The ISEA project

Inter-organizational **S**upply-chain **EA**sing

A project to restore the natural flow between Shell Chemicals and their Logistics Service Providers

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A project to restore the natural flow between Shell Chemicals and their Logistics Service Providers

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Executive Summary

In today's world of cutthroat competition, more and more companies are searching for ways to team with others in order to improve efficiency and competitiveness. It is no longer a question of companies competing with each other, but more a competition between chains of companies. In this respect Shell Chemicals Europe is no different. In order to focus on their core competencies, namely the production of petrochemicals, they began outsourcing all logistics activities of their operations in the 80'ies.

One of the major challenges of outsourcing is the management of the *customer/supplier relationships* that these companies engage in with their suppliers. Also Shell Chemicals Europe is experiencing difficulty in managing these relationships. Currently Shell is experiencing a lot of day-to-day firefighting, which occurs when issues bounce back from the supplier. This research investigates these customer/supplier relationships between Shell and the various Logistics service providers they work with and makes an effort to unearth possibilities for improvement. Next to customer/supplier relationships, this investigation also touches upon the areas of *portfolio management* and *supply chain management*.

The approach taken in this thesis initially starts with defining the research design. This is a detailed plan of the required steps needed to close the gap between what is experienced and what is desired. This desired state of the world is defined by Shell as achieving a more sustainable and relaxed supply chain, which involves less firefighting. With a clear roadmap in place, the second step involves a thorough literature review to learn about the state-of-the-art in customer/supplier relationships and other relevant related fields. The third step involves the assembly of evidence from various sources to be able to paint a clear picture of the current situation within the Shell supply chain. Once a detailed understanding of the supply chain is established, the conceptual model, based on the literature study, is applied. In this step the literature is combined with the real-life situation. Based on this linking of literature to the Shell supply chain, various detailed solution scenarios can be defined to aid Shell Chemicals Europe in reducing firefighting. Finally the conclusion combines all the insight gained from the steps previously performed, and results in the key findings of this research. These contributions can be summarized into five main, high-level findings:

1. For the supplier to exhibit a pro-active and improvement-focused attitude, in which the supplier collaboratively thinks with the customer, their dealings need to evolve beyond a so-called arm's length relationship. Suppliers will remain to be reactive, or at best calculative, if the relationship does not evolve towards a strategic, long-term oriented customer/supplier relationship. By diagnosing the problems within the Shell supply chain, it is found that the main issues revolve around the following themes: a lack of expertise/learning orientation, lack of customer/supply chain orientation, lack of/inability of information sharing, lack of shared investments, lack of shared responsibilities and a lack of clear roles and responsibilities. Dealing with the majority of these issues involves building closer relationships.

2. The logistics service providers that (1) are most loyal, (2) cause the least amount of firefighting, and (3) are generally the top-performers, are those that demonstrate a high degree of financial dependency. Since smaller suppliers have less business, most of these suppliers are the smaller-sized ones. The primary issue with smaller-sized suppliers though is that their maturity is very low (with respect to management resources and IT capabilities for instance). Smaller-sized suppliers do not have the capabilities to evolve beyond an operational focus. The bigger-sized suppliers on the other hand, are unhappy in their relationship with Shell exactly because they do posses these management resources and strategic capabilities. The problem here lies in the fact that Shell retains all control of the logistics operations, which frustrates the mature suppliers. Due to a lack of shared responsibilities in these customer/supplier relationships, their commitment is low. To reap the benefits of an efficient supply chain, Shell needs to hand over part of its control to the suppliers. Without this important step, firefighting will remain to be a major part of normal practices within Shell.

3. From literature it has come forward that any strategic outsourcing arrangement should have a team of strategically focused people to manage it. In order to reduce firefighting, long-term strategic capabilities need to be built. Firefighting remains when the focus of the customer/supplier relationship is operational. Analysis revealed that in Shell's case the relationship are primarily operationally focused.

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5. One has to be wary of getting too much caught up in management tools and KPI's, as this can retard a successful customer/supplier relationship. Both parties need to be careful in not wanting to capture everything in numbers or graphs. In all relationships, whether it is on a personal or professional level, a personal touch is essential. Also it is important not to lose sight of why we do what we do. Therefore, it is essential in achieving an effective supply chain to always retain a customer focus throughout all links in the chain.

Samenvatting

In de hedendaagse wereld van moordende concurrentie, zoeken steeds meer bedrijven naar relaties met anderen om hun efficiëntie and concurrentiepositie te verbeteren. Het is niet langer meer slechts individuele bedrijven die met elkaar concurreren; de grenzen zijn nu aan het verleggen naar concurrentie tussen gehele ketens van bedrijven. In dit opzicht is Shell Chemie Europa niet anders. Om het mogelijk te maken dat alle aandacht op de kerntaken gelegd kan worden, namelijk het produceren van petrochemische producten, heeft het bedrijf in de jaren tachtig besloten alle logistieke activiteiten uit te besteden.

Eén van de grootste uitdagingen van uitbesteding is het succesvol onderhouden van de *klant/leverancier relaties* welke deze bedrijven aangaan met hun toeleveranciers. Ook Shell Chemie Europa ervaart moeilijkheden in het managen van deze relaties. Momenteel vindt er in de relaties welke Shell heeft aangegaan, op een dagelijkse basis, veel ad-hoc probleemoplossen plaats. Dit gebeurt als problemen terugkaatsen van hun leveranciers. Deze scriptie onderzoekt de klant/leverancier relaties tussen Shell en de verschillende logistieke dienstverleners waarmee ze samenwerken en maakt inspanningen om mogelijkheden tot verbetering boven tafel te krijgen. Daarnaast zal dit onderzoek ook raakvlakken hebben met de gebieden van *portfolio*- en *ketenmanagement*.

In deze scriptie is het beginpunt het definiëren van het onderzoeksontwerp. Dit ontwerp is een gedetailleerde routekaart met alle benodigde stappen om het perceptuele gat te dichten tussen wat door Shell wordt ervaren en wat door Shell verlangd wordt. Deze gewenste staat van de wereld is door Shell gekarakteriseerd als het bereiken van een meer duurzame and stressvrije keten, waarbij een verminderde mate van ad-hoc probleemoplossen plaats vindt. Met deze routekaart als beginpunt, is de volgende stap een uitgebreid literatuuronderzoek, om meer te weten te komen over klant/leverancier relaties en andere gerelateerde wetenschappelijke velden. De derde stap betreft het samenstellen van bewijs, puttend uit verschillende bronnen, om zodoende een duidelijk beeld te kunnen scheppen van de huidige situatie binnen de keten van Shell. Als eenmaal een inzichtelijk begrip van de keten is bewerkstelligd, zal het conceptuele model, welke gebaseerd is op het literatuuronderzoek, uitgevoerd worden. Binnen deze stap zal de literatuur gecombineerd worden met de werkelijke situatie. Gebaseerd op het leggen van deze link tussen de literatuur en de Shell keten, kunnen verschillende oplossingsscenario's gedefinieerd worden om Shell Chemie Europa te helpen om het mogelijke plaatshebben van de geïdentificeerde problemen te verminderen. Tot slot zal de conclusie alle verkregen inzichten van de voorgaande stappen combineren, en de hoofdbevindingen van het onderzoek presenteren. Deze wetenschappelijke contributies kunnen samengevat worden in vijf hoofdbevindingen:

1. Het is belangrijk te onderkennen dat het voor het managen van een leverancier belangrijk is dat de relatie verder evolueert dan één welke voornamelijk leunt richting markttransacties. In dat geval zullen de leveranciers zich reactief en berekenend blijven gedragen. Door de problemen binnen de Shell keten gediagnosticeerd te hebben, blijken de problemen zich te concentreren

rond de volgende thema's: een gebrek aan expertise/leeroriëntatie, een gebrek aan klant/keten oriëntatie, een gebrek aan/onbekwaamheid in het delen van informatie, een gebrek aan gedeelde investeringen, een gebrek aan duidelijke rollen en verantwoordelijkheden. Omgaan met een meerderheid van deze problemen houdt in dat intiemere betrekkingen nodig zijn.

2. De logistieke dienstverleners welke (1) het meest loyaal zijn, (2) de minste problemen veroorzaken, en (3) over het algemeen het beste presteren, zijn deze leveranciers welke een hoge mate van financiële afhankelijkheid tentoonspreiden. Deze dienstverleners zijn meestal de kleinere ondernemingen. De belangrijkste beperking met deze kleinere leveranciers is dat zij meestal een lage volwassenheid hebben (op het gebied van management capaciteit en IT capaciteiten bijvoorbeeld). Deze leveranciers hebben niet de middelen verder te groeien dan hun operationele herkomst. De grotere leveranciers aan de andere kant zijn ontevreden in hun samenwerking met Shell juist omdat zij wel over deze strategische hulpmiddelen en capaciteiten beschikken. Het probleem ligt hem in het feit dat Shell alle macht beteugelt in de logistieke activiteiten met de leveranciers, iets wat deze volwassen leveranciers frustreert. Door het gebrek aan gedeelde verantwoordelijkheden, is de toewijding van deze leveranciers laag. Om te profiteren van de voordelen van een efficiënte keten, is het noodzaak dat Shell een deel van zijn verantwoordelijkheden overdraagt aan de leveranciers. Zonder deze ingreep zullen de problemen blijven terugkaatsen naar Shell.

3. Uit het literatuuronderzoek is naar voren gekomen dat in elke strategisch georiënteerde uitbestedingsregeling, een team van strategisch toegespitste werknemers nodig is om dit te managen. Om ad-hoc probleemoplossen te verminderen, dienen lange termijn strategische capaciteiten gecreëerd te worden. Zonder deze strategische toespitsing blijft het probleem van terugkaatsende problemen bestaan. Analyse heeft aangetoond dat in het geval van Shell de relatie voornamelijk operationeel georiënteerd is.

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5. Men dient voorzichtig te zijn om teveel verstrikt te raken in managementinstrumenten en KPI's, omdat dit een succesvolle relatie kan verhinderen. Beide partijen dienen voorzichtig te zijn om niet alles in cijfers of grafieken uit te drukken. Daarom is het belangrijk de persoonlijke factor in een klant/leverancier relatie niet uit het oog te verliezen. Daarnaast is het van belang een klantgerichte oriëntatie in alle schakels in de keten te behouden om een effectieve keten te bewerkstelligen.

Preface

This thesis is the concluding part for a Master of Science degree in Business and Information Technology at the University of Twente. The challenge in writing this M.Sc. thesis was to create value not only for Shell Chemicals, but also for the Dutch Government. Since this was a government-sponsored project within SCE, it was a struggle for me at times to remain the objective government employee, as I spent everyday at the SCE headquarters, turning ever more red and yellow inside. Having said that though, I wanted to carefully map the views of all different members in the supply chain; looking also at it from the angle of the Logistics service providers that Shell Chemicals Europe works with. I believe I have succeeded in that by being able to present the results of the research in this thesis.

Because of the fact that this thesis would never have been completed without the support and feedback of many helpful souls, I would like to take this opportunity to thank them. First of all I would like to thank Alberto, my company supervisor, for his insights into SCE and his continuous support that allowed me to complete the thesis. Secondly I would like to thank Romana, my thesis supervisor and fellow researcher in this project, for her energy and enthusiasm in tackling the many hurdles along the path towards the finish line. Without a doubt, the results presented here, would not have been as thorough and complete without her accompanied research and feedback. Next to that, I would like to thank my team; the SCE Land Logistics Group, as well as those from other departments who were kind enough to lend a hand in answering the many questions I had. Also I would like to thank Silja, my second supervisor, for her valuable feedback in making sense out of all the data that was gathered throughout my months at SCE and condensing it into a readable whole. I would like to thank the many LSP's, the ECTA and EPCA as well in participating in this project. Also I would like to thank Jos for getting me in touch with SCE and allowing me to embark into this wonderful project.

I would also like to thank family and friends for their support, not only during these last nine months, but also during the, at times frantic, last three years. Finally I would like to show my gratitude to the former BIT coordinator, Ms. Corry Huijs, for giving me the opportunity to continue my academic journey when that had come to an end. All the best to you in the future.

Rotterdam, August 2009

Chris Jager

Intended audience

In order to properly identify to whom this thesis is targeted, we can split the audience into two separate groups; one group from Shell Chemicals and one group from the Dutch Government, represented by TRANSUMO, including the researchers and practitioners interested in the field of logistics.

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Regardless of separate groups of audience though, for each of the stakeholders it would be valuable to read through the "*Executive summary*" in the beginning of this thesis to get a basic feel for what the thesis sought out to achieve. Also, each stakeholder is invited to read the "*Answering the problem statement (Main Results)*" paragraph in the conclusion chapter (paragraph 6.2). This paragraph gives an in-depth explanation of the main conclusions of this thesis that are introduced in the executive summary.

Table of Contents

This section provides a brief overview of the contents of this thesis. The thesis starts with an introduction into Shell Chemicals Europe and their main problems. The second chapter details a step-by-step plan to guide the process of providing an answer to these problems. The third chapter provides a literature study to help understand the problems that Shell Chemicals Europe describes, from a theoretical standpoint. The fourth chapter presents the analysis of the current situation at Shell Chemicals Europe, by comparing literature to practice, and establishing a diagnosis of the problems identified. Based on this knowledge, solutions can be defined, which are covered in chapter five. Chapter six draws the final conclusions to be made from the entire research effort, answers the problem statement and reflects on the research process.

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Terminology

Appendix K contains the definitions of the most important concepts. The most important abbreviations are stated here.

CM	Contract Manager
CoB	Class of Business
CRC	Customer Relations Coordinator
HSE	Health, Safety and Environment
HSSE	Health, Safety, Security and Environment
KPI	Key Performance Indicator
LL Group	Land Logistics Group Europe
LSP	Logistics Service Providers (synonyms: carrier, haulier)
PBU	Product Business Unit
RTC	Rail Tank Car
RTT	Road Tank Truck
SCE	Shell Chemicals Europe B.V.
TA	Technical Advisor
TC	Transport Coordinator

CHAPTER I - Introduction

This chapter describes the ISEA project and also the context of this thesis. Next to this, it introduces the reader to Royal Dutch Shell Plc. and SCE and its LL Group in particular. Also the problems within this LL Group of SCE, where the internship took place, are introduced here.

1.1. Introduction

In these times of economic despair, where Shell Chemicals is hit badly as the "*supplier of the suppliers*", the need to deal with inefficiencies has become one of the top priorities. Where the former CEO of Shell, Jeroen van der Veer, focused on exploration, Peter Voser, supported by the current state of the world, seems to have set his eyes on exploitation. The danger involved with this type of strategy though, is that it makes long-term sacrifices in order to ascertain short-term recovery. Shell's frantic focus on first quartile performance, driven by its shareholders, makes it difficult to sell sustainability.

Both companies and governments in general can't seem to stop talking about sustainability, yet looking at how they deal with the economic downturn, it has to be concluded that their measures have little to do with long-term sustainability. Why does it seem that mankind's horizons seem to be continuously shortened? Richard Foreman (2005) has stated that we are turning into pancake people; we are spread wide and thin, as we are exhausted of our inner repertory of cultural inheritance. This fundamental change in society has been fuelled by the use of mobile phones, e-mail, and the general information overload caused by the Internet revolution. Twenty-first century working life seems to be characterized by the fact that employees are utterly connected. On a daily basis we are so pre-occupied with dealing with all the incoming calls, piles of (automatically generated) e-mails and messenger conversations that it has become more and more difficult to really take the time to stop and think. Our preoccupation in dealing with operational matters takes away the possibility and capacity for deep-thought; the ability to reach a point in time where one can truly tackle issues on a strategic level.

Also within the Land Logistics Group (LL Group) of SCE, where this project has been set out, this short-term, operational focus seems to be a dominating paradigm. SCE is aware of this and would like to break this cycle by using the ISEA project as a platform.

The issues within the SCE Land Logistics supply chain become most apparent in the relationships with their LSP's. On the one hand SCE has outsourced all logistics activities, but on the other hand SCE is still spending a lot of time coordinating its day-to-day operations. The philosophy of the LL Group is that when a problem occurs in transport, it is not SCE's problem and the LSP's need to deal with it. The LSP's, on the other hand, feel that the LL Group is like mum and dad, constantly taking them by the hand, making it difficult to walk on their own. Regardless of the truth, it is obvious that this causes certain tensions in the relationships and will almost certainly not advance efficiency. This thesis entails an investigation into the Land Logistics supply chain, specifically with respect to the customer/supplier relationships between SCE and the LSP's, in order to understand what it is that frustrates the supply chain and define solution scenarios to deal with these.

This chapter introduces the TRANSUMO project, the ISEA project and the thesis itself. The TRANSUMO project is the overarching project, which consists of seven smaller, self-contained projects, of which this project with SCE is one. It is defined as the ISEA project, which stands for Inter-organizational Supply-chain EAsing. It involves a research team of four members, from both the

Twente University and Erasmus University. This thesis is a part of the ISEA project, which focuses on customer/supplier relationships in the Land Logistics supply chain.

Subsequently this chapter gives the required background on both SCE and the LSP's that work with SCE, in order to lay the foundations for further problem definitions in the *research design* chapter.

Within this thesis, whenever the term supply chain is used, we employ the adopted definition by Langley et al. (2008: p.17), which is defined as:

"*A pipeline or conduit for the flow of products/materials, services, information, and financials from the supplier's suppliers through to the various intermediate organizations/companies out to the customer's customers or the system of connected networks between the original vendors and the ultimate final consumer.*"

From this point onward, when we talk about the supply chain, we refer to the SCE Land Logistics supply chain. Next to this, one other very important concept is that of a relationship. The definition of relationship used in the thesis is the following:

"*The state of being mutually or reciprocally interested; as in social or commercial matters.*" [Merriam-Webster, 2009]

To give an example, a citizen of a country has a relation with the local tax office. Even though the citizen is not a fan of paying tax, he or she has an interest to do so, since otherwise this person will get fined. The tax office on the other hand requires taxes from the citizen in order to be able to provide services to the country's citizens and therefore both parties are interested in each other, thus a relationship exists. The same applies to SCE and it's LSP's, where SCE is could be interested in the LSP's services, while the LSP's for instance in the financial gain by delivering these services to SCE.

So by looking at both the definitions of supply chain and relationship, used in this thesis, a link between the two can be made. In the supply chain, transactions (e.g. information, products, services) are being completed between organizations, in order to add value, which is done to be able to deliver a final product to the consumer. As relationships were defined as mutual interest (either social or commercial), it can be explained why relationships exist between these organizations. Since each of these organizations performs a value adding activity, there is mutual interest in each other, and therefore relationships exist between these organizations to make up the supply chain.

1.2. The TRANSUMO project

The Dutch government is very interested to find ways to sustain mobility. This is important in order for The Netherlands to remain competitive in the international market. In order to aid in this effort the Dutch government started the Transumo project in 2004 [TRANSUMO, 2009], which stands for TRANsition SUstainable MObility. Sustainable mobility seeks to find ways to reduce congestion, environmental and safety issues, but next to that improve cost efficiency, and making the Dutch physical infrastructure more attractive to its users.

Next to locally improving mobility, the Dutch government would like to present itself as a knowledge economy. By coming up with innovative new ideas and solutions, using the Transumo project as a platform, they hope to accomplish this, and also be able to play a part in solving mobility issues around the world [TRANSUMO, 2009].

1.3. The ISEA project

For the ISEA project, the LL Group is looking for ways to minimize firefighting in the relationships with their LSP's in order to achieve a more '*relaxed*' and '*sustainable*' supply chain [Aziz et al., 2008]. Shell has outsourced outbound logistics to these 3PL providers primarily to reduce costs, but also to increase flexibility. In total there are 14 LSP's operating for Shell to deliver the product. Figure 1.1 gives an overview of the supply chain relevant to SCE and the role of the LSP's in this.

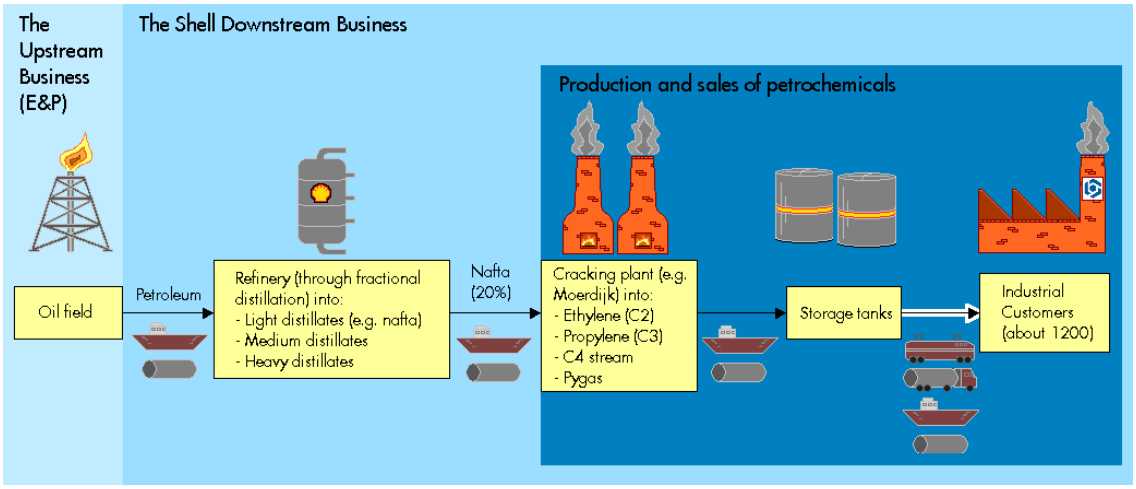

Figure 1.1 – Segment of the Royal Dutch Shell supply-chain relevant to Shell Chemicals.

The figure shows both the upstream and downstream activities and how crude oil is transformed into raw materials and transported from the oil field, to the refinery, cracking plant, storage tank and ultimately to the industrial end customers.

The focus of the project is the "*transport planning and execution of Shell Chemicals' landside logistics Supply Chain operations*" [Aziz et.al, 2008: p.1]. This is the section of the figure of the transport of the products from the plant location/location of the storage tanks to the industrial customers by the LSP's (indicated by the light colored arrow on the right of the figure). Since it is concerned with landside logistics, it only includes trains and trucks (no pipelines and boats). SCE mainly transports chemicals to their customers using trucks, but also a smaller segment of these customers are served using inter-modal transport, or have a train connection and are directly served by train using Rail Tank Cars (RTC's).

Appendix H contains the entire ISEA project proposal. The remainder of this section elaborates on the ISEA project problem statement; it's relevance to SCE's Lion project, the people involved and how the tasks are divided among them.

1.3.1. People actively involved in the project

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1.3.2. The ISEA project problem

The problem statement for the entire ISEA project [Aziz et al., 2008]:

"Find out how Control and Coordination in Customer (SCE) and Supplier (LSP) Relationships between Shell Chemicals (Logistics Group) and their Logistic Service Providers (LSPs) can be improved."

It can be seen that the project problem statement focuses on the aspect of *control and coordination* in the area of *customer/supplier relationships*. The objective of SCE is to minimize fire fighting and to achieve a more '*relaxed*' and '*sustainable*' supply chain [Aziz et al., 2008]. The project's problem statement and objective are combined in figure 1.2.

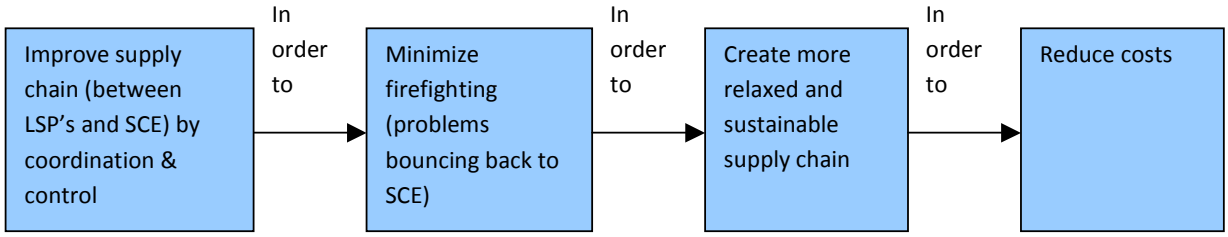

Figure 1.2 – Breakdown of the ISEA project problem statement.

In order to guide the project SCE has defined eight questions that they would like to be answered [Aziz et al., 2008]. These eight SCE defined questions, summarize the main deliverables of the ISEA project. A simplified version of these eight main deliverables is given here:

1. Is SCE effectively making use of the right mix of LSP's?
2. Should SCE move more business to smaller sized LSP's?
3. What would be the ideal size of SCE "spent" as part of an LSP's revenue stream, such that SCE has enough leverage over an LSP?
4. -
    a. What can be concluded about the current mixture of size of LSP's against the SCE HSSE requirements?
    b. What can be concluded about the current mixture of size of LSP's against the SCE performance requirements?
5. -
    c. Based on analysis done what should be the ideal mixture of LSP's used for SCE given the SCE requirements?

   d. Based on other industries best practices what should be the ideal mixture of LSP's used for SCE given the SCE requirements?

6. -

   e. Which LSP's are causing more work to SCE relative to other LSP's?

   f. Why are these LSP's causing more work to SCE relative to other LSP's?

7. Given the causes of these inefficiencies what can SCE do to improve this situation by:

   g. Changing LSP base

   h. Changing internal Supply and Logistics processes

   i. Improving IT solutions

8. What would be the value improvement in USD?

Analysis (see Appendix A) shows that these eight questions cover the following two areas:

1. Portfolio management (creating right mix of LSP's based on size, HSSE performance, operational performance, total cost of ownership)
   a. Best practices
2. Integrated process/Relationship management (power characteristics, processes, IT)
   a. Best practices

Next to this best practices are a sub-component for both components, since it is valuable to look at best practices in both portfolio management and supply chains/relationships. This results in the final division into two research areas as shown.

Based on the amount of times each of the two remaining areas are mentioned in the eight SCE defined questions, the sequence was determined. So most questions revolve around how SCE can manage the portfolio more effectively. Next to that the questions on the topic of customer/supplier relationships are mentioned most often. From this analysis it becomes clear that these two areas will make up most of the ISEA project.

Since this project is bigger than the thesis alone, the work has been divided based on these two areas. A fellow researcher, Dr. Aziz, will focus on portfolio management and in this thesis the focus will be on customer/supplier relationships. The reason why Dr. Aziz has taken on the portfolio management component is because of the fact that due to her geographical distance from SCE, it was decided that the part that required the least direct presence at SCE would be chosen. Because the customer/supplier analysis involves a lot of required observation of internal processes, it's associated IT and data storage, and interviews with SCE employees, it was decided that Dr. Aziz

would focus on portfolio management. Next to that, one of the main instruments to gather data on the portfolio management component will constitute the development of a questionnaire (i.e. survey) sent out to all LSP's. This strengthened the belief that this is the best separation of responsibilities.

1.3.3. Relevance with respect to Project Lion

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1.4. The M.Sc. project

As was mentioned in paragraph 1.3.2, this thesis will focus on the customer/supplier relationships between SCE and the LSP's. Next to this, the supply chain in general is also taken into account. The goal of the thesis is to design solution scenarios to help improve the inefficiencies in the supply chain, specifically with respect to these relationships. This will be done through analysis of literature and best practices from case studies. This will result in a conceptual model that will be applied to SCE. In order to be able to apply this model, the current situation needs to be mapped first. This mapping will be done through interviews at both SCE and the LSP's. Next to this, documentation and the activity of observation will be utilized.

Based on the understanding of the current situation, the conceptual model will be applied. This will result in an overview of possible steps and best practices in order to improve the current supply chain and/or relationships. For all these best practices and possible improvement steps, the overall efficiency gains and ability to establish a more "*relaxed*" supply chain will be the main criteria. This will be the starting point for defining the aforementioned solution scenarios.

Because of time constraints, only the supply chain performed by SCE is within the scope of the project. This would leave out the part performed by the Exploration & Production class of business (CoB), or the refining of the crude oil in the oil refinery (see figure 1.1).

1.5. The organization

This section covers the organization of Royal Dutch Shell plc at various levels. We start at the highest level and gradually focus in on SCE and the LL Group, where the internship took place.

1.5.1. Royal Dutch Shell

Royal Dutch Shell plc is best known for it's over 46.000 service stations. But this company name refers to the Shell Group of Companies, a global group of energy and petrochemical companies. Royal Dutch Shell was founded in 1903 through the merger of the British based Shell Transport and the Dutch oil field developer Royal Dutch [Shell International, 2008].

The Shell Group of Companies can be divided in two segments, the upstream and downstream business. The upstream businesses consist of *Shell Exploration and Production* and *Shell Gas and Power*. This consists of the exploration, production and transport of crude oil and natural gas prior to refining. The downstream business consists of *Shell Oil Sands*, *Shell Oil Products*, *Shell Chemicals* and

Shell Corporate. This encompasses all the activities necessary to transform crude oil into Shell petroleum products and petrochemicals, and deliver them around the world.

Royal Dutch Shell plc employs a total of 104.000 people around the world. Of that number about 6000 people work for Shell Chemicals [Shell International, 2008]. In 2007 Royal Dutch Shell plc made earnings of $31.9 billion. Of these earnings, Shell Chemicals attributed to roughly $2 billion of this total amount. In 2007 Shell Chemicals ranked third among the global top 50 of chemical companies based on sales.

1.5.2. Shell Chemicals

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1.5.3. Shell Chemicals Europe

The Shell Chemicals Alexanderpolder location in Rotterdam is the regional headquarters for Shell Chemicals in Europe. It consists of the Customer Relations Coordinator & Export department, the Supply & Logistics department, Finance department, HSE & Quality department. In total about 230 people are employed at the location. Within the Supply & Logistics department the LL Group is positioned, which will be discussed in further detail in the next section.

1.5.4. The Land Logistics Group Europe

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1.6. The Logistics Service Providers

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CHAPTER II – Research Design

After having explained the relevant background for the thesis to the reader in the first chapter, this chapter entails the actual problem statement and research questions that need to be answered. Also a significant part of this chapter entails an action plan to come up with these answers. It attempts to follow the necessary steps needed to come to these answers in a scientifically sound way.

2.1. Introduction

This chapter will describe the research design, which is defined by Yin (2003: p.19) as: *"An action plan for getting from here to there, where here may be defined and the initial set of questions to be answered, and there is some set of conclusions (answers) about these questions"*.

The chapter will begin with determining the right research strategy for the problem described. Next the goals, objectives (sub-goals), problem statement and research questions to answer the problem statement are given. After that the unit of analysis is chosen, which defines the scope of the phenomena under investigation. Then the research instruments, which entail the types of data relevant for collection, are chosen. This is further elaborated upon in the data collection paragraph, which defines more detailed what sources will be used of each research instrument. Then the literature review process is described in detail. Paragraph 2.11 presents the research model that will be used to show the steps taken to answer the research questions, and ultimately the problem statement defined in paragraph 2.3.2. After that the limitations of the project are defined, impact of the project and finally the research design is validated.

2.2. Research Strategy

Research, in the context of a thesis, entails a structured process for solving complex problems, formulated as research questions [Berndtsson et.al, 2008]. It involves the collection of information (data), to solve a problem or contribute to knowledge about a theory or practice. Wieringa (2008) also makes this distinction by stating that there are two kinds of problems: practical problems and knowledge problems. Practical problems are about a difference between phenomena and the way stakeholders desire them to be. Knowledge problems on the other hand are about a difference between knowledge and the way stakeholders like it to be. Research helps provide scientific understanding and solves practical problems [Best, 1998]. Yin (2003) identifies six different research strategies: literature analysis, interviews, case studies, implementation, experiments and surveys. In order to grasp what the methods/techniques mean, identified by Yin (2003), they are briefly explained below:

- Literature analysis is a systematic examination of a problem, by means of an analysis of published sources, undertaken with a specific purpose in mind [Berndtsson et al., 2008].
- Interviews are formalized ways of exchanging information [businessdictionary, 2008] and can be either open-ended, focused or being of survey type [Yin, 2003].
- Case studies are in-depth explorations of a contemporary phenomenon within its natural context using sources like interviews, observation, documentation and physical artifacts [Yin, 2003].
- Implementation is used in a project where it is necessary to implement a proposed solution [Berndtsson et al., 2008].

- Experiments focus on investigating a few variables and the ways in which these are affected by the experimental conditions. Typically, experiments are used to verify or falsify a previously formulated hypothesis [Berndtsson et al., 2008]. It is used when behavior can be directly, precisely, and systematically be manipulated [Yin, 2003].

- Surveys are closely associated with the use of questionnaires, and statistical techniques for analyzing their responses. Such research is often used for exploring a relatively well-known phenomenon, for which there exists respondents having some knowledge of the issue of concern [Berndtsson et al., 2008].

Looking at the fact that the investigation will entail the in-depth explorations of a contemporary phenomenon within its natural context (i.e. the SCE LL Group supply chain), accomplished by fieldwork, being in a position close to the subject under study [Berndtsson et al., 2008], a case study is the most appropriate research strategy. Gable (1991) explains that the case study strategy refers to a group of methods, which emphasize qualitative analysis, but as Yin (2003) explains, it should not be confused with qualitative research. The characteristic of qualitative research is the collection of data in the form of images and words, which are analyzed by methods that exclude statistics or quantification [Strauss & Corbin, 1990]. As Yin (2003b) states, the case study strategy is not limited to quantitative evidence. In fact, the contrast between quantitative and qualitative evidence does not distinguish the six research strategies described above [Yin, 2003].

Figure 2.1 shows the structured case method [Carroll & Swatman 2000] that will be used as a guideline to perform the case study. It extends existing methods for performing case study research [Carroll & Swatman, 2000]. The structured case method provides a framework that includes five phases, which are thoroughly described and aims to build theory in a rigorous manner [Steghuis, 2006]. The meaning used for theory in the description of this method, is taken from Nueman (1991: p.30), and is defined as: "*a system of interconnected ideas that condense and organize knowledge*".

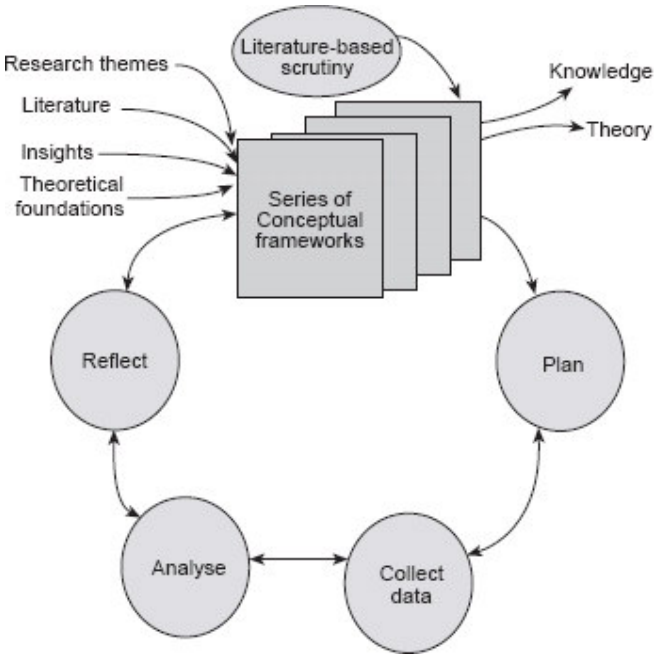

Figure 2.1 - The Structured-Case Research Method, adopted from Carroll et al. (2000)

Looking at the method in the figure, the circles represent the five phases and the rectangle the conceptual framework(s). The interplay between them provides for theory building. The research cycle is meant to be executed several times, each time updating the conceptual framework to reflect the insight established during that research cycle. That is why Carroll & Swatman (2000) talk of a "*series of conceptual frameworks*". The initial conceptual framework expresses the researcher's pre-understanding for the research cycle. The research cycles produce a series of conceptual frameworks, where "*CFn*" represents the latest version of the theory built to date. Carroll & Swatman (2000) note that the spiral towards understanding is never completed. To prevent an infinite loop, Glazer and Strauss (1967) suggests that research should be ceased when theoretical saturation occurs. This means that observations have been seen before, and then the incremental additions per research cycle are slight. Available funding and time are also mentioned [Carroll & Swatman, 2000].

Now that the research strategy and a suitable framework to guide the strategy have been decided upon, the next paragraph covers the questions to be answered in this thesis for the SCE case.

2.3. Questions

This section introduces the research goal, the objectives (i.e. sub-goals), the problem statement and the research questions that need to be answered to reach the goal. Also it states for each of the research questions defined, what kind of problem it is; a knowledge problem or a practical problem [Wieringa, 2008], as was identified in the previous paragraph.

2.3.1. Goal

The research goal chosen for this thesis is:

"To draw up solution scenarios for SCE's Land Logistics Group that describe how the inefficiencies in the execution of the current SCE Land Logistics supply chain, specifically with regard to the interaction between SCE and their LSP's, can be reduced."

2.3.2. Problem statement

The main research question that is chosen for this M.Sc. thesis is:

"How can the SCE Land Logistics supply chain, specifically with respect to the customer/supplier relationships between SCE and the Logistic Service Providers, be improved?" (P)

As the problem statement involves multiple concepts, it needs to be broken down into specific research questions according to Sidhu (2008). By then answering these research questions, the problem statement will be addressed. The next paragraph defines these research questions.

2.3.3. Research questions

The research questions that will be used to answer the problem statement cover the aspects of literature, creating understanding in the current situation and defining solutions for SCE and the broader logistics community:

1. *"What factors are identified in literature, that should be taken into account, as being valuable when looking at a supplier to engage a relationship with, or valuable for successfully managing customer/supplier relationships?"* (K)
2. *"What best practices can be found in case studies to be of value in selecting the right mix of LSP's to engage a relationship with, or be of value in successfully managing customer/supplier relationships?"* (K)
3. *"Apart from the aspect of customer/supplier relationships, what other factors can be identified in literature to be of value to a supply chain?"* (K)
4. *"Apart from the aspect of customer/supplier relationships, what other best practices can be found in case studies to be of value to a supply chain?"* (K)
5. *"What are the issues that arise in the current SCE Land Logistics supply chain?"* (K)
6. *"How can the issues, identified in the SCE supply chain, be mapped to the factors and best practices drawn from literature and case studies?"* (P)
7. *"Which solutions can be defined for SCE to deal with the issues by drawing up a step-by-step plan to improve the current situation?"* (P)

8. *"To what extent and in which way can the solutions proposed for the SCE supply chain be applied to other settings?"* (P)

As can be seen, each of the research questions has either a "*K*" or "*P*" printed behind it, to indicate what kind of problem it addresses. Although the problem statement is clearly a practical problem, as it tries to solve problems that occur in the supply chain of SCE, the research questions address both types. This is actually quite a common structure. Roughly half of the research questions are about answering knowledge problems that will increase the knowledge into supply chains and customer-supplier relationships in general and also the understanding of the current situation. The other half is about changing the current state of the world, which describes plans of how to deal with the phenomena within the supply chain.

2.4. Units of analysis (Scope)

Lucas (1993) in Yin (2003) identifies six different levels of analysis at which data can be collected. The levels of analysis are: (a) economic sector, (b) group of firms, (c) a unit/part of a firm, (d) an industry segment, (e) single firm and (f) individuals/groups. Yin (1994) noted that this demonstrates the flexibility of case research as being able to cope with varying units of analysis. Berndtsson et al. (2008) adds to this by saying that a case study aims to understand and explain something within the unit selected.

For this thesis, the level of analysis chosen is that of a "*group of firms*". This is because of the fact that the focus lies on the supply chain, and therefore puts the emphasis beyond a single firm (to also include the LSP's for instance), but does not take it so far as to understand the entire chemicals industry segment for instance. This means that within the supply chain, it includes the point from where the customer places an order, to the point of delivery at the customer, after which the customer pays SCE for the delivered services.

But since it also involves a significant analysis of the internal supply chain, specifically with respect to how the LL Group deals with the day-to-day operations, also a "*unit/part of a firm*" should be noted as being part of the case.

To conclude, the case is to understand and explain the inefficiencies in the units of the LL Group and other relevant departments within SCE, then do the same of the LSP's and then taking this broader scope of the supply chain to understand, explain and relate the bigger picture.

2.5. Case selection

After having selected the relevant units of analysis in the last paragraph, it should be determined which actual departments within SCE and which external LSP's are going to be selected for this study.

First of all, when it comes to the internal supply chain, it would be reasonable to include the LL Group. They have defined the problem, and according to them, a large amount of this before mentioned firefighting is performed within this group. Next to this, it would be valuable to include all

other departments that are involved with LSP's on a day-to-day basis. One department that matches this description is the CRC department within SCE. This department processes all customer orders and transfers them to the various LSP's. Therefore this department is also included. Apart of these departments, also the Moerdijk and Pernis plants are included, since next to producing the actual petrochemicals, are involved daily with loading the trucks of the various LSP's. It has to be stated though that access to those sites will be quite restricted, since they are geographically located elsewhere, and strict safety regulations apply.

Next to these *units within the firm*, also the external supply chain is analyzed by looking at the various LSP's that SCE works with; the "*group of firms*" unit. As was explained in the introductory chapter, SCE currently works with 14 LSP's. Since resources will not be available to visit all LSP's, it is important to select a relevant sub-set that is represents the entire set. Therefore a selection was made based on (1) LSP size, (2) LSP country of origin and (3) access to the case (which is identified by Yin as one of the main criteria for selecting cases).

The first criterion was selected, as the eight SCE desired deliverables constantly mention LSP size. There is the notion within SCE that LSP size is a determinant of performance. Therefore this is chosen as the first selection criteria. This criterion will be operationalized by looking at the total revenue stream that each of the LSP's have, and based on that categorizing them as either small, medium or large (see Table 1.1). The desire is to select LSP's from all sizes. The second criterion was selected in order to take into account the different company cultures existing within the various LSP's. It would be undesirable to only select Dutch based LSP's, since it would most likely not be representative for the entire set. This criterion is operationalized by looking at the country in which it resides. Last but not least, the LSP's that have the easiest access will be chosen after they meet the first two criteria. This is done to save valuable resources available to us in this investigation. For instance, three times a year, an operational review is held with the LSP to assess their performance. On some of these occasions, LSP management travels to The Netherlands to hold this meeting, instead of SCE going to them. Opportunities like these are a perfect occasion to hold an in depth interview. Based on these criteria, we believe that conclusions drawn from the sub-set will also apply for the entire set.

Based on the three criteria mentioned, seven of the 14 LSP's were selected; 1 big LSP, 3 medium sized LSP's and 3 small LSP's. Next to this, the selected LSP's are located in four different countries.

2.6. Case identities

Now that the units of analysis and cases have been selected, it is important to decide upon whether or not to disclose the identities of both the cases and the individuals. Yin (2003) describes that it is most desirable to disclose the identities. This way the reader can create linkages between what information was previously read on a specific case and what is can be found further up in the report. Next to this, the case can be reviewed more readily [Yin, 2003].

In this case unfortunately, anonymity is necessary, since the topic is quite delicate both within SCE and with the various LSP's. Next to this, some LSP's will only provide us with information on the

issues described, if anonymity is guaranteed. Some LSP's might be reluctant to share the issues within the SCE supply chain with us, since most LSP's are dependent to some extent on the business that SCE provides them. They might interpret this investigation as cutting the hand that feeds them. Secondly, even within the various departments and also within departments at SCE, there are contradicting goals at play. Therefore here again, some SCE employees might not be as honest as they could be, if their names would be mentioned in this thesis.

2.7. Research instruments

Yin (2003) describes six different research instruments used within case studies to provide evidence. These are documents, archival records, interviews, direct observation, participant-observation and physical artefacts. See Table 2.1 for the entire overview, the ones indicated with an asterisks (*) are utilized in this case study.

Type of evidence	Description
Documentation *	Includes letters, memoranda, agendas, announcements, proposals, reports, studies, clippings, and other internal/external documents
Archival records *	Includes service records, organizational records, database records, maps, charts, lists, survey data, and personal records
Interviews *	Are face-to-face interactions where researchers directly question respondents to collect primary information within the context of a study
Direct observation *	When researchers make a site visit and watch people in action
Physical artifacts *	Include technical devices or other physical evidence
Participant observation	When the researcher is actually engaged in the project

Table 2.1 – Types of evidence within case studies, adopted from Khosrow-Pour (2006).

As was mentioned before by Yin (2003), case studies are characterized by the use of sources like interviews, observation, documentation and physical artefacts. Also in this study, the evidence gathered through interviews will play a crucial role in understanding the issues throughout the supply chain. Interviews will provide the first insights into these. Surveys used to gather evidence are also categorized as one of the interview types by Yin (2003). Next to this, documentation and archival records will play an important role. SCE has an extensive internal network that includes a wide range of reports, studies, mapped organizational processes, and historical LSP performance data. Thirdly, since most of the time during this internship will be spent within the LL Group, it provides a great opportunity to perform observations. This can be used to compare how processes have been mapped and how they are put into use in the real-life situation. Finally physical artefacts like trucks, production plants and (un)loading sites are part of the scrutinized supply chain and will therefore also be taken into account. This will take shape for instance through looking at the production process and loading procedures during site visits and understanding the different types of trucks, their characteristics and total loading capacity.

In the next section these six sources of evidence will be specified in more detail, to include the actual interviews and documentation used in this case study.

2.8. Data collection

This section will elaborate further into the different types of data sources of each research instrument that will be used to gather the data for this case study (per research question). This is shown in Table 2.2. Please note that also literature sources has been included in this table.

Research question	Data Sources
"What factors are identified in literature, that should be taken into account, as being valuable when looking at a supplier to engage a relationship with, or valuable for successfully managing customer/supplier relationships?"	Literature on customer/supplier relationships and/or portfolio management
"What best practices can be found in case studies to be of value in selecting the right mix of LSP's to engage a relationship with, or be of value in successfully managing customer/supplier relationships?"	Case studies on customer/supplier relationships and/or on portfolio management
"Apart from the aspect of customer/supplier relationships, what other factors can be identified in literature to be of value to a supply chain?"	Literature on supply chain management, 3PL and/or outsourcing
"Apart from the aspect of customer/supplier relationships, what other best practices can be found in case studies to be of value to a supply chain?"	Case studies on supply chain management, 3PL and/or outsourcing
"What are the issues that arise in the current SCE land logistics supply chain?"	(External) LSP interviews, (internal) SCE interviews, observation, historical LSP performance data, contracts, customer satisfaction reports, annual reports and/or CBAM process/role descriptions, plant visit
"How can the issues, identified in the SCE supply chain, be mapped to the factors and best practices drawn from literature and case studies?"	-
"Which solutions can be defined for SCE to deal with the issues by drawing up a step-by-step plan to improve the current situation?"	(Internal) SCE interviews for selection of solutions
"To what extent and in which way can the solutions proposed for the SCE supply chain be applied to other settings?"	Expert opinions (interviews) for validation

Table 2.2 – Sources of evidence for the different subjects of in this research.

Since performing interviews will take up most time within the data-gathering phase, we devote special attention to it. As can be seen in the table, there will be internal interviews with SCE employees, external interviews with LSP's, interviews with SCE employees involved with the ISEA project and interviews with experts regarding the various findings of this study. As was mentioned before in the research strategy paragraph of the last chapter, there are three types of interviews (i.e. open-ended, focused and survey). In this case, focused interviews will be the type of choice. The reasons for this being first of all that it would be unrealistic to perform open-ended interviews, especially with experts and employees of the LSP's, since time with them will be too limited. Next to this surveys would be too strict, leaving out the required freedom, especially for the experts but also for the employee interviews to get to the root of the problems.

Yin (2003: p.85) describes a focused interview as: "*open-ended and in a conversational manner, but more likely to be following a certain set of questions.*" Because of the fact that a set of questions forms the basis of this type of interview, an interview protocol is developed. For this purpose Wengraf (2001) devised a two-step process. Because of the limited time available, and the considerable number of (similar) interviews with the LSP's (external interviews), a protocol is developed for them specifically. The development process and the resulting LSP interview protocol are found in Appendix B.

2.9. Data coding & Analysis

Yin (2003) describes two generic analytic strategies. These are used to put the evidence in some order prior to actual analysis. One of the suggested strategies is to transform the case study data into numerical form, so that statistical analysis can be performed. The other is the use of various analytical techniques. One of the suggested analytical techniques is to make a matrix of categories (i.e. themes) and placing the evidence within such categories, also referred to as coding. Coding is the process of classifying the ideas presented in the case studies into fewer content categories (Weber, 1985 in Yin, 2003).

Miles & Huberman (1994: p.56) state that: "*words render more meaning than numbers alone and should be hung on to throughout data analysis.*" Therefore, this will be avoided as much as possible within the thesis by not transforming data into numerical form to be able to stick to the meaning of the words. The approach taken will be the second one, to identify several themes based on the literature review that will be used to place all the evidence in. This is related to content analysis, which stands for: "*a research method for the subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes or patterns*" (Hseih & Shannon, 2005: p.1278). This approach will be used to analyze the various interviews conducted for this study.

When it comes to the actual analysis, after coding has been performed based on the various themes identified, both a within-case analysis and cross-case analysis will be performed. Within-case analysis is performed by intensive reading and studying of the individual case studies, and comparing its findings against existing literature [Yin, 2003]. Cross-case analysis on the other hand looks at both the similarities and differences across all case studies along the general themes [Yin, 2003]. Also the lesser mode of analysis of "*repeated observations*" mentions this: repeated observations can be used to make a comparison on a cross-sectional basis to identify similarities between the various LSP's internally and also in their views of SCE.

2.10. Literature selection

This section covers the selection of literature, mostly consisting of scientific papers, for the use in this thesis. The literature review process is concept-centric, as recommended in Webster and Watson (2002). This will become apparent in the keywords as an entry point into the available literature. The first paragraph covers the search process, which is then executed in the second, third

and fourth one. The last paragraph takes the results from this process and presents an overview of the definitive literature selected.

2.10.1. Overview literature search process

This paragraph explains the process involved with finding the proper literature to use in this study. This process is executed in the consecutive paragraphs (2.10.2, 2.10.3, 2.10.4 and 2.10.5). Paragraph 2.10.2 and 2.10.3 consist of picking the right literature based on selecting journals and the Scopus engine search (top row of Figure 2.2), and paragraph 2.10.4 on the additional literature recommended by either SCE or Dr. Aziz, as well as literature I came across myself over the course of my studies (bottom row of Figure 2.2). The rectangle with no outgoing arrows defines the set of definitive literature deemed suitable for use for SCE's LL supply chain and this thesis.

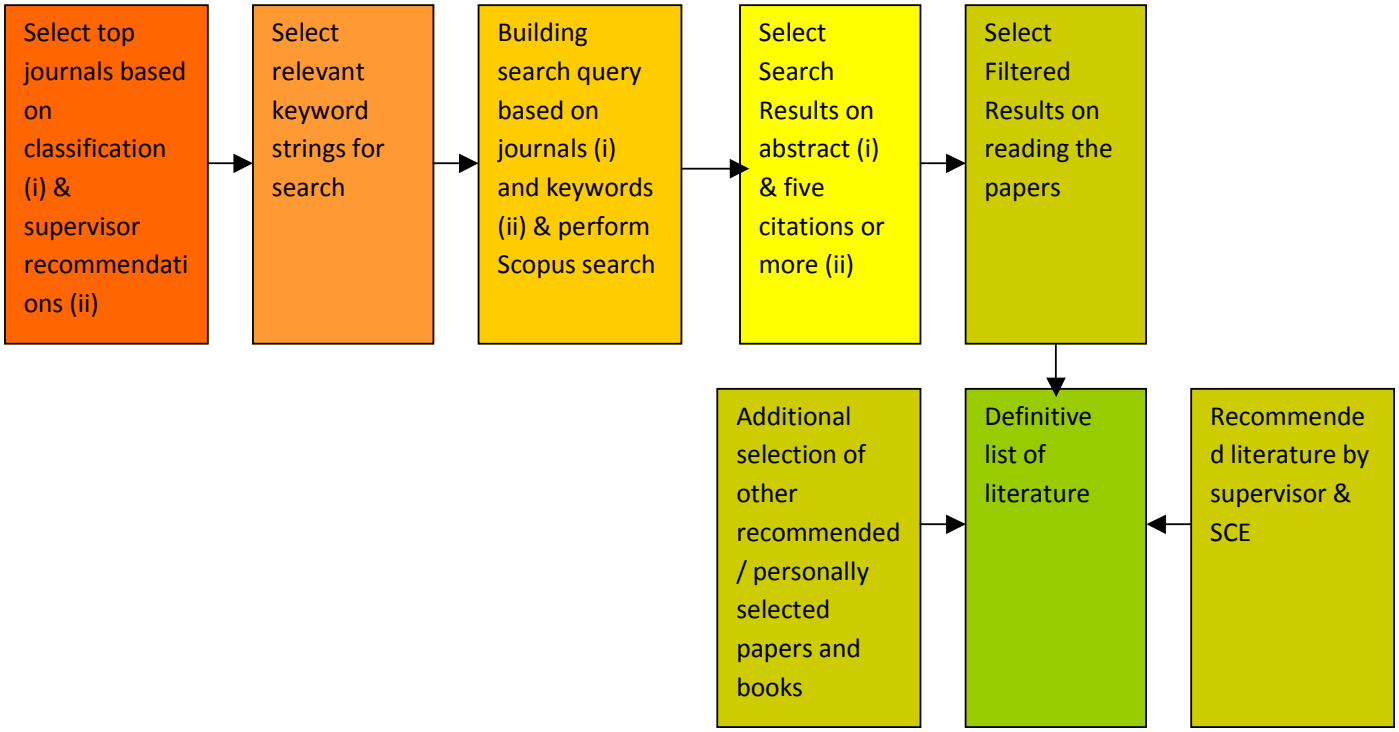

Figure 2.2 - Overview of literature search process and selection

2.10.2. Selection of Journals

Table 2.3 gives a selected overview of the Top 8 Journals in the field of Information Systems. This table is based on the research performed by Schwartz and Russo (2004), and has been updated by Clahsen (2008) and adopted for use in this thesis. These journals will be our main entry points used to search for relevant literature. The reason why IS journals are chosen, is because of our background in information systems within the BIT curriculum, as they might give fresh input into the supply chain management research field. As the ability to manage a supply chain is irrevocably intertwined with information systems, there should be significant insights to be gained. It is expected that associations between successful supply chains/relationships and IT can be made.

Scopus will be the database search engine of choice. The reason for this is the advanced search capabilities of this engine.

Next to these top IS Journals, Dr. Aziz has recommend to add three high quality journals in the field of supply chain management and logistics. This will allow part of the literature review to remain true to the traditional supply chain management field. These are the following: Journal of Business Logistics, Supply Chain Management: An International Journal and International Journal of Physical Distribution and Logistics.

Rank	Journal
1	MIS Quarterly
2	Communications of the ACM
3	Management Science
4	IEEE Transactions (various)
5	Harvard Business Review
6	Decision Sciences
7	Decision Support Systems
8	Information and Management

Table 2.3 – The top 8 of IS Journals in the world (adopted from Schwartz and Russo, 2004; Clahsen, 2008).

These eight remaining IS journals and the three supply chain and logistics journals will be used in collaboration with Scopus to localize valuable papers, based a set of keywords which will be discussed in the next paragraph.

2.10.3. Keywords

Tables 2.4 and 2.5 give an overview of the keywords that were used to search in Scopus. These keywords were derived from reoccurring themes from both the ISEA project proposal (see Appendix H), as well as those from the M.Sc. thesis research questions (see paragraph 2.3).

The first column of both tables gives the initial keyword for the search; the second one lists the possible synonyms. In the third column the keywords that are actually used in the search are shown. Within the parentheses the total number of hits for that keyword is shown. The columns next to that (four and five) show filtered results based on reading the abstracts of those papers with five or more citations and the last one shows the final selection. The reason why only papers were selected with 5 or more citations, is because we except that these papers will prove to be more useful than papers that lack citations. Usefulness by citations is one of the five search strategy criteria utilized in the paper by Herrmann and Daneva (2008). The final selection is made based on actually reading the entire paper. We also utilized one of the other search strategy criteria by Herrmann and Daneva (2008), which deals with getting hold of the original publication. In order to fully understand the

theories described in the papers, we attempt to seek out the original papers, in which these theories were described first. Please note that the numbers in this last column (column 5) show the amount of papers selected per keyword.

1. Initial keywords	2. Synonyms	3. Actual used keywords (all)	4. Selected papers based on abstract & citations >= 5	5. Final selection based on paper
Supply-chain	Supply chain; Supply-chain; SC;	Supply chain (500); SC (107)	Supply chain (25); SC (0)	Supply chain (8); SC (0)
Supply-chain management	Supply chain management; SCM	SCM (10); Supply chain management (95); Supply chain & management (119)	SCM (0); Supply chain & management (4)	SCM (0); Supply chain & management (2)
Supply-chain uncertainty	Supply chain risk; Supply chain uncertainty; Uncertainty; Supply chain & Issues; Supply chain & Factors	Supply chain uncertainty (0); Supply chain risk (3); Supply chain & risk (11); Supply chain & uncertainty (7); Uncertainty (870); Supply chain & Issues (2); Supply chain & Factors (6)	Supply chain & risk (1); Supply chain & uncertainty (0); Uncertainty (5); Supply chain & Issues (0); Supply chain & Factors (2)	Supply chain & risk (0); Supply chain & uncertainty (0); Uncertainty (1); Supply chain & Issues (0); Supply chain & Factors (1)
Business process re-engineering	BPR; Business process reengineering	Business process reengineering (7); BPR (5)	Business process reengineering (2); BPR (0)	Business process reengineering (1); BPR (0)
Inter-organizational relationship	Interorganizational relationship; IO relationship	Inter-organizational (10); Interorganizational (37);	Inter-organizational (0); Interorganizational (3);	Inter-organizational (0); Interorganizational (1);
IOIS	Inter-organizational information system; Inter organizational information system;	IOIS (1); Interorganizational information system (5); Interorganizational & information system (6)	IOIS (0); Interorganizational & information systems (2); Elemica (0)	IOIS (0); Interorganizational & information systems (1); Elemica (0)
Logistics	-	Logistics (134)	Logistics (4)	Logistics (4)

Table 2.4 – Identification of keywords and selection of papers for database search engine Scopus (First part).

1. Initial keywords	2. Synonyms	3. Actual used keywords (all)	4. Selected papers based on abstract & citations >= 5	5. Final selection based on paper
3PL	TPL, Logistics alliances, Logistics partnerships, Dedicated contract distribution	3PL (2); TPL (3); Logistics alliances (0); Logistics partnerships (1); Dedicated contract distribution (0)	3PL (0); TPL (0); Logistics alliances (0); Logistics partnerships (0); Dedicated contract distribution (0)	3PL (0); TPL (0); Logistics alliances (0); Logistics partnerships (0); Dedicated contract distribution (0)
Relationship	-	Relationship (766)	Relationship (6)	Relationship (4)
LSP	Logistics Service Provider	LSP (10); Logistics Service Provider (0)	LSP(0); Logistics Service Provider (0)	LSP(0); Logistics Service Provider (0)
Supplier Relationship Management	SRM, Relationship Management	Supplier Relationship Management (1); SRM (33); Relationship & Management (27);	Supplier Relationship Management (0); SRM (0); Relationship & Management (1)	Supplier Relationship Management (0); SRM (0); Relationship & Management (1)
Control	-	Control (12956); Control & Relationship (10)	Control & Relationship (0)	Control & Relationship (0)
Coordination	-	Coordination (313)	Coordination (5)	Coordination (0)
Logistics Planning	-	Logistics & Planning (1)	Logistics & Planning (0)	Logistics & Planning (0)
Supplier Evaluation	-	Supplier & evaluation (3)	Supplier & evaluation (0)	Supplier & evaluation (0)
Performance measure	-	Performance & measure (95)	Performance & measure (1)	Performance & measure (2)
Supplier Portfolio Management	SPM, portfolio management	Supplier & Portfolio (4) ; Portfolio (3) ; SPM (0)	Supplier & Portfolio (0) ; Portfolio (0) ; SPM (0)	Supplier & Portfolio (0) ; Portfolio (0) ; SPM (0)

Table 2.5 – Identification of keywords and selection of papers for database search engine Scopus (Second part).

2.10.4. Other relevant literature

Next to the literature that was found through the database search, there is also other literature that will be used for this research.

First of all, Dr. Aziz advised the use of a book on case study research (Yin, 2003), which will be indispensable in order to perform a proper case study at SCE and their LSP's. Secondly a fellow student at the Rotterdam School of Management, who specializes in supply chains, advised the use of the book *introduction to supply chain management* (Handfield and Nichols, 1998).

Dr. Aziz also recommended a few papers on supply chain management (Halldorsson et al., 2007; Halldorsson et al., 2008; Harland, 1996), logistics service quality (Parasuraman, 1985; Mentzer and Konrad, 1991; Mentzer et.al, 2001) and Third Party Logistics (Selviaridis and Spring, 2007) in order to get a quick glance at the field as a whole and to act as a starting point for the thesis.

Next to this there is also literature from previous courses that will be useful. This will be the material from Wieringa on *problem analysis and solution requirements* (Wieringa, 2008). Furthermore also material from the course *business process integration lab* will be used. This mainly deals with the book on e-business (Papazoglou and Ribbers, 2006).

Also other papers were personally selected, these are on core capabilities in outsourcing [Willcocks and Criag, 2007], the famous paper on the purchasing portfolio matrix by Kraljic (1983), the partnership model by Lambert et al. (1996 & 1999) and several papers on customer-supplier relationships [Cannon and Homburg, 2001; Mohr and Spekman, 1996;Davis, 1993;]. And finally the books of Langley et al. (2008) on the logistics approach to managing supply chains and Van Weele (2005) on Purchasing & Supply Chain Management.

With respect to best practices, empirical research extracted from the Aberdeen Group will provide a good start [Aberdeen Group, 2007,2008a,2008b,2009]. These Aberdeen reports cover a wide spectrum of subjects, where empirical findings of Best-in-Class companies on supply chains and 3PL are also covered. Next to this the yearly 3PL study performed by Capgemini will be used [Langley and Capgemini, 2008]. Also the EPCA (European Petrochemical Association) organized, think-tank sessions will be a source of evidence for best practices [EPCA, 2004,2005,2007].

2.10.5 Overview definitive literature selection

In total 48 valuable sources of literature were identified for this investigation. The literature review process delivered 21 relevant papers to be used. Next to that an additional 10 papers and books were recommended by Dr. Aziz, 7 reports on best practices and case studies were selected, and finally 10 papers and books were selected from previous courses at Twente University or from own experience.

If you look at the results of the literature review process and all the additional literature that was recommended or otherwise added, the following subjects are covered:

Rank	Subject	Core paper(s) within subject
1	Customer/supplier relationships	Lambert et al. (1996) ; Lambert et al. (1999) ; Mohr and Spekman (1996)
2	Supply chain management	Tan (2001); Handfield and Nichols (1998); Lambert and Cooper (2000); Mentzer et al. (2001a);
3	Portfolio management	Kraljic (1983)
4	Logistics service quality	Mentzer et al. (2001b); Parasuraman et al. (1985)
5	Third party logistics	Selviaridis and Spring (2007);Langley et al. (2008); Sink and Langley (1997)
6	IT & Supply chain management	Rai, Patnayakuni, Seth (2006)
7	Fourth party logistics	Bade and Mueller (1999)
8	Outsourcing	Willcocks and Criag (2007)

Table 2.6 – Identification of subjects of the total set of literature gathered

The ranking is based on the quantity of literature acquired for each of the subjects. Also, in the third column, the papers are stated which will form the theoretical core of the thesis. The reason why these were chosen is because they are considered most valuable in providing solutions that would be applicable to the SCE supply chain as it was described in the first chapter. This set of 48 literature sources will be analysed in more detail in the literature review chapter (chapter 3).

2.11. Research model

The research model (see Figure 2.3) shows the various activities and deliverables involved in reaching the goal in this thesis and answering the problem statement. It maps to the research cycle described in paragraph 2.2, by Carroll and Swatman (2000). The top part of the model performs the "*collect data*" phase. The bottom part of the model performs the "*analyze*" and "*reflect*" phases. These phases could not be separated since the analysis and its subsequent findings will be critically reflected upon at all stages in this phase. Also with respect to the research cycle Carroll and Swatman (2000: p.238) identify that: "*While the four stages are described […] as inclusive and separate, in practice they are fluid and ill-defined, allowing much iteration between adjacent stages. Consequently, movement through the cycle does not follow any set, sequential pattern.*" Finally, the planning phase is described in this (research design) chapter, of which this research model is a component, and is therefore not included in the model itself. Again, although the research model is presented as being strictly sequential, some activities will be performed intertwined or in parallel.

If we look at the model, what can be seen, is that first of all a literature study will be performed. Based on that a conceptual model will be created, which builds on the current knowledge base (based on the literature, best practices). Then evidence is gathering on how the SCE supply chain currently looks like. This current situation is modelled based on interviews at both SCE and the LSP's, observations at the SCE HQ, the LSP's, and the SCE petrochemical plants. Finally also documentation on the supply chain and the LSP's specifically will be utilized. Next, the conceptual model will be applied to the SCE supply chain, to understand to what extent the findings in practice match those identified in literature (this is the "*analysis of current situation*" activity). Once it is clear which issues/inefficiencies are present in the supply chain (by describing the current situation) and how these are addressed in literature (by building the conceptual model), solution scenarios can be defined. Finally these solutions scenarios for the SCE supply chain will be validated to see what their applicability could be in other settings apart from the petrochemical industry. This addresses the government requirement for the TRANSUMO project, to see how sustainable mobility can be improved within the logistics field.

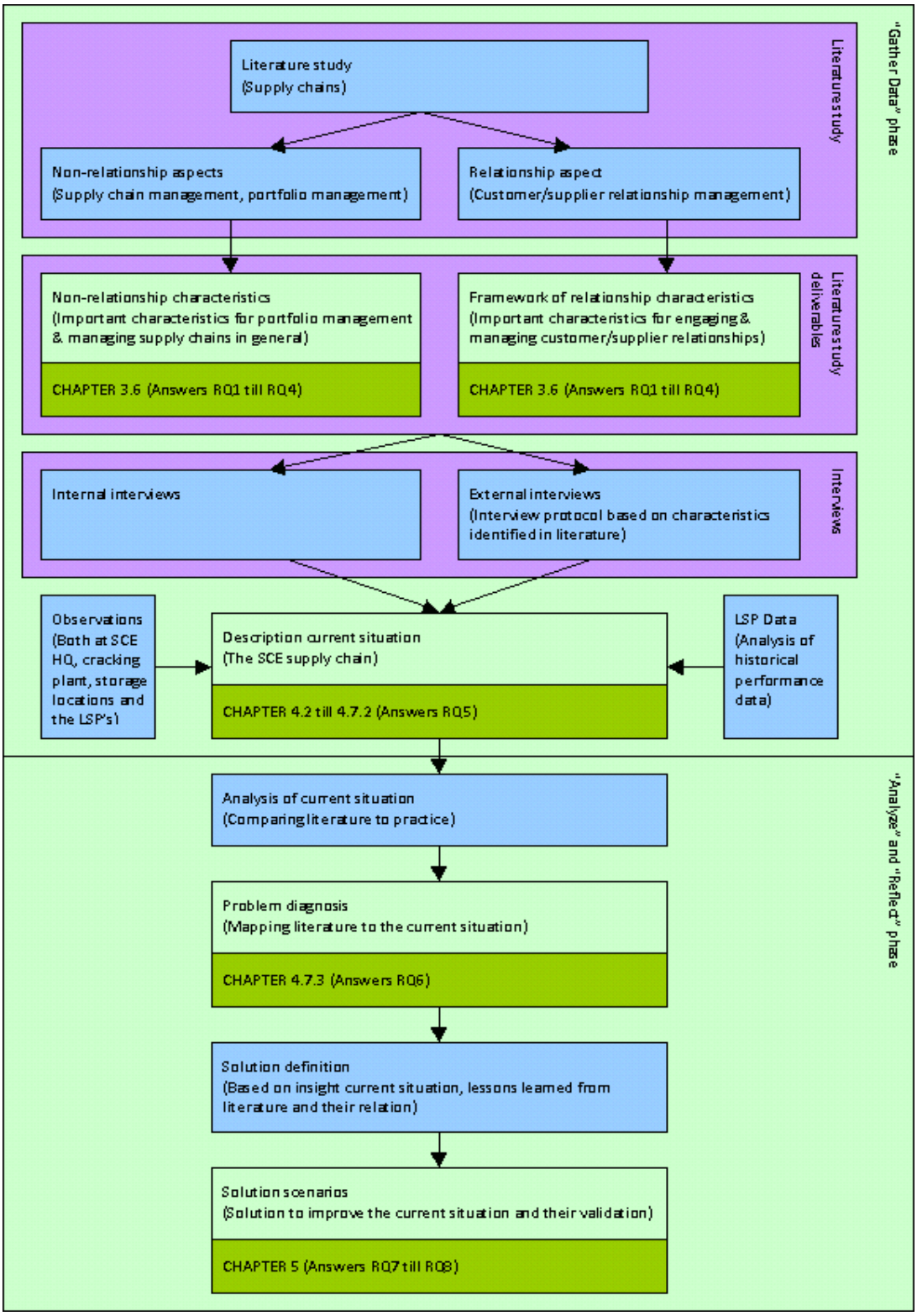

Figure 2.3 – The research model used to answer the research questions, and ultimately the problem statement.

2.12. Limitations of Project

Since this research project will take place over a period of only eight months, it is unrealistic to also implement the solutions that will be defined to deal with the inefficiencies found in the supply chain (as mentioned in paragraph 1.4). Therefore, implementation of the various solutions that are suggested will have to be part of a separate project that can be a follow up of this one. Since the implementation of the solutions will be described on a step-by-step basis, implementation should be a possibility based on the information provided by the thesis alone.

2.13. Impact

The impact of the thesis can be described by distinguishing again between knowledge and practical problems, as was also done for the research questions. As answering the practical problems establishes managerial relevance and answering knowledge problems establishes academic relevance. Both will be discussed below.

Royal Dutch Shell plc states that each of the CoB's that make up the Shell Group are governed by a set of General Business Principles that explain how Shell Chemicals should conduct its affairs (Shell International Limited, 2005). It addresses the key objectives: efficiently, responsibly and profitably. The efficiency and profitability of Shell Chemicals are greatly reduced by inefficiencies in the supply chain; therefore, this is at the heart of Shell Chemicals inability to maintain these operationalized goals. The solution scenarios that will be defined in this thesis will demonstrate the managerial relevance of this thesis for SCE and the Dutch Government. This is achieved by answering the last three research questions. First of all, by mapping literature to the issues in the supply chain, then by defining the solutions for SCE and finally by validating the solutions for other settings.

When looking at the knowledge oriented research questions, it becomes clear that they can help to build academic relevance by constructing a conceptual model to address issues in customer/supplier relationships and/or supply chains. Next to this it gives an overview of what issues occur in the SCE supply chain, and this evidence could be used to in other research initiatives. One example could be that theories in the scientific community can be validated using the gathered empirical evidence.

2.14. Research Design Validation

By validating the research design, we try to reflect upon if the steps described in this chapter, answers the research question for the unit of analysis (i.e. the SCE supply chain) as described in Wieringa (2008). To recap, the research question defined for this thesis is the following: *"How can the SCE Land Logistics supply chain, specifically with respect to the customer/supplier relationships between SCE and the Logistic Service Providers, be improved?"* The thesis is therefore concerned with improving the supply chain by looking at customer/supplier relationships and supply chain management in general. These subjects are clearly covered in the literature review process paragraph. This leads to a relevant set of literature to aid in the process. Next to this, in order to deal with the issues that are occurring in the SCE supply chain, the current situation needs to be understood. Therefore, the case under investigation, the SCE supply chain, needs to be analyzed. This is discussed in the "*research instruments*" and "*data collection*" paragraphs, which show the

types of relevant data types and data needed to accomplish this task. After data collection on the current situation and understanding of what is described in literature (including best practices), recommendations can be made for actual improvement. Therefore, we believe the research design covers all necessary steps to answer the research question. Finally, the research design traces the structured case method by Caroll and Swatman (2000), which further justifies the research design described in this chapter.

CHAPTER III – Literature review & Conceptual framework

Now that the problem statement and the research questions have been defined in chapter 2, a first step towards presenting answers to them, is to look to literature to find out more about the problem. This chapter analyzes relevant literature to aid the investigation. Based on the literature, a conceptual model is presented that combines this relevant literature (and their contained theories) so it can easily be applied to the actual case.

3.1. Introduction

This chapter analyses a set of 48 literature sources in the field of customer/supplier relationships and supply chains. Related to this, also literature on portfolio management, logistics, IT and outsourcing is covered. This is done to understand the most important characteristics of managing a supply chain and specifically of managing customer/supplier relationships like SCE and their LSP's. This will result in a conceptual framework that will ultimately be applied to the SCE supply chain to come to improvement recommendations.

The first paragraph sets the scene by investigating the relation between supply chains and customer/supplier relationships. These are the two most important concepts in this thesis (see the research questions in paragraph 2.3.3), and therefore deserve a closer analysis. Based on that understanding, the second paragraph covers what types of relationships actually exist. The third paragraph covers Kraljic's purchasing portfolio; a method to categorize a supplier portfolio into four different supply strategies. The fourth paragraph looks at the partnership model by Lambert et al. (1996). This model explores the potential for a relationship, and the required activities and processes that need to be implemented to maintain it. The fifth paragraph performs an extensive literature to identify all important characteristics for a relationship (the extent to which a supportive environment for a relationship is present, and ways to make the relationship a success). In total a set of 48 papers are reviewed to come to a comprehensive list. As a foundation, the partnership model will be used to compare the findings with. The sixth paragraph dives into each of the important characteristics identified, by defining them and operationalizing them. After that, the core capabilities model is discussed, which deals with ways in which an outsourcing organization should arrange its own organization around the outsourced services. The eighth paragraph presents an integrated conceptual model, based on the literature review performed. Finally, the last paragraph summarizes the chapter and checks if the literature review actually answers the related research questions.

3.2. Supply chains and Customer/supplier relationships

As was mentioned in the introductory chapter (chapter 1), a supply chain was defined as a: "*pipeline or conduit for the flow of products/materials, services, information, and financials from the supplier's suppliers through to the various intermediate organizations/companies out to the customer's customers or the system of connected networks between the original vendors and the ultimate final consumer*" [Langley et al.,2008: : p.17]. Next to this a relationship was defined as: "*The state of being mutually or reciprocally interested; as in social or commercial matters.*" [Merriam-Webster, 2009]

Also it was explained how the two are interconnected. Lambert et al. (1999: p.166) define a partnership, in their paper on customer/supplier relationships, as: "*a tailored business relationship based upon mutual trust, openness, shared risk, and shared rewards that yields a competitive advantage, resulting in business performance greater than would be achieved by the firms individually*". So this mutual interest in a relationship [Merriam-Webster, 2009] stems from the fact that working with another organization increases the performance. Therefore, one could say that a relationship is about making transactions between entities (in this case organizations), because

these transactions add value to a products/services that would not be achieved to the same extent if the organization would act alone. This then also explains why supply chains exist.

This belief can be further strengthened by looking at the supply chain management definition of Scott and Westbrook (1991) and New and Payne (1995) in Tan (2001:p.40), where they describe supply chain management as: "*the chain linking each element of the manufacturing and supply process from raw materials through to the end user, encompassing several organizational boundaries".* Therefore a supply chain always consists of multiple organizations and will always have a relationship aspect contained in it.

This makes clear that relationships and supply chains are tied together to a great degree. Therefore, it would be difficult to see them as two separate entities as described in the research questions in paragraph 2.3.3. Therefore in the remainder of this literature review the distinction between supply chains and customer/supplier relationships will no longer be explicitly made. This concretely means in answering the research questions related to this literature chapter, no distinction is made between supply chain and customer/supplier relationship literature, since this distinction would be difficult and also undesired to make. Therefore, the first four research questions from this thesis, that are to be answered in this literature review chapter, relating to important factors in both customer/supplier relationships and supply chains, in order to successfully manage them, are combined in this chapter.

3.3. Lambert's Types of relationships

Although we have defined relationships as existence of mutual interest from both parties [Merriam-Webster, 2009], it can be imagined that different types of relationships exist. Also in real life one can image that although all relationships a person undertakes are characterized by mutual interest, it is clear that they are of different types. Some relationships are business related, some are love related and some are defined as friendships. Therefore, it is valuable to get a better understanding of what types of relationships exist between companies. Lambert et al. (1999: p.169) identify five types of relationships on a scale from "*arm's-length*" to "*joint ventures*". The most common type of relationship found between companies is that of "*arm's-length*" [Lambert et al., 1996]. The arm's length setup is the traditional customer/supplier relationship that: *"(1) emphasizes multiple sourcing, (2) competitive bidding and use of (3) short-term contracts*" [Hahn et al., 1986 in Tan, 2001: p.45]. They tend to focus on the price and quality of a service, and not on the long-term capabilities of the supplier. However, Watts and Hahn (1993) have observed a shift towards more long-term arrangements. The complete overview of various flavours of relationships is shown in Figure 3.1.

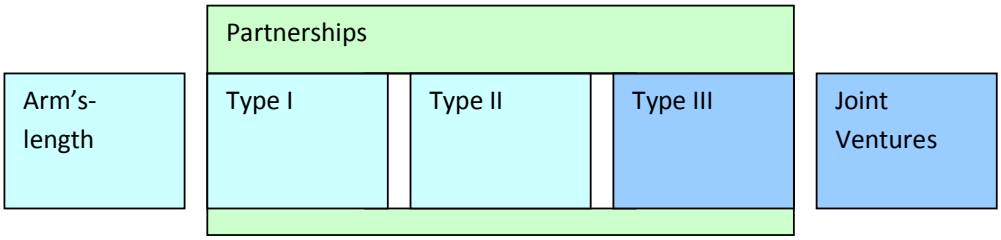

Figure 3.1 - Types of relationships, adopted from Lambert et al. (1996)

Let us briefly go through these types of relationships as described in Lambert et al. (1996; 1999) to understand what it is that characterizes each type.

First of all arm's-length relationships are characterized by two companies who conduct business with each other, often over a long period of time and involving multiple exchanges. However, there is no sense of joint commitment or joint operations between the two companies. The seller (in this case the LSP) typically offers standard services to a wide range of customers who receive standard terms and conditions. In the case that the exchanges end, the relationship ends. Lambert et al. (1996) explains that this type of relationship is the appropriate option in many situations, but at times a closer relationship would be more suitable, since they would provide significant benefits to both companies (Lambert et al., 1996). Research conducted by the authors indicated that there are three types of these closer relationships, referred to as partnerships: Type I, Type II and Type III [Lambert et al., 1996].

In Type I relationships (see also figure 3.1), the companies see each other as partners and sometimes coordinate activities and planning. The focus is usual short-term and usually involves only one department within each organization.

In Type II relationships the companies go beyond coordination and move to integration of activities. This type of relationship has a long-term focus, involving multiple departments of both organizations.

In Type III relationships, quite some amount of operational integration is shared. The parties see each other as an extension of their own firm, where typically no end date of the relationship exists. This type of relationship should bee reserved for those suppliers who are critical to a company's long-term success.

The last type of relationships is that of joint venture. A joint venture is characterized by shared ownership across the two companies [Lambert et al., 1996].

This classification of relationships is valuable since it allows a mapping to the actual supply chain under investigation, in order to understand what the dominant type of relationships in place between SCE and the LSP's are. This mapping will be performed in the analysis and results chapter (see paragraph 4.8.4)

3.4. Kraljic's Purchasing Portfolio

In the famous paper "*purchasing must become supply management*" by Peter Kraljic (1983: p. 109), the author gives advice on how management can recognize the severity of its own supply weakness and presents strategies to manage this supply [Kraljic, 1983]. The value of this paper is that it allows a classification of suppliers into four quadrants, each with the most appropriate strategy to apply. It does this based on two easily retrievable criteria; namely supply risk and financial volumes. Key in developing these strategies is the issue of influencing the balance of power between the customer and its most critical suppliers [Van Weele, 2005]. According to Kraljic (1983), the balance of power should preferably be in favour of the subcontractor. Otherwise the danger of becoming to dependant on a specific supplier could occur. It could be that then the supplier pushes its requirements and conditions towards the customer, which would be undesirable [Van Weele, 2005]. The use of the portfolios leads to a differentiated purchasing strategy. It points out that suppliers represent different interests for a customer [Van Weele, 2005].

Van Weele (2005) identifies four categories of products/services, each with the most appropriate strategy to go with them. These are shown below:

- Leverage services = Competitive bidding
- Strategic services = Performance-based partnership
- Routine services = Category management and e-procurement solutions
- Bottleneck services = Securing continuity of supply

Figure 3.2 visually shows the purchasing portfolio matrix with the four different quadrant and the strategies mentioned here.

Figure 3.2 - The purchasing service portfolio, adopted from Van Weele (2005)

3.5. Lambert's partnership model

Lambert et al. (1999) describes the *partnership model*, a systematic, replicatable method of partnership development and implementation between two parties in (a supply chain). This model will be the starting point of our investigation into important supply chain and customer/supplier relationship characteristics. The reason for this is that it has been built in collaboration with many different companies, from different industries and also validated in eight actual relationships [Lambert et al., 1999: p.166]. Again, Lambert et al. defined a partnership is as: "*a tailored business relationship based upon mutual trust, openness, shared risk, and shared rewards that yields a competitive advantage, resulting in business performance greater than would be achieved by the firms individually*". Unfortunately, Lambert et al. (1999) do not define what a relationship is, therefore, we have to rely on the definition chosen in this thesis, which is based on mutual interest. This mutual interest is to some extent reflected in the fact that this business relationship results in greater business performance, which could not have been achieved by the firm individually.

The model can be split up into three important elements. These are drivers (strategic benefits/motivation to partner), facilitators (supportive environment for partnership), and management components (joint activities and processes used to build and sustain the partnership). The drivers set the expectations of the partnership and the facilitators determine the compatibility

of the two organizations. The main facilitators are: *corporate compatibility, similar managerial philosophy and techniques, mutuality*, and *symmetry*. Combined these two elements represent the appropriate degree of integration in the partnership. This integration has been defined on a 5-point partnering scale, ranging from arm's length to a joint venture (as described in paragraph 3.3). The amount to which this appropriate degree of integration is actually achieved, depends on the last element; the management components. These components are: *planning, joint operating controls*, *communications*, *risk/reward sharing*, *trust and commitment*, *contract style*, *scope*, and *financial investment*. Depending on the appropriate degree of integration, each of these management components is implemented to a certain level. The partnership model is shown in Figure 3.3.

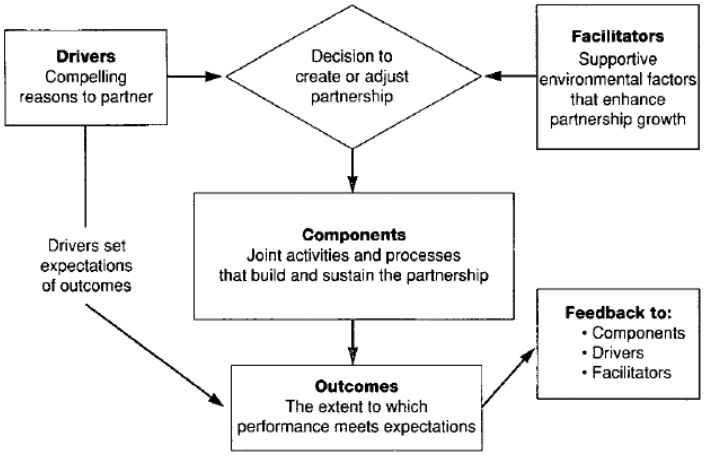

Figure 3.3 - The partnering model, taken from Lambert et al. (1996)

3.6. Important characteristics in supply chains and customer/supplier relationships

Now that some understanding has been established into what is important in customer/supplier relationships (in a supply chain), and why one would form one in the first place, this paragraph analyzes the 48 selected literature sources to identify important characteristics in a supply chain and customer/supplier relationships. So no distinction is made between them. This is done to get a complete overview of everything that is important in a supply chain, which includes the customer/supplier relationships. This analysis has been done through reading each of the papers carefully, and identifying a characteristic based on two simple rules:

- A supply chain and/or customer/supplier relationship characteristic is identified when the paper identifies an activity, process, mechanism or inherent property that leads to a *successful* supply chain and/or relationship
- A supply chain and/or customer/supplier relationship characteristic is identified when the paper identifies an activity, process, mechanism or inherent property that leads to a *unsuccessful* supply chain and/or relationship

All these characteristics will be categorized using the partnership model, as described in the last paragraph (this is the first categorization), based on the definitions given by Lambert et al. (1999). This means that the characteristics will be categorized as being either a *facilitator* or a *management component*. Management components revolve around activities, processes and mechanisms. Facilitators revolve around inherent properties within the supply chain and/or relationship. Drivers were not included in the literature search, since drivers state the motivation to partner. Although very interesting, the focus is on the supportive environment of a relationship and ways to maintain it.

After having identified all the supply chain and customer/supplier relationship characteristics, they were put into sub-categories (this is the second categorization), based on the definitions and/or descriptions of the mentioned characteristics provided in the papers. This was done to get a better overview of the total set of characteristics. To give an example, one sub-category named "*shared vision*", includes both supply chain and/or customer/supplier relationship characteristics identified as being either "*shared vision*" or "*compatible goals and objectives*". Next to this, for each occurrence of a certain characteristic, grouped into a specific category, the total amount of occurrences was kept track of. This means when for instance three clearly distinct situations are described in the same paper, of why the characteristic "*shared vision*" is important, than the total amount of occurrences for this characteristic is incremented by three. This allows for an overview of the most important characteristics. Also characteristics that were identified less than three times in all of the 48 sources were not put in the overview. The overview is given in figure 3.4.

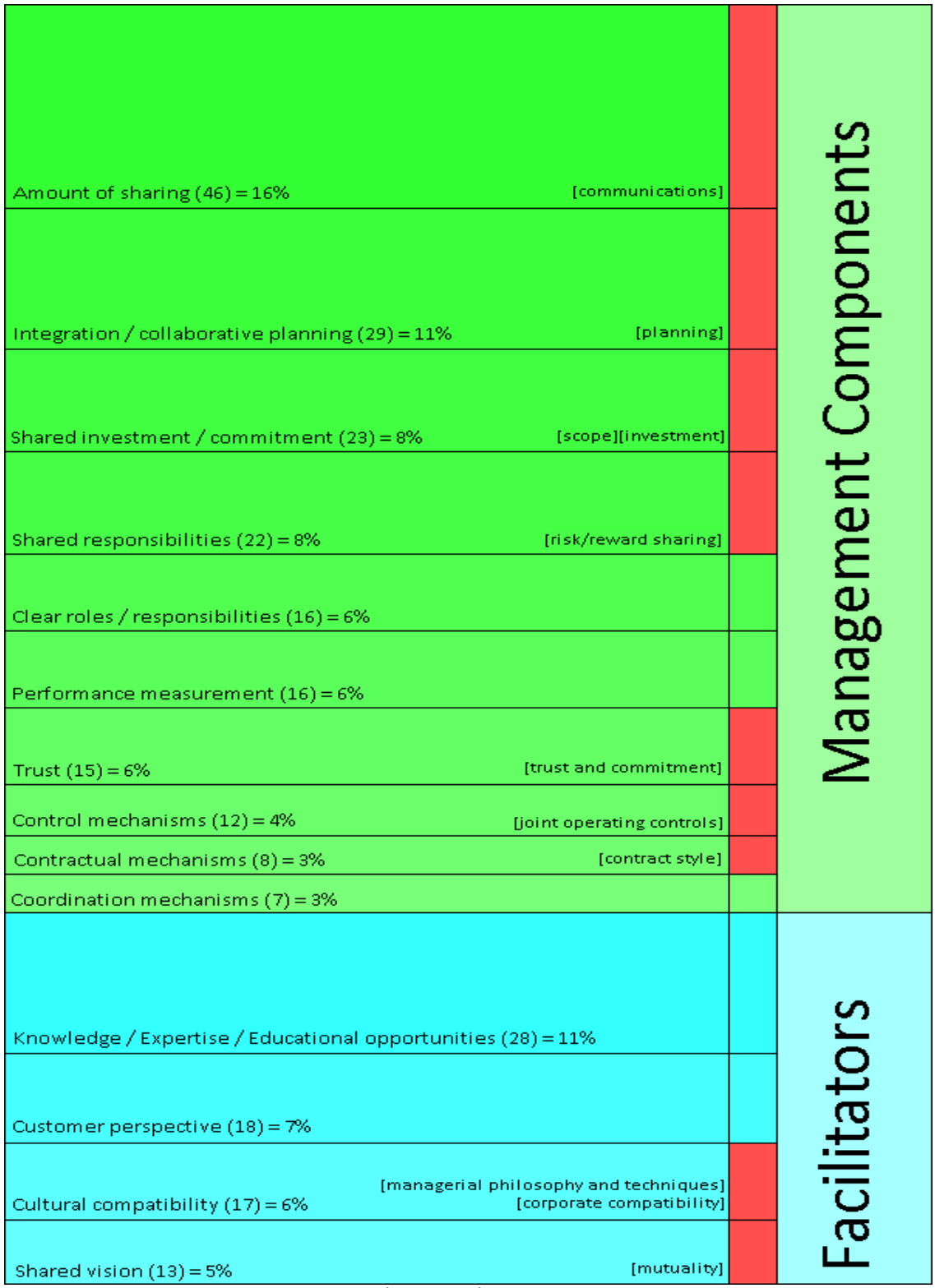

Figure 3.4 – Overview of important supply chain and/or customer/supplier relationship characteristics, divided into facilitators and management components.

When looking at this figure, it can be seen that in total there are 4 facilitators and a total of 10 management components identified. The categories that can be traced back to the partnership model by Lambert et al., are shown with a red rectangle on the side. This is done, again by comparing the definitions of each of the components given in Lambert et al. (1999,1996). The original component to which the category in the overview is mapped to, is stated between brackets behind the category name.

When you look at the management components mentioned in Lambert et al. (1996,1999), all eight of them are present in the overview. But for instance the category "*shared investment/commitment*" in figure 3.4 entails two of the Lambert components; namely *scope* and *investment*. This is because all are concerned with showing commitment (financial and production/activity wise) from both sides into making the partnership work. The others map one on one. Therefore, a total of seven components are marked with red.

When looking at the facilitator categories, only Lambert's *corporate compatibility* component could be mapped directly to "*cultural compatibility*" and Lambert's *mutuality* to "*shared vision*". The reason for mapping mutuality to the aforementioned category is because Lambert et al. (1996) says that mutuality is about developing shared goals, among other things. The other two facilitator components in Lambert's partnership model, *similar managerial philosophy and techniques*, and *symmetry* could not be mapped directly. With respect to *similar managerial philosophy and techniques*, Bucklin and Sengupta (1993) define organizational compatibility as complementary goals and objectives, as well as similarity in operating philosophies and corporate cultures. Therefore, there seems to be a thin line between cultural compatibility and organizational compatibility. With this in mind it was decided to also map *similar managerial philosophy and techniques* to "*cultural compatibility*". The other component, symmetry, is concerned with a (symmetrial) balance between the partners (in size, brand name, financial strength, etc) [Lambert et al., 1996]. This factor was not identified in other literature, and is therefore not used in the overview.

When looking at the most important facilitator, "*knowledge/expertise/educational opportunities*", it can be seen that this is missing from Lambert's partnership model. It seems strange that expertise and learning opportunities are unimportant as a characteristic. Next to this, some other missing categories are those, which find their origin in supply chain literature and not so much in customer/supplier relationship literature. Therefore, this could explain their absence. For instance the second most mentioned facilitator is having a "*customer perspective*". Would this then not be important in a customer/supplier relationship? It would seem logical that it would definitely apply to two parties within the supply chain to a certain extent. Although it could be reasoned that part of having a "*shared vision*" is that you take the customer perspective into consideration. Next to this, it is interesting to note that "*performance measurement*", the fourth most important management component in figure 3.4 (based on percentages), is not mentioned by Lambert et al. (1996).

So to recap, a total of five new categories are identified, which amount to a total of 33 per cent of the overview. The categories that are new compared to the partnership model by Lambert et al. (1996), are in descending importance:

TYPE OF CHARACTERISTIC	RANK	CHARACTERISTIC CATEGORY
Facilitator (18%)	1 (11%)	Knowledge/Expertise/Educational opportunities
	2 (7%)	Customer perspective
Management component (15%)	1 (6%)	Clear roles/responsibilities
	2 (6%)	Performance measurement
	3 (3%)	Coordination mechanisms

Table 3.1 - New characteristics by comparison to the partnership model by Lambert et al. (1996)

Tables 3.2 and 3.3 show the formal overview of the same data as presented in Figure 3.4, but also shows synonyms of the category name based on what was identified in literature. Next to that it shows some sources of where this information can be located. Again the different coloured rows represented a mapping to the partnership model. Table 3.2 shows all facilitators, and Table 3.3 shows all management components.

OVERVIEW OF FACILITATOR CHARACTERISTICS		
RANK	CHARACTERISTIC CATEGORY (SYNONYMS)	EXAMPLES OF AUTHOR(S)
1 (11%)	**KNOWLEDGE/EXPERTISE/EDUCATIONAL OPPORTUNITIES** (Up-to-date knowledge & technology, expertise & skills employees, Understanding of supply chain, Learning opportunities, Organizational learning, Organizational development, Organizational education, Learning orientation, Supplier development)	Halldorsson 2007; Lambert, Cooper 2000; Brewer, Speh, 2000; Selviaridis, Spring 2007
2 (7%)	**CUSTOMER PERSPECTIVE** ((End) customer orientation/perspective, supply chain focus)	Lee 2004
3 (6%)	**CULTURAL COMPATIBILITY** (Organizational Compatibility)	Cooper et al. 1997; Cooper. Lambert, and Pagh 1997; Ellram and Cooper 1990; Lambert. Stock, and Ellram 1998; Novack. Langley, and Rinehart 1995;Tyndan et al. 1998
4 (5%)	**SHARED VISION** (Compatible goals and objectives)	Ross; Bowersox, Closs, Stank, 2000

Table 3.2 – Overview of characteristics that influence customer/supplier relationship and/or supply chains, the facilitators (based on Lambert et al., 1999).

OVERVIEW OF CHARACTERISTICS THAT INFLUENCE SUPPLY CHAIN AND/OR CUSTOMER/SUPPLIER RELATIONSHIPS		
RANK	**CHARACTERISTIC CATEGORY (SYNONYMS)**	**EXAMPLES OF AUTHOR(S)**
1 (16%)	**AMOUNT OF SHARING/COMMUNICATION** (Availability of information, Openness, Real-time information sharing)	Vorst, Beulens 2002; Lambert, Cooper 2000; Selviaridis, Spring 2007; Handfield, Nichols 1998
2 (11%)	**INTEGRATION/COLLABORATIVE PLANNING** (Integration of processes, Process Alignment, Cross-functional activities, Inter-firm adaptation, Joint decision making)	Bowerbox, Closs 2000; Lambert, Cooper 2000
4 (8%)	**SHARED INVESTMENT/COMMITMENT** (Joint Investments, Joint Participation, Joint Support, Joint Resources, Interdependence)	Morgan and Hunt, 1994; Jap, Ganesan 2000
3 (8%)	**SHARED RESPONSIBILITIES** (Risk/reward sharing mechanisms, Shared responsibilities, Equity preservation)	Selviaridis, Spring 2007; Lambert, Cooper 2000;
5 (6%)	**CLEAR ROLES/RESPONSIBILITIES** (Clear power roles, Clear leader roles, Clear tasks, Clear responsibilities)	Lambert, Stock, Ellram 1998; Bowersox, Closs 1996
5 (6%)	**PERFORMANCE MEASUREMENT** (Performance measurement system in quality/delivery and price)	Halldorsson 2007; Selviaridis, Spring 2007; Lambert, Cooper 2000; Handfield, Nichols 1998
6 (6%)	**TRUST** (Trust based mechanisms - reliability, competence, affect-based trust, vulnerability)	Bowersox, Closs, Stank 2000; Achrol 1991; Dwyer, Schurr and Oh 1987
7 (4%)	**CONTROL MECHANISMS** (Presence of Control (action) mechanisms, Joint operating controls, Joint operating policies)	Williamson, 1985, 1993; Jap, Ganesan, 2000; Swaminathan, 1998
8 (3%)	**CONRACTUAL MECHANISMS**	Selviaridis, Spring 2007; Handfield, Nichols 1998
9 (3%)	**COORDINATION MECHANISMS**	Porter, 1985; Lee et al., 2001; Fugate, Sahin, Mentzer, 2006

Table 3.3 – Overview of characteristics that influence customer/supplier relationship and/or supply chains, the management components (based on Lambert et al., 1999).

Now that a categorization has been made of all the important characteristics that support and build a relationship, each of them will be further discussed in the next paragraph.

3.7. Defining each of the characteristics identified

This paragraph covers each of the important characteristics identified in the last paragraph, by defining each of them. For every management components, we will look to explain what *activities* and *processes* need to be implemented, while for every facilitator, we will look to explain how they create the *supportive environment* for a relationship. Finally, where possible, the characteristics will be complemented by examples to make them more explicit.

3.7.1. Knowledge/Expertise/Educational opportunities

Handfield and Nicols (1998) identify that it is crucial for parties to develop a better understanding of their processes. This is critical because otherwise it is difficult to identify process improvement opportunities and better ways to serve their customers. Therefore they advise that for organizations to have a detailed understanding of current supply chains and their associated processes. They also state that one of the obstacles in becoming a top logistics performer is: "*top management's limited understanding of the process*". Serviaridis and Spring (2007: p.134) add to this by saying that one of the often-cited difficulties in the design and implementation of 3PL relations includes: "*a lack of adequate expertise in specific products and markets*". Vorst and Beulens (2002) also identify that one of the issues in a supply chain can be a lack of understanding of the supply chain or its environment and/or processing capabilities for it. Liker (2004) suggests that a better understanding of the supply chain can be obtained by for instance plant visits on all managerial levels.

Next to knowledge, organizational learning is also thought to be an important quality, which facilitates innovation and 3PL service improvement. When outsourcing, a good way of getting employees in the chain up to date, is to provide extensive training and team-building activities (Gray and Larson, 2007).

3.7.2. Customer Perspective

Mentzer et al. (2001a) establish that all members of a supply chain should have the same goal and same focus on serving the customer. Bowerbox et al. (2000) state that if a customer-perspective is maintained throughout the supply chain, the organizational collaboration is enhanced. Next to this they state that efforts to achieve objectives must focus on providing the best end-customer value. Handfield and Nicols (1998) identify that one of the obstacles in becoming one of the top performing logistics performers, is a lack of customer perspective. They stress that one overriding focus with respect to process improvement should be the continual improvement of end-customer service.

3.7.3. Cultural Compatibility

Cultural compatibility is the first characteristic that was already defined by Lambert et.al (1996). In that paper, they state that cultural compatibility is important because partners must share compatible values. The cultures should mesh, and not clash. This can be checked, by looking at the value placed on strategic planning and the approaches used for planning. If they are similar, it is more likely that the cultures mesh. If the cultures are more similar, the partners will feel more comfortable and chances of a successful collaboration are better (Deshpande et al., 1989 in Lambert et al., 1996). Ellram and Cooper (1990) add to this by saying that next to having compatible cultures, also the management techniques should be compatible.

Bucklin and Sengupta (1993) in Mentzer et al. (2001) define organizational compatibility as complementary goals and objectives, as well as similarity in operating philosophies and corporate cultures. Aspects of culture include how employees are valued and how they are taken into account into the management of the organization (Lambert and Cooper, 2000).

3.7.4. Shared Vision

The second characteristic that can be directly mapped to the partnership model is having a shared vision. This shared vision ensures a common direction (Gray and Larson, 2007) In a case example from the Lambert paper it becomes clear that taking on the partner's goals and aspirations is part of this. This means giving part of your own identity to grow with your partner (Cooper, Gardner, 1993 in Lambert et al., 1996). Bowersox et al. (2000) state that there must be a shared vision and objectives among customers and suppliers about interdependency and principles of collaboration. They state that having a vision that is shared throughout the chain is essential before any supply chain management project can begin. This is supported by Halldorsson (2007) who states that a precondition of inter-organizational relationships is a shared vision. Also, on a firm level, the overall goals of an organization must be reconciled with the sub-goals of the individual departments (Mentzer and Konrad, 1991).

Skjoett-Larsen (2000) states that (1) the personal "*chemistry*" between individuals within the parties, (2) the common understanding and knowledge of each other's visions and attitudes combined with (3) actual (positive) experience from earlier relations play a major part in the development of third party cooperation.

3.7.5. Amount of Sharing/Communication

From the partnership model paper, Ellram (1991) in Lambert et al. (1996) states that effective communication, on both a day-to-day and on a non-routine basis, is a key component of successful partnerships. This is established for instance by having:

- Integrated E-mail systems
- Regularly scheduled meetings and phone calls
- The willingness to share both good and bad news
- Communication systems such as EDI

Next to this, the communication links should be across all levels of the organizations including strategic, tactical, operational, interpersonal and cultural.

Brewer and Speh (2000) say that without information sharing it will be difficult to: eliminate costs, reduce waste, cut costs and respond flexibly to customers. Vorst and Beulens (2002) state that with sharing it is important to prevent lack of correct, accurate and up-to-date information. Lambert and Cooper (2000) add to that by saying that the frequency of information updating has a strong influence on the efficiency of the supply chain.

Handfield and Nicols (1998) discus the advantages of using an inter-organizational information system for sharing, as it provides: open and rapid communication across the chain, and provides partners with real-time status information.

Gordon (2005) gives some examples of situations where there is a lack of communication:

- Little or no feedback on performance to suppliers
- Performance expectations not communicated to suppliers
- Too many resources cleansing data and arguing about data integrity
- Value not captured or communicated to management

3.7.6. Integration/Collaborative Planning

Londe and Cooper (1989) in Lambert et al. (1996) discuss joint planning as a key component of effective partnerships. This is supported by other authors (Handfield and Nicols, 1998; Selviaridis and Spring, 2007). It can range from sharing existing plans to joint development of strategic objectives. Joint planning adds flexibility and strength to a relationship. In one of their case studies, Lambert et al. (1996) gives the example of the McDonald's and Coca-cola relationship, where joint planning is done at multiple levels. Handfield and Nicols (1998), state that a lack of collaborative planning between supply chain partners is detrimental to supply chain performance, as it means that sequential decision-making occurs.

Next to collaborative planning, another component is that of integration. Supply chain process integration is defined as: "*the degree to which a focal firm has integrated the flow of information, materials, and finances with its supply chain partners*" (Rai et al., 2006: p.230). This integration should vary from partner to partner and integration of activities requires continuous information flows (Lambert and Cooper, 2000). The integration of activities can avoid "*sub-optimalization*" at the organizational level (Handfield and Nicols, 1998).

Lee and Billington (1992) identify some of the risks towards integrated supply chain management. First of all a problem is that it requires a great extent of commitment by all members within the chain. Some partners might have to completely change their processes. Since the costs involved with changing a partner can be significant, the customer can become a captive of its own suppliers. Next to this the customer needs to worry about possibility of the supplier passing trade secrets to competitors. They state that, despite some exceptions, most suppliers are best handled with hostility, as it usually is more profitable.

3.7.7. Shared Investment/Commitment

In the partnership model, Lambert et al., explain that relationships can be made stronger by including more economical activities of each organization in within the relationship. Next to this a relationship can be made stronger by sharing financial resources. Shared assets, joint investment, exchange of personnel, and joint research and development indicate a great degree of financial interdependence (Heide and John, 1988 in Lambert et al., 1996).

Also in relation to a shared investment and displaying commitment, Anderson and Weitz (1992) state that a willingness to make short-term sacrifices for the long-term builds a relationship. This

view on commitment is shared by Morgan and Hunt (1994). They state in the trust-commitment theory that it is important because: parties want to protect a specific investment by cooperating with their exchange partner, will resist short-term distractions, and will not act very risky, as they are assured that the partner will not engage in opportunistic behaviour.

Selviaridis and Spring (2007) identify that a joint investment for achieving relationship objectives is one of the success factors for 3PL partnerships. Handfield and Nicols (1998) also state that "*financial investment*" is one of the partnership success factors. Barrett (2004) identifies that resources and commitment (including that from senior management) is one of the strategic elements of collaboration in a supply chain. If one party makes an investment, the principle is that this is a reciprocal financial investment (Lambert et al., 1999).

3.7.8. Shared Responsibilities

It is important to have shared responsibilities. This is because it builds commitment (Lambert et al., 1996). Having shared responsibilities means that benefits and rewards are shared, but also costs and risks (Cooper and Ellram, 1993 in Lambert et al., 1996). This willingness to share costs and benefits is also emphasised by Halldorsson (2007). Handfield and Nicols (1998), Mentzer et al. (2001) and Barrett (2004) identify that there should be risk/reward sharing. Bowerbox et al. (2000) state that part of setting clear rules and agreements is that shared responsibilities are set up. They also say that setting rewards and penalties can enhance organizational collaboration. Lee (2004) expands this view by stating that also for improvement initiatives; risks, costs and gains should be shared.

It becomes clear that the characteristic of shared responsibilities is very closely related to that of shared investment/commitment. Having shared responsibilities seems to be a way for establishing commitment and therefore investments.

3.7.9. Clear roles/responsibilities

Related to shared responsibilities, is setting up responsibilities. Also definition of roles is a part of this process. By laying down roles, tasks and responsibilities clearly for suppliers and customers, performance of the entire chain is improved (Lee, 2004). Several sources state that when it comes to power and leadership, there needs to be an organization that assumes the leader role (Lambert et al., 1998; Bowersox and Closs, 1996; Mentzer et al., 2001). By setting clear rules and agreements., for instance when setting up leadership roles, organizational collaboration is enhanced (Bowerbox et al., 2000). When the power roles are not present, or exercised incorrectly, the level of commitment of other chain members can be affected (Lambert and Cooper, 2000).

3.7.10. Performance Measurement

Handfield and Nicols (1998) state in their book on supply chain management that one of the major obstacles to effective supply chain management is the lack of an appropriate performance measurement system. Gordon (2005) states some benefits of measuring performance. These are among others:

1. You can't manage what you don't measure.

2. If you measure suppliers, they will improve.
3. You can uncover and remove hidden waste and cost drivers in the supply chain.
4. You can facilitate supplier performance improvement.
5. You can increase competitiveness by shrinking order cycle times and inventory levels.
6. You can make informed business decisions that impact the enterprise.

Next to this the author states measuring supplier performance is about understanding, communicating and then improving supplier performance. This improvement of the supplier, can lead to supplier development as well. Halldorsson (2007) also states performance measures of a way to actually measure performance improvements of a member of the supply chain. Handfield and Nicols (1998) state that with this performance measurement system, it is very important that the system is objective. The system should be used to ensure both parties are meeting their stated objectives.

When it comes to performance measurements, Handfield and Nicols (1998) also state that both internal and external performance measurements need to be taken to become best-in-class. Liker (2004) states that for performance measurements, targets should be set, performance should be monitored, and measure how suppliers work. Langley et al. (2008: p.24) finally states that it is important to recognize that: "*lower-level metrics in an organization must connect directly to the high-level performance measures of the organization and the supply chain, which are usually net profit, return on investment, or assets and cash flow*".

3.7.11. Trust

Trust is quite an illusive term and hard to define by organizations, though every organization intuitively knows when it exists (Lambert et al., 1996) Trust has been defined as a willingness to rely on an exchange partner in whom one has confidence (Deshpande and Zaltman, 1993). Lambert et al. (1996) explain that no partnership can exist without trust and commitment. True partners do not have to constantly worry about being replaced. Dwyer et al. (1987) emphasize the role of trust to overcome mutual difficulties such as power, conflict, and lower profitability.

As was already established with some of the other important characteristics, also this characteristic is closely related to some of the others. Achrol (1991) for instance states that trust is a major determinant of relationship commitment. Therefore, the author concludes that trust has both direct and indirect relationships with cooperation. Next to this, Mentzer et al. (2001a) propose that trust has an effect on the sharing of risks and rewards. Also the amount of information that is shared will often depend on the level of trust between two parties (Handfield and Nicols, 1998).

When there is a lack of trust between partners, it reduces the willingness to share tactical and strategic information such as forecasts, promotions, and product development plans (Bowersox et

al., 2000). When it comes to trust, organizations must not only be able to trust their supplier but also their supplier's suppliers (Handfield and Nicols, 1998). Also Forrest and Martin (1990) identify that one of the reasons why partnerships fail is because of a lack of continuous and mutual trust.

Handfield and Nicols (1998) identify five types of trust:

- Reliability
- Competence
- Affect-based trust ("goodwill")
- Vulnerability
- Loyalty

Reliability is about following through on a commitment, and acting in a predictable manner. Competence is about having people in the organization that are known to have certain competencies, knowledge and experience. This is related to trust in someone's abilities. The third type of trust, affect-based trust, can be seen as the moral integrity or goodwill of others, which is produced through repeated personal interaction. Vulnerability projects a feeling of being exposed in addition to uncertainty or risk. The last type of trust is that of loyalty. This comes into play when for instance there is a rush order from a major customer (Handfield and Nicols, 1998). This is about "*going out on a limb*" if the situation requires it.

3.7.12. Control Mechanisms

In the partnership model, Lambert et al. (1996) describe joint operating controls as the ability to make changes that can range from being encouraged to suggest changes to being empowered to operationalize a change without needing prior approval or notification from the partner. (Gardner et al., 1994 in Lambert et al. 1996). Williamson (1985) states that control mechanisms are indispensable for improving relationship performance. Huntley (2006) describes a control mechanism as a basic relationship management tool. This is used to minimize partners' opportunism (Brown et al., 2000), protect specific investment (Jap and Ganesan, 2000), increase channel members' satisfaction and performance, and improve relationship quality (Jap and Ganesan, 2000). Swaminathan (1998) says that control elements facilitate production and transportation of products within the supply chain. Also the author states that choice of appropriate control elements is the objective of problems related to supply chain contracts and supply chain coordination. Swaminathan (1998) identifies various control elements:

- Inventory control (centralized control, decentralized control)
- Demand control (marketing element, forecast element)
- Supply control

- Flow control (loading element, routing element)
- Information control (directly accessible, periodic)

3.7.13. Contractual Mechanisms

Gundlatch and Murphy (1993) in Lambert et al. (1996) state that the type of contract in place in a relationship says a lot about the relationship. The strongest relationships usually have the least specific contracts, just outlining the basic philosophy and vision for the partnership. In the example that Lambert et al. (1996) gives between McDonald's and Coca-cola, the contract is not in writing. It is an agreement based on trust, sealed merely by a handshake. When looking at a contract from the Principal-Agent theory, as explained in Halldorsson (2007), the aim of the theory is to design a contract that can mitigate potential agency problems. The most efficient contract includes the right mix of behavioural and outcome-based incentives to motivate the agent to act in the interests of the principal. It is stated that if a contract is created that balances rewards and penalties, misalignment can be mitigated. Also from a Transaction cost economics point of view, it is pointed out that one of the mechanisms for mitigating the risk of opportunism is having contracts. Langley et.al (2008) states that contracting enables the shipper to eliminate the uncertainties in rates and services that suppliers provide.

Selviaridis and Spring (2007) mention some of the typical 3PL contract elements:

- Contract term
- Costs per activity
- Service and activities description
- Service levels
- Bonus payment for excellent performance
- Penalty clauses for service failures
- Allocation of roles and responsibilities, risks and insurance costs
- Length of contract and termination clause

3.7.14. Coordination Mechanisms

Swaminathan (1998: p.610) defines coordination as dealing with: "*routine activities in a supply chain such as materials flow, distribution, inventory control, and information exchange*". Lee et al. (2001) state that coordination with suppliers is not easy unless systems for cooperation and information exchange are integrated. Also the author explains that the reason why coordination is important, is because the failure of coordination results in excessive delays, and ultimately leads to poor customer services. From an empirical investigation, described in this paper, it became clear that successful

buyer-supplier coordination consists of trust, commitment, cooperative norms, dependence, organizational compatibility, and top management support.

Some of the benefits of coordination are:

- Provides risk reduction, access to resources, competitive advantage (Min, 2001).
- Lowers costs for all participants (Porter, 1985).
- Dictates the cost improvement and value that can be gained (Fugate et al., 2006)
- Creates efficiency (Fugate et al., 2006)
- Can provide inventory reductions of up to 25% (Fugate et al., 2006)

Fugate et al. (2006) place coordination mechanisms into thee major categories (Fugate et al. 2006):

- Price coordination (e.g. “double marginalization”, buy-back and returns policies, two-part tariff)
- Non-price coordination (e.g. quantity flexibility contracts, allocations rules, promotional allowances, cooperative advertising, and exclusive dealings/territories)
- Flow coordination (e.g. Vendor Managed Inventory, Quick Response, Collaborative Planning, Forecasting and Replenishment, Efficient Consumer Response and postponement)

From research conducted by the authors (by interviewing 13 managers in logistics), they established that the managers found price and non-price coordination mechanisms to be detrimental to supply chain performance. For instance the use of price coordination, using quantity discounts with promotions, distorts the supply chain and leads to the bullwhip effect [Fugate et al., 2006]. Flow coordination mechanisms on the other hand lead to supply chain performance improvement. In order to implement flow coordination mechanisms successfully, the managers stated that learning orientation and supply chain orientation are important enablers. Also standardization of processes and multi-functional involvement is needed [Fugate et al., 2006].

3.8. Feeney and Willcocks' Core capabilities framework

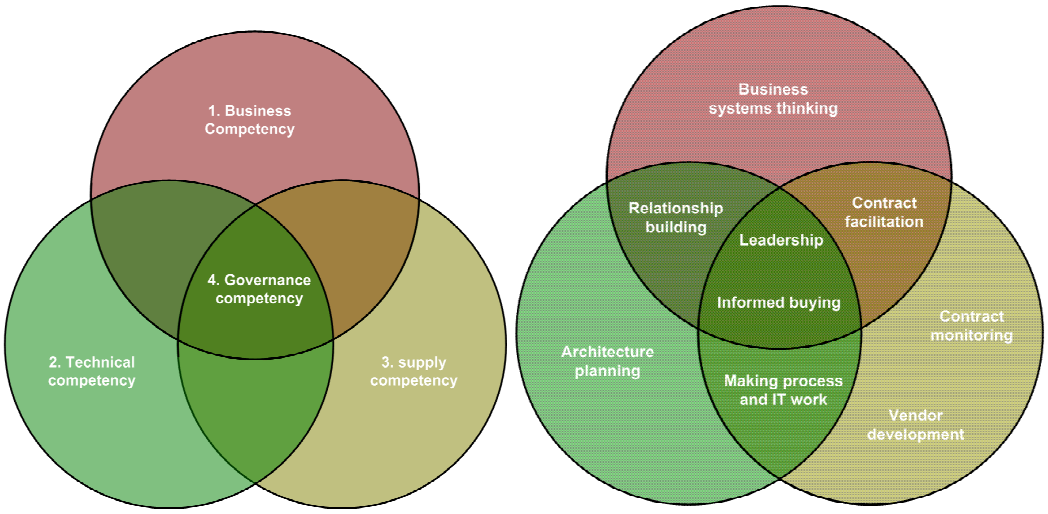

Figure 3.5 - The nine-core capabilities model for the retained organization by Feeney and Willcocks (2006), in De Jonge (2009)

Another interesting model is that by Feeney and Willcocks (2006). They discuss a model of the nine core capabilities an organization needs in order to remain in control of the outsourcing project [De Jonge, 2009]. Having these capabilities in place helps an organization deal with the governance of an outsourcing relationship. A capability is defined as: "*a distinctive set of human-based skills, orientations, attitudes, motivations, and behaviours that transform resources into specific business activities*" [Willcocks and Feeney, 2006: p.69]. According to Feeney and Willcocks (2006), a retained organization is filled with a high performance team. A flexible group of people, that focuses on competencies rather than tasks. One important task of this group of people for instance, is to utilize their knowledge and expertise to assess the quality of the services provided.

As was identified in paragraph 1.3.2, the ISEA project problem statement revolves around control and coordination in SCE's customer/supplier relationships. Therefore, it is identified as being valuable in dealing with issues of control in these relationships and also in helping to understand the current situation within the supply chain. This model has been validated at various organizations, and is used by consultants from both Capgemini as well as Price-Waterhouse-Coopers [De Jonge, 2009]. In the model they define four competencies that should be fulfilled by the outsourcing organization. This is (1) the *business competency*, (2) the *technical competency*, (3) the *supply competency*, and (4) the *governance competence* (the picture on the left of Figure 3.5). In order to achieve these competencies, the authors define nine core capabilities. Roughly four capabilities contribute to one competency, where some capabilities overlap and contribute to more than one competency. Each competency represents a role that should be fulfilled to successfully manage the outsourcing arrangements. From experiences in applying the model in practice, it turned out that one person can deliver performance for up to two to three roles [Willcocks and Feeney, 2006]. The picture on the right of Figure 3.5 shows these nine core capabilities. Feeney and Willcocks (2006) state that these capabilities need to be fulfilled by a client (i.e. outsourcing organization) in the so-

called "*retained organization*". The nine core capabilities have been defined by Feeney and Willcocks as [De Jonge, 2009]:

1. Leadership (Operate the back office as a business and deliver value by integrating the back office effort with business purpose).
2. Business systems thinking (Envision back office services in terms of the support of business)
3. Relationship building (Engage the business in back office direction and governance)
4. Architecture planning (Design a coherent, reliable, flexible and scalable platform for service delivery that responds rapidly to current and future business needs)
5. Informed buying (Manage the back office sourcing strategy to meet business needs)
6. Contract facilitation (Ensure the success of existing contracts from the suppliers)
7. Contract monitoring (Protect the business' contractual position)
8. Vendor development (Seek additional value with suppliers beyond existing contracts)
9. Making process and IT work (Troubleshoot issues, scrutinize supplier proposals and activities, and understand emerging innovations)

Each of these nine core capabilities represents a role to be fulfilled within the outsourcing organization. For each capability we will give some insight into what these roles entail. First of all, (1) leaders devise organizational structures, processes, and staffing to successfully manage the interdependencies, and to ensure that the back office function delivers value for money. Influence the overall business perception of the back office's role and contribution. (2) Business systems thinkers are important contributors to teams charged with business problem solving, process re-engineering, strategic development, and delivering new capabilities. Help to ensure that organizations do not operate as isolated silos, but rather as integrated business units. (3) Relationship builders facilitate the wider dialogue by establishing understanding, trust, and cooperation between business users and back office specialists. (4) The architect anticipates process and technology trends to ensure that the organization is consistently able to operate from an effective and efficient platform. Must deliver without constant investments in energy-sapping migration efforts or over-dependence on suppliers. Plans and shapes the increasingly IT-enabled infrastructure. (5) Informed buyers analyze the external market for relevant business and IT services. (6) Contract facilitators serve as liaisons between business users and 3rd party suppliers. The contract facilitator tries to ensure that problems and conflicts and resolved fairly between them. (7) Contract monitors hold supplier accountable against both existing service contracts and the developing performance standards of the services market. (8) Supplier developer is concerned with the long-term potential for suppliers to add value. Seek to invigorate the relationship, perhaps by finding shared sources of revenue generation or new investments that benefit both parties. And finally (9)

process and technology workers are needed to assess and challenge 3rd party suppliers claims about technical problems and proposed solutions [Willcocks and Feeney, 2006].

We feel that the logistics department within SCE can be seen as a type of retained organization, as it manages the outsourcing relationships with its LSP's. Therefore this model would be valuable to compare to the actual capabilities (roles) in place at the LL Group, compared to what is defined by Feeney and Willcocks. Based on that, the gap becomes apparent and steps can be designed to deal with these.

3.9. An integrated conceptual model

Figure 3.6 shows the complete conceptual model based on the literature review. It shows how two methods (that of Kraljic and that of Lambert et al.) lead to an *appropriate degree of relationship investment*. This is achieved by determining the *potential of the relationship* (with Lambert et al.), and the most suitable *strategy* to manage it (with Kraljic). It is assumed that these outcomes will support each other, but more on this subject will follow further in this paragraph. The *appropriate degree of relationship investment* in turn determines what activities and processes should be implemented between the customer and the supplier, as defined by the *management components*. These management components were gathered through analysis of 48 sources of literature and taking the partnership model of Lambert et al. (1996) as a starting point. Finally, based on the implementation of the right level of management components, supply chain and customer/supplier performance is achieved.

Lambert et al. (1999: p.169) defines drivers as : "*strategic benefits that will result from strengthening a relationship*". They state the motivation of why to have a relationship. Therefore, it seems to be a different way of applying Kraljic's purchasing portfolio. Because when determining the drivers from the customer side from Lambert et al. (1996; 1999), you will naturally also take into account the supply risk of the services that are offered, which has an impact on the importance of this supplier to the customer (influencing the value of the drivers). The higher the supply risk, in combination with high financial volumes, the more a supplier will be classified as being strategic (see paragraph 3.4 for the Kraljic matrix). Or if for instance the supplier has very unique and specific knowledge, which enhance asset efficiencies, customer service or profit, the supplier will be more important for the customer.

So the conceptual model described here, uses two different methods (both from Lambert and Kraljic) to reach the same conclusion. This is to determine the value of a supplier to the customer, which leads to an *appropriate degree of relationship investment*. The clear difference is that Kraljic solely takes into account the perspective of the customer, while Lambert takes both sides into consideration. Next to this the result of Kraljic's method is the appropriate supply strategy to apply from in the relationship (out of a set of four), while the result of Lambert et al. is a set of activities and processes to implement (on a level ranging from low to high) in the relationship. These are referred to in Lambert et al. (and in the conceptual model) as *management components* .

The value of having two different methods in place, as described in the conceptual model, is to further strengthen the belief that the outcome of the exercise is indeed the right one, before actually acting upon it. Next to this, both take slightly different views on the problem at hand, and can therefore supplement each other. This means that we expect that both methods integrated in the conceptual model will lead to the same conclusion. It would be therefore interesting to see, when applying the model to the SCE supply chain, if this will actually be the case.

In the case that both methods would lead to different outcomes, it would be interesting to see why this is. For instance when a supplier is classified as "*strategic*" by the Kraljic method, but the potential is only "*arm's length*" according to the Lambert method. Then the customer would be wisest to find another LSP to replace the former, since it would be impossible to build any type of close relation with this particular LSP, even though they should.

This conceptual model will be applied to the SCE supply chain in the "*analysis & results*" chapter, after a clear level of understanding has been established of the supply chain through the use of interviews, observations, documentation and historical data.

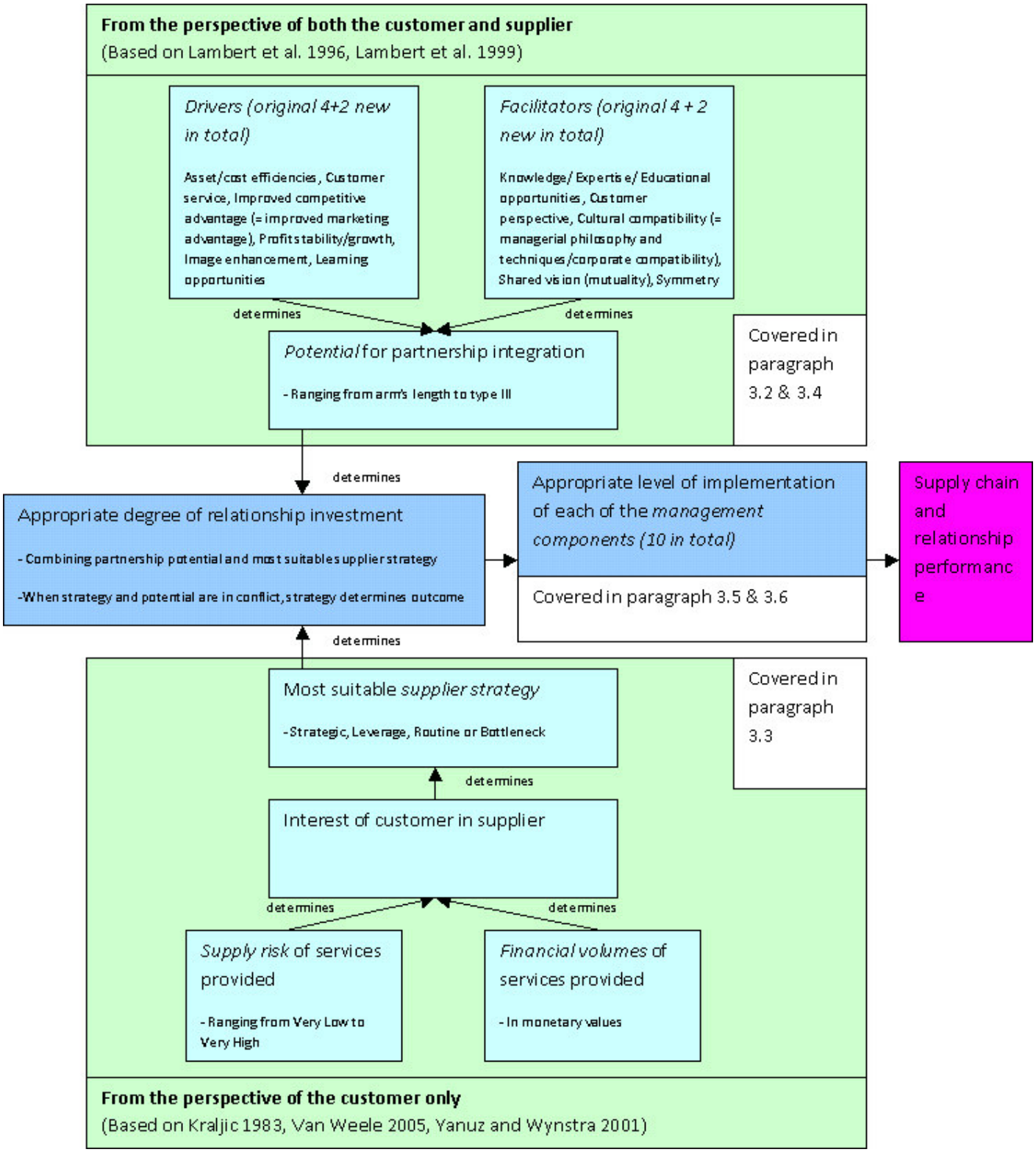

Figure 3.6 – Overview of the complete conceptual model

3.10. Summary

After having covered the most relevant literature with respect to the problems defined in the first two chapters, it is important to check whether the literature review answers the research questions related to this chapter. In this case, the literature review should answer the first four research questions as mentioned in paragraph 2.3.3. They are concerned with identifying important factors from literature (including case studies) on relation to customer/supplier relationships and supply chains. As was established in paragraph 3.5, the partnership model by Lambert et al. (1996) was the starting point for customer/supplier relationship characteristics, and added to that were other characteristics based on an extensive literature review. This resulted in a conceptual model that captures all those characteristics. Based on this chapter a proper understand has been established that allows us to move on to the next step; which is using the literature to analyse current supply chain, after this has been modelled.

CHAPTER IV - Analysis & Results

This chapter presents the actual heart of the thesis; it puts the theories and the conceptual model, described in the literature review chapter, to the test. In order to achieve this, it is vital that the current situation is thoroughly understood. Therefore this chapter begins with building this understanding through analysis of interviews with stakeholders, historical documentation and own observations. Once that has been done the theories from the literature review are applied.

4.1. Introduction

This chapter covers the analysis of the supply chain, based on the evidence gathered by interviews, historical performance data, documents and observations. The first paragraph covers the various interviews that where conducted with stakeholders within the supply chain as well as with experts. The first part covers an in-depth within-case analysis, while the second part covers the cross-case analysis. The second paragraph builds LSP profiles based on Dr. Aziz's LSP questionnaire and other documentation. The third paragraph discusses the historical LSP performance data analysis. This data has been gathered by SCE over the last three years based on their KPI scheme. This data is used by SCE to grant the "*haulier of the year*" award. The fourth paragraph discusses the placement of the LSP and LL Group within the supply chain and analyses that from two different perspectives. The fifth paragraph covers the so-called problem theory. Here, stakeholders, stakeholder goals, the problematic phenomena and the causal relations between them are identified [Wieringa, 2008]. The sixth paragraph applies the conceptual model, defined in the literature review, to the supply chain. The first part consists of the Kraljic method, the second part of the partnership method, and the third part combines the two, to come to implementation strategies per LSP. Finally, the last paragraph summarizes the chapter by highlighting the most crucial steps taken and its findings.

4.2. The interviews

This section covers the within-case and cross-case analysis of the various interviews that were conducted for this research. The main goal of these interviews was to gather information on the issues occurring within the supply chain. Once evidence has been gathered with respect to these issues, they will be used to establish a diagnosis that states what it is exactly that is causing the issues (please see paragraph 4.7.3). The cross-case analysis will be very important in this, as only those issues established cross-case will be part of this. Using only the cross-case issues makes sure that complexity is kept reasonably acceptable, while not getting lost in all of the issues found in the individual interviews.

Over the period from the 21st of January of 2009 till the 25th of March, a total of 9 formal interviews were held with various employees of SCE (the internal supply chain interviews). These were recorded, summarized in written form, and validated by the people involved. Due to some sensitive statements made in these interviews, they were made anonymous. They include interviews at both operational and management level of employees of the LL Group itself and the CRC department. The interviews did not follow a fixed set of questions, as access to these employees was easy. Therefore, getting all bases covered in the first try was not much of an issue. Therefore no interview protocol was made for these interviews.

Next to this, four LSP/representative organizations interviews with senior management were selected (the external supply chain interviews) as a source of evidence (based on the interview protocol from Appendix B). These interviews took place in the period of the 20th of January till the 7th of May. These were held at various places in The Netherlands and across Europe. For confidentiality reasons, the names of these managers or LSP's/representative organizations are not disclosed (as also discussed in paragraph 2.6). These interviews were recorded, summarized in written form, and

validated by the people involved. The summarized form of these interviews can be found in Appendix C.

Finally, also expert interviews are discussed, which involved scholars from the Erasmus and Twente Universities, as well as experts in the fields of purchasing and supply chains. These interviews took place from the 29th of November of 2008 till the 9th of July of 2009. The summary of these meetings can be found in Appendix E.

The LSP interviews as well as the SCE employee interviews and the expert interviews, focused on inefficiencies in the supply chain. These issues (and solutions) were categorized based on what area they related to. These are:

(1) Processes and communication within SCE or coming from SCE,

(2) Processes and communication within LSP's or coming from LSP's,

(3) Portfolio management by SCE,

(4) Performance measurement of LSP's.

4.2.1. Within-case analysis

CONFIDENTIAL

4.2.3. Cross-case analysis of expert interviews

CONFIDENTIAL

4.3. LSP Profiles

CONFIDENTIAL

4.4. Historic LSP Performance Data Analysis

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4.5. Observations within the supply chain

This paragraph will discuss the most important observations made while being embedded in the LL Group and through visits of the various LSP's. This evidence will prove to be valuable in creating a complete overview of the current situation.

First of all, during my six months at the SCE regional headquarters, I was placed within the LL Group of SCE. The three most striking observations were that of the *extensive spreadsheet usage* for data analysis, the *focus on transport safety*, and the seemingly contradicting *views on control and pro-activeness* of the LSP's. With respect to the extensive spreadsheet usage, it was quite surprising to see most analysis being performed using Excel spreadsheets. Langley et.al (2008) state that Excel has been coined the most widely used supply chain software. A lot of data is gathered in SCE's SAP system, but analysis is not performed using SAP. Instead the data is exported to an Excel spreadsheet, where employees deploy their own tools to analyse the data. Langley et al. (2008:

p.205) identify the advantages of spreadsheet usage, but also state that: *"…the planning and analytical work done via these tools be linked to the supply chain information system so that information does not become fragmented and visibility lost.*" Also related to this, SCE employees physically print the SAP data on paper and then manually enter this data into their spreadsheets. Next to spreadsheet usage, it became clear that SCE takes safety as their top-priority, not only with respect to the SCE owned petrochemical plants, but also with respect to the transportation of these chemicals by the LSP's. This also means that SCE wants to retain all control of transportation, due to SCE's fear of accidents. This leads to the last observation within SCE, which is the fact that SCE desires a pro-active approach of LSP's, yet on the other hands SCE wants to keep all control over the operations of the LSP's. The LL Group has stated that when an LSP has a problem, they need to deal with it, and it's not SCE's problem (see Appendix C). Also they have stated that some bigger LSP's cause issues because they have ideas of their own (also see Appendix C). There seems to be a contradiction there, because when the LSP's show initiative, SCE views this as a negative thing. Next to this, it would be difficult to coincide this desire to control all aspects of LSP transport and SCE's ambition to not having to deal with their issues.

Secondly, from the side of the LSP's, there was one thing most striking. This is the *generally low LSP IT maturity*. During visits to the LSP's, the researchers found that generally speaking the IT maturity of the LSP's is very low. Most LSP's use a big board on a wall, representing Europe, and then pinning all trucks on them, to track the location of drivers and equipment. Other LSP's, couple container ID's and trucks (using the licence place identifier) and put that on a board based on country. Also LSP's make "*order lists*", based on what orders are coming in from the various customers. These "*order lists*" are written down on paper using a pen and are then fed into the LSP planning system to plan the orders. Next to this, most LSP's plan the orders 24 hours ahead. There are some exceptions in the SCE portfolio, of LSP's planning 2 to 3 days ahead. Also what has to be noted, is that most LSP's worked with around ten different systems to receive incoming orders from their customers. This further adds to issues of low IT maturity.

4.6. The LSP and the Logistics department placed within the supply chain

This paragraph provides more insight into the position of the LSP and the LL Group within the supply chain. This is achieved by taking two different perspectives. The first looks at all flows between the LSP and other parties in the supply chain and the second analyses the LL Group from a 4PL perspective.

4.6.1. Interaction between LSP and other parties in supply chain

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4.6.2. The LL Group and CRC department as a 4PL

Through the observations we did at SCE, in combination with the literature analysis, we came to understand that SCE operates very similarly to a 4PL. If one would take the LL Group and the CRC department, they operate inside SCE as a 4PL. This is visually depicted in Figure 4.3.

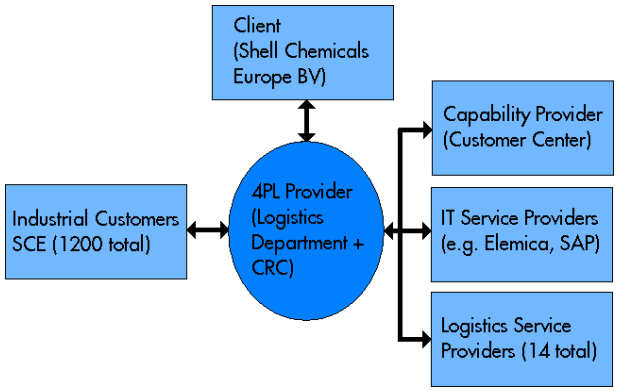

Figure 4.3 – The LL Group and CRC department as a 4PL provider

The 4PL group of SCE (shown as a circle in the center) delivers services for the client (in this case the sales department) to deliver to the various SCE customers. The 4PL does this by utilizing capabilities of the SCE customer center (which handles invoicing), of IT providers (like Elemica and SAP) and of the various LSP's to provide the actual transport.

The reason why we see the LL Group and the CRC department as a 4PL is because 4PL literature states that a 4PL is a supply chain integrator [Skjoett-Larsen, 2000]. Next to this a 4PL leverages: "*the capabilities of 3PL's, technology, technology service providers, and business processes to create a solution*" [Bade and Mueller, 1999: p.79]. Also these authors state that a 4PL maintains accountability, responsibility and quality within the arrangement. Also, a 4PL is a centralized point of contact between the client and multiple LSP's. Finally 4PL's focus on strategic and operational issues in the supply chain [Bade and Mueller, 1999], have skills in creating and maintaining supply chain relationships, and manage and direct activities of multiple 3PL's [Langley et al., 2009]

It is clear that in the current setup, SCE is performing all the firefighting, and this makes sense since a 4PL's focus is on both strategic as well as operational issues. Next to this, SCE maintains a firm grip of control over its LSP's. This can also be explained, as a 4PL holds all responsibility for the arrangement. Also SCE uses various IT applications like those from Elemica and SAP to conduct its business. Also it is clear that the Transport Coordinators within the LL Group and the Customer Relations Coordinators manage and direct all activities of the LSP's.

4.6.3. The LL Group as a retained organization

This paragraph provides an additional view to the LL Group, apart from the 4PL interpretation. Here we will discuss the LL Group from the perspective of a retained organization, as described in the nine core capabilities model by Willcocks and Feeney (2006). This is valuable because this model provides guidelines of what should be retained within an organization in terms of capabilities, in order to deal with the governance of the (outsourced) business, in this case the services provided by the LSP's. By following the descriptions of what each of these nine core capabilities entail, a mapping can be made as to what capabilities are already performed by the LL Group and also determine the gap. After the analysis of the roles, that contain each of the capabilities that Willcocks and Feeney define,

it turns out that SCE is performing 4 of the 9 roles to manage the LSP's. This has been visually portrayed in Figure 4.4. The picture on the left shows the already implemented capabilities and the picture on the right indicates the gaps.

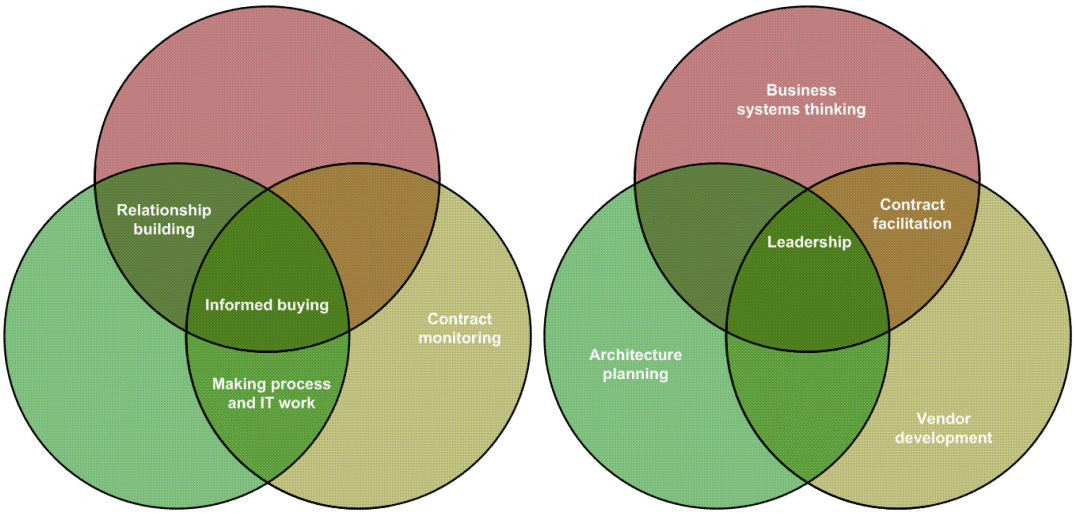

Figure 4.4 - The implemented and non-implemented capabilities within the SCE LL Group, adopted from Feeney and Willcocks (2006), in De Jonge (2009)

First let us go through those capabilities that are already being performed by SCE. If we look at the capability of "*relationship building*", Willcocks and Feeney (2006) describe it as those people in the retained organization that facilitate dialogue, understanding, trust and cooperation in the relationship. Also these people can put themselves in the shoes of the supplier and also understand the potential for the services they provide [Willcocks and Feeney, 2006]. Within the LL Group of SCE, the transport coordinators perform this role, as they have known most of the LSP's for years and also during performance reviews, it is clear that their personal touch is a valuable addition to creating mutual understanding between the two parties.

The second capability already in place is that of "*contract monitoring*". According to Willcocks and Feeney a contract monitor holds suppliers accountable for the existing service contracts, and also for the performance provided. They compare supplier performance against benchmarks in order to constantly monitor how the supplier compares to the rest of the market. It is clear that within SCE, the contract manager performs this role. Related to this capability, is that of "*Informed buying*". This capability involves analysis of the external market for relevant services. Also it involves leadership for tendering, contracting, and service management processes. The Contract & Procurement department within Shell provides this capability. This department has all the ins and outs of what's going on in the market and also gathers all the feedback from the various Shell CoB's on the service providers currently under contract.

The final implemented core capability is that of "*making process and IT work*". People in this role assess and challenge suppliers claims on technical problems and proposed solutions. The capability

requires a strong and broad understanding of technology fundamentals, rather than a deep understanding of a few technologies [Willcocks and Feeney, 2006]. To our belief the logistic planners within the LL Group perform this capability. Their role within the LL Group is focussed on continuous supply chain optimization, taking a broad perspective. Next to this, also the technical advisor within the LL Group performs this role. With all of the knowledge that the technical advisor has, this person can also challenge the supplier on technical difficulties.

Now that all the performed capabilities have been covered, we are left with those core capabilities that are currently missing within the LL Group. Those are: "*architecture planning and design*", "*business systems thinking*", "*contract facilitation*", "*vendor development*" and "*leadership*". Of these five core capabilities, Willcocks and Feeney (2006) identify that there are both short-term and long-term capabilities. In order to prevent being drawn into firefighting, the focus should not only lie only on the short-term capabilities, but also on developing the long-term strategic core capabilities. They identify that "*business systems thinking*", "*architecture planning and design*", "*informed buying*" and "*leadership*" for example fall under the strategic core capabilities. Since three of these are not performed yet, the remainder of this paragraph will focus on these.

First of all the "*business system thinkers*" capability is absent. The logistics planners could perform this role. The reason for this is because this role fits the logistic planner profile, as it concerns process re-engineering, strategic development and business problem solving [Willcocks and Feeney, 2006]. Internally they already perform this role to some extent, but not so much towards the external supply chain of the LSP's. This role helps to ensure that the organization does not operate in isolated silos but rather as integrated business services [Willcocks and Feeney, 2006].

Next to that, the "*architecture planning and design*" role, concerns planning and shaping IT-enabled infrastructure. This is achieved through developing the vision of an appropriate technical platform and ways to ensure integration and flexibility of the IT services [Willcocks and Feeney, 2006]. In order to fulfil this role, someone from outside the LL Group should be attracted, for instance someone already working within Shell Global as an IT application portfolio analyst. Currently this IT expert knowledge is missing in the LL Group.

The "*leadership*" capability finally, devises organizational structures, processes, and staffing to successfully manage the interdependencies and to ensure that the retained organization delivers value for money. Leaders also influence the overall business perception of the retained organizations role and contribution. Although the LL Manager, to some extent, performs this function, the business perception of the retained organization's current contribution, especially its operational components, are debatable. Therefore even more leadership is needed to transform the retained organization in such a way that the perceptions of its contribution towards others within SCE are positively influenced.

4.7. Problem Theory

Within this paragraph, a problem theory is articulated, based on identifying the stakeholders, their goals, the problematic phenomena and finally to establish a diagnosis.

4.7.1. Stakeholders and Goals

In an effort to enhance our understanding of the problem, the various stakeholders are identified. Stakeholders can be both people and organizations [Wieringa, 2008]. Wieringa (2008) states that stakeholders are those people or organization that are affected by reducing the gap, or those that want the gap to be closed (problem owners).

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4.7.2. Phenomena

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4.7.3. Diagnosis

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4.8. Applying the Conceptual Framework to the SCE Supply Chain

This section of the analysis and results chapter executes the conceptual framework as conceived in the literature review chapter. The idea is that execution of this model will give more insight into how the LSP's in SCE's portfolio should be managed.

The model is executed in two steps. The first is to categorize the LSP's into four different supply strategies developed by Kraljic (1983). The second step is to identify which important characteristics should come into play to manage each of the LSP's per category.

Paragraph 4.8.1, 4.8.2 and 4.8.3 cover the first step of the conceptual framework. Based on the 2008 spend figures and an interview with the LL Group contract manager, the first step of the conceptual model can be executed. This interview took place on the 8th of July of 2009. This first step concerns the Purchasing Portfolio & Supplier Portfolio matrices by Kraljic (see paragraph 3.4 from the literature review chapter). The actual guidelines to come up with the matrices were taken from Van Weele's book on purchasing and supply chain management (2005) and the article by Yavuz and Wynstra (2001). These describe the exercise of the purchasing and supplier portfolio for Heineken N.V..

Paragraph 4.8.4 covers the second step of the conceptual model, which is the partnership model of Lambert et al. (1996). Execution of this part determines the potential for a relationship between SCE and the LSP's.

Paragraph 4.8.5 combines the findings of both methods to determine the appropriate degree of relationship investment. This will lead to a customized advice for each of the LSP's, on the extent of which the management components are required to be implemented (paragraph 4.8.6).

4.8.1. The Purchasing Portfolio

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4.8.2. The Supplier Portfolio

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4.8.3. Overview of SCE's mix of LSP's and appropriate supply strategies

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4.8.4. The partnership model

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4.8.5. Comparing findings from both models

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4.8.6. Establishing the extent of implementing each of the management components per LSP

Although the partnership model was only executed from the LSP perspective, it became clear that from the LSP's side, the "*potential for partnership integration*" is a Type III relationship. This is the second highest possible relationship (see Figure 3.3 from the literature study). This would suggest that each of the management components (operationalized by processes and activities) should be implemented to a high degree. But since SCE's perspective should be taken into account also, we will use the results from the Kraljic method to realize this.

From Kraljic's descriptions of each of the strategies, it becomes apparent that for leverage suppliers (high financial volumes and low supply risk) and routine suppliers (low financial volumes and low supply risk) no added value would be gained through partnerships. Here the approach towards the LSP's should be competitive bidding and LSP reduction [Van Weele, 2005]. Therefore the setup of arm's length relationships is the right one, as currently this is also the strategy applied to the entire portfolio; therefore nothing needs to change here (except reducing LSP's in the routine quadrant). For the strategic and bottleneck LSP's on the other hand, the supply risk is considerable, and the supply needs to be secured. Therefore building closer relationship is important. Since all LSP's have the potential of a Type III relationship, it is up to SCE if this actually will be realized.

Lambert et al. (1996) suggest for each of the three partnerships (ranging from Type I to Type III relationships) what should be implemented for each of the management components they defined. This table can be found in Appendix N. Taking this table as a starting point, an implementation approach is determined per LSP. Tables 4.18, 4.19 and 4.20 give an overview of this, by combining Kraljic and Lambert:

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These implementation characteristics of the management components (shown in the last column of Tables 4.18, 4.19 and 4.20) will be expanded by the new ones identified in the literature review in the following sub-paragraphs to create a full description of processes and activities to be implemented for the bottleneck and strategic LSP's.

4.8.6.1. Appropriate level of implementation of each of the management components for Leverage and Routine LSP's

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4.8.6.2. Appropriate level of implementation of each of the management components for Bottleneck LSP's

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4.8.6.3. Appropriate level of implementation of each of the management components for Strategic LSP's

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As was explained in Table 4.18, Lambert et al. (1996) gives quite some guidelines at to what processes and activities to implement in a Type III relationship for each of the management components. This is in contrast to the Type I relationship, as established in the last sub-paragraph. These have been put in the list below, together with other desirable processes and activities (and newly added management components) identified during the literature review.

The activities and processes needed to establish a Type III relationship, described per management component (based on Lambert et al., 1996; Lambert et al., 1999; Brewer and Speh, 2000; Lambert and Cooper, 2000; Gordon, 2005; Rai et al., 2006; Anderson and Weitz, 1992; Morgan and Hunt, 1994; Handfield and Nicols, 1998; Barrett, 2004; Bowersox and Closs, 1996; Mentzer et al., 2001; Langley et al., 2008; Lee et al., 2001):

1. **Amount of sharing** [communications] (issue within SCE as identified in paragraph 4.7.3)
    a. Both routine and non-routine communication, sharing both positive and negative feedback (willingness to share both good and bad news) and communication is two-way balanced
    b. Communication is characterized by high frequency of information updating
    c. Communication links should be across all levels of the organizations including strategic, tactical, operational, interpersonal and cultural
    d. For day-to-day communication have a systemized methods in place (either manual or electronic)
    e. Use of different (technological) mediums to establish communication channels, and link all these systems together
    f. Also joint development of electronic communications

g. Continue current practices of giving LSP's feedback on established performance measurement system

2. **Integration/collaborative planning** [planning]

   a. Planning is performed jointly at multiple levels, objective is to mesh strategies

   b. This joint planning ranges from sharing existing plans to joint development of strategic objectives

   c. Establish the integration of activities with the LSP, by integrating the flow of information, materials, and finances with the LSP. This requires continuous information flows

3. **Shared investment/commitment** [scope][investment] (issue within SCE as identified in paragraph 4.7.3)

   a. The partnership represents significant business for both parties

   b. With respect to investment, there are significant joint research and development activities

   c. Create a high degree of financial interdependence (relation specific investments) by establishing shared assets, joint investment and exchange of personnel

   d. Make short-term sacrifices for the long-term perspective of the relationship

   e. Show commitment for the relationship on all levels within the organization (this includes resources and commitment from senior management)

4. **Shared responsibilities** [risk/reward sharing] (issue within SCE as identified in paragraph 4.7.3)

   a. With risk/reward sharing there is a high tolerance for short-term loss

   b. Establish shared responsibilities in order to make sure that both costs and risks and benefits and rewards are shared

5. **Clear roles/responsibilities** (issue within SCE as identified in paragraph 4.7.3)

   a. Lay down roles, tasks and responsibilities clearly for suppliers and customers

   b. Appoint an organization to assume the leader role within the partnership, but prevent this power role from being exercised incorrectly

6. **Performance measurement**

a. In order for a performance measurement system to be effective, the KPI's should be understood by the partners, and the performance (represented in these KPI's) should be clearly communicated

b. The performance measurement system is established in a collaborative effort from both parties

c. In order to establish an objective performance measurement system, the system should be used to ensure that both parties are meeting their stated objectives

d. Establish both external as well as internal performance measures

e. Directly connect low-level performance measures to the high-level performance measures of supply chain, like net profit, return on investment, or assets and cash flow

7. **Trust** [trust and commitment]

   a. Commitment is directed towards both partners long-term success

   b. Communicate clearly that the partnership is not a short-term venture, so that the partner does not have to worry about replacement

   c. Show trust in a relationship by:

      i. Following through on the commitment and acting in a predicable manner,

      ii. Having frequent personal interactions to express goodwill and moral integrity

      iii. Showing vulnerabilities and uncertainties

      iv. Going "*out-on-a-limb*" for each other on a regular basis, for instance when rush orders come in

8. **Control mechanisms** [joint operating controls]

   a. Operating controls are jointly developed and shared, focus on joint performance

   b. The operating controls facilitate both parties in being encouraged to make changes, and that these changes can be made without approval of the other partner

9. **Contractual mechanisms** [contract style]

   a. Contracts are very general in nature and does not specify duties or responsibilities; it rather outlines basic philosophy

b. Contracts are utilized in such a way that it enables the LSP to eliminate the uncertainties in rates and services that the supplier (SCE) provides

10. Coordination mechanisms

a. Coordination should be established having integrated systems for cooperation and information exchange

b. Establish coordination mechanisms based on trust, commitment, cooperative norms, dependence, organizational compatibility, and top management support

4.9. Summary

The analysis and results chapter was set out to provide an answer to the issues that arise in the current SCE Land Logistics supply chain and how these issues can be related to literature and case studies. As was found in paragraph 4.7.3, the most important (generally defined) issues identified, based on a comparison of all evidence gathered, are the following (in no particular order):

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Based on this mapping to the characteristics, best practices could also be mapped to them (derived from Lambert et al., 1996; Lambert et al., 1999; Brewer and Speh, 2000; Lambert and Cooper, 2000; Gordon, 2005; Rai et al., 2006; Anderson and Weitz, 1992; Morgan and Hunt, 1994; Handfield and Nicols, 1998; Barrett, 2004; Bowersox and Closs, 1996; Mentzer et al., 2001; Langley et al., 2008; Lee et al., 2001). The first two characteristics are facilitators ("*lack of expertise/learning orientation*" and "*lack of customer/supply chain orientation*"), meaning that they are inherent properties present in a supply chain or relationship according to literature [Lambert et al., 1996]. Therefore no best practices could be identified for them. For the four management components (characteristics 2 to 6), a total of sixteen best practices could be derived as can be seen in paragraph 4.8.6.3. It has to be stated that literature proposed, that the way to deal with the issues identified, based on a mapping to the characteristics, is to build closer relationships (by sharing information, investments and responsibilities). Since SCE has expressed their fear in getting to comfortable with the LSP's (see Appendix C), this has some apparent implementation difficulties.

Next to this it is important to look at which findings could be made with confidence and which were uncertain. This is because a discrimination must be made between the two, to indicate that they should be treated differently [Berndtsson et al., 2008]. Looking at the processes and procedures taken in this chapter, the findings that have been presented so far in this summary are based on extensive rigorous research and are considered certain (being the main issues, the mapping to characteristics and the identified best practices). The application of the partnership model is a different story though. First of all, not all drivers and facilitators were derived from the appropriate questions from the LSP questionnaire. Secondly, some driver and facilitators were missing altogether. Thirdly, the facilitators should be determined in coloration with the other party (i.e. SCE). And next to that, the SCE perspective of the model had to be skipped entirely. This last remark is the least relevant for the results, as the exercise still provides half of the viewpoint. The most important factor in establishing that uncertainty is part of its results, is that for establishing the facilitator

scores, no SCE input was taken into account. Therefore the scores for the facilitators are probably higher than they would have been if SCE and the LSP's had sat down together to determine the scores.

CHAPTER V - Solution Design

Based on the understanding of both the literature review and the analysis and results chapters, it is possible to define solutions for the problem statement from the research design chapter. This chapter presents these various solution scenarios found to be suitable for implementation in the case.

5.1. Introduction

This chapter covers the solutions scenarios that can be used to improve the current situation within the SCE supply chain. The second paragraph maps the solutions to the problem bundle, to identify which issues they deal with, the third paragraph describes the solutions in detail, and the last paragraph summarizes the chapter by reflecting on the original research question defined for this chapter.

5.2. Selected solutions

In order to make an easy distinction between the solutions scenario's for SCE, it was decided to categorize them into (1) solutions that can be implemented on the *short-term* (within a couple of months), (2) solutions that require more time and effort (ranging from about six to twelve months), identified as *medium-term solutions* and finally (3) solutions for the *long-term*; which have an horizon of one to three years.

The solutions were defined after having performed the literature review, to establish insight into the important characteristics of effective supply chains and customer/supplier relationships. Next to this, to come to these solutions, these characteristics from literature were mapped to the problems that are present in the supply chain. These problems provided insight in the current situation, and allowed the issues within the supply chain to be made explicit. As it is known that problems are actually solutions defined in a different form (Wieringa, 2008). Therefore this also directly provided insight into some of the solutions described in this section. Next to this historical performance data and other documentation created solution visibility. Finally, observations made by the researchers involved with the ISEA project and expert opinions lead to some of the solutions described here.

5.2.1. Short-term horizon solutions

1. Correct SAP master data
2. Understanding hand-over process externally in changing an LSP
3. Continuous focus on customer satisfaction
4. Continued LSP Communication and information exchange
5. Share overview of SCE supply chain and its issues internally
6. Employment of internally focussed Logistics Planner within the LL Group
7. More flexibility with "right first time" targets
8. Update LSP KPI scheme

5.2.2. Mid-term horizon solutions

9. Document and improve Excel tools used within the supply chain
10. Provide SCE employees with SAP courses

11. Improving LSP Incentive Scheme
12. Arranging SCE access to the Contracting & Procurement database
13. Intensified contact with other CoB's for contract negotiations with shared LSP's
14. Give room for reading existing documentation internally
15. Improve knowledge transfer for TC's
16. Improve hand-over process of jobs internally
17. Implement LSP satisfaction surveys
18. Involving all expertise in contract negotiations
19. Change date for setting product prices

5.2.3. Long-term horizon solutions

20. Implement freight declined KPI for LSP's
21. Reduce freight declined by forming closer LSP relationships
22. Extending Track & Trace capabilities
23. More responsibility to medium and large LSP's
24. Document responsibilities and linkages in processes with respect to LL Group internally
25. Communicate and document responsibilities in processes between LL Group and LSP's
26. Prevent subcontracting
27. Understanding LSP pro-activeness/control trade-off
28. Setting up internal KPI's
29. Creating accountability at plant loading sites for improvement

5.3. Mapping of solutions to the problem diagnosis

As was identified in the last chapter, the diagnosis of the problems in the SCE supply chain revealed that the problems revolve around six of the in total fourteen identified customer/supplier and/or supply chain characteristics (see paragraph 4.7.3). These were (1) lack of expertise/learning orientation, (2) lack of customer/supply chain orientation, (3) lack of/inability of information sharing, (4) lack of shared investments, (5) lack of shared responsibilities, (6) lack of clear roles and responsibilities.

This section will show the relations between each of the solution scenarios described in this chapter, and which of these problematic customer/supplier and/or supply chain characteristic it addresses. This will help make the value of the solution scenarios more apparent to SCE, since it is SCE that will need to make the decision whether or not to implement any of these solutions.

5.3.1. Short-term horizon solutions mapping

As can be seen in Table 5.1, four of the six problematic characteristics are (partially) addressed by the eight short-term horizon solutions.

Nr.	Name of solution scenario	Addressing of characteristic (issue)
1	Correct SAP master data	(6) Lack of clear roles and responsibilities
2	Understanding hand-over process externally in changing an LSP	
4	Continued LSP Communication and information exchange	(3) Lack of/inability of information sharing
5	Share overview of SCE supply chain and its issues internally	
6	Employment of internally focussed Logistics Planner within the LL Group	(1) Lack of expertise/learning orientation
3	Continuous focus on customer satisfaction	(2) Lack of customer/supply chain orientation
7	More flexibility with "right first time" targets	
8	Update LSP KPI scheme	

Table 5.1 – Mapping of short-term horizon solution scenarios to the six problematic characteristics of effective supply chain management and/or customer/supplier relationships.

Currently for the correction of SAP data it is not clear who should be responsible for this, and what the procedures should be. Therefore it falls under a lack of clear roles and responsibilities. Next to this by understanding the hand-over process externally, it becomes clear how roles are currently divided between the LSP and SCE and the impact of changing LSP's in the light of the Lion project becomes more apparent.

The lack of/inability of information sharing can be addressed by intense communication between SCE and the LSP's. Next to this the issues in the SCE supply chain should also be communicated internally. This will help understand its limitations and create awareness into what should be taken into account by the SCE employees.

The lack of expertise/learning orientation can be countered by having an internal supply chain optimizer within the LL Group. This person can get away from the more operationally focused activities and really make a difference by putting theory and knowledge to practice.

There are three solution scenarios dealing with the customer/supply chain orientation characteristic. Having an ongoing focus on customer satisfaction, more flexibility with "*right first time*" targets and performing an update to the LSP KPI scheme achieve exactly this. Each of these solution scenarios

makes sure that both the customer and supply chain perspective is maintained in the SCE supply chain.

5.2.2. Mid-term horizon solutions

Table 5.1 presents the mapping of the mid-term horizon solution scenarios to four of the six distinct characteristics.

Nr.	Name of solution scenario	Addressing of characteristic (issue)
9	Document and improve Excel tools used within the supply chain	(1) Lack of expertise/learning orientation
10	Provide SCE employees with SAP courses	
11	Improving LSP Incentive Scheme	
14	Give room for reading existing documentation internally	
12	Arranging SCE access to the Contracting & Procurement database	(3) Lack of/inability of information sharing
13	Intensified contact with other CoB's for contract negotiations with shared LSP's	
16	Improve hand-over process of jobs internally	
18	Involving all expertise in contract negotiations	
15	Improve knowledge transfer for TC's	(5) Lack of shared responsibilities
17	Implement LSP satisfaction surveys	(2) Lack of customer/supply chain orientation
19	Change date for setting product prices	

Table 5.2 – Mapping of mid-term horizon solution scenarios to the six problematic characteristics of effective supply chain management and/or customer/supplier relationships.

The solution scenarios here deal with four of the characteristics. First of all the lack of expertise/learning orientation can be addressed by having Excel tool workshops to improve these and reducing manual actions in them. Also giving room for training and self-study will facilitate this. The LSP incentive scheme improvement makes sure that learning orientation for the LSP is facilitated.

Secondly, the lack of information sharing is dealt with by more intensive communication between departments (solution scenarios 12 and 13). Next to this by having a so-called "*buddy system*" in place, the hand-over process internally can be improved, making decision made in the past much more traceable. Also involving all expertise in the contract negotiations invites communication between all important departments within SCE and the LSP's.

Thirdly by codifying part of the work that TC's perform, part of the (more easier) TC's tasks can be taken over by the CRC department as this activity makes it possible to write scripts with step-by-step explanations of how to deal with certain issues when they occur.

Finally, the lack of a customer/supply chain orientation is dealt with by implementing LSP satisfaction surveys. This will create a better understanding and awareness of what other parties think of SCE. Also by changing the product price setting, the limited view of solely SCE's sales department is altered so that only those dates are chosen that benefits the whole supply chain.

5.2.3. Long-term horizon solutions

Table 5.3 presents the mapping of the long-term horizon solution scenarios for all six of the characteristics.

Nr.	Name of solution scenario	Addressing of characteristic (issue)
20	Implement freight declined KPI for LSP's	(3) Lack of/inability of information sharing
22	Extending Track & Trace capabilities	
23	More responsibility to medium and large LSP's	(5) (4) Lack of shared responsibilities/investments
27	Understanding LSP pro-activeness/control trade-off	
24	Document responsibilities and linkages in processes with respect to LL Group internally	(6) Lack of clear roles and responsibilities
25	Communicate and document responsibilities in processes between LL Group and LSP's	
26	Prevent subcontracting	
21	Reduce freight declined by forming closer LSP relationships	(2) Lack of customer/supply chain orientation
28	Setting up internal KPI's	
29	Creating accountability at plant loading sites for improvement	(4) Lack of shared investments

Table 5.3 – Mapping of long-term horizon solution scenarios to the six problematic characteristics of effective supply chain management and/or customer/supplier relationships.

Solutions scenarios 20 and 22 deal with the limited ability of information sharing. These are meant to give more insight into the SCE supply chain, so that better decisions can be made.

By giving more responsibilities to medium and large LSP's, and by realising the influence of LSP control on their level of pro-active behaviour, deal with lack of shared responsibilities and investments (characteristic 5 and 4).

The lack of clear roles and responsibilities within the SCE supply chain can be addressed by sharing this information internally and externally. Next to this, due to a lack of LSP control on their sub-contractors, which is an indirect consequence of unclear responsibilities, issues occur. Since dealing with this will be difficult, SCE should seek to prevent their LSP's from sub-contracting.

Reducing freight declined through closer relationships and by setting up internal KPI's, the lack of customer/supply chain orientation can be addressed.

Finally, the lack of shared investments can be dealt with by having both the plant and the SCE HQ invest resources in improving the loading gantries. This will build commitment on both sides. Also making them accountable for the costs incurred will help to establish these shared investments.

Now that the mapping of the solution scenarios to the various problems in the SCE supply chain has been performed, the next section perform an in-depth explanation of the solutions mentioned here.

5.4. Step-by-step explanation of the solutions

In total twenty-nine solutions are defined, some of which are more extensive to implement than others. Next to this, the solutions defined here take into account SCE's effort to roll out project "Lion" as well.

5.4.1. Short-term horizon solutions

1. **Correct SAP master data -** In total there are about 1600 lanes. These should be divided among the CRC department, and after that let them contact the customers to verify the customer requirements. But one person within CRC/Logistics department should have the responsibility and authority to collect this data, and then compare this to what is in master data and then correct/update. This activity needs to be performed before the big-bang tender of the Lion project. Also it is important to identify which of these lanes requires special equipment and discuss with possible new LSP if they can provide those facilities.

   In order to keep this data up to date and not lead to the same problems SCE is currently facing, it should become part of the CRC working processes. So on a regular basis, e.g. once every 6 months, update not only the data, but also look at all data for a specific lane and then add/remove information where necessary. This way you prevent contradicting information and/or overwriting of information. Since this might also involve less simple changes to customer data, master data team involvement could be required.

   On the long-term memo fields should be made obsolete. Elemica follows the so-called CIDX format, so push Elemica to put a new version/other version in so all information can be captured in the standard. This way the LSP's can automatically handle the orders coming in from SCE.

   Performing this activity is quite critical with respect to successfully executing the Lion project. When Langley et al. (2008) discuss the risks involved in reducing the number of LSP's, they also state that in a ten-LSP portfolio (in comparison to a 100-LSP portfolio), the loss of one LSP requires the customer to use LSP's that are unfamiliar with the former LSP's freight, shipping procedures, and customer service requirements. This, according to the authors, will disrupt operating systems and customer service levels and possibly lead to higher transportation costs. This increase in transportation costs is due to the fact that when an LSP would be lost, this crisis situation would not allow the customer to negotiate favourable rates.

2. **Understanding hand-over process externally in changing an LSP -** Devise a plan on what needs to be concretely done when changing the business of one LSP to another. This is advised to understand what the relevant aspects and impacts are, involved in changing LSP's. This is especially relevant in relation to the Lion project, since this could cause a significant shift in how the business of SCE is divided between its LSP's. This would give more confidence in the decision making process of choosing a certain division of business. This complements recommendation 1 on the master data.

3. **Continuous focus on customer satisfaction -** This is currently established through surveys sent out to all SCE customers. As was identified in the conceptual model, keeping the customer perspective is vital. This model identified the customer perspective as the second most important characteristic of the facilitators in a customer/supplier relationship and/or supply chain. It seems to be stating the obvious, but sometimes we seem to forget why we do what we do in the first place. SCE currently has customer satisfaction surveys in place to measure their satisfaction, and continued effort should be undertaken to understand their satisfaction and requirements. Handfield and Nichols (1998), identify four main obstacles from companies to reaching the same amount of supply chain performance as the best-in-class. One of them is the lack of a customer perspective. Bowerbox et al. (2000) also stated that if a customer-perspective is maintained throughout the supply chain, collaboration is also improved.

4. **Continued LSP Communication and information exchange –** Identified in the conceptual model, the most important management component is communication. Therefore having regular meetings with the various LSP's to ensure everything is running as planned. This is more a continuation of a current practice, but regular contact should be intensified with the most important LSP's when project Lion is taken into effect. Currently one of the TC's has a weekly conference call with the rail provider, which is quite strategic for SCE. Therefore the same practice would be valuable for those LSP's in the new arrangements with whom the amount of spend would be similar or more than is now the case for the rail provider.

5. **Share overview of SCE supply chain and its issues internally -** Also in relation to the ISEA workshop, which was organized by SCE in July, the involved participants expressed their appreciation of the exercise, that focussed on issues and solutions, and contributed to their awareness of issues in the supply chain. It would be recommended to draw up a short visual summary of the SCE supply chain and the issues that occur in it, as described in this thesis, and share that as a standard practice for the SCE employees to be aware of (especially for the CRC, Supply and Logistics departments). Handfield and Nicols (1998) stated that it is crucial for parties in the supply chain to develop a better understanding of their processes. The reason for this being that otherwise process improvement opportunities are difficult to identify.

   By sharing the SCE supply chain and its shortcomings, (new) employees understand the issues, or can give their input to improve the overview of the issues in the supply chain as

described in this thesis. This would then further validate the overview and spark continuous improvement initiatives throughout the supply chain. This would only work, if recommendation 14, "*giving room for reading existing documentation*" is implemented.

6. **Employment of internally focussed Logistics Planner within the LL Group –** It is advised to hire an extra employee for analysing and improving the internal supply chain. Currently the "*classic*" LP is responsible for optimizing mostly the external supply chain (e.g. looking at transportation lanes). It would be a real advantage to also have a logistics planner in place, which would focus on optimizing the internal supply chain. Currently LP's are the link between the logistics and the commercial departments, and building from this, an internally focused LP would be a true asset. Also LP's are one of the few employees on the working floor at SCE who are involved with project work next to their operational tasks. Therefore this person would fit the profile of an LP. Another main criterion is that this optimization of the internal supply chain always relates to the higher, long-term strategic level of operations.

   Based on the description of the current situation, it became clear that also a lot of issues reside in the internal supply chain (see chapter 4). The best person for the job would be someone currently already working at SCE, for instance a capable person from the CRC department. This person is already familiar with the current culture within SCE, knows which people are valuable, or causing obstructions, etc.

   Another recommendation would be for this internal LP to work in cooperation with an external consultant to mix organizational knowledge with theoretical concepts suggested by the consultant.

7. **More flexibility with "right first time" targets –** The right first time targets at the CRC department illustrates sub-optimalization within the supply chain; as a means to counter the sub-optimalization from the LSP's when they want to change the planning of deliveries. According to some LSP's and SCE employees as well, these targets prevent improvements to the planning and are counter-productive. It would be a valuable recommendation to extend this target to include both positive as well as negative order revisions. This way friction, that is currently present between the LSP's and SCE can be reduced.

5.4.2. Mid-term horizon solutions

8. **Update LSP KPI scheme -** Update the KPI's in negotiation with the LSP's in order to have a system that both SCE and the LSP's can find themselves in. This way the LSP will not make decisions that are detrimental for the overall performance in favour of sub-optimalization at SCE or visa-versa.

   It should be taken into account in the scoring of an LSP, whether the transport was performed using inter-modal transport or just using a regular Road Tank Car solely by road.

LSP's felt negatively impacted by that, and was the most frequent complaint they had with the KPI system.

Another suggestion, to create more support for the KPI system, is to distinguish between the type of product transported. You could think of distinguish EO, PO and TDI for instance, since these are considered very dangerous.

Next to this, also to take into account rush orders vs. normal orders. When an issue occurs with a rush order, the LSP's should have less of a negative impact then when it happens with an order that was delivered to the LSP within the contract agreed timeframe.

Also the difficulty of business should be taken into account in order to determine the LSP KPI score. This can be defined by ranking the LSP's based on the following properties:

(1) Modality (e.g. rail, road), (2) *Combi-loads* (more than one product), (3) *Product* (e.g. danger), (4) *Loading locations*, (5) *Destination* (country), (6) *Type of customer*, (7) *Distance* and (8) *Route* (e.g. do they need a ferry).

The Aberdeen Group (2009) identifies that best-in-class companies use the following LSP performance measures, of which *on-time delivery* is already in place at SCE: On-time delivery (92%), Invoice accuracy (88%), On-time pickup (75%), Data quality (54%)

If new KPI's are to be introduces, SCE should not set targets at the same time. It would we unsportsmanlike to the LSP's for SCE to set the targets without having relevant knowledge of what is actually possible within a certain KPI. Once SCE retrieves the first data from the LSP's regarding the KPI values, a target can be set.

Finally, from the literature review chapter, it became clear that the performance measures must also directly connect to the high-level performance measures of the organization and supply chain. Langley et. al. (2008) states the following: *net profit*, *return on investment*, or *assets and cash flow*.

9. **Document and improve Excel tools used within the supply chain –** Excel has been coined "*the most widely used supply chain software*" [Langley et al., 2008: p.205]. This is no different within SCE, where Excel usage is extensive. But they state that: "*it is critical that the planning and analytical work done via these tools be linked to the supply chain information system so that information does not become fragmented and visibility lost*." In the case of SCE, the supply chain information system is SAP. And indeed the link between SAP and a lot of these Excel tools is problematic. By exporting the data from SAP, real-time visibility is lost and the information becomes fragmented, like Langlet et al. (2008) state.

   A first step to reduce the negative effects of a lack of visibility and fragmentation would be to map which Excel tools are used by SCE employees in the supply chain. From this basic information, identify what types of tools have been created, and more importantly *what*

functionality they were created for. If an SAP expert could look at these findings and identify which part(s) of these Excel tool functionalities could be possible performed by SAP, the amount of data that needs to be exported is reduced, reducing the visibility and fragmentation issues.

The second step would be to get in external expertise (in the fields of SAP and Excel) to aid the SCE employees with changing the tools in such a way that the SAP steps are removed, and exporting of the remaining data becomes automated. Observation showed that currently various SCE employees physically print data from SAP and type it over in their Excel analysis tool. It was identified that the Shell Group actually provides the facilities to hire these experts for a couple of days. But awareness within SCE of these IT facilities seems to be limited.

10. **Provide SCE employees with SAP courses –** Related to recommendation 9, it is important for SCE employees to understand the capabilities and limitations of the SAP system. Currently it seems that most analysis of data is performed using Excel tools, while SAP is seen as a database. SAP should be more that just an information system for entering data. In order to create this awareness of both capabilities and limitations of the current SAP system, providing a course to employees would be the perfect medium. SCE luckily nurtures a culture of offering courses to improve ones capabilities, only most employees seem to focus on Excel, while for most of them the missing link is that between SAP and Excel. Therefore SAP courses should be brought to everyone's attention.

11. **Improving LSP Incentive Scheme –** SCE currently has an incentive scheme in place for the LSP's, so that when they perform well, they are awarded more business, while when they perform poorly, business is taken away. This is also one of the important characteristics of the conceptual model. What would be a good practice would be to extend that somewhat by cancelling out the penalty when the LSP shows significant performance improvement in the period after that.

12. **Arranging SCE access to the Contracting & Procurement database –** This database contains information on the various LSP's that the entire Shell Group works with. Problem is that SCE cannot access this database, and all information has to be obtained via this Contracting & Procurement department. Although only a limited amount of the current SCE LSP's are present in this database, it would give SCE better knowledge of the entire market, in case SCE would like to seek out LSP's outside of the current mix. The key aspect of importance here is availability of information; that the information is available to the SCE contract manager when needed.

13. **Intensified contact with other CoB's for contract negotiations with shared LSP's –** Some LSP's work for multiple Shell CoB's. This is the case for a few of the medium to large LSP's in SCE's current mix. For instance some LSP's also do business with Shell Bitumen or Shell Lubricants. Although on some occasions all contract managers, from each of the various

groups, combine forces, this should be made standard practice for contract negotiations. This way the total package of business presented to the LSP is bigger, and more volume means a better the price.

14. **Give room for reading existing documentation internally -** The employees, at a minimum at least within the CRC department, should be given the opportunity to read the existing documentation available to them. At the moment no resources are made available to them to do so. Through observation and questioning, it became clear that the processes for CRC employees for instance are well documented, but that nobody really has the time to read them. This lead to the problem that documentation wasn't actually used, even though it was available and the employees were aware of it. When it comes to the CBAM, CRC employees had no awareness of. This issue is related to the operational focus within the SCE supply chain, leaving reduced opportunity for employees to innovate. By giving employees the opportunity to actually read the available documentation, this operational orientation could be shifted somewhat.

15. **Improve knowledge transfer for TC's -** The TC's role within the Logistics group is based primarily on experience to be able to perform day-to-day tasks. In the current setup, this is an issue. Most employees change job functions on a 2 to 3 year basis, but for the TC's this is not the case. This is because it is difficult to replace anybody there. Also in the CBAM system the LL Group is not mapped. For instance for the Supply & CRC departments this does not apply, where most has been has been put into words. An effort should be made to transfer part of the TC's knowledge and make it explicit. The TC's indicated that when it comes to dealing with operational matters, where *solving internal problems* or *handling LSP/Customer complaints* was identified by them as taking up most time on a daily basis, they act on it based on experience as they have encountered it before. Therefore it would a valuable exercise to understand what exactly this set of problems and/or complaints is that reoccur, so at least that can be put into written form. This way the successors of the current team of TC's have some guidelines on how their jobs should be performed and maybe also prove valuable for the CRC department.

    Two of the three TC's have about 30 years of combined logistics knowledge and it would be a pity if all this knowledge would be lost when they would leave the organization. Applying the 80/20 rule, 20 per cent of the operational situations that can occur, amount to 80 per cent of the total amount of time spent on operational situations by the TC's. Therefore CRC personnel could solve this majority of regularly reoccurring situations, when a guide to solve them has been made. The minority of more unique, customized issues would still remain in the hands of the experienced TC staff.

16. **Improve hand-over process of jobs internally -** Next to this, although a lot has been documented in the CBAM system, it would be advised to look at the hand-over process. Some LSP's indicated that when there a new employee coming in, they take a completely different course than their predecessors. It could be due to the fact that knowledge of why a

predecessor arranged the procedures in a certain manner, are not transferred to the successor. The example given by one LSP was about how LSP's are paid. They stated that the first SCE employee required to have one price for deliveries, then his or her successor wanted freight separated from extra costs, then another successor a sump sum again, etc. If decision would be more traceable, especially also within the hand-over process, SCE employees would not have to start from scratch and able to make better decisions.

What is being utilized in other companies is what is called a "*buddy system*". This means that the leaving employee spends about two weeks with the new employee. This way some of the knowledge can be retained within the various departments. Observations at SCE indicate that currently the former employee is long gone before the successor comes in.

17. **Implement LSP satisfaction surveys -** Prof. Dr. Wynstra suggested that next to having customer satisfaction surveys, also implement anonymous LSP satisfaction surveys. This can be done via a third party to operate between SCE and the LSP's. It became clear from interviews with LSP's that some issues were only shared since we ensured anonymity and also because we were seen as an independent party. Therefore this would be a good way of getting additional feedback from LSP's that might not be shared during operational reviews and such. It is absolutely critical that the survey does not contain any LSP specific questions, which could breach the anonymity. From the LSP interviews it was seen that LSP's felt very hesitant to share the issues, since SCE was an important customer.

18. **Involving all expertise in contract negotiations -** Identified in the conceptual model, the most important management component is communication. In relation to this, in order to set proper expectations for both SCE and the LSP, before getting into a contract, it is recommended to involve both logistics and supply knowledge in contract negotiations. This would mean that for contract negotiations within SCE, next to the contract manager, someone from the supply department and logistics department would be present. The employee from the logistics department has knowledge on how transport is operational arranged, while the person from supply has knowledge on the various loading sites/plants. This would help create a better understanding into what both the contract manager of SCE, as well as the LSP, is getting into when the business is eventually granted. This would prevent any issues (i.e. hold-ups) arising at start-up between SCE and the LSP in question, since the LSP understands SCE's position and problems.

    Next to this, it builds up credibility and trust if SCE is being straight on difficulties that can occur when business with this LSP is initiated. From the LSP interviews it became clear that they have a very good sense of pinpointing the weak spots in the internal supply chain. Since the LSP's will become familiar with these issues anyway when business has been executed over a certain amount of time, it would be beneficial for building a relationship to state them upfront.

19. **Change date for setting product prices -** There is a peak in customer orders at the end of the month, since on at the start of each month the prices for the products are set. Because setting prices is a strenuous and time-consuming task, it would be impossible to set more dates per month to set prices. Therefore it is advised to experiment to change the date of setting the prices, from the end of the month to a different date (e.g. halfway through the month), depending on the product. That way the orders would be more spread over the month reducing the loading gantry capacity issues. The idea is that this reduces demand fluctuations to a certain extent and therefore firefighting, which results from prioritizing LSP trucks when they enter loading site.

    It could be imagined that the employees involved with setting the prices would then on a daily basis be working on setting product prices. Therefore the second-best would be to set the prices once every two weeks. This would already, theoretically, reduce the problem by half. Any of the two recommendations made here, would not solve the problem of SCE customers buying stock for rest of year though, based on the cheapest price.

5.4.3. Long-term horizon solutions

20. **Implement freight declined KPI for LSP's –** Add the "freight declined" KPI to the existing ones, to monitor the percentages of declined deliveries by each of the LSP's. This KPI was taken from a case study of the Hershey Company [Zsidisin et al., 2007] which they use to monitor LSP performance. This KPI is valuable because when the market would pick up, it would be valuable to see which LSP's are underperforming in this field. Based on this information, knowledge could be gathered about why some LSP's continue to provide these logistics services as usual, while others might not, when the market would become tight.

21. **Reduce freight declined by forming closer LSP relationships –** One the main problems described by SCE in the ISEA project proposal is that there is supply uncertainty from the side of the LSP's due to considerable manpower fluctuations. This problem is partly caused by the fact that market capacity for logistics services is endless. Next to the outcome of the portfolio method by Kraljic, SCE should also look at those LSP's where manpower fluctuations are most severe and consider building closer relationships with those LSP's as well.

    In a case study at the Hershey Company, they compared the "*on-time delivery*" and "*freight declined*" KPI's with the type of relation they had with the LSP (either being arm's length, contractual, or partnership). The authors define a partnership as involving integrated processes with the LSP, as well as focus on long-term, mutual benefits for both firms. They looked at three years of performance data and found that on-time delivery was not affected by relational closeness [Zsidisin et al., 2007]. This is interesting to note, since SCE should therefore not build relations to improve on-time delivery. But when it comes to freight declined, when in the case study the market experienced constrained transportation capacity: "*the arms'-length carriers responded to market pressures by acting opportunistically, whereas partnership and contractual carriers remained relatively stable in*

their willingness to commit assets to Hershey" [Zsidisin et al., 2007: p.15]. Therefore the results indicate that relational closeness pays off when the market becomes tight. This is also corroborated by Douglas' (2006) findings. Therefore, for SCE to prevent situations reminiscent of that of a year ago, before the economic decline, they should consider building closer relations.

22. **Extending Track & Trace capabilities –** To improve further integration between SCE and the various LSP's, it was identified in the conceptual mode, that integration of processes is the second most important management component in effective supply chains and/or customer/supplier relationships. In respect to that, SCE should look for ways to extend the track & trace capabilities beyond just RTC's.

    SCE hires an RTC's fleet, which is managed by a 4PL provider. At the moment a project is in place to equip all these RTC's with track an trace capabilities, so that real-time visibility is provided into where the fleet is located and how long each step in the transport from point A to B takes. Together with some developed LSP's, it would be good to extend that to also include road transportation for SCE orders. This way, SCE gets more visibility into transportation process. It shows where the LSP trucks are located and this allows SCE to report to SCE's customers directly on where their transport is located. Currently, since all customer contact is arranged via the CRC department, SCE has to always go via the LSP's logistics department to obtain this information. This provides improvement opportunities and a better overview of the entire supply chain. The LSP could be compensated for this facilitation by providing better rates for those trucks that can be tracked.

23. **More responsibility to medium and large LSP's -** Should SCE decide to keep some smaller LSP's (100 million or less revenue), SCE can continue to treat them the same way they are done today. Since the small LSP's will follow with SCE's demands. Also based on the past historical LSP performance data, they are the best performers. They smaller LSP's don't have much issues with the control put upon them by SCE, so from that side there are not so much difficulties.

    For the medium to big LSP's on the other hand, they have to be treated in a different way, because they are not just shippers, but logistics solution providers. Very selectively SCE should grant more responsibility to some of the best-in-class LSP's in order for them to come up with more creative solutions. Building a relationship is the starting point behind giving more responsibility. Based on the selection of those LSP's that were revealed as strategic partners (see the Kraljic portfolio method in paragraph 4.8), start building a relationship, keeping the Willcocks & Feeney (2008) core capabilities model in mind (see paragraph 4.6.3). Once relationships are built with these strategic partners, trust will start to play a role. Part of this trust naturally links to granting more responsibility to the LSP's.

24. **Document responsibilities and linkages in processes with respect to LL Group internally –** The sales and CRC departments should have at least some basic knowledge of logistics

processes in order to prevent internal issues when new customers are attracted (for sales) or when an issue arises with an LSP (for CRC). Since there is a gap in the CBAM system with regard to the documentation of the LL Group, this knowledge should be made explicit. Recommendation 14, on giving more room for existing documentation, should also be put into effect for this recommendation to have any effect.

Sales should understand the impact of attracting a new customer for the logistics operation. It should be clear that the supply is not limitless and that for instance for new routes and RTC's it requires a certain period before the customers can be supplied. Sales should be aware of this, especially for RTC's.

Next to this the focus should be more process orientated and not so much towards the departmental separation as is now the case. Handfield and Nicols (1998), identify *the persistence of rigid departmental-based organizational structures* as one of the four obstacles that keeps most companies from being able to compete with best-in-class. If every employee would understand which parts of which processes they represent and are responsible for, awareness would be improved. Understanding what link an employee is in the chain, and what the effect of their actions are to other links in the chain would, make employees more aware of the impact of their actions.

25. **Communicate and document responsibilities in processes between LL Group and LSP's –** One the important supply chain and/or customer/supplier characteristics was that of setting up shared responsibilities and clear roles. From one of the steering committee meetings, it became clear that responsibilities of the LSP officially depend on their maturity (see Appendix C). Therefore when it comes to responsibilities, SCE upholds a customized approach. The question is whether or not these responsibilities, partially shaped by role assignment, is currently properly communicated or documented. From the LSP interviews, of varying maturity, there did not seem to be much difference in the approach SCE took in managing the LSP's.

    Therefore it is advised for SCE to find out in what ways this has been communicated or documented, that different LSP's have a different distribution of responsibilities, and how this manifests itself in the current mix of LSP's. Currently it seems that every LSP passes most responsibilities on to SCE, since they feel that SCE wants to control all aspects of the operation anyway (see Appendix C).

26. **Prevent subcontracting -** Sub-contracting results in a lot of issues, since LSP's are unable to keep the same amount of control on their operation when it concerns sub-contracting. Since it requires a lot of resources from SCE's side to constantly check which SCE approved subcontractors LSP's use, a dialogue should be engaged with the LSP's, to understand what they need (e.g. business wise) to only supply SCE customers with their own equipment. Some LSP's use a rating system, from A-F customers, and when SCE could become an LSP's A-customer, no subcontracting is used. This would reduce issues to a certain extent, improve

the overall safety of the transport operation and should be taken into account for the Lion project. Langley et al. (2008) state that when a shipper is one of the LSP's A customers, it possesses market power with the LSP. Langley et al. define an A customer as being part of the 20% of the LSP's customers who provide 80% of the LSP's sales revenue.

27. **Understanding LSP pro-activeness/control trade-off -** Based on the service quality analysis by Dr. Aziz (see Aziz and Jager, 2009a: p.10), it came forward that when it comes to LSP's being "*able to satisfactorily handle order discrepancies like incomplete, ambiguous or conflicting orders*", the expectation from the LL Group management is very low (2 out of 7). While on the other hand LL Group management would like LSP's to deal with all issues that occur in transport, and not having them bounce back to SCE. Therefore there seems to be a contradiction here. Therefore it is recommended to make a choice between the desired level of control over the LSP's, and the desired level of pro-activeness, since there is a trade-off there. Prof. Dr. Wynstra suggested for SCE to check if current strategy is in line with what SCE is actually doing. If this is the case, this has certain consequences. Each strategy has advantages and disadvantages. It will be hard to deal with this. Next to this, one of the LSP's stated that it is normal for SCE to deal with firefighting, since they want to keep much control (see Appendix C).

    Some of the most common benefits of outsourcing logistics are cost reductions (57% of respondents), and increased flexibility (56% of respondents), according to LSP customers. It could be questioned whether or not this increase in flexibility is actually achieved at SCE, due to SCE's extensive built-in involvement with the day-to-day LSP operations.

    Finally, also with respect to the findings from this research, that the LL Group and the CRC department practically function as a 4PL, it becomes clear that SCE is keeping all control. Bade and Mueller (1999: p. 80) state that a 4PL maintains: "*accountability, responsibility and quality within the arrangement*". This is clearly evident in the LL Group's current setup.

28. **Setting up internal KPI's -** If chosen carefully, setting up internal performance measures will help improve understanding and cooperation between departments. Based on the Aberdeen Group, 74% of the top performing organizations has KPI's set up to measure internal performance. This is aside from the fact that 85% of the best-in-class organizations have LSP performance measures in place [Aberdeen Group, 2008a]. The Aberdeen Group (2009: p.21) states that Best-in-class organizations: "*have done an exceptional job of setting up performance measurements with their carriers and internally to ensure that key business goals are followed and lead to driving down transportation spend*". Some examples of internal measures that best-in-class organizations have in place (with respect to LSP's) are: Payment time (86%), Volume commitments (71%), Invoice accuracy (48%), Data quality (43%) and Driver wait times (29%).

    It is important to understand internal compliance because, according to the Aberdeen Group (2009: p.22): "*guidelines are in place for a reason and ensuring that resources are using data*

to their advantage and making better decisions is important to controlling costs". They also ask them selves a set of questions with regard to the data that has been gathered:

a. Is the data of such a degree of quality that we can make decisions based on that?

b. Are we using the data we have to drive down spend or in any other ways for improvement?

Since, loading issues exist on the SCE plants (D-terrain Pernis and to a lesser extent Moerdijk), it would be valuable to track data in the suggested *driver wait times* measure. Since SCE is committed in doing a project to improve these loading related issues, the data gathered from this metric could be used to assess the changes that were made to the processes and procedures. At the moment, LSP's are already compensated when they have to wait on an SCE loading site for more than an *x* amount of hours. This could be seen as the first elements of having internal KPI's in place, and represents a first step in the right direction.

For the other internal performance measure mentioned, the data quality measure, it is recommended to implement it. In order to create commitment for continuous improvement, SCE should be held accountable whenever an LSP has to call or otherwise change data in Elemica orders, because the data provided is outdated/incorrect and/or incomplete. This way insight is provided into what the actual quality of the SAP master data is how severe the problem actually is. Since the LSP's will be compensated for reporting master data deficiencies, they will be triggered to do so. From LSP interviews it was gathered that LSP's are hesitant to report data quality issues, since they currently just deal with it, and don't want to lose any business by pointing out issues at SCE. But since SCE committed to reduce the risks involved with poor SAP master data quality (see recommendation 1), a continuous improvement effort is needed. This performance measure, combined with the proper incentive, would be perfect to determine data quality.

29. **Creating accountability at plant loading sites for improvement –**

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5.5. Summary

This chapter sought to answer the practical problem of: "*Which solutions can be defined for SCE to deal with the issues by drawing up a step-by-step plan to improve the current situation?*" This chapter presents a total of twenty-nine solution scenarios, which were described in detail. These have been split up into short-term, mid-term and long-term horizon solutions. SCE can start to implement the solutions by following the steps described for each of them. These solution scenarios are aimed at improving the current situation of which the SCE supply chain finds itself in. Overlooking what has been covered in this solution design chapter, we feel that this research question is answered.

CHAPTER VI - Conclusion

The conclusion chapter builds on all previous chapters, but especially on the analysis and results chapter, to come to an answer to the problem statement defined in the beginning of this thesis. Next to this, also a reflection on the quality of the research is discussed here (validation).

6.1. Introduction

This chapter presents the main findings from this nine-month investigation into the SCE supply chain. The first paragraph sums up the main conclusions by providing an answer to the problem statement. The second paragraph maps the main conclusions to the eight SCE questions. This is done to establish which of these questions can be answered by looking at the findings from this thesis, as a component of the ISEA project. The third paragraph evaluates the work performed for this thesis. This is important, since it helps the reader establish the weak and strong points of the investigation and also its findings [Berndtsson et al., 2008]. Finally, the last paragraph covers any future research based on what found here.

6.2. Answering the problem statement (Main Results)

This thesis set out to answer the following problem statement: "*How can the SCE Land Logistics supply chain, specifically with respect to the customer/supplier relationships between SCE and the Logistic Service Providers, be improved?*" The main theme here is for SCE to minimize firefighting to achieve a more "*relaxed*" and "*sustainable*" supply chain. In order to come up with the definitive answer to this problem statement, the main conclusions have been split into more operationally focused conclusions, and the more strategically focused conclusions. This does not imply a difference in time horizon in this case, but in abstraction level.

6.2.1. Main conclusions on a strategic level

This section of answering the problem statement focuses on more general, abstract findings, which should be taken into account by SCE on a more long-term basis.

6.2.1.1. Function of customer/supplier relationships in dealing with the SCE supply chain issues

In order for the LSP's to jointly think about improvements with SCE and to act pro-active, there needs to be a reason to do so. Therefore it's inherent that in order to ascertain these goals, a relationship needs to exist that goes beyond arm's length. This is because otherwise there is no added value for the LSP's to invest time and effort in helping SCE out. This is drenched in almost every best practice from industry and literature. Also in dealing with the main issues identified in the SCE supply chain, best practices suggest establishing closer relationships.

Currently the LSP's in SCE's portfolio are between *reactive* and *calculative*, and this will not change, if the current relationships do not evolve beyond arm's length. Therefore it is evident that SCE should take the initiative to turn this around and start with selecting one of the best-in-class LSP's in the portfolio (which is strategic to SCE) and selectively applying the best practices described in this thesis to build a strategic, long-term oriented customer/supplier relationship (also see main conclusion 6.2.1.3.).

Referring back to the main issues identified in the SCE supply chain (including the relationships with the LSP's), they can be brought back to the following themes (i.e. characteristics): a lack of expertise/learning orientation, lack of customer/supply chain orientation, lack of/inability of information sharing, lack of shared investments, lack of shared responsibilities and a lack of clear

roles and responsibilities. To deal with these six important supply chain and/or customer/supplier relationship characteristics, a total of sixteen best practices were found that specifically deal with them (refer to paragraph 4.8.6.3 for an overview). The most striking best practices for dealing with these identified issues are that of (1) implementing performance measure across the supply chain, not just externally, (2) joint development of (electronic) communication means, (3) creation of financial interdependence in assets, personnel and R&D, (4) establishing shared responsibilities and (5) assigning clear (power) roles.

6.2.1.2. LSP Size, Control and Pro-activeness

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The important thing to understand about pro-activeness is that because of SCE's total control on the logistics operations (due to its role as a 4PL), there is no equal sharing of responsibilities between the LSP and SCE. This leads to low commitment in the arrangement, as these bigger LSP's are also not dependent on the business that SCE provides them (as *image enhancements* and *learning opportunities* are the main drivers to partner with SCE). Therefore the first step in nurturing pro-activeness is to have shared responsibilities; implying that SCE has to hand over part of its control over to the bigger LSP's. This means that LSP's should have the ability and be encouraged to make changes without requiring approval from the other partners [Lambert et al., 1996]. By giving these bigger LSP's more responsibilities, commitment will be built [Lambert et al., 1996]. If the relationships remain to be primarily arm's length, it is unlikely that SCE will be able to reap the benefits of a more efficiently performing supply chain. This can be compared to raising children according to Prof. Dr. Wynstra (see Appendix E). There comes a point where you have to let go of their hand, and let them fend for themselves. Otherwise the children can never grow into self-reliant, mature adults.

6.2.1.3. Operational focus within the LL Group

Willcocks and Feeney (2006) state that an organization in any outsourcing arrangement should have a team of highly capable, and strategically focussed employees to manage it. This group of people is referred to as the "*retained organization*". This is a flexible group of people that focuses on competencies rather than tasks. In their model, the authors offer an insight into what core capabilities (i.e. roles) should be present in this retained organization to achieve strategic agility, service excellence and cost-efficiency [Willcocks and Feeney, 2006]. In this case, the retained organization is the LL Group, as they are the people involved in managing the LSP (outsourcing) relationships.

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It has to be noted though that in order for the retained organization to be pulled off successfully, the LSP's also have to display various capabilities, as there are also twelve core capabilities defined for the supplier (which are outside the scope of this thesis). This also means that this strategic focus can

therefore never be achieved with smaller-sized LSP's, as they display a lack of strategically focused experts or resources to *attract*, *develop*, and *retain* these experts [Willcocks and Feeney, 2006].

6.2.1.4. Achieving cost savings through customized LSP strategies

From the application of the purchasing portfolio by Krajic and the partnership model by Lambert et al., and through an extensive literature review we have established a great deal of support for the proposition that management of LSP's should be customized depending on the value that the LSP presents to SCE, and visa versa. This implies that one needs to discriminate within the LSP portfolio in order to achieve more efficiency. The most valuable of these exercises was that by Kraljic, which allows a classification of LSP's into four distinct quadrants (strategic-, bottleneck-, routine- and leverage suppliers), based on *supply risk* and *financial volume*. For each of these quadrants, strategies are defined that are most suitable for each of the individual LSP's.

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As can be seen, the customized approach to LSP management is operationalized by the different strategies that Kraljic provides. Most of the contract manager's efforts should lie in the leverage and strategic quadrants [Van Weele, 2005].

6.2.1.5. The human factor

It is very important not to lose sight of the human factor in any supply chain; therefore this also applies to the SCE supply chain. Not everything can be captured in a mathematical model, or in a well thought out plan. By getting too much caught up in management tools like the ones mentioned in this thesis, the essence of a relationship can be lost. This applies to both the internal and external supply chain. Therefore always exercise caution in wanting to capture everything in either a number or a graph.

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From literature, it became clear that having a customer perspective helps to streamline goals and objectives throughout the supply chain [Bowerbox et al., 2000]. Without this overriding priority, an effective supply chain cannot be achieved [Handfield and Nicols, 1998], resulting in sub-optimalizations in the chain. Although electronic means for customers to order from SCE (e.g. Customer Lounge) provides efficiency gains, it can never replace the depth, richness and conveyed commitment of a face-to-face meeting.

6.2.2. Main conclusions on a operational level

This section of answering the problem statement focuses on more specific findings (i.e. solution scenarios), which should be taken into account by SCE on a more short-term basis and can be applied for the Lion project.

By looking at the strategic conclusions from the last paragraph, it has become apparent that not only changes need to be made to the external set of LSP's in SCE's portfolio, but that also internal

changes are needed. This is no different for the operational conclusions discussed here that are also applicable to SCE's Lion project, a project to radically re-distribute SCE's business among the LSP's. This second part in answering the problem statement will focus on the solution scenarios, as described in the solutions chapter of this thesis and describe practical ways of improving the customer/supplier relationships and/or SCE supply chain.

The solution scenarios are divided based on short-term horizon solutions, medium-term horizon solutions and finally long-term horizon solutions. The short-term horizon solutions (seven in total) can be implemented within a couple of months. For the medium-term horizon a total of twelve solutions have been defined. These solutions can be implemented within six to twelve months after initiation. Finally for the long-term horizon a total of ten solutions are defined. These solutions can realistically be implemented within one to three years. Therefore in total there are twenty-nine solutions scenarios that SCE can start working on. Now we will categorize these solution scenarios based on what type of solution it is, to get a general idea of the solution directions.

Of the twenty-nine solution scenarios, twelve of them cover process or communication improvements in the internal supply chain (see Table 6.1). Next to this, nine solution scenarios discuss process or communication improvements in the customer/supplier relationships between SCE and the LSP's (see Table 6.2). Four solutions cover portfolio management improvements for SCE (see Table 6.3). Finally, three solutions cover performance measurement improvements (see Table 6.4).

Solution Scenario	Short-term horizon solution (X)
Share overview of SCE supply chain and its issues internally	X
Employment of internally focussed Logistics Planner within the LL Group	X
Document and improve Excel tools used within the supply chain	-
Provide SCE employees with SAP courses	-
Arranging SCE access to the Contracting & Procurement database	-
Intensified contact with other CoB's for contract negotiations with shared LSP's	-
Give room for reading existing documentation internally	-
Improve knowledge transfer for TC's	-
Improve hand-over process of jobs internally	-
Change date for setting product prices	-
Document responsibilities and linkages in processes with respect to LL Group internally	-
Creating accountability at plant loading sites for improvement	-

Table 6.1 - Process/communication improvement scenarios at SCE

Solution Scenario	Short-term horizon solution
Correct SAP master data	**X**
Continuous focus on customer satisfaction	**X**
Continued LSP Communication and information exchange	**X**
More flexibility with "right first time" targets	**X**
Implement LSP satisfaction surveys	-
Reduce freight declined by forming closer LSP relationships	-
Extending Track & Trace capabilities	-
More responsibility to medium and large LSP's	-
Communicate and document responsibilities in processes between LL Group and LSP's	-
Understanding LSP pro-activeness/control trade-off	-

Table 6.2 - Process/communication improvements scenarios in customer/supplier relationships

Solution Scenario	Short-term horizon solution
Understanding hand-over process externally in changing an LSP	**X**
Improving LSP Incentive Scheme	-
Involving all expertise in contract negotiations	-
Prevent subcontracting	-

Table 6.3 - Portfolio management improvement scenarios

Solution Scenario	Short-term horizon solution
Update LSP KPI scheme	-
Implement freight declined KPI for LSP's	-
Setting up internal KPI's	-

Table 6.4 - Performance measurement improvement scenarios

The solutions chapter, details how these scenarios are actually realized. The third column in the table shows the page number in the solutions chapter to find more details on the suggested solution

scenario. Next to this, the last column in these tables show which of them is a short-term horizon solution. These are the solution scenarios to be looked at specifically in relation to the Lion project, as these can be executed within a short time span, yet provide valuable short-term improvements.

These, short-term, directly to project Lion related solution scenarios, mostly concern *streamlining* information exchange and *improving* general communication between SCE and its LSP's. These solution scenarios are that of (1) updating/correcting SAP master data for transport orders, (2) making SCE employees aware of the issues in the SCE supply chain, (3) understanding the need for continuous customer focus, (4) more flexibility for LSP's in relation to the "*right-first-time*" targets, (5) understanding the handover process and the possible risks involved in replacing LSP's, and (6) employment of an internally, and strategically, focussed logistics planner within the LL Group.

6.3. Answering the eight SCE questions

This paragraph maps the main findings from this thesis to the eight main deliverables of the ISEA project, as defined by SCE (see Appendix H). This way it can be established what gaps are closed through the investigation in this thesis, and what still remains unanswered. It has to be stated that this thesis is only part of the ISEA project, focusing on customer/supplier relationships; therefore it cannot answer all eight SCE questions fully. Next to this thesis, Dr. Aziz will also make an extensive contribution; these findings will be combined and presented to SCE in a separate report.

Let us go through each of the eight SCE questions, as defined in the original project proposal (see Appendix H), and establish to what extent these can be answered using the results from this thesis.

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6.4. Evaluating the process

This section evaluates the process performed in this research. Berndtsson et al. (2008) identify that this section is important because it helps the audience establish the strong and weak points of the research. This is valuable in determining to what extent the results can be trusted and their usefulness. Pointing out strong points, weaknesses and mistakes that have become apparent, as described in Berndtsson et al. (2008), and their effects on the subsequent steps in the process, will be part of this. Next to this, this section also covers several limitations to the research, and finally also future research possibilities are discussed.

6.4.1. Validity

With respect to validity, it is important that the research and the outcomes need to be valid for them to be of use, as also described in the introduction of this evaluation section. Yin (1994) identifies four different types of validity. For this thesis, each of them will be discussed briefly as to address these major validity components.

6.4.1.1. Construct validity

With respect to construct validity, Yin (2003) identifies that this has to do with the way the data on the research object (in this case a group of firms in the SCE Land Logistics supply chain) was gathered. From Yin's point of view, it is very important to establish a chain of evidence, so one can

trace how information was gathered and to see if there is a way in which the research can be repeated.

When looking at this chain of evidence, where possible, multiple sources of evidence and theory were used to establish both data and theory triangulation. To give some examples, first of all with respect to identifying the main issues with in the SCE supply chain, only those issues identified across case were taken into account (from internal and external interviews). Also for constructing the conceptual model, only those characteristics important to customer/supplier relationships and/or supply chains, found in at least three different occasions were put in the model.

Next to the chain of evidence, also all of the interviews performed for this project, were reviewed by the persons in question, assuring that the evidence gathered reflects their views.

Some of the things that reduce the traceability in this research somewhat is the delicate nature of the subject of this investigation both internally and externally. Therefore the interviewees had to be anonymized. But since the author is in possession of the original interview summaries, the chain of evidence could be reconstructed.

6.4.1.2. Internal validity

Wieringa (2008) states that the internal validity should address the question of whether or not the research really answers the research questions about the unit of analysis (the members of the SCE Land Logistics supply chain). To ensure that this is actually the case, at the end of each chapter, the summary draws from the original research questions that it was meant to answer and establishes to what extent this is actually the case. As it was described in these summaries, the literature review chapter answers these knowledge problems to a very satisfactory level. As for the analysis and results chapter, the problem identification part is very strong and draws from many different sources of evidence. These could also all be mapped to phenomena from theory. The validity of the results coming from the partnership model by Lambert et al. (1996) remains a weak point in this thesis. Therefore with respect to customer/supplier relationships, Kraljic's method provides more reliable results. This does not take away the fact that the relevant practical problem related research questions are answered. Finally with respect to this last conclusion chapter, the combined knowledge from answering the separate research questions provides the foundations to answer the problem statement beyond a reasonable degree of uncertainty.

6.4.1.3. External validity

Next to the internal validity, the external validity is another quality aspect. According to Yin (2003), the external validity is concerned with establishing the domain to which the thesis' findings can be generalized. The findings of this thesis can be split into two components. The first is the conceptual model based on literature, the second is the solution scenarios defined together with the main conclusions.

As from literature it has been found to be difficult to find literature specifically on the chemical industry, most was actually drawn from general relationship and/or supply chain literature. Therefore we feel that the conceptual model could also be used outside the chemical industry, and be used in transport and logistics industry in general to identify supply chain performance improvements.

The second component, is that of the solutions scenarios identified together with the main conclusions. These can be combined, as both are unmistakably intertwined. With respect to the solution scenarios, most are very specific and focussed towards dealing with the issues identified in the SCE supply chain. This does not take away the fact that they were also drawn from literature and best practices. Therefore those solution scenarios based on customer/supplier and/or supply chain literature or best practices, should be seen to be applicable outside of the SCE supply chain as well. For the main conclusions, they represent main findings from the analysis of the SCE supply chain in specific. But it has to be said that the conclusions presented here should also be valid outside of SCE. The conclusions mainly revolve around the importance of having shared responsibilities and its impact on control, the importance of a strategic focus, importance of customized relationship management and finally the importance of the human factor.

For TRANSUMO, it becomes clear that the conceptual model, with its 14 important customer/supplier and/or supply chain characteristics, and the main conclusions from this thesis should therefore also provide value outside of SCE. These findings can be used from the viewpoint of sustainable mobility, as improved supply chain performance, also creates a more sustainable supply chain. From this thesis it has become clear that from the relationship perspective taken in this thesis, much can be gained to improve mobility. We feel TRANSUMO can build solutions by combining these findings with those of the other projects in the TRANSUMO project.

6.4.1.4. Reliability

Reliability is the last of the four quality aspects (Yin, 2003). This quality aspect is operationalized by demonstrating that the operations of the study can be repeated with the same results. It's goal is to minimize the errors and biases in a study (Yin, 2003).

If one is completely honest, it is impossible not to be biased. Therefore in this case, in order to reduce this problem, all findings were deliberated with experts in the field and also with the parties in the SCE supply chain. With respect to the experts, Dr. Aziz and Dr. Zuidwijk were the most valuable people to provide me feedback on my findings. Next to this my company supervisor, Alberto Brito, and some of the LSP related parties were also asked to provide feedback. By getting both sides of the story, I have made an attempt in writing a balanced thesis.

Another way to increase repeatability is the use of an interview protocol to guide the various LSP interviews. This is very valuable to be used by another person, to come to the same results. Also when conducting the LSP interviews, it proved essential in assuring that all important areas of the interview were covered. One problem is that due to the limited availability to some of the LSP's,

interviews had to be held before a definitive interview protocol was defined. After each of the interviews, the insights gathered there were used to improve and add to the protocol. Therefore it will be difficult to exactly recreate the findings of some of the earlier LSP interviews. This is because the interviews were therefore somewhat different each time, lowering repeatability.

Also it has to be said, that although I would like to consider myself independent in this investigation, it was SCE that was paying me for my activities. This probably contributed to me being more biased towards SCE's viewpoints in comparison to those from the LSP's. Please take this into account when looking at this thesis' findings.

6.4.2. Limitations of Research

The most important limitation is that the conceptual model, which is the result of the literature review, did not play an important role in the various interviews conducted for this project and thesis. Normally this would be the case. The literature review did not take place quite as sequential as would be expected, but was performed rather more parallel with the gathering of the evidence. Therefore also, as was mentioned in the results and analysis chapter, some data was missing to properly execute the partnership model by Lambert et.al (1996). If the literature review would have been finished before performing the interviews, it could have been included in there.

6.4.3. Future research

Because of the many different angles at which the SCE supply chain can be analyzed, not all directions could be pursued in this thesis unfortunately. In this section some of these possible future research options are covered, which might be part of a follow-up research project to this thesis, but could also be part of a project executed within SCE itself.

First of all, as was mentioned already, there are some limitations to the execution of the partnership model in this thesis. Therefore it would be valuable to also establish the partnering potential from SCE's perspective. This is currently missing.

Secondly, the historical data analysis covered in this thesis, only looked at two distinct years of the data and was also limited to 50% of the KPI's. It would be valuable to perform an analysis of all data over all three years. Based on the findings in this thesis, it would be valuable to discriminate in the analysis between LSP performance per country. This is because it was found that performance various greatly between countries. Next to this, performance should be separated per service that the LSP provides to SCE. Also here, it was found that performance varies greatly. Once this understanding has been made, it gives SCE a better view of how supply chain performance can be optimalized.

Thirdly, to help establish more external validity, it is important to get more understanding into which aspects of the chemical industry are similar and what aspects are dissimilar when comparing it to other industries. SCE feels that the chemical transport industry cannot be compared to other transport industries, since in this business so many family owned companies exist for instance. Also with respect to the aspect of safety, is the chemical industry the only industry with stringent safety

concerns? If parallels could be drawn with other (transport) industries, more best practices and such could be identified to further supply chain performance.

Fourthly, it would be of great value if there would be a way to get retained logistics department expertise of various companies (next to SCE) together to discuss how all of these establish supply chain performance. As external validity was established to some extent, possibly many valuable best practices and concepts could arise in these kind of meetings. Currently SCE and the Erasmus University are already in the process of setting up so-called “round-table” meetings, to achieve exactly these kinds of insights.

Next to this, in establishing the diagnosis in the problem bundle (see Appendix R), there are still some issues that need further investigation. Our insight is that one could delve deeper into each of these issues to come to the root causes. Unfortunately due to time constraints there was no possibility to investigate these issues any further. The most important ones of these are (shown in red in Appendix R):

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For each of these issues, one could ask the question "*why?*" (Wieringa, 2008) to the right people to better understand the causes of these problems.

Finally, and most importantly, when defining the conceptual model, it was found in literature that some of the customer/supplier relationship and/or supply chain characteristics are related. Currently the 14 characteristics that make up part of the conceptual model are just seen as separate components to improve supply chain performance. To give an example, Swaminathan (1998) stated that the choice of appropriate control elements is the objective of problems related to supply chain contracts and supply chain coordination. This would imply that the control mechanisms characteristic is a means of the coordination characteristic: the one leading to the other. Next to this Halldorsson (2007) states that in long-term relationships trust may serve as a coordination mechanism next to a formal contract. Therefore coordination mechanisms and contractual mechanisms influence the trust characteristic. Also, as was already mentioned in the literature review chapter, there is a very close relation between the shared responsibilities characteristic and the shared investment/commitment characteristic. It seems that by having shared responsibilities, shared commitment is established, and therefore also shared investments.

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APPENDICES

This chapter contains the appendices for this thesis. These appendices are meant as a source of additional information to the reader that provides a more detailed explanation of various aspects that could not be placed in the main text.

APPENDIX A – Analysis of the SCE deliverables

Below a simplified version of the eight SCE deliverables are given. Behind each of the (sub) questions, it is stated what the subject of the deliverable is.

3. Is SCE effectively making use of the right mix of LSP's? (All aspects of LSP mix)
4. Should SCE move more business to smaller sized LSP's? (LSP Size)
5. What would be the ideal size of SCE "spent" as part of an LSP's revenue stream, such that SCE has **enough leverage** over an LSP? (Relational power balance)
6. -
    j. What can be concluded about the **current mixture of size** of LSP's **against** the SCE **HSSE requirements**? (LSP Size & HSSE perf.)
    k. What can be concluded about the **current mixture of size** of LSP's **against** the SCE **performance requirements**? (LSP Size & Operational perf.)
7. -
    l. **Based on analysis done** what should be the ideal mixture of LSP's used for SCE given the SCE requirements? (HSSE/ Operational perf. Aspects of LSP mix)
    m. **Based on** other industries **best practices** what should be the ideal mixture of LSP's used for SCE given the SCE requirements? (HSSE/ Operational perf. Best practices aspects of LSP mix)
8. -
    n. **Which** LSP's **are causing more work** to SCE relative to other LSP's? (LSP performance)
    o. **Why** are these LSP's **causing more work** to SCE relative to other LSP's? (Understanding LSP performance)
9. Given the causes of these inefficiencies what can SCE do to **improve this situation** by:
    p. Changing LSP base (LSP mix inefficiencies)
    q. Changing internal Supply and Logistics processes (Internal process inefficiencies)
    r. Improving IT solutions (IT relationship inefficiencies)
10. What would be the value improvement in USD? (To be situation cost savings)

From these simplified SCE deliverables, we can put the subjects of the questions together to get the following categorization:

- *Portfolio management*
    - LSP size
    - LSP size & HSSE perf.
    - LSP size & Operational perf.
    - HSSE/ Operational perf. Aspects of LSP mix
    - LSP cost of ownership (performance)
    - LSP cost of ownership underlying reasons (performance why?)
    - LSP mix inefficiencies
- *Relational properties*
    - Relational power balance
    - IT relationship inefficiencies
    - (Internal) process inefficiencies
- *Best practices*
    - Best practices for HSSE/ Operational perf. Aspects of LSP mix

This can be condensed into the following list of SCE deliverable categories:

- 1. Portfolio management (creating right mix of LSP's based on size, HSSE perf., operational perf., total cost of ownership)
- 2. Relationship management (looking power characteristics, processes, IT)
- 3. Best practices (getting good SCE performance characteristics)

APPENDIX B – Interview Protocol

The first step in Wengraf's (2001) process is to identify the set of questions that you plan to ask your informants. Wengraf (2001) distinguishes Theory-based questions and Interview questions. Theory-based questions are very general and often too abstract for the interviewee to answer properly. Therefore interview questions are created. A series of these interview questions answer one theory-based question. The theory-based questions are based on the main research question. Let's recap: "*How can the SCE Land Logistics supply chain, specifically with respect to the customer/supplier relationships between SCE and the Logistic Service Providers, be improved?*" The second step is to rearrange the solicited questions so that they engage the interviewee and flow cleanly. This will be combined with the first step in order to result in the final interview questions.

The following abstract Theory-based questions have been defined:

1. What defines your relationship (on company and personal level) with SCE (e.g. general attributes)?
2. What does your supply chain (set of integrated processes) look like?
3. What issues surface in your collaboration with Shell Chemicals?

The Theory-based questions resulted in the following sets of operationalized interview questions:

1. When did you first hear of the ISEA project? How were you approached?
2. Could you describe your function within the company and how long you have personally had experience with Shell Chemicals?
3. Could you briefly describe the relationship that exists between your company and Shell Chemicals?
4. What is the history of the relation that your company has with Shell Chemicals?
    a. How many years has your company been doing business with Shell Chemicals?
    b. How has this relationship evolved over the years? And what aspects of the relationship have changed over these years (IT, contracts, management, processes and performance)?
5. How important is the collaboration that you have with Shell Chemicals for your company?
6. Could you identify and describe the different actors (departments, persons and systems) that you deal with in your cooperation with Shell Chemicals?

7. Could you identify and describe the different actors (departments, persons and systems) that within your company that cooperate with Shell Chemicals?
8. What kinds of processes take place between your company and Shell Chemicals? Is there a distinction between a regular order and an emergency order for instance?
9. Could you describe the entire process that is triggered when the Shell Chemicals Planning department notifies your company of an order that has to be delivered?
10. What kind of relationship exists between your company and the Shell Chemical customers you deliver to? Do you always mitigate issues to Shell, or do you also provide extra services to them?
11. When there is a complaint from a customer, what is the process in order to solve it? What is the role of Shell Chemicals and your company in this?
12. Does your company have relationships with other companies that also perform activities related to Shell Chemicals? How much (as a percentage) subcontracting makes up the entire relationship with Shell Chemicals?
13. Could you identify what aspects of the process you find positive and what aspects you find less positive? What parts of the process provide added value?
14. Do you ever encounter any problems or things that frustrate the process with Shell Chemicals?
    a. If so, could you specify what type of problems occur in the process?
        i. Incomplete shipments?
        ii. Late deliveries?
        iii. Manpower fluctuations?
            1. How does planning deal with that?
        iv. LSP sub-contracting
        v. Capacity at loading gantry?
        vi. Dedicated transport truck shortage (dangerous goods)?
        vii. Incorrect info on order?
            1. Is Elemica working properly for special orders?
    b. If so, could you give examples of problems that occur in the process?

c. If so, could you think of solutions to these problems?

15. Could you give an indication as to how satisfied you are with the way this collaboration process is currently being performed on a scale from poor to excellent?

16. Could you describe the different types of IT that your company uses in your collaboration with Shell Chemicals (telephone, email, web application, EDI, XML, etc.)?

17. In what way does Shell Chemicals communicate the planning to your company (telephone, EDI, etc.)? How does Shell Chemicals communicate with your company to create the planning? Is there any mutual consent as to how the planning is made?

18. Are you content with the current information exchange, or can communication be improved?

19. Do you think the role of IT sufficiently covered in the current relationship with Shell Chemicals or is there too much IT in this relationship? How much (expressed in percentages) are your processes with Shell Chemicals based on IT and how much is performed manually?

20. Could you indicate (in percentages) how much of your revenues come from Shell Chemicals?

21. Could you give an indication as to how you feel about the overall collaboration with Shell Chemicals on a scale from poor to excellent?

22. You also work with other customers, how do they compare to SCE? Do you also have other ones that have IT systems? Are there some who perform better, and do you know what characteristics those have?

23. Is there any advice you could give to Shell Chemicals in order to improve the relationships that Shell Chemicals engages with its LSP's? Do you see any improvement possibilities?

24. Is there anything else that would be helpful to know, that has not yet been covered in this interview that should be addressed?

It can be concluded from the interview protocol displayed above, that it starts off with easy and general questions addressed to the LSP employee. The protocol ends with more difficult, less easy to answer, and sensitive questions. Especially the questions on finances and the rating of the overall collaboration are imagined to be very sensitive for the LSP. It has been designed as such to cover all the questions relevant for the analysis part of this project. Next to this the focus on IT and processes is clearly seen and corroborates the supply chain focus of this thesis.

An academic scholar and the Land Logistics manager of the SCE LL Group have validated the interview protocol to ensure relevance and completeness.

APPENDIX C – Supply Chain Interviews

Background

Over the period from the 21st of January of 2009 till the 25th of March, a total of 9 formal interviews were held with various employees of SCE (the internal supply chain interviews). These were recorded, summarized in written form, and validated by the people involved. Due to some sensitive statements made in these interviews, they were made anonymous. They include interviews at both operational and management level of employees of the LL Group itself and the CRC department.

Next to this, four LSP/representative organizations interviews with senior management were selected (the external supply chain interviews) as a source of evidence (based on the interview protocol from Appendix B) out of a total of eight interviews. These were held at various places in The Netherlands and across Europe. For confidentiality reasons, the names of these managers or LSP's/representative organizations are not disclosed. Also, any details of activities that could disclose the actual company have been omitted. These interviews were recorded, summarized in written form, and validated by the people involved.

The reason why these interviews were all combined is to ensure anonymity of the LSP and SCE employees involved. Next to this, because we are analysing this from a supply chain point of view, it makes sense to not discriminate between LSP interviews and SCE interviews.

The interviews are split up based on the subjects covered. These are the following: (1) process/communication SCE, (2) process/communication LSP, (3) portfolio management and (4) performance measurement.

The Interviews

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APPENDIX D – Cross-case Analysis Supply chain interviews

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APPENDIX E – Expert interviews

Background

CONFIDENTIAL

The Interviews

CONFIDENTIAL

APPENDIX F – Cross-case Analysis Expert interviews

CONFIDENTIAL

APPENDIX G: Spend versus Turnover

CONFIDENTIAL

APPENDIX H: ISEA Project Proposal

CONFIDENTIAL

APPENDIX I - Personalized Reading Instructions

CONFIDENTIAL

APPENDIX J - LSP Difficulty of Business Survey

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APPENDIX K – Definitions of important concepts

3rd party SAP connection = Third parties (non Shell Network connected companies) can be provided access to "SAP" via a secure public Internet web portal [2].

Business Warehouse (BW) = Transactional data-reporting tool to trigger information stored in SAP [2].

C9 complaint = E.g. Customer complaints on late deliveries recorded as Standard QNs (C9). Action: Apology to customer, no remedial action required [7].

C1 complaint = E.g. Customer complains of leakage from Solvents drum CRC raises Major QN (C1), HSSE actual [7].

Contract manager (CM) and/or operations manager = A person who manages the operations over road transport, rail transport, third party storage facilities and storage service [1].

Contractor = A third party company that provides services to the Chemicals CoB (Class of Business) [3].

Customer Relationship Coordinator (CRC) = Primary customer contact with responsibility to process customer orders in an efficient and error free way and deal with any customer queries or complaints. This includes order capture, commitment to orders, resolution of obstacles to commitment (product supply, commercial, transport, HSSE and finance), confirmation, progression, order-amendments, invoicing, cash collection, managing complaints and indirect tax issues [4].

Logistics planner (LP) = Responsible for planning logistics services in alignment with Supply Chain supply/demand plans. He/She is responsible to ensure that the land logistics network is capable of supporting the supply chain and business plans [1].

Logistics Service Providers (LSP) = Such as haulier, rail operators, storage terminals [1].

Quality Notification (QN) = A generic term for any type of customer complaint, HSSE incident or improvement opportunity. There are three broad types [6]:

- Customer complaints (raised by customer on Shell);
- Vendor complaints (raised by Shell on suppliers);
- Internal QNs raised by Shell staff where they see an improvement opportunity.

SAP = The Global SAP system used by all Shell Chemicals Companies [2].

Technical Advisor (TA) = HSSE Adviser or MTA (in case of marine incidents)- the person (within the HSSE function) responsible for: (1) Evaluating if QNs marked as HSSE incidents are indeed HSSE relevant or can/should be considered non HSSE incidents, (2) Supporting the investigation of an

HSSE Incident, (3) Adding the HSSE classification data to the QN for subsequent analysis and review, (4) Checking that the corrective action(s) have been implemented for HSSE marked incidents, (5) Assigning cause and cause-locations in GSAP for HSSE QNs (and ensuring they are used in a "blame–free" way), and (6) completing QNs, which are marked as HSSE incidents once all necessary actions have been taken [5].

Transport Coordinator (TC) = Responsible for obtain prices and arrange transport for non automatic processed orders where either no contract/agreement in place or where the contractor is unable to meet the commitment; Update SAP transport tables and maximize automatic transport booking; Co-ordinate load scheduling for trucks and manage time charter operations for barges; Implement new contracts/developments; Process monthly LSP performance reports and manage operational reviews; To develop process for monitoring and resolving additional cost issues; Co-ordinate and manage transport claims processes [4].

[1] = CBAM: Review Land Logistics operations, Huy, Nguyen Anh*, 2007.*

[2] = CBAM: RECORD CARRIER ON TIME DELIVERY PERFORMANCE, Rik Onrust, 2006.

[3] = CBAM: Contracting for Land Logistics Services, Richard Mooring, 2008.

[4] = ROLE DESCRIPTIONS/DEFINITIONS, Izabela Zalewska, 2006.

[5] = Handle Customer Complaints & other Improvement Opportunities Handle HSSE Incidents, Arda Van Dongen, 2008.

[6] = HSSE performance data – glossary of terms, Benjamin Braun, 2008.

[7] = Complaints Process Simplification, Arda van Dongen, Sheila Paquette, Vivian Tan, Sean Duggan, Jeremy Rodell, 2007.

APPENDIX L –LSP Questionnaire Overview as developed by Dr. Aziz

NUMBER	STATEMENT	STRONGLY DISAGREE						STRONGLY AGREE
1	We have had more than the usual amount of ups and downs in our dealings with SCE (as compared with our other customers).	1	2	3	4	5	6	7
2	Our relationship with SCE enhances the image of our organization.	1	2	3	4	5	6	7
3	Relationship with SCE has helped our organization to enhance its existing capabilities/skills.	1	2	3	4	5	6	7
4	If another organization offered us a financially better contract we would most certainly take them on, even if it meant dropping SCE.	1	2	3	4	5	6	7
5	SCE is continually on the lookout to reduce dependence on our organization.	1	2	3	4	5	6	7
6	We conduct periodic internal reviews of our relationship with SCE to understand what we are doing right and where we are going wrong.	1	2	3	4	5	6	7
7	If we do not do as asked, we will not receive very good treatment from SCE.	1	2	3	4	5	6	7
8	If we decided to stop representing SCE we would be wasting a lot of knowledge regarding products and procedures that we adopted and tailored to SCE's needs.	1	2	3	4	5	6	7
9	Just for SCE we have invested time in developing new information systems.	1	2	3	4	5	6	7
10	Just for SCE we have invested time in learning their procedures.	1	2	3	4	5	6	7
11	We share information with SCE which we do not generally share with our other customers.	1	2	3	4	5	6	7
12	SCE's expectations of us are verbally communicated in detail.	1	2	3	4	5	6	7
13	SCE makes it clear that failing to comply with their requests will result in penalties against us.	1	2	3	4	5	6	7
14	Our interaction with SCE provides learning opportunities for our organization.	1	2	3	4	5	6	7

15	Our relationship with SCE is characterized by friendship between the two partners at multiple levels.	1	2	3	4	5	6	7
16	Our relationship with SCE is characterized by high reciprocity (mutual or cooperative interchange of favors or privileges) between the two partners.	1	2	3	4	5	6	7
17	SCE is willing to make sacrifices to help us.	1	2	3	4	5	6	7
18	There is high similarity/overlap between the IT capabilities of SCE and our organization.	1	2	3	4	5	6	7
19	SCE offers rewards so that we will go along with their wishes.	1	2	3	4	5	6	7
20	We are quite willing to make long-term investments in transporting SCE's products.	1	2	3	4	5	6	7
21	Our organization is continually on the lookout to reduce dependence on SCE.	1	2	3	4	5	6	7
22	In our relationship withSCE top management from both sides is involved in resolving conflicts.	1	2	3	4	5	6	7
23	SCE's evaluation process is conducted through standard procedures.	1	2	3	4	5	6	7
24	Being a haulier for SCE gives us more competitive advantage.	1	2	3	4	5	6	7
25	SCE and our organization work as partners while solving problems.	1	2	3	4	5	6	7
26	We feel that by going along with SCE in meeting their demands, we will be favored on other occasions (in relation to getting more business with SCE).	1	2	3	4	5	6	7
27	Our organization frequently approaches SCE for discussion regarding ideas for performance improvement.	1	2	3	4	5	6	7
28	SCE considers how its actions will affect us.	1	2	3	4	5	6	7
29	In our relationship with SCE both parties are expected to keep each other informed about events or changes that may affect the other party.	1	2	3	4	5	6	7
30	In this relationship no matter who is at fault, problems are joint responsibilities.	1	2	3	4	5	6	7
31	We are willing to take risks on behalf of SCE.	1	2	3	4	5	6	7
32	To accomplish their own objectives, sometimes SCE promises to do things without actually doing them later.	1	2	3	4	5	6	7
33	Our activities with SCE are well coordinated by	1	2	3	4	5	6	7

	SCE.							
34	We are willing to put ourselves in a disadvantaged position in order to strengthen our relationship with SCE.	1	2	3	4	5	6	7
35	Whenever SCE gives us advice on our business operations, we know they are sharing their best judgment.	1	2	3	4	5	6	7
36	We are willing to take chances on SCE's behalf.	1	2	3	4	5	6	7
37	An explicit mechanism has been established and used to address or resolve conflicts with SCE.	1	2	3	4	5	6	7
38	Improved asset efficiencies are a reason why our organization partners with SCE.	1	2	3	4	5	6	7
39	In this relationship any information which might help us is provided by SCE.	1	2	3	4	5	6	7
40	Overall, our organization and SCE perform well together in carrying out our respective tasks.	1	2	3	4	5	6	7
41	The organizational cultures of SCE and our organization are compatible with each other.	1	2	3	4	5	6	7
42	Just for SCE we have invested time in learning their products.	1	2	3	4	5	6	7
43	Just for SCE we have invested time in training our employees.	1	2	3	4	5	6	7
44	The terms of our relationship have been written down in detail.	1	2	3	4	5	6	7
45	Our relationship with SCE is better described as a "cooperative effort" rather than an "arm's length negotiation".	1	2	3	4	5	6	7
46	We are willing to make sacrifices to help SCE.	1	2	3	4	5	6	7
47	In our relationship with SCE we are proactive in suggesting improvements for planning and transportation.	1	2	3	4	5	6	7
48	If the relationship with SCE would end, we would have a lot of trouble redeploying our people and facilities presently serving SCE.	1	2	3	4	5	6	7
49	We have invested considerable resources in building up business with SCE.	1	2	3	4	5	6	7
50	SCE can be counted on to do what is right.	1	2	3	4	5	6	7
51	In coordinating our activities with SCE, formal communication channels are followed.	1	2	3	4	5	6	7
52	The source of SCE's information about supplier	1	2	3	4	5	6	7

	evaluation is predominantly word-of-mouth.							
53	Business with SCE provides long term financial stability	1	2	3	4	5	6	7
54	We do not volunteer much information regarding our business to SCE.	1	2	3	4	5	6	7
55	SCE will not take advantage of a strong bargaining position.	1	2	3	4	5	6	7
56	At one point, SCE came close to terminating its relationship with us.	1	2	3	4	5	6	7
57	The management and operating styles of the partners are compatible with each other.	1	2	3	4	5	6	7
58	We feel like we never know what we are supposed to be doing or when we are supposed to be doing it for SCE.	1	2	3	4	5	6	7
59	We modify our procedures as we learn from experience.	1	2	3	4	5	6	7
60	Our relationship with SCE is marked by a high degree of harmony.	1	2	3	4	5	6	7
61	SCE communicates well their expectations for our organization's performance.	1	2	3	4	5	6	7
62	SCE's formal system to track the performance of their suppliers is fair.	1	2	3	4	5	6	7
63	Partnering with SCE has resulted in growth in profits for us.	1	2	3	4	5	6	7

For statements 64 to 68: How would you rate your organization's financial performance over the past five years with respect to the following five criteria:

NUMBER	CRITERIA	DECREASED VERY SIGNIFICANTLY						INCREASED VERY SIGNIFICANTLY
64	Return on investment	1	2	3	4	5	6	7
65	Profits as a percent of sales	1	2	3	4	5	6	7
66	Net income before taxes	1	2	3	4	5	6	7

67	Present value of the organization	1	2	3	4	5	6	7
68	Net profits	1	2	3	4	5	6	7

For statements 69 to 74: Please indicate the extent to which your organization has made changes specifically to accommodate SCE with respect to:

NUMBER	STATEMENT	NONE						A GREAT DEAL
69	Changes in personnel	1	2	3	4	5	6	7
70	Changes in procedures	1	2	3	4	5	6	7
71	Changes in policies	1	2	3	4	5	6	7
72	Changes in strategy	1	2	3	4	5	6	7
73	Changes in information systems	1	2	3	4	5	6	7
74	Changes in capital equipment	1	2	3	4	5	6	7

NUMBER	STATEMENT	UNSTABLE						STABLE
75	The relationship between our organization and SCE is	1	2	3	4	5	6	7

NUMBER	STATEMENT	SHORT TERM						LONG TERM
76	The relationship between our organization and SCE is	1	2	3	4	5	6	7

NUMBER	STATEMENT	INSECURE						SECURE
77	The relationship between our organization and SCE is	1	2	3	4	5	6	7

For statements 78 to 80: What do you think are the chances of your organization terminating this relationship with SCE:

NUMBER	PERIOD	VERY HIGH						VERY LOW
78	Within the next six months	1	2	3	4	5	6	7
79	Within the next one year	1	2	3	4	5	6	7
80	Within the next two years	1	2	3	4	5	6	7

For statements 81 to 83: What do you think are the chances of SCE terminating this relationship with your organization:

NUMBER	PERIOD	VERY HIGH						VERY LOW
81	Within the next six months	1	2	3	4	5	6	7
82	Within the next one year	1	2	3	4	5	6	7
83	Within the next two years	1	2	3	4	5	6	7

NUMBER	STATEMENT	VERY POOR						VERY GOOD

84	Compared to other manufacturers, how good is communication with SCE:	1	2	3	4	5	6	7

NUMBER	STATEMENT	UNTIMELY						TIMELY
85	To what extent do you feel that your organization's communication with SCE is:	1	2	3	4	5	6	7

NUMBER	STATEMENT	INACCURATE						ACCURATE
86	To what extent do you feel that your organization's communication with SCE is:	1	2	3	4	5	6	7

NUMBER	STATEMENT	INADEQUATE						ADEQUATE
87	To what extent do you feel that your organization's communication with SCE is:	1	2	3	4	5	6	7

NUMBER	STATEMENT	INCOMPLETE						COMPLETE
88	To what extent do you feel that your organization's communication with SCE is:	1	2	3	4	5	6	7

NUMBER	STATEMENT	NOT CREDIBLE						CREDIBLE
89	To what extent do you feel that your organization's communication with SCE is:	1	2	3	4	5	6	7

For statements 90 to 95: Assuming that some conflict exists over certain issues how frequently are the following methods used to resolve such conflict:

NUMBER	METHODS	VERY INFREQUENTLY						VERY FREQUENTLY
90	Smooth over the problem	1	2	3	4	5	6	7
91	Persuasive attempts by either party	1	2	3	4	5	6	7
92	Joint problem solving	1	2	3	4	5	6	7
93	Harsh words	1	2	3	4	5	6	7
94	Outside arbitration	1	2	3	4	5	6	7
95	SCE imposed domination	1	2	3	4	5	6	7

For statements 96 to 104: Please indicate the extent to which your organization uses the following technologies and IT systems

NUMBER	TECHNOLOGIES & IT SYSTEMS	NEVER USED						HIGHLY USED
96	E commerce	1	2	3	4	5	6	7
97	Enterprise resource planning	1	2	3	4	5	6	7
98	Customer relationship management	1	2	3	4	5	6	7
99	Supply chain management	1	2	3	4	5	6	7
100	Data warehousing	1	2	3	4	5	6	7
101	Electronic data interchange	1	2	3	4	5	6	7
102	Client/server computing	1	2	3	4	5	6	7

103	Email	1	2	3	4	5	6	7
104	Internet	1	2	3	4	5	6	7

	For statements 105 to 110: Please indicate the extent to which your organization has achieved the stated factors through partnering with SCE:							
NUMBER	**STATEMENT**	**NONE**						**A GREAT DEAL**
105	Asset efficiencies	1	2	3	4	5	6	7
106	Image Enhancement	1	2	3	4	5	6	7
107	Competitive advantage	1	2	3	4	5	6	7
108	Growth in profits	1	2	3	4	5	6	7
109	Long term financial stability	1	2	3	4	5	6	7
110	Learning opportunities	1	2	3	4	5	6	7

Table L.1 – The LSP questionnaire on a 7-point Likert scale

APPENDIX M – Execution of Lambert's partnership model for the LSP's

This appendix explains how Lambert's partnership model has been applied to SCE. Looking at Figure 3.6, the conceptual model, it can be seen that there are 6 drivers in total, and 5 facilitators. As was explained, for this analysis only 5 of the drivers, and 3 of the facilitators are used. For each of the drivers and facilitators, a question from the LSP questionnaire was identified that covers this subject. The questions identified for the 5 drivers are:

- **Image enhancements =** LSP questionnaire question 2. → "*Our relationship with SCE enhances the image of our organization*"
- **Learning opportunities =** LSP questionnaire question 14. → "*Our interaction with SCE provides learning opportunities for our organization*"
- **Improved competitive advantage =** LSP questionnaire question 24. → "*Being a haulier for SCE gives us more competitive advantage*"
- **Asset/cost efficiencies =** LSP questionnaire question 38. → "*Improved asset efficiencies are a reason why our organization partners with SCE*"
- **Profit growth/stability**
  - **Profit stability =** LSP questionnaire question 53. → "*Business with SCE provides long-term financial stability*"
  - **Profit growth =** LSP questionnaire question 63. → "*Partnering with SCE has resulted in growth in profits for us*"

The questions identified for the 3 facilitators are:

- **Symmetry** = LSP questionnaire question 18. → "*There is high similarity/overlap between the IT capabilities of SCE and our organization*"
- **Cultural compatibility =** LSP questionnaire question 57. → "*The management and operating styles of the partners are compatible with each other*"
- **Shared vision (=mutuality) =** LSP questionnaire question 47. → "*In our relationship with SCE we are proactive in suggesting improvements for planning and transportation*"

In the LSP questionnaire a 7 point Likert scale is used (score between 1 and 7). In the original Lambert partnership paper, a 5-point scale is used (score between 1 and 5). Therefore the total score obtained for both the drivers and facilitators, needed to be tanslated to a 5-point scale, in order to determine the best type of relationship per LSP.

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APPENDIX N – Lambert's management component implementations

Partnership Component		Low	Medium	High
PLANNING	• Style • Level • Content	• On ad-hoc basis • Focus on projects or tasks • Sharing of existing plans	• Regularly scheduled • Focus is on process • Performed jointly, eliminating conflicts in strategies	• Systematic: Both scheduled and ad hoc • Focus is on relationship • Performed jointly and at multiple levels, including top management; objective is to mesh strategies; each party participates in other's business planning.
JOINT OPERATING CONTROLS	• Measurement	• Performance measures are developed independently and results are shared	• Measures are jointly developed and shared; focused on individual firm's performance.	• Measures are jointly developed and shared; focused on relationship and joint performance
	• Ability to make changes	• Parties may suggest changes to other's system	• Parties may make changes to other's system after getting approval	• Parties may make changes to other's system without getting approval
COMMUNICATIONS	NON-ROUTINE	• Very limited, usually just critical issues at the task or project level	• Conducted more regularly, done at multiple levels; generally open and honest	• Planned as a part of the relationship; occurs at all levels; sharing of both praise and criticism; parties "speak the same language"
	DAY-TO-DAY • Organization	• Conducted on ad-hoc basis, between individuals	• Limited number of scheduled communications; some routinization	• Systematized method of communication; may be manual or electronic; communication systems are linked
	• Balance	• Primarily one-way	• Two -way but unbalanced	• Balanced two-way communications flow
	• Electronic	• Use of individual system	• Joint modification of individual systems	• Joint development of customized electronic communications
RISK/REWARD SHARING	• Loss tolerance • Gain Commitment	• Very low tolerance for loss • Limited willingness to help the other gain	• Some tolerance for short-term loss • Willingness to help the other gain	• High tolerance for short-term loss • Desire to help other party gain
	• Commitment to fairness	• Fairness is evaluated by transaction	• Fairness is tracked year to year	• Fairness is measured over life of relationship
TRUST AND COMMITMENT	• Trust	• Trust is limited to belief that each partner will perform honestly and ethically	• Partner is given more trust than others, viewed as "most favored" supplier	• There is implicit, total trust; trust does not have to be earned
	• Commitment to each other's success	• Commitment of each party is to specific transaction or project; trust must be constantly "re-earned"	• Commitment is to a longer term relationship	• Commitment is to partner's long-term success; commitment prevails across functions and levels in both organizations
CONTRACT STYLE	• Timeframe	• Covers a short time frame	• Covers a longer time frame	• Contracts are very general in nature and are evergreen, or alternatively the entire relationship is on a handshake basis
	• Coverage	• Contracts are specific in nature	• Contracts are more general in nature	• Contract does not specify duties or responsibilities; rather, it only outlines the basic philosophy guiding the relationship
SCOPE	• Share	• Activity of partnership represents a very small share of business for each partner	• Activity represents a modes share of business for at least one partner	• Activity covered by relationship represents significant business to both parties
	• Value-added	• Relationship covers only one or a few value-added steps (functions)	• Multiple functions, units are involved in the relationship	• Multiple functions and units are involved; partnership extends to all levels in both organizations
	• Critical activities	• Only activities which are relatively unimportant for partner's success	• Activities that are important for each partner's success are included	• Activities that are critical for each partner's success are included
INVESTMENT	• Financial	• There is low or no investment between the two parties	• May jointly own low value assets	• High value assets may be jointly owned
	• Technology	• No joint development of products/technology	• There is some joint design effort and there may be some joint R&D planning	• There is significant joint development; regular and significant joint R&D activity
	• People	• Limited personnel exchange	• Extensive exchange of personnel	• Participation on other party's board

Table N.1 - Levels of implementation for each of the Lambert management components for Type I, Type II and Type III partnerships

APPENDIX O – Overview of important processes within SCE

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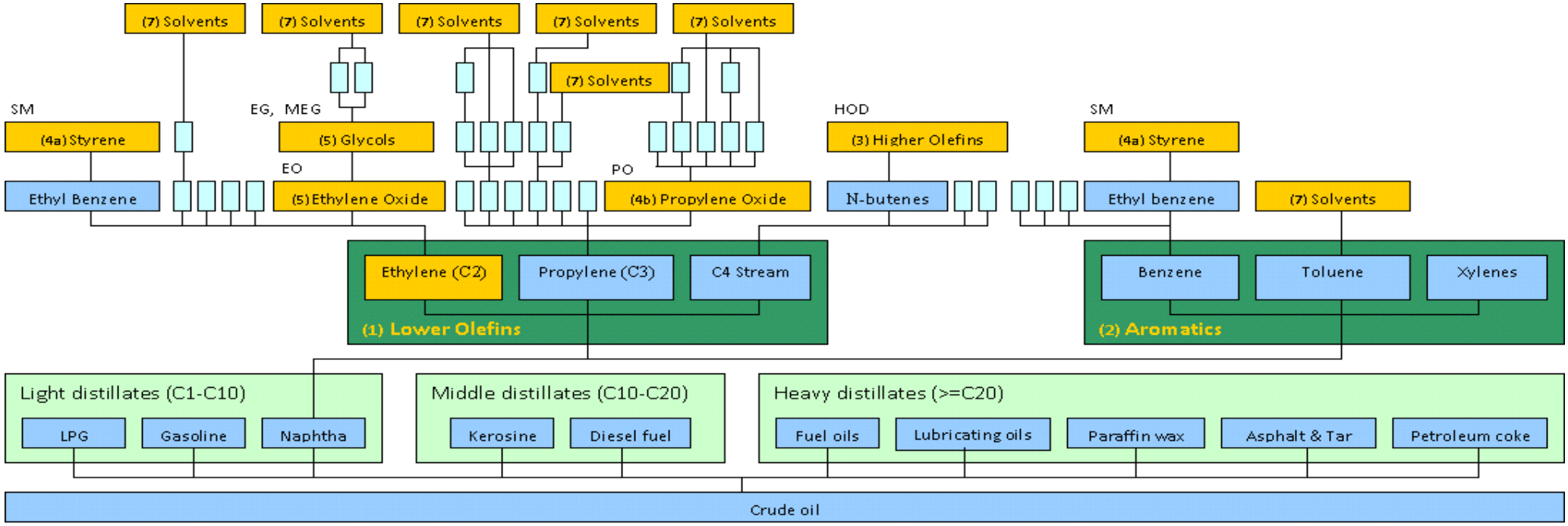
APPENDIX Q – Production Flowchart - Shell Chemicals Production Flowchart & Product group overview

Adopted from APPA (2009). Website: www.petrochemistry.net/flowchart/flowchart.htm



Shell Chemicals Product-groups/Product-Business Units:

1.) Lower Olefins (base chemical)
2.) Aromatics (base chemical)
3.) HODer (Alpha Olefins [Higher Olefins]/ Detergent Alcohols)
4.) SM/PO (Styrene Monomer/Propylene Oxide & Derivatives [POD])
5.) EOG (Ethylene Oxide/Glycols)
6.) PDO (CORTERRA/PDO) → A derivative of EO/EG
7.) Solvents

APPENDIX R – Problem Bundle

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