Table 2: Criterion analysis of the drafted solutions

As can be observed, the solution of *insourcing transport management* has a higher score based on the decision analysis. An argumentative reason that the retaining of outsourcing of transport management only provides some improvements on the current situation, however does not eliminate the core problems that cause errors within the relationship of outsourcing. Insourcing transport management prevents these, as a complex activity is positioned in-house. Furthermore, insourcing transport management achieves a significant cost-saving, in spite of the appointment of an extra employee.

In the next chapter, we will provide concrete recommendations for implementing the new solution, as well as recommendations regarding the second solution in case the company decides not to adopt the recommendation of insourcing transport management.

8. Conclusions, Recommendations & Limitations

8.1. CONCLUSIONS

8.1.1. SOLUTION CONCLUSIONS

The research performed for this thesis was motivated by the many problems occurring within the outsourcing relationship of the company and its logistics service providers. The focus has been on the outsource activity of transport management, which, opposite to expectations, still accounted for significant work regarding problem solving for the company's employees.

The initial tendency of the research was investigating the problems within the process that is influenced by LSP misbehaviour within the transport management process: namely the outbound ordering process. Problems were found that were caused by breaching agreements, but furthermore we discovered the overall *lack of agreements*, where after we were able to confirm our core problem that the lack of agreements caused LSP misbehaviour and no insights in reliability and processes at the LSP.

Rather than the lack of central sourcing management as a cause for the lack of agreements (lack of sourcing management only caused inconsistency within business units), we have found the cause within theory. Paragraph 7.2 discussed this theory, relating it to the problems.

We are able to conclude that the advanced and complex nature of the outsourced activity, namely transport management, along with the high asset specificity of the transaction and the behavioural uncertainty that this implies, the company should have set up detailed and different contract provisions (7.2.2 & 7.2.3). However, chapter 3 and 4 have given us insight in the lack of these detailed contracts and agreements, thus causing problems as expected, according to transaction cost economics theory. These problems, summarized in paragraph 4.6, can all be categorized under the problems that transaction cost economics predicts when governance structure, and thus in this case proper contract provisions, are not maintained in proportion with the nature of the asset. Namely: opportunistic behaviour (self-interest behaviour), and contract breaching.

These problems can also be regarded as *agency problems*, as discussed in section 7.2.1. Whereas the transaction cost economy theory suggest that these problems arise as a result of *the nature of the transaction*, agency theory suggests that they are not prevented due to the *nature of the relation*, where contract complexity and duration play an important role, along with the reward system accounted in the contracts.

Above sums up the mistakes that the company has made while outsourcing their transport management, yet outsourcing transport management has been a wrong proposition *in the first place*. As the theory of core competencies (5.4) indicates, an activity that is no core competence, but still is a critical success factor, should be outsourced, but while remaining in control of the process. Translating this to the outsourcing of outbound distribution (transport), it suggests that transport management (thus the *control* of the process), should be kept in-house.

The solution proposed in paragraph 7.3.2 insources transport management, in order to prevent the problems occurring as a result of an external transaction with an asset that is highly complex and advanced, and needs monitoring and internal control in order to be successful in the market. This solution is thus effective as the transaction is now internal, where risks of opportunistic behaviour, contract breaching and thus increased transaction costs do not occur. Next to the prevention of problems, control of the process also implies improved performance of outbound distribution as escalations can be solved quicker or can even be prevented (due to the short communication chain). Finally, the solution is estimated to save costs and margin calculations by the logistics service provider, up to €300,584,-.

A second solution is also provided, namely the improvement of the current situation, to the extent that this is viable. The second solution will not completely prevent errors as a result of transaction nature (as transport management is still outsourced, thus there is a transaction) but the recommendations on the second solution will at least prevent errors as a result of the nature of the relationship. This second solution could be implemented whenever the company does not deem the criteria of the decision analysis of the first solution proper enough to undertake an entire operation that should insource transport management. Recommendations on both solutions are provided in the next paragraph.

8.1.2. RESEARCH CONCLUSIONS

Research objective

Our research objective would be accomplished if we are able to present the possibilities on how the current transport management outsourcing relationship and the relating process within the company can be optimized, given the problems occurring.

By proposing a solution that not only solves the current problems and the core cause of these problems by improving the outsourcing configuration, we are able to conclude that our research objective is accomplished. Furthermore, we have provided the company with valuable insight on the inconsistency in their processes and in between business units, so that in future propositions this can also be accounted for.

Our core problem was that the lack of agreements causes a lack of insight and reliability in LSP operations, as well as process-related problems. The cause of lack of agreements and agreement breaching has been an improper outsourcing configuration, as well as the nature of the asset that is outsourced. By insourcing, a lack of agreements will no longer cause problems, and by proposing concrete contract provisions for outsourcing to third-party carriers, we have solved the core problem.

Solving the core problem would imply that we have solved the problems that we mentioned in the problem cluster (1.2.2). First is the problem that employees still spend time on trouble solving. These problems were further defined in paragraph 4.4, as process problems and general problems caused by an erroneous configuration. These problems have been solved by proposing a solution preventing these problems from happening, as well as contract provisions that help maintaining the agreements.

Second, the insights in reliability of tariffs and bills imposed have been provided by indicating margin calculation in section 6.2.1. Third, the lack of overview on transport management. Insourcing transport management makes the solution for this redundant.

Fourth, the problem solution of miscommunication and inconsistency in between the business units has been explored through centralising the order desks of each business unit after implementing the solution.

However, this proposition needs further research to conclude whether centralisation solves the problem of inconsistency.

The final problem, which is the lack of responsible behaviour of the LSP, as been extensively described throughout this research, and the root cause has been found in both the type of LSP, as well as the nature of the transaction and relation. Insourcing transport management solves this problem, as error handling of the LSP regarding outbound distribution is no longer necessary as it is performed internally.

Research questions

The research questions set up at the beginning of this research (2.1.3) have provided us focus and direction within this research, in order to achieve the research goal and provide an optimization of the current outsourcing relation between the company and their logistics service providers.

The first question regarding the agreements was answered in chapter 3, where we lined out the agreements between the logistics service providers and the business units.

This allowed us to answer our second question, namely where within the process the problems were. By reviewing the processes per business unit, we found that they partly occurred due to breaching of agreements.

The third research question regarding the best options for the company within this outsourcing context has been answered by first performing literary research in chapter 5, and consequently relating this theory to the current situation in paragraph 7.2.

The fourth research question has not been answered, as we were unable to compute the TCO. However, we did use parts of the TCO approach, as study has shown us that TCO is not the right approach in this context, as well as the fact that most cost drivers where impossible to calculate as they were not recorded by the company.

The final research question is answered in chapter 7, where the solutions are provided. The solutions are both supported by theoretical propositions, as well as a cost-analysis that we performed in chapter 6.2.

8.2. RECOMMENDATIONS

The sourcing department of the company should start insourcing transport management again. This means that the activities of *carrier selection* and *carrier negotiation and contracting*, along with *carrier monitoring and controlling should* be insourced under the responsibility of the sourcing department. One extra employee should be hired to either commit this employee to the above responsibilities, or an already available sourcing employee should commit to these responsibilities, whereas the extra hired employees takes over the responsibilities of the respective sourcing employee.

Due to the insourcing of transport management, contracts with the logistics service providers have to be revised and a new carrier selection system called Transsmart has to be integrated with the ERP system of the company and possibly the WMS system of the logistics service provider. In new contracts and agreements, it has to be stated that the company, for every non-Ex works shipment, will provide the selected carrier along with the EDI order of the picking of the product to the LSP. The LSP employees consequently sign in the shipment with that consecutive carrier, and will prepare transport. The moment the transport leaves the LSP warehouse, control and communication responsibility lies with the company only. This happens also via the Transsmart system.

Above aspects should be considered into the new contracts and agreements. Any further agreements and contracts with both the LSP and the selected carriers should be set up *per logistics activity*, instead of one contract for the entire outsourced operation, unless only 1 activity is outsourced. This leads to maintaining a *hybrid governance* form, as discussed in 7.3.2.

Next to these aspects in the new contracts and agreements, the following contract improvements should also be taken into account:

- Make contracts *outcome based*, which means agreeing on fee's based on the outcome of transport and performance rather than baseline tariffs as are imposed currently.'

- Clear agreements should be made regarding duties and other extra costs of transport, where preferably the risk should be perched with the carrier who is assigned for transport.

- Contract lengths should be long-term (10-15 years rather than 2-4 or 1-2 years), to improve mutual investments and benefits.

- Contracts should approve the performing of audits, in order to maintain control of the process and prevent opportunistic behaviour.

- Contracts should include clear and solid agreements regarding outcome-based rewards and incurred tariffs or margins.

Furthermore, the company is recommended to consider the centralization of the order-desk departments in order to streamline communication, prevent escalation errors and to prevent BU-specific adjustments of agreements (inconsistency).

If the company chooses to retain transport management outsourced, as the implementation and coordination effort is too high, the second solution should be adopted.

The solution of retaining transport management outsourced suggests contract improvement similar to the solution where transport management is in-sourced, however now only 2 logistics service providers have to be taken into account. The contract improvement should focus particularly on *contract length* (long term: 10-15 years) and an *outcome-based* reward system. Concretely:

- Make contracts *outcome based*, which means agreeing on fee's based on the outcome of transport and performance rather than baseline tariffs;

- Clear agreements should be made regarding duties and other extra costs of transport, where preferably the risk should be perched with the carrier who is assigned for transport;

- Contract lengths should be long-term (10-15 years rather than 2-4 or 1-2 years), to improve mutual investments and benefits;

- Contracts should approve the performing of audits, in order to maintain control of the process and prevent opportunistic behaviour;

- Contracts should include clear and solid agreements regarding outcome-based rewards and incurred tariffs or margins;

- New agreements have to be set to deliver transportation costs in time, similar to the current process of BU 1 (4.3.1);

- New agreements or systems have to be set in order to properly provide actual track & trace information.

It is suggested to explore possibilities to terminate the contract with LSP 1 and re-designate logistics operations of BU 1 and BU 2 to a 3PL+/LLP or 4PL (with warehouse assets) logistics provider.

Similar to the previous solution, the order-desk departments of each business unit that has logistics outsourced should be centralised, in order to prevent business-unit specific adjustments to any of the agreements or contracts, and to retain control of the process.

When adapting this solution, there will be no significant incremental cost savings regarding personnel or tariffs that can be accounted for in advance. We have not researched the possible impact of tariff improvement after re-bargaining the contract or re-assigning logistics to another logistics service provider. The only costs that would be added to this solution are bargaining costs and *pretransaction* costs that are concerned with the reviewing of switching logistics service providers.

8.3. LIMITATIONS

Due to the extensive nature of this research, and the abstractness of the various problems encountered, some limitations should be added as a disclaimer to the recommendations provided.

First, the general problems regarding escalations and communication errors (4.4) and the problem causes of the problem matrix (1.2.2) have been deduced from semi-structured interviews of which minutes were not taken, and only small fractions of problem reports. The problems as noted in this thesis are thus subject to the researchers interpreting capabilities. As these problems account for the biggest part of the framework of this thesis, more extensive verification and time-studies of these problems should have been provided, however this was not possible given the time and resources available.

Second, the aspect of receiving transport costs and track & trace information on the timelines in paragraph 4.3 are subjective to the opinion of employees. Information regarding these aspects was also acquired by semi-structured interviews, in which the extent of veracity by employees was not verified. Other aspects within these timelines such as the time between ordering and shipment confirmation have been verified by means of order logs, but only at BU 3 and BU 4, as these were the only business units of which this data was available at that time.

Third, the reduced tariff projections discussed in 6.2.1 only provided calculations for a single BU, and for a two month-period only. Furthermore, the *parcel* rates reductions were not based on actual charged shipments, but rather on proposed tariffs. In our solution generation, it is assumed that the average tariff reduction of the BU is representative for all 4 business units to some extent, but we were unable to verify due to the different nature of other BU shipments.

Despite the original question of the company being whether outsourcing transport management has been a good choice or not based on *total cost of ownership*, the focus of this thesis laid much more attention to the strategic impact of the choice, based on theories regarding outsourcing. Furthermore, the available calculations show only two cost drivers regarding the total cost of ownership model, as most cost drivers have not been measured or documented or the researches were unable to do so given time and resources.

Despite being recommended, no research has been executed regarding the optimal employee division when centralising the order-desk department and whether this is a good solution concerning business structure. The recommendation has been made in order to prevent the core problem from occurring again, not based on literature.

Finally, all theories that were used in order to conclude on our final solution were theories that have been designed to help in the decision and configuration of outsourcing *as a whole*, rather than focused on logistics outsourcing. No empirical research is known to us regarding these theories and their successful application in *logistics* outsourcing decisions, let alone *transport management* outsourcing decisions.

8.4. FURTHER RESEARCH

Given the limitations in the previous paragraph, we will now propose some subjects for further research in the future that would enable the company and the sourcing department to substantiate any decision regarding the solutions provided by this thesis:

More extensive research on tariff reduction

A more complete study on tariff reductions could be performed. What would be needed is more exact data from additional carriers, specialized in different fields of transport over different destinations. This could also be done with *parcel* shipments, where actual charged parcel shipments could also be taken into consideration.

Documentation of transaction costs

In order to benefit future TCO or general cost calculations, it is necessary for the company to document for each outsourcing transaction the pre-transaction costs, transaction costs and the post-transaction costs. Elaboration in these costs can be found in Appendix F: Literary Research on Total Cost of Ownership.

Outsourcing decision making

In order to prevent outsourcing failures in the future, internal research should be done on literature available on outsourcing, and the practical suggestions that this provides.

LSP selection

If the company may choose to adapt solution 2 and also chooses to terminate contract with either one of the logistics service providers, research should be performed to alternative LSP's taking the literature of levels of outsourcing and service levels of this thesis into account (5.2.5. & 5.2.6), and possibly extending this review.

Time-studies

Already mentioned in the limitations, we conclude that our process research on the outbound ordering process has been subject to employee interpretation and only to a small extent proof by data. Further research that can strengthen the propositions of this research should be focused on time-management studies, where the actual time that employees spend extra on solving problems that they are not supposed to solve, is measured in an exact way. Consequently, the company is enabled to make a better decision whether a new proposition is worth the problem solving of the employees.

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Appendix A: Operational Transportation Process

The management of the transportation process is done similarly for both logistic service providers. This also implies the same process flow for each business unit. What can be seen, is the process as *managed* by the LSP, and *executed* by either a third-party carrier, or by the transport subsidiary of the LSP itself.

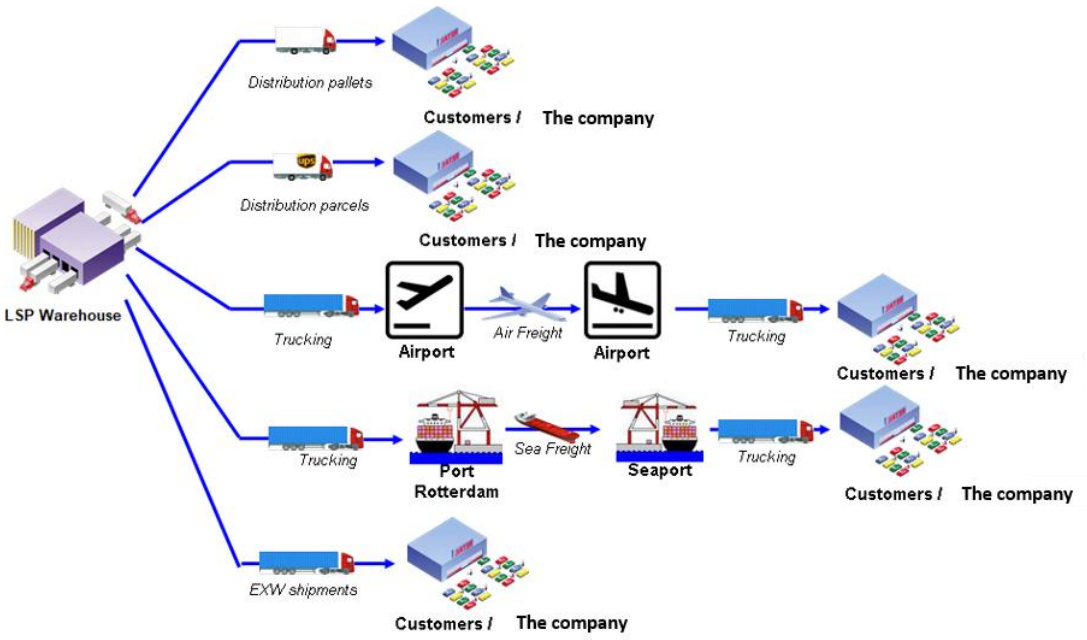
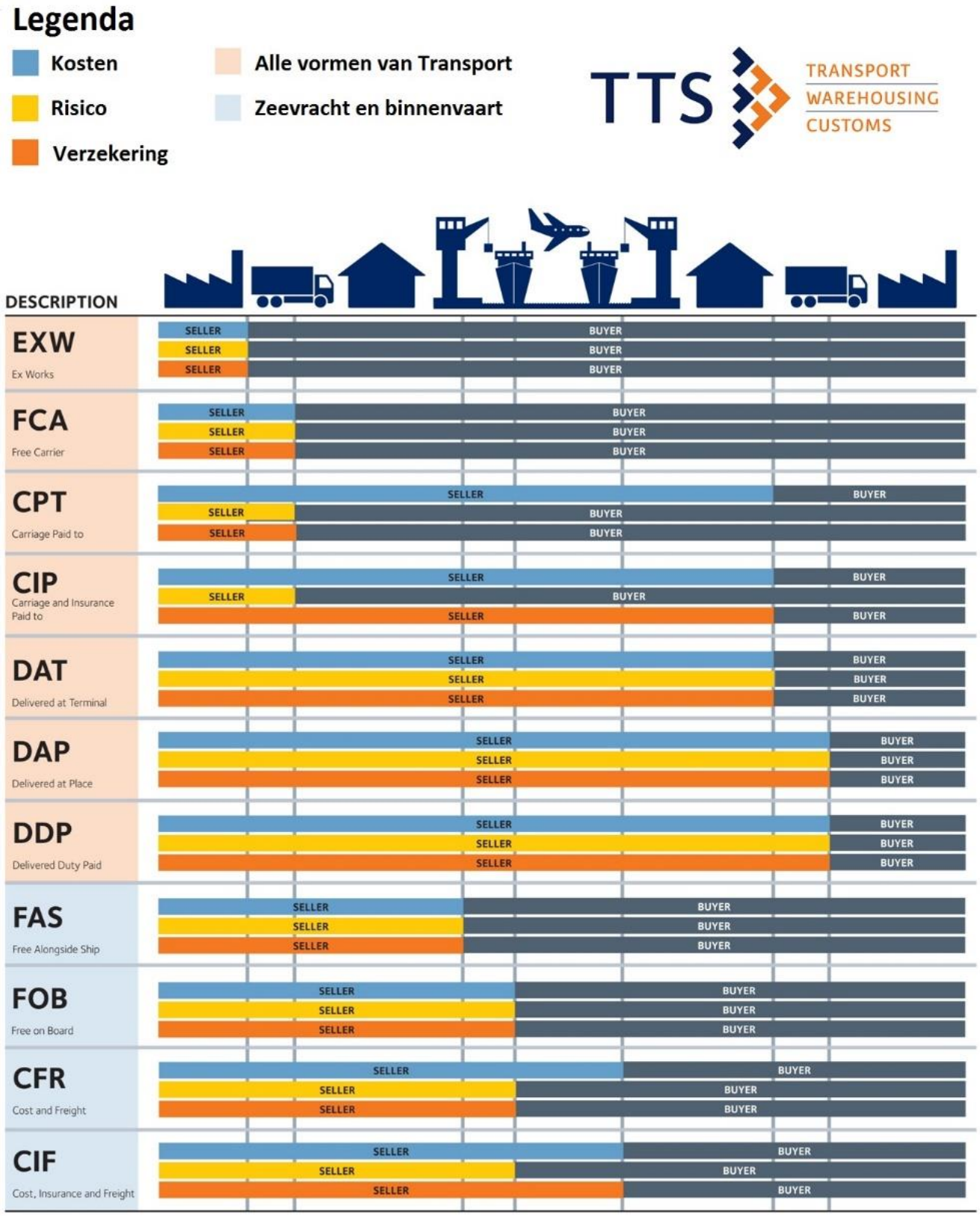


Figure A.1: Outbound distribution from a warehouse of one of the LSP's, to the company's customers.

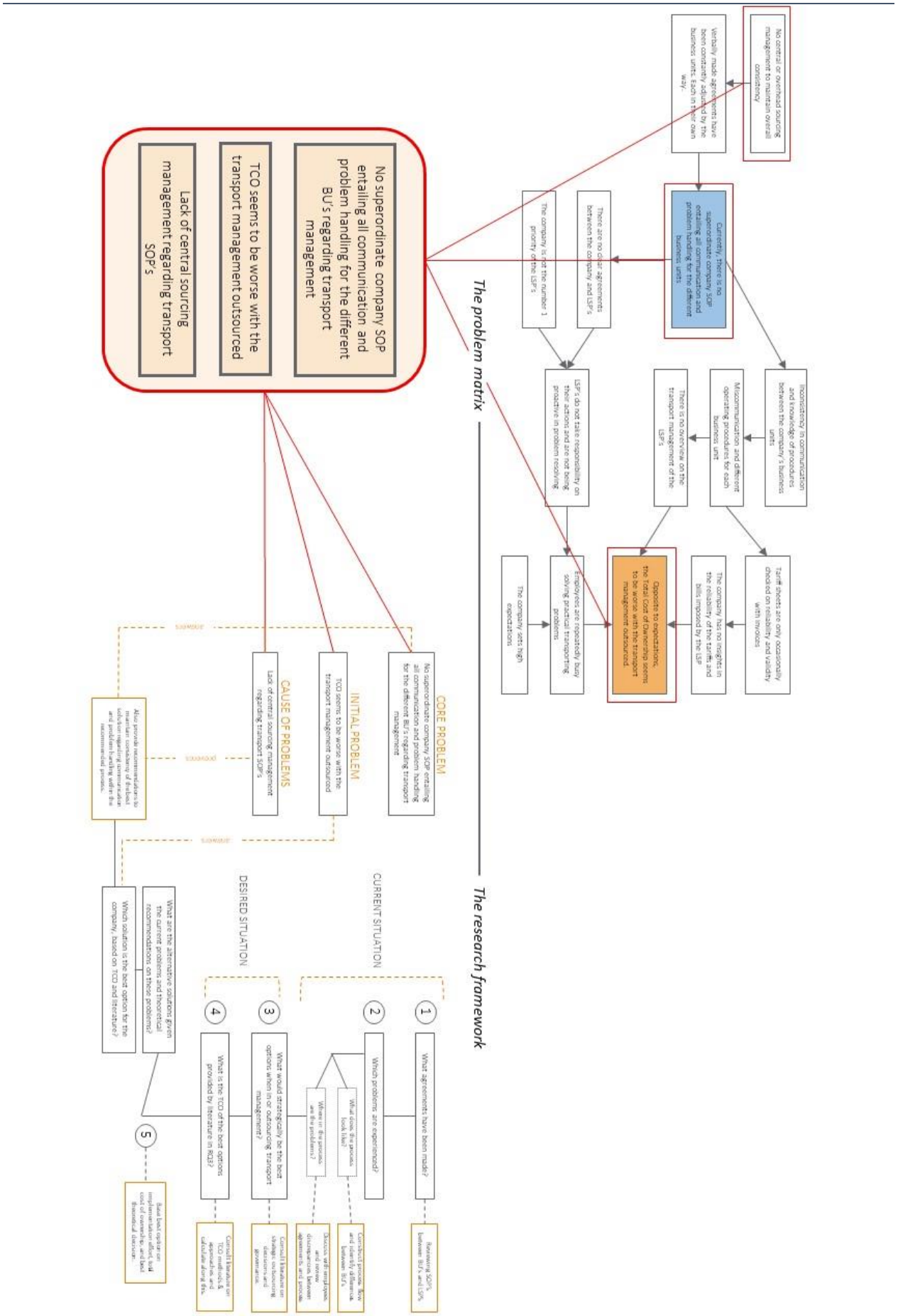
Outbound distribution is the transportation of a product from a company designated warehouse of one of the LSP's, to a customer of the company. In concept definitions (subsection 1.2.3), we discussed the most used incoterms, including Ex Works shipments. In figure A.1 Ex Works shipments are schematically shown with a truck at the lowest flow, which means organised by the customer. All other trucking and parcel distribution within outbound distribution is either facilitated by the transport subsidiary of the LSP, or by a third-party transporter. In the latter case, this may be because the LSP has agreements with a third party when shipping to specific countries or areas, or when the shipment contains for example dangerous goods. It also occurs that the company already specifies the transport party, which is actually part of transport management, when they have a preferred carrier to for example execute sea-and air shipments.

DDP and DAP shipments (or similar incoterms) can both be parcel or pallet shipments. Parcel shipments/deliveries are generally executed by parcel services such as UPS or DHL, whereas pallet transport is done by a variety of companies. Furthermore, in figure A.1 it is seen that all transportation ends at the customer, or at the company. The latter happens when products require a final (software) customisation, which happens generally at the company HQ. From here, the product is then shipped directly to the customer. The latter is done by requesting a transport at the LSP from the business unit that the product belongs to. The LSP subsequently arranges pick-up and shipment to the final customer.

Appendix B: Incoterms 2010 overview



Appendix C: the Problem Matrix & Research Framework



Appendix D: Overview of the Order Process [LEFT OUT]

This Appendix has been left out due to confidentiality agreements

Appendix E: Categorization of Logistics Activities into Service Levels

Category of logistics services	Rahman (2011)	Min (2013)	Bakar and Jaafar (2016)
Basic logistics services	Fleet management (41) Shipment consolidation (27)	Customs clearance (60) Port services (56) Freight forwarding (45) Shipment management (40) Shipment consolidation (34) Freight brokering (33) Inbound traffic control (20) Outbound traffic control (16)	Freight forwarding (69) International transportation (68) Domestic transportation (56) Warehousing (23)
Value-added logistics services	Order fulfillment (59) Order processing (27) Product returns (27) Product assembly / installation (9)	Freight bill payment (47) Import / export documentation (40) Product packaging / labeling / marking (16) Returned good (14)	Reverse logistics (40) Invoicing (21) Order processing (21) Value-added services (17)
Advanced logistics services	Warehouse management (64) Carrier selection (23)	Security management (24) E-logistics (19) Returned good management (14) Warehouse management (14) Carrier negotiation and contracting (11) Inventory management (11)	Inventory management (15) Logistics IT system (15)

Note: Figures in parentheses are percentages that refer to the share of firms outsourcing these logistics services as identified by the twelve studies. (Continued)

Category of logistics services	Sohail and Sohal (2003)	Hong *et al.* (2004)	Sadiq Sohail and Saad Al Abdali (2005)	Sahay and Mohan (2006)	Ansari and Modarress (2010)
Basic logistics services	Shipment consolidation (58) Fleet operations (49)	Freight forwarding (61) Transportation (44) Warehousing (38) Distribution (26)	Shipment consolidation (28)	Outbound transportation (56) Inbound transportation (52) Custom clearing and warding (51) Outbound warehousing (34) Consolidation (29) Fleet management (29) Inbound warehousing (29) Distribution (23) Outbound traffic control (16)	Inbound freight (86) Outbound freight (74) Customs brokerage (68) Freight consolidation (58)
Value-added logistics services	Freight payment (42) Order fulfillment (30) Product returns (20) Order processing (15) Product assembly / installation (11)	Value-added services (11)	Freight payment (19) Order fulfillment (17) Product assembly / installation (15)	Labelling and packaging (29) Order picking (27) Reverse logistics (22) Order fulfillment (20) Order processing (19) Assembly / installation (13)	Freight bill payment (43)
Advanced logistics services	Carrier selection (39) Rate negotiation (37) Warehouse management (33) Inventory replenishment (24) Logistics information systems (21)	Logistics information systems (14) Logistics system design (11)	Carrier selection (33) Inventory replenishment (14) Information systems (10)	Import / export management (34) Inventory management (23) Rate negotiation (22) Selected manufacturing (16) Inventory management (11) Demand forecasting / planning (3)	Warehousing management (65) IT logistics (62) Consulting (37) Global logistics (28)

Category of logistics services	Millen *et al.* (1997)	Boyson *et al.* (1999)	Van Laarhoven *et al.* (2000)	Larson and Gammelgaard (2001)
Basic logistics services	Fleet management (53) Shipment consolidation (42)	Warehouse operations (29) Fleet management (17)	Storage (87) Line haul (81) Emergency transport (70) Network based transport (70) Tracking and tracing (64) Merge-in-transit (36) Inbound warehousing (29) Distribution (23) Outbound traffic control (16)	Outbound transportation (82) Warehousing (72) Logistics planning (64) Inbound transportation (62) Shipment consolidation (62) Track and trace (44) Fleet management (42)
Value-added logistics services	Order fulfilment (33) Product returns (33) Order processing (16) Product assembly & installation (13) Freight payment (9)	Freight payment (57) Packaging (15) Product returns (15) Order processing and fulfilment (10)	Order picking (79) Inventory administration (64) Labelling (52) Customisation (26) Assembly (19) Invoicing(18) Order entry (11)	Customs clearance and duty processing (61) Pick and pack (59) Labelling/Packaging (51) Returns/Reverse logistics (51) Order processing (47) Invoicing (46) Payment processing (31) Assembly (23) Cross-docking (21)
Advanced logistics services	Warehouse management (47) Carrier selection (27) Logistics information systems (22) Inventory replenishment(13) Rate negotiation(11)	Carrier selection (24) Rate negotiation(24) Information systems (20) Shipment planning (17) Inventory management (8) All supply chain functions (10)	Forecasting (2)	Inventory management (61) EDI (56) Web-based linking (56) Inspection/Quality control (39) Information systems management (33) Management reports (33) Supply chain design (29)

Appendix F: Literary Research on Total Cost of Ownership

F.1. TCO IN GENERAL

The overall concept of *Total Cost* has been widely discussed throughout literature, but the primary research considering *Total Cost of Ownership* was performed by Ellram and Siferd (1993, 1998) and Ellram (1993, 1994, 1995); *in Ferrin & Plank (2002).* TCO is a tool and philosophy in purchasing that can be used to understand the real cost of buying a particular good or service from a subsequent supplier (Ellram, 1995).

TCO is a rather complex method, that is however becoming very useful for firms that do not want to know just the 'price' of a certain product or service, but the total cost associated with the product. Two aspects that make TCO more difficult and different to determine than conventional methods are the broader spectrum which it considers regarding acquisition costs, and the review of life cycle costs. The latter considers costs associated from – mostly – a product or item from a supplier during the complete life cycle of that product (Ellram, 1993a). The tool is especially useful as a quantitative tool for benchmarking, evaluating supplier performance, and improved decision making.

F.2. COMPONENTS

Ellram (1993a) identifies different components on which firms should have track during the period that a product or service is *in use*. This period is also the period that most firms struggle to maintain an overview of costs, whereas they do keep proper overview in the acquisition process.

As TCO is originally a tool used in supplier decision and evaluation, it is most often based on valuating the total cost of a product that is delivered by a supplier. Most components that are defined by Ellram (1993a) are therefore not of use for this research, such as *component parts and materials cost, capital costs* (the exact price of an item), *maintenance, repair, and operating supply items cost.* However, a fourth component is provided, which are *costs of services*. It is also stated that costs of service are particularly difficult to estimate due to the intangible nature of the service. Think of the value of satisfaction of the firm, or the satisfaction of the customer.

In a study, Ellram & Siferd (1993) provide a model which gives components of the TCO approach based on *purchasing activities*. These activities are *quality*, *management*, *delivery*, *service*, *communications*, and *price*. However, in a later study, another view on TCO elements is suggested, that fits a customer service model by Lalonde & Zinzer (1976) into the TCO concept. This view bases the elements of TCO on the order in which costs are incurred, namely *pretransaction*, *transaction*, and *posttransaction*. A schematic overview of this method of three TCO elements is depicted in figure F.1 on the next page.

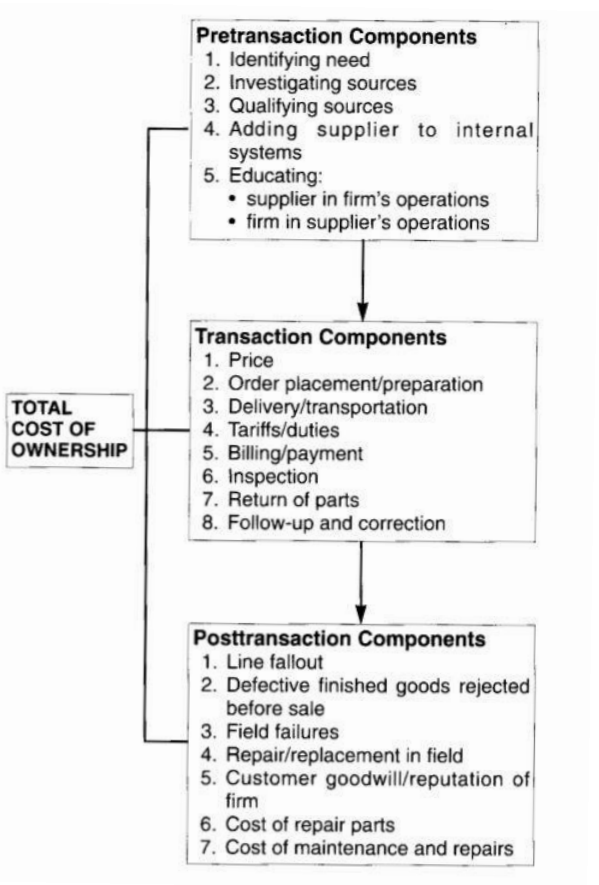


Figure F.1: Major categories for the components of Total Cost of Ownership (Ellram, 1993a)

Pretransaction costs

Pretransaction costs are all the costs that are charged or do occur during the period prior to placing the order or receiving the products or service. In case of the company, the pretransactional period would have started from the moment that anyone within the company starts to consider and investigate the possibility of outsourcing, until (but not including) the placement of the order. The pretransactional period would include research into the different LSP's, determining the degree of outsourcing and which components to outsource, and educating and training personnel. Pretransaction costs such as the qualification of a supplier (or LSP) are often not accounted for, therefore creating a wrong indication of the total costs incurred with the outsourcing process (Ellram, 1993a).

Transaction costs

Transaction costs are usually more widely recognized than the other two costs in the spectrum (pretransaction and posttransaction) because of the fact that *transaction costs* "occur in closest time, space, and relationship with the transaction itself" (Ellram, 1993a). Transaction costs are incurred when preparing or placing an order. In case of the company, these transaction costs are all linked and similar to costs resulting from the *outbound order process* discussed in chapter 4 (4.2. & 4.3.). Examples are EDI messaging costs, communication costs (phone, email), followed by receiving the bill (which also has to be checked with the agreed tariffs) and invoicing to the customer, etc. It is furthermore stated that transaction costs that tend to be overlooked are *order preparation, auditing and matching of order,* and *correction of incorrect documents* (Ellram, 1993a).

Posttransaction costs

As the opposite of pretransaction costs, *posttransaction costs* are costs that develop subsequent to the possession of the product or service of the firm. In terms of product or item transaction this could be when the product is in possession of either the firm itself (machines), or in the possession of agents and customers. Posttransaction costs could develop shortly after the transaction has been done, or years after, when the product or item is modified or disposed of (Ellram, 1993a). "The more distant in time a cost occurs from the transaction, the less likely it is that the cost will be recognized as explicitly related to the purchase of a certain item from a certain supplier" (Ellram, 1993a). It is therefore that costs in this stage are most often overlooked, even more frequent than pre-transaction costs, as with the latter the *focus of the firm* still lies on the acquisition of a product or item.

For service transactions, especially the service of transport management that this research focuses on, it is rather difficult to identify multiple posttransaction costs, as most mentioned cost drivers of posttransaction costs in figure 30 are related to product or item purchase or sale. We however identified one cost driver that still is applicable to service transactions, which is *customer goodwill/ reputation of firm*. As the quality of the service and process, offered and executed by the supplier (LSP), has a major influence on perceived customer benefits (5.4). This benefit is however only measurable after the transaction has been done between the supplier, firm, and its customer. In an outsourcing situation as with the company, it is desired that this transaction is solely between the supplier and the customer, without interference of the firm, as outsourcing should be inherent to 'unburdening' (1.2). When this is not the case, any costs incurred by the involvement of the firm are related to customer goodwill and thus posttransaction components.

F.3. TOTAL COST OF RELATIONSHIP

Maltz & Ellram (1997), further reinforce our statement in the previous section that stated that logistics outsourcing, or transport management as being a part of the logistics process, is fundamentally different from component outsourcing as it involves acquiring a process instead of a discrete quantity of parts or products. They therefore propose a modification of the Total Cost of Ownership, which they call *Total Cost of Relationship* (TCR). The new model accounts more for cost drivers that we identified in the *transaction* and *posttransaction* sections in the previous subparagraph, such as customer satisfaction costs.

The major difference between components and logistics outsourcing is that logistics outsourcing deals with more *contact interfaces* than component outsourcing. For example, where a component buyer only has contact with the supplier of the component, logistics processes include the first interface between the buying company and the LSP, and the second interface between the LSP and the ultimate customer. Even more contact interfaces could occur when the LSP outsources transportation to a third-party transporter, which does in fact occur in our research context. This difference is addressed and summarized by Maltz & Ellram (1997) in figure 30 below.

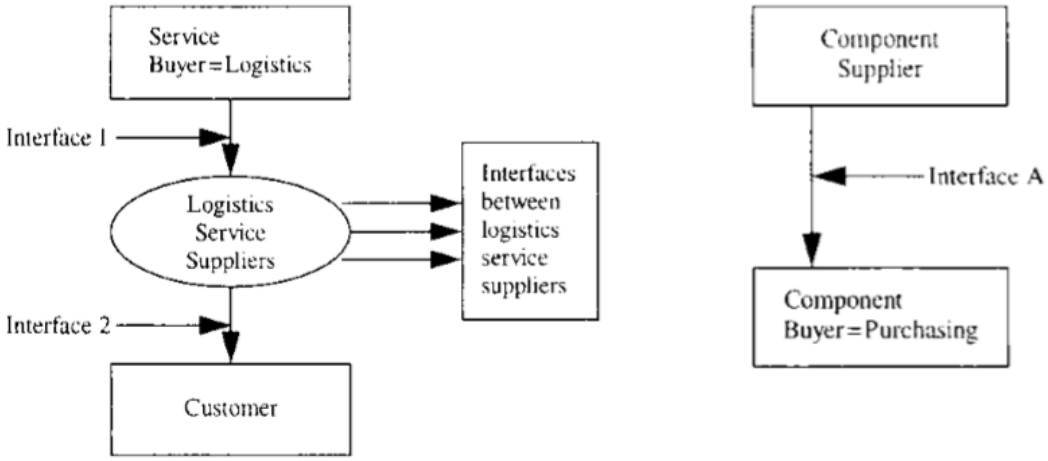


Figure F.2: Purchasing/outsourcing logistics services vs. components or products (Maltz & Ellram, 1993)

Next to the contact interfaces regarding the purchasing of services, information monitoring also becomes more complex within logistic services purchasing, as it is more variable and personnel dependent than manufactured products (Maltz & Ellram, 1993).

As a result, additional cost drivers adding to the conventional TCO model are proposed (Maltz & Ellram, 1993), that should be accounted for when considering the make-or buy decision in logistics outsourcing. A few of these costs are *costs of monitoring service levels, handling of unexpected requirements, performance monitoring, etc.*