Managing supplier relationships in an IT supply network
a case study of how the Philips IT supply network can contribute to successful innovations

Veldhuijzen, D.J.A.

Award date:
2015

Link to publication
Managing Supplier Relationships in an IT Supply Network:
A Case Study of how the Philips IT Supply Network can contribute to successful innovations

Ing. Dirk Jan Veldhuijzen
Student Identity Number 0747010

In partial fulfilment of the requirements for the degree of

Master of Science
in Innovation Management

Supervisors:
Prof. dr. A. van Weele, TU/e, ITEM
dr. M. Cloodt, TU/e, ITEM
ir. J. de Vries, Philips N.V.
TUE. School of Industrial Engineering.
Series Master Theses Innovation Management

Subject Headings: Innovation, Supplier Relation Management, Supply Network
Management Summary

This summary covers a research project carried out within the Philips Procurement and IT organization. It is the result of a graduation project in the area of Innovation Management at Eindhoven University of Technology.

In the last decades the sector of IT has reinvented itself multiple times setting a very high pace of innovation. For many organizations the impact of IT has increased, IT is enabler of innovation with an increasingly stretching impact: from a corporate IT function to the heart of products. It is the goal of Philips IT and Procurement to actively engage its suppliers in innovation and cost reducing initiatives. This strategy provides benefits to Philips compared with doing this internally. It reduces the need for resources and provides access to a larger and diverse knowledge base.

As a start of this research an initial analysis within Philips IT & Procurement was conducted. The observation was that 22% of the strategic suppliers share ideas improving efficiency or effectivity on a ‘regularly or more’ basis. In interviews examples were provided of joint innovation activities that did not meet the expectations of stakeholders. Therefore it was decided to focus on the following research question: “How can the IT Supply Network contribute to successful Innovation and how can this be influenced by the procurement function?”

To answer this question, a design-oriented research design was used. The first step was a review of relevant literature in the domains of Innovation Management, Knowledge Management and Network literature. The review led to certain answers but also raised questions which needed further exploration. As a result theory informed propositions were formulated and a conceptual model was designed. This conceptual model has been researched via a Case-Study method, which covered detailed analysis and description of four cases within Philips Involving IT, Multiple Suppliers and Innovation.

The findings in the four case studies were to a large extends in line with the proposed conceptual framework. As a start performance was defined in terms of novelty of the idea, speed with which the project is completed and the cost savings it delivered.

- The case findings indicate that knowledge sharing between the buyer and the supplier is a phenomenon that consistently drives performance. Knowledge sharing is a behavior that cannot be contracted, it is hard to grasp and codify, it involves risks, and to a large extent it depends on the motivation of stakeholders involved.
- The case findings also indicated that knowledge sharing in the supplier network influenced performance. Philips faces many situations in which the performance of services and innovations depend on more than one supplier. If knowledge sharing between these suppliers is facilitated this provides several benefits: First, Philips accesses more and diverse knowledge domains, if different knowledge domains interact and share their knowledge, the quality of ideas and solutions is improved. Second, between supplier knowledge sharing can be a more efficient approach than sharing knowledge with one supplier and Philips. It is not solely Philips responsibility to integrate all knowledge.
- In line with these observations the relationship with a supplier is what can extend and drive the knowledge sharing, both dyadic and network, in these projects. Several studies, within Philips (de Vries, 2014; Sjoerdsma 2013) have indicated that the quality of relationship between organizations improves knowledge sharing and innovation performance.
- Finally in line with the model, we found that orchestrating a knowledge sharing network contributes to knowledge sharing. This was achieved by practicing the following behavior: By sharing part of the risk with a supplier and providing incentives for suppliers, by best practicing knowledge sharing behavior as Philips towards suppliers and penalize violation of this behavior, by facilitating and participating in events that create a shared identity of suppliers, by facilitating the means for suppliers (events, platforms) to communicate.

Additionally the case studies provided insight in best practice strategies. It was found that in one scenario the concepts and their effects were stronger than in others. Based on this insight we formulated two strategies: ‘Orchestrate the Knowledge Sharing network’ and ‘Keep control: Invest in knowledge and coordination’.

- ‘Orchestrate the Knowledge Sharing Network’: In this strategy Philips acts as a ‘supply network orchestrator’. It involves a high loading on maintaining relationship quality and orchestrating the knowledge sharing network. The network orchestrator should focus on continuously improving the quality of relationships with suppliers in the network. This strategy was pursued in Case 1-3, and was successful in Case 2 because the right conditions were set. Two contingent effects where observed when to apply this strategy: i) the project is low to moderate in terms of complexity, as complexity is too high a project requires more extensive knowledge sharing and integration, the chances that this will happen in a buyer-seller relationship are lower, ii) There should not be a large overlap between suppliers in terms of expertise. Commercial opportunism has a strong and negative effect on the relation between network governance and knowledge sharing.

- ‘Keep control, Invest in knowledge and coordination’. In this strategy Philips remains in control of all knowledge integration. The strategy still involves a high loading on relationship quality and share knowledge with suppliers individually but involves less loading on network knowledge sharing. Several effects were identified when to apply this strategy: when project complexity is really high ii) when there commercial opportunism present between the suppliers. Best practices to make this strategy a success are: having much functional knowledge on the topic at hand. This strategy was pursued in Case 4 and proved to be very successful.
Contents

1. Introduction ........................................................................................................................................... 7
   1.1 Philips .............................................................................................................................................. 7
   1.2 Philips IT ........................................................................................................................................ 7
   1.3 Philips Procurement & IMS IT ........................................................................................................ 10
   1.4 Problem Description ..................................................................................................................... 12
   1.5 Research Questions ...................................................................................................................... 15
   1.6 Research Method & Content of the Thesis ..................................................................................... 16

2. Literature Review .................................................................................................................................. 17
   2.1 Literature Review Approach ........................................................................................................... 17
   2.2 Theoretical Foundation .................................................................................................................. 18
   2.3 Innovation & Exploration Success .................................................................................................. 19
   2.4 Innovation Process & Knowledge Sharing ..................................................................................... 20
   2.5 Knowledge Management ............................................................................................................... 23
   2.6 Supplier Networks .......................................................................................................................... 26
   2.7 Conceptual Model .......................................................................................................................... 28

3. Empirical Research Design .................................................................................................................. 32
   3.1 Type of Research ............................................................................................................................ 32
   3.2 Issues in Case Study Research ....................................................................................................... 32
   3.3 Research Design ............................................................................................................................. 33
   3.4 Data Collection ............................................................................................................................... 35
   3.5 Data Analysis .................................................................................................................................. 35

4. Empirical Research Findings ................................................................................................................ 37
   4.1 Case 1 Description & Problems ..................................................................................................... 37
   4.2 Case 1 Findings ............................................................................................................................... 40
   4.3 Case 2 and 3 Description & Problems ........................................................................................... 46
   4.4 Case 2 Findings .............................................................................................................................. 48
   4.5 Case 3 Findings .............................................................................................................................. 51
   4.6 Case 4 Description and Problem ................................................................................................... 55
   4.7 Case 4 Findings .............................................................................................................................. 56

5. Cross Case Comparison ....................................................................................................................... 60
   5.1 Introduction ................................................................................................................................... 60
   5.2 Analysis ........................................................................................................................................... 60
   5.3 Reflection ...................................................................................................................................... 68

6. Conclusion ............................................................................................................................................ 70
   6.1 Research Questions ......................................................................................................................... 70
   6.2 Implications for Practitioners ......................................................................................................... 72
   6.3 Future Research .............................................................................................................................. 74
   6.4 Limitations ..................................................................................................................................... 75

7. Bibliography .......................................................................................................................................... 76
Overview of Figures
Figure 1 Philips IT Operating Model ................................................................. 8
Figure 2 Conceptual Relations Philips IT Strategy .............................................. 10
Figure 3 Pareto Analysis IT Expenses ............................................................... 11
Figure 4 Exploration Success ....................................................................... 20
Figure 5 The Innovation Process according to Nickerson & Zenger (2004) ........ 20
Figure 6 Conceptual Relations Knowledge Sharing and Exploration Success ........ 22
Figure 7 Example of Structural Holes .............................................................. 26
Figure 8 Example of Network Density ............................................................. 27
Figure 9 Conceptual Model .......................................................................... 31
Figure 10 Research Framework & Case study findings ................................... 37
Figure 11 Knowledge Sharing in Case Unified Communications ..................... 40
Figure 12 Relationship Quality Philips, GAMMA & Alfa ................................. 44
Figure 13 Relationship Quality Philips E-PSILON ............................................ 54
Figure 14 Overview CityTouch Solution ......................................................... 56
Figure 15 Counting high loading examples of Study Concepts ......................... 62
Figure 16 Ideas for interaction effect (in this figure the independent variables are not shown) .......... 69

Overview of Tables
Table 1 Overview of Governance Activities IMS IT .............................................. 12
Table 2 Supplier Relation Management Goals ................................................ 13
Table 3 Research Domains and Key Search Strings ....................................... 17
Table 4 Overview of Cited Academic Journals .............................................. 17
Table 5 Attributes of Problems And Search Types ........................................ 21
Table 6 Summary of Concepts Identified in Literature .................................... 28
Table 7 Overview of Procurement Stages in Relationship Formation ............... 29
Table 8 Case Descriptions part 1/2 ................................................................. 34
Table 9 Case Descriptions part 2/2 ................................................................. 35
Table 10 Knowledge Sharing in Case Unified Communications ..................... 41
Table 11 Summary Findings Case Unified Communications ........................ 45
Table 12 Summary Findings Case DCO EMEA .............................................. 50
Table 13 Summary of Findings Case DCO NAM ............................................. 54
Table 14 Project Phases CityTouch ................................................................. 55
Table 15 Summary of Findings Case CityTouch ............................................. 58
Table 16 General Overview Case Comparison ............................................... 61
Table 17 Comparison Loading Cases ............................................................. 63
Table 18 Support for Propositions ................................................................. 64
Table 19 Example Support Proposition 2 ....................................................... 65
1. Introduction

The starting point for this assignment was to focus on Innovation and Supplier Relation Management activities within Philips Indirect Materials & Services (IMS) Procurement IT. This chapter introduces the main stakeholders and problem description which form the start for this research paper. The first part of this chapter (from section 1.1 till section 1.3) has a descriptive character in which the goals and strategies of Philips, Philips IT & Philips procurement are briefly discussed. The second part of this chapter comprises the problem analysis.

1.1 Philips

Philips is a global company founded in 1891 in Eindhoven. The company operates in three main sectors: Healthcare, Lighting and Consumer Lifestyle. Within these sectors Philips takes leading positions in world markets. Philips has a long history of being an innovative company and has innovativeness embedded in its mission: “Improving people’s live through meaningful innovation”. This is underwritten by the vision of Philips: “Our goal is to improve the lives of 3 billion people a year by 2025. We will be the best place to work for people who share our passion. Together, we will deliver superior value for our customers and shareholders.”

The strategic portfolio of Philips has changed over the past years. The divisions around entertainment products have been sold, and the focus is placed more and more on consumer lifestyle, lighting and health products. The business models are also changing. In professional markets an increase in service business models is visible, where assets are owned by the delivering company and a fee is charged to the customer for the period of use. Philips was the first company to sell lighting as a service to cities. Another trend is more integrated and connected products. In these cases Philips integrates several capabilities into one product, often information technology is the binding factor. An example of a successful Philips product is the HUE, a light bulb that can be controlled via internet.

In 2013 Philips employed around 117.000 employees around the world and total sales in 2013 were €23.33 billion with an EBIT of 8.5% as a % of sales. The Philips group headquarter is based in Amsterdam. The Executive Committee owns the overall result of Philips and is overseeing the businesses and market operations. Philips is comprised of three axes: The business, the market, and functional axis. The business axis consists of the three business units with several business groups reporting to them. The market axis consists of 100+ countries and is clustered in 17 logical markets. The combination of a business and a market is called a Business Market Combination (BMC). The functional axis consists of support and business functions. Support functions are joined in a value added layer delivering to the business and market axis, support functions are: Finance, HR, IT, Procurement.

In the next two sections the support functions IT and Procurement will be further discussed, as these narrow the context for this research.

1.2 Philips IT

In this section the organization of Information Technology activities within Philips will be discussed. Firstly the way the corporate IT function is discussed. Secondly the five key technology trends for Philips and their impact on Philips products and corporate IT is discussed.

The corporate IT organization is organized as part of the value added layer and supports the Philips businesses on IT needs such as: hardware, software, data storage, connectivity. The IT mission statement
is “enable growth of Philips through world-class IT for ‘customer centricity’ and ‘agile’ business processes”. Philips Corporate IT gives the Philips businesses the means necessary to grow. In its mission statement customer centricity and agile are mentioned. These aspects of the mission tell how Philips IT wants to enable growth for the Philips businesses. Firstly by keeping the customer center to all their processes (customer centricity) and secondly by designing it in a way that is up and down scalable, less customization, more flexibility (agile). Philips IT is organized around sectors (consumer lifestyle, healthcare & lighting), services (architecture & platforms, delivery, infrastructure & operations), markets & supporting functions. In principle the IT organization always operates on behalf of the Philips businesses. There are three types of demand identified: Strategic demand, Tactical Demand and Operational demand. Depending on the type of demand different services are included. In figure 1 the different types of demands and according involvement of stakeholders is shown. A strategic demand is for example a new business transformation, then a multi-disciplinary team will develop the end to end process & business models, in portfolio management the resources, risks and priority are determined and a team involving stakeholders from Philips Businesses and IT architecture, delivery and operations will further develop the project. Procurement is part of the supporting function of IT and is primarily involved in strategic and tactical demand.

As the organization of IT activities has been introduced and discussed in the next section the impact of IT technology on the strategy of Philips and Philips IT is discussed. It is expected that Information Technology will further impact companies like Philips in new ways. In a company meeting in Andover USA, the at that time group CIO of Philips and now CEO Healthcare Informatics Philips – Jeroen Tas – gave a presentation about the impact of five key IT technologies for Philips. This presentations sheds light on how technology trends will impact Philips products and how Philips IT systems need to keep up:

1. Internet of Things (IoT): The internet of things is a continuation that all other devices will be connected to the internet in ways that are enhancing life comfort, energy savings, and convenience. This will increase the amount and type of data that will be available for companies, customers in the future.
2. Big Data: Developments in software algorithms, data harmonization is impacting the way companies can deal with large amounts of data.

Figure 1 Philips IT Operating Model
3. Mobile: connected devices that are mobile or wearable have high adoption volume in western countries and China. Elsewhere high adoption rates are visible. Network technologies are deployed in countries at high rates (glass fiber, 4G, 5G, WiFi).

4. Cloud: Data storage and computing power is available without capital investments

5. Social Business: Huge adoption rate for social technologies that enable new forms of interaction and communication.

It is expected that these technologies will create new opportunities in digital value propositions. Research done by Capgemini among 450 large companies in 106 countries shows that 78% of the respondents thought that achieving a digital transformation will become critical to their organization within the next two years. The term digitalization is used to describe a trend of increased use of ICT by society. The MIT center for digital business defined digital transformation as: “Use of new digital technologies to enable major business improvements such as enhancing customer experience, streamlining operations or creating new business models”.

With the knowledge that Philips possess in the domains of healthcare, consumer and lighting this means a set of new opportunities in areas like connected healthcare, smart homes & cities will be created. There are different estimates about the size of the opportunity: for example industry research firm Gartner revealed that it had estimated the worldwide IoT technology market would accrue a value of around 1.9 trillion by 2020 and encompass up to 26 billion individual devices and Beta expects that the amount of connected devices will double each 2 years.

Philips already launched its first products in these areas. For example the Philips Hue, a light bulb connected to the internet. Another example is Philips smart touch: a software platform connecting city lights adding several possibilities and extra services to city lighting. The point made is that new technologies will create opportunities with links to healthcare, lighting and consumer lifestyle, often at the intersection of two or three. This is expected to be a large opportunity for Philips of which exploration just started. In this scenario IT will have a more strategic role, directly impacting products and strategy that face customers and software will be a differentiator for Philips products in the future.

The impact of this trend of connected products is first seen in the notion that IT is becoming of direct impact on Philips strategy and products and therefore become more strategic. The strategic direction of IT has two aspects. First it supports the infrastructure, software, hardware, systems to enable the development of connected products. Second it is contributing to the development of new capabilities associated with digital and connected products.

---

4 http://pww.it.com/apps/p_dir/e1623801.nsf/pages/itmanagementagenda
An important source of knowledge for Philips IT is its supplier landscape. Philips has shifted much of its IT programs, operations, delivery to suppliers and only taking an orchestrating role. Because of this suppliers have a lot of knowledge about Philips processes and operations. Besides the embedded Philips knowledge, supplier bring their own R&D, Market, Technology knowledge which can potentially be of interest to Philips. When IT knowledge becomes of strategic interest to Philips products, current relations with suppliers can potentially be extended to partnerships. A recent example is the partnership between Philips and Salesforce to develop a health platform that will connect healthcare providers, insurers and healthcare customers5.

So far this section has described the organization of IT within Philips. It also described how IT technologies are developing and how five big IT trends are creating new opportunities for Philips, which will be part of their future strategy, future products and business models. The key role of IT is to build the infrastructure to make this possible and to contribute to developing the right digital capabilities to enable this strategy together with Philips businesses. The knowledge of Philips suppliers is key to do this in an effective and efficient way, making the relationship with some suppliers strategically important. Recently this has led to a partnership between Salesforce and Philips.

1.3 Philips Procurement & IMS IT

Philips procurement is the umbrella for all procurement activities within Philips. Around 2000 people are working in a procurement job within Philips. Procurement operates as a business partner across business functions and teams to ensure an end2end approach. The mission of procurement is to “…through a strong partnership with suppliers, we bring Philips Innovation and sustainable competitive advantage,

faster than competition being best in class business partner”. Procurement activities are separated in ‘Bill of material’ (BOM) and ‘Indirect material & services’ (IMS). The IMS organization is structured in commodities, which are clusters of more or less similar products or services, IT procurement is such a commodity. The procurement function develops strategies for the sourcing portfolio, drives supplier selections, leading negotiations, and manages the suppliers in the portfolio at the lowest total cost of ownership.

The procurement IMS IT team is responsible for procurement of IT. The team is dispersed around Eindhoven, India, US and has about 20 members. The IT team consists of three sub commodities: Infrastructure & Operations, Business Application software & Output based.

In 2009 the Philips IMS IT team started a supplier relation management program called ‘The supplier ecosystem’. The idea is that this set of suppliers is the foundation of the IT environment of Philips, these suppliers form the IT Ecosystem and have a tailored governance structure. The main goal of the program is to gain performance in terms of cost advantage or increased value (innovation) from these suppliers. Philips IMS IT uses a segmentation of Suppliers in three groups: Eco Suppliers, SRM light and commercial. Figure 3 shows how the total spend is divided across these three groups.

![Figure 3 Pareto Analysis IT Expenses](image-url)
The ecosystem is a selection of suppliers with an assigned governance structure. The size of the ecosystem is about 10 suppliers which are defined yearly. The selection criteria not explicitly articulated and are negotiated among commodity leads. Important aspects of selection for suppliers for the ecosystem are total spend, innovation, future spend. The determined governance for Eco suppliers is shown in Table 1 in principal all activities are part of the governance structure for eco-suppliers.

SRM light spend is a selection of about 50 suppliers. These suppliers are larger accounts but not enough impact on spend and innovation to be part of the Ecosystem. The governance is only part of the governance for the Eco suppliers. For the SRM light spend the assigned a one pager and Global Supplier Rating System (GSRS) score are standard governance activities. In some cases an SRM role, SFS, Executive meetings are carried out. Commercial spend comprise the rest of the suppliers which are according spend data about 3000. In principal none of the governance activities are carried out for commercial suppliers.

<table>
<thead>
<tr>
<th>Type</th>
<th>Meetings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Meetings</strong></td>
<td>Eco Supplier Meetings – a meeting with all eco-partners. The idea in these meetings is to share strategy related information, identify projects and priorities and agree on a follow up with the eco supplier partners</td>
</tr>
<tr>
<td></td>
<td>Executive Meetings – Meetings between Philips and Supplier executives facilitated by the supplier relation management function. These meetings strategies are aligned and problems in doing business are discussed and actions are being determined.</td>
</tr>
<tr>
<td><strong>Documents</strong></td>
<td>Joint Account plan – This is a document jointly created by the supplier account manager and the Philips supplier relation manager. The document comprises the key strategies, joint interests and opportunities for cost savings and innovation in the future. One Page Overview – This document tells the most important information regarding ongoing business (stakeholders, contracts, spend etc.)</td>
</tr>
<tr>
<td><strong>Tools</strong></td>
<td>GSRS a survey carried out 2xyear, measuring the satisfaction of internal customers regarding a supplier. The dimensions measured in this survey are, quality, delivery, responsiveness, cost and innovation. The results of the GSRS are also a KPI on the procurement IMS IT dashboard. SFS - a survey carried out 2xyear, measuring relationship quality and team climate for innovation in buyer-seller relationships. The results of SFS are a KPI on the CIO dashboard.</td>
</tr>
<tr>
<td><strong>Roles</strong></td>
<td>Supplier Relation Manager (SRM) - the supplier relation manager is an informal role often practiced by a sourcing specialist or commodity manager in the IMS IT team. The role of SRM is to manage the stakeholders in the relation resulting in a relationship that is satisfactory for both sides and delivers an advantage to Philips. The SRM is also managing contract issues when something escalates.</td>
</tr>
</tbody>
</table>

1.4 Problem Description
In this chapter the goals regarding supplier relation management will be compared with an analysis of the supplier relation management within Philips. This results in a description and analysis of the problem which will be guiding the further research. Guiding for the problem analysis were a series of interviews
with team members in a role of sourcing specialist or supplier relation manager of the IMS IT team held end 2013. First the goals regarding supplier relation management are introduced.

Supplier relation management is described in Philips Procurement job profiles as driving and ensuring performance with a supplier for Philips and being able to focus on long term mutual benefit and risk sharing with suppliers. In this sense supplier relation management is described as a competency and the measurement happens on an individual level by assessment to which degree a Philips Buyer or commodity manager masters this competency. In this way supplier relation management is an extra means to achieve the goals of performance of Philips procurement.

In a series of interviews within the IMS procurement IT team the question was asked “for which goals do you use supplier relation management within IMS IT?” From these interviews four different types of goals were identified, these are: Cost savings, contribute to Innovation, Risk Management & Contract realization. Table 2 shows the goals and provides information regarding the degree these goals are measured and achieved. For reducing total cost of ownership clear goals have been developed per commodity. The way of measuring and keeping track of these goals is advanced and described in the procurement savings methodology (PSM). Goals regarding innovation are less developed, while innovation is part of the procurement mission (both global and department level) there are no hard targets within procurement IMS IT.

Table 2 Supplier Relation Management Goals

<table>
<thead>
<tr>
<th>Goal</th>
<th>Description</th>
<th>Measurement and performance,</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce Total Cost of Ownership</td>
<td>Reduce the total cost of ownership for Philips IT. According to the Procurement Saving Methodology (PSM).</td>
<td>A target of <strong>7,5%</strong> cost savings in 2013, a realized number of <strong>10,5 %</strong> savings for IMS IT</td>
</tr>
<tr>
<td>Contribute to Innovation</td>
<td>Contribute to innovation for Philips IT, either by product / service innovations or by process innovations. (Interviews IMS IT, end 2013).</td>
<td>Target is set rather qualitative: “…be best in class business partner” (Philips Procurement mission) and “…improve quality, agility and innovation through digitizing Philips” (IMS IT mission). Philips Procurement is recognized as a best in class business partner, however there is a lack of innovative examples driven from procurement perspective and. A survey showed that 22% of stakeholders eco suppliers regularly or more contribute to innovation or efficiency. There are goals set relating relationship and operational performance with the ECO suppliers: SFS score &gt;70% for ECO suppliers. The SFS score is on average around 70% SFS: avg 70%+</td>
</tr>
<tr>
<td>Risk Mitigation</td>
<td>“…Reduce supply risk by creating favourable conditions” (Interviews IMS IT, end2013)</td>
<td></td>
</tr>
</tbody>
</table>

13
Risk mitigation and contract realization are mentioned by the IMS IT team as goals to which SRM contributes. Contracts & law are the basis of agreements in the buyer seller relationship and determine to a large extend what risk and value the company gets out of it. However, besides this ‘hard factor’ supplier relation management is seen as an instrument to improve performance with regard to risk mitigation and realizing the value agreed in the contract.

The goals of IMS IT and supplier relation management have been introduced, the analysis to what extent

1. Goals regarding relationship quality are met. The suppliers are expected to score >70% in a survey. In the past these scores were too low for certain suppliers but relationship quality improved over time.

2. Lowering transaction cost between Philips and Suppliers. The role of SRM has been proven useful in maintaining an effective relation with the supplier. Examples are given in interviews for example by tackling payment problems or managing escalations with suppliers.

Since the start of the supplier ecosystem in 2009 no clear improvements and direct improvements with regard to innovative activities with suppliers have been reported. Which was one of the initial goals.

1. Lack innovation success examples that came from SRM activities. One of the causes is that while ideas or opportunities may be identified the actual realization of these ideas is often troublesome. Several causes were mentioned: lack of motivation with the demand side, lack of motivation from the supplier, or the causes were not known.

2. A survey among procurement and IT specialists working with the ECO suppliers shows that only 22% of the 44 respondents experienced that the suppliers regularly contributed to ideas that improved cost levels or effectiveness for Philips.

3. Certain initiatives have stopped due to lack of results. In the first years joint innovation were started to explore opportunities but these projects did not bring direct results and stopped before completion. At the moment there are no examples of such projects. Also, the ECO supplier Meetings have stopped. This is seen as a sign at the wall that this particular governance activity and in special the activities in which more than one suppliers are involved do not work / the benefit is not seen.
Based on the interviews and the goals documented for IMS IT we can conclude that the way the supplier ecosystem is contributing to innovations of Philips is not always as expected. The following conclusion can be made:

“Procurement IMS IT and the Supplier Relation Management program are not effective in enabling innovations from their IT supply relations”

In an outsourced environment organization will depend on the innovative capability of supply base. Knowledge is important to create an innovative environment. When the strategy is to outsource technologies and processes the ability to improve and rethink those is partially with the supply base.

Strategically products are becoming more like services. In that sense the ability to collaborate determines a company’s innovative performance and requires the capability to manage partnerships and risks in value chains.

1.5 Research Questions

The central problem in this research is procurement ecosystem does not sufficiently support innovation within IT. This is an applied problem to the specific context of Philips Indirect Material & Services IT.

Research Question: “How can the IT supply network contribute to a successful innovation process and how can this be influenced by the procurement function?”

Emphasis on the supply network. Current studies deal with innovation in a dyadic way and show that relational aspects are important. This question will add the dimension of multiple suppliers. Since the policy towards 1 supplier might be optimal but what happens if do not account for other suppliers which will have effect on the performance in the relationship.

Specifically look at roles for the procurement function. This is different from a typical study since the procurement function has commercial and innovation perspective. I expect that an answer to this question will provide knowledge to better create strategies in situations where innovation and multiple suppliers are working.

By literature review:

Sub Research Question 1: “What factors influence the success of IT Innovation process in General?”

By answering this question more insight is gained in the innovation process of IT and what it takes to successful innovate. Will deal with the current theories available in literature regarding this.

Sub Research Question 2: “How do suppliers contribute and influence the success of IT Innovation process?”

This question will handle in more detail what supply network role is. By moving from dyadic relations look at the relations with multiple suppliers.

By Empirical research:

Sub Research Question 3: “How is the contribution of Suppliers and Procurement to the IT Innovation process organized?”
Sub Research Question 4: “How can procurement best organize involvement of suppliers in IT Innovation Process?”

To answer these questions first a review of relevant literature is made, the detailed methodology and findings will be further discussed.

1.6 Research Method & Content of the Thesis
The research method used is the business problem solving methodology described by van Aken, Ernst & Berends (2007). This methodology is driven by a problem which is described in this chapter, second a literature review is done to inform researched and reader with a better understanding of the problem at hand, the empirical research drives that leads to answering questions and contribute to problem solving.

The next chapter will cover the literature review, the result is a set of theory informed propositions that need to be validated by empirical research and guide answering the research questions stated above. The third, fourth and fifth chapter cover the process of the empirical research, the most important outcome is the support or lack of support for propositions identified in the literature study. At the beginning of these three chapters the specific research methodology used, case study research is discussed in detail. The sixth and final chapter gives the conclusion of the thesis, here the theoretical part and empirical part will be combined and an answer to the research questions will be given. The major outcomes of this thesis are outlined here: i) An analysis of theory regarding Supplier Involvement in IT Innovations resulting in a set of propositions(CH2), ii) Contribution to this specific field, by confirmation or rejection of theory informed propositions (CH3,4,5,6), iii) Implications for practitioners of IT / Procurement functions of this research (CH6). With this outlined the first chapter is concluded, the next chapter will discuss the literature and forming of propositions.
2. Literature Review

This chapter discusses the approach taken to review literature. A clear answer to the research questions is not readily available; therefore we draw from different knowledge domains that relate to the topic at hand. Combination and interpretation of these domains, will lead be the basis for propositions that will be validated via empirical research. The question central to this literature chapter are the first three sub questions: “What factors influence the success of IT Innovation process in General?” , “How do suppliers contribute influence the success of an IT innovation process?” and “How can procurement best organize involvement of suppliers in an IT Innovation process?” The chapter is structured as follows, in section 2.1 the approach to review the literature is discussed, in section 2.2 the theoretical foundation is discussed, section 2.3 to section 2.6 will discuss the different knowledge domains.

2.1 Literature Review Approach

First we set up the theoretical background for the paper. A short discussion of the main theoretical works considering the topic of innovation process and supply network. Hereafter a choice will be made what is the theoretical background used to study the subject. Second we will discuss the main knowledge domains that relate the topic at hand. Based on the questions the bodies of work are identified and shown in table 3.

<table>
<thead>
<tr>
<th>Research Knowledge Domains</th>
<th>Key Search Strings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innovation Management Literature</td>
<td>Innovation, Innovation Process, Exploration</td>
</tr>
<tr>
<td>Network Literature</td>
<td>Supply Network, Supplier Network, Supplier Involvement</td>
</tr>
<tr>
<td>Knowledge Management</td>
<td>Knowledge Sharing / Transfer, Inter-organizational Knowledge Sharing / Transfer, Buyer-Seller Knowledge Sharing / Transfer</td>
</tr>
<tr>
<td>Purchasing</td>
<td>Procurement, Purchasing</td>
</tr>
</tbody>
</table>

Next a search strategy was used, these search strings, and combinations of these search strings were entered in Proquest and Science Direct Database. These databases search through wide array of scholarly journals, to increase the quality of the literature review the journal impact factor method was used. A selection of the following journals is shown in table 4, these journals were searched for the search strings from table 3.

<table>
<thead>
<tr>
<th>Journals used in Search</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT Journals</td>
</tr>
</tbody>
</table>
The articles found after this first search were saved and scanned through (introduction / conclusion) based on this scanning a selection was made of articles in each knowledge domain. These articles were studied and a discussion of these is included in this chapter.

2.2 Theoretical Foundation

This section discusses the different theories that guide the research. These theories determine how to look at the subject at hand. To identify the theoretical foundation three criteria are identified from the research question.

1. First, the theoretical foundation should consider the boundaries of a firm. When studying innovation the characteristics of the environment are important.
2. Second, it should contribute to analyzing innovation performance. The theory should help determining whether the decisions made will contribute to innovation success.
3. Third, it should provide means to analyze projects with more than one supplier. The unit of analysis is can be the relation but in many cases it is more than one supplier that takes a role in a Philips IT project. Therefore we want to include a perspective of more suppliers in the theoretical foundation.

A classic theory in the consideration of boundaries of the firm is transaction cost economics (TCE). TCE is a theory in economic literature concerning two governance modes: Firms & Markets. This influential theory has been applied to buyer seller relations and the concept of networks. Williamson (1991) sees networks as a hybrid form between markets and firms. According to TCE firms exist to minimize the cost associated with transactions (Coase, 1937). The cost associated with transactions are search, information, bargaining, policing and enforcement costs. When external transaction costs (market) are higher than internal transaction cost (firm), the organization will grow. When the other way around (external transaction cost lower than internal transaction cost) the organization will downsize by for example outsourcing. Williamson (1991) states two assumption regarding the behavior of firms. 1. Firms are opportunistic and simply said they choose for their own benefit 2. Firms and decision makers are bound rational, which implies that decision of labor is a requirement to reach otherwise unattainable goals. TCE has been an influential theory in explaining the boundaries between firms and markets. The capabilities of TCE to explain the role of networks in innovation is disputable. Nooteboom et al (1997) poses the question about opportunism, whether the central assumption of opportunism in TCE can be reconciled with the development of mutual trust underlying long term relations between organizations? For example as the relation and series of transactions proceed can there be a change of perceived risk of opportunism and may that be replaced as trust (Nooteboom, Berger, & Noorderhaven, 1997). Within TCE there is no room for trust as a product of embeddedness of economic relations. Similar argument comes from Powell et al (1996). They argues that minimization of costs in TCE does not respect the strategy of organizational learning aspects in social contexts. TCE is more a cost trade-off and cannot be used to explain the dynamic gains of networks which are knowledge creation and innovation.

The resource based view (RBV) is a theoretical framework explaining why competitive advantage of firms exists and might be sustained over time. The development of this framework started with Penrose (1959) and has been extended by several other scholars (Dyer & Singh, 1998; Prahalad & Hamel, 1990; Teece, Pisano, & Shuen, 1997). The RBV assumes that resources are heterogeneously distributed across firms.
When these resources are: rare, hard to imitate, and non-substitutable, and have a system to generate market value with these resources, then firms may develop a sustainable competitive advantage over other firms. The relational view is grounded in the resource based view but adds that relationships can also yield competitive advantage. In the relational view resources are the primary source of competitive advantage (like in RBV) but the resources are not necessarily owned by the organization. These relations can provide specific assets, knowledge sharing routines, complementary resources & Capabilities, lower transaction cost to the organization (Dyer & Singh, 1998). This provides an incentive for firms to form alliances with other firms because they are not self-sufficient, especially in knowledge intensive industries like technology (Hagedoorn & Duysters, 2002). Both the resource based view and the relational based view describe that resources are the source of competitive advantage for firms. The theories help to understand positions of companies and their success but do not deal with the type of resources and how to organize the resources. The knowledge based view (KBV) is in this respect ‘adding’ to the previous theories that it deals with the type of resource, being knowledge. The KBV sees ‘knowledge’ as the most

The RBV and specially variations of the RBV such as Knowledge Based View and the Relational View provide a theory that generates insight in both how crossing boundaries of firms, how firms act when boundaries are crossed, and how this influences knowledge sharing. The combination of both considering boundaries of the firm and performance makes the RBV better applicable as a theoretical framework than TCE. One of the assumptions in TCE is opportunism, and provides no explanation for organizations collaborating and forming a network. Therefore we choose the RBV as the theoretical angle in this thesis.

D5 The next sections discuss the building of a conceptual model to answer the formulated research questions.

### 2.3 Innovation & Exploration Success

Innovation is defined as: “the process of making changes to products, processes, and services that result in new value creation to the organization and its customers by leveraging knowledge efforts of the firm and (or) that of its network partners” (Narasimhan & Narayanan, 2013). In this definition innovation is seen as a process and not ‘as something new. The input for the innovation process is knowledge so for example the combination of various novel ideas can result in a change of a product, process or service. The output has an impact on a unit of adoption, this can for example be an organization or its customers. The value component is what innovation separates from inventions, inventions are things that can be new but do not necessarily generate some value for the organization.

Innovation has an exploratory and exploitative aspect (Gibson & Birkinshaw, 2004); naturally these two concepts have a sequential nature. First the organization looks around to identify opportunities, and then the organization will start with exploiting this opportunity and for example make it into a saleable product or implement it in a process. As the process of exploration and exploitation differs in its nature, and different network structures provide different benefits in each stage (Dyer & Nobeoka, 2000; Hite & Hesterly, 2001) the choice in this thesis is made to focus on exploration, to limit the scope of the study to “Exploration success” defined as: “The willingness of the stakeholder to use an idea, practice or product developed by, or developed in collaboration with the stakeholder(s) and start looking into the development of it”. 
Exploration success in this way is defined as the ‘end state’ of the process of exploration. This encompasses the process of problem recognition, the stakeholder and the supply market both conceptualize the problem in the same way and agree on the approach of finding a solution to the problem. After exploration success the organization starts the exploitation phase. Finding success in the process of exploration also relates to resources and time. Time to market is seen as an important antecedent of competitive advantage (Kessler & Chakrabarti, 1996). Therefore a timely completion of the exploration phase will increase the speed of the total innovation process and is associated with competitive advantage. Use of resources is associated with the cost of a project and will impact the added value the project will have for the organization. Cost savings generated from the idea is another measure of the value of exploration success. With this definition and aspects of exploration success the first part of the conceptual model can be drafted

<table>
<thead>
<tr>
<th>Exploration Success</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Speed</td>
</tr>
<tr>
<td>- Newness</td>
</tr>
<tr>
<td>- Cost Savings</td>
</tr>
</tbody>
</table>

*Figure 4 Exploration Success*

2.4 Innovation Process & Knowledge Sharing

Innovation is strongly linked to problem solving and knowledge creation. Following previous work, it is assumed that solutions to problems represent unique combinations or synthesis of existing knowledge (Henderson & Clark, 1990). Managers cannot choose the knowledge they want to acquire because this is something that is not known, instead managers must choose valuable problems, those which if successfully solved, yield desirable knowledge and result in value for the organization (Nickerson & Zenger, 2004). Choosing a problem is an assessment of identifying the expected value of potential solutions. Once the problem is chosen the task becomes identifying relevant knowledge and then maximizing the probability of discovering a high value solution this is achieved.

Managers choose problems while identifying knowledge sets or existing technology either within or outside the firm that are potentially useful in searching for solutions to that problem. According to Simon (1962) the complexity of a problem is a function of the degree to which individual design choices influence each other. Similar to the definition of Simon, problems can be categorized depending on the interactions among knowledge sets and design choices. Nickerson & Zenger (2004) introduce three different types of problems. Low interaction problems, moderate interaction problems, high interaction problems. Low interaction problems are problems in which the value of the solution depends very little on the interactions among knowledge sets and design choices. With such problems, groups or individuals possessing rather distinct knowledge can independently apply their knowledge and find a solution. This type of problem relates to ‘modular knowledge’ (Henderson & Clark, 1990) or component knowledge. In high interaction problems - for example designing a leading edge microprocessor – an actor with particular
knowledge cannot enhance the value of the product design based solely on the knowledge he or she possesses. Such problems are non-decomposable and show similarities with the concept of architectural innovation (Henderson & Clark, 1990) which requires knowledge about the way components are integrated and linked together. Moderate interaction problems are problems that are nearly decomposable. The level of interaction among design choices is intermediate, sub problems can be defined but the value of a design choice within one sub problem is not independent of the design choices made in another sub problem.

When a valuable problem and responding knowledge sets are defined the task left is to ‘maximize the probability of finding a high value solution’. The process of finding a solution in this case is called ‘search’. The likelihood, speed, and cost of arriving at a valuable solution depends on both luck and on the pattern of trials that actors undertake (Simon, 1965). Directional search is guided by feedback or experience from prior trials. New combinations of knowledge are found by changing one design element at a time and observing the result in change on the solution value. If the result declines the design parameter is changed back to the original position. If improved the design parameter can be held. This type of search resembles trial and error. Nickerson & Zenger (2004) argue that directional search is well suited to low interaction problem because there are little interactions among design choices. Directional search is quite inefficient when exploring solutions to high-interaction problems. Heuristic or Cognitive search is the other type of search discussed. This is a form of solution search in which the person cognitively evaluates the implication of a design choice rather than relying on the feedback of the output result. Theory plays a role in heuristic search because it provides a basis for evaluating the impact of design choices. Minds are limited in the rate at which knowledge can be assimilated, accumulated and applied (Simon, 1965). Hence, distinct knowledge sets needed for solving complex problems are likely to be widely dispersed and reside in the minds of many agents (Simon, 1965). Heuristic search requires knowledge sharing to facilitate the development of heuristics that derive from multiple and dispersed knowledge sets. Adapted from the view of Nickerson & Zenger (2004) and Simon (1965) the different types of search and their application to problem types is shown in Table 5.

Table 5 Attributes of Problems And Search Types

<table>
<thead>
<tr>
<th>Attributes of Problem</th>
<th>Decomposable</th>
<th>Nearly Decomposable</th>
<th>Non Decomposable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Directional Search</td>
<td>++</td>
<td>+</td>
<td>0</td>
</tr>
<tr>
<td>Heuristic Search</td>
<td>0</td>
<td>+</td>
<td>++</td>
</tr>
</tbody>
</table>

When looking at innovation the type of problem is mostly related to non-decomposable or nearly decomposable. Innovation is typically a difficult task involving new interactions among knowledge sets and a unique search path not taken before. Heuristic search is therefore the most obvious type of search associated with innovation. Heuristic search requires extensive knowledge transfer which is discouraged by knowledge exchange hazards. According to Williamson (1991), governance forms differ fundamentally in their use of three organizational futures: 1) decision rights over the path of solution search. 2) Communication channels to support knowledge transfer 2) incentives to motivate search. Several authors have analyzed different types of governance forms and their ability to facilitate knowledge transfer. Grant (2004) considers two governance forms: markets and hierarchies. Nickerson & Zenger (2004) consider three governance forms: markets, authority based hierarchies and consensus based hierarchies.
In conclusion, the process of exploration can be conceptualized like a problem as proposed by theory of knowledge based view (Nickerson & Zenger, 2004). Exploration is about discovery, up front the knowledge sets might not be known, partly intentional, partly unintentional knowledge will be shared that leads to the same understanding of a problem and eventually a solution to a valuable problem. Below some examples are shown about that could be requirements regarding the knowledge to solve a problem.

- Knowledge about application of the idea, practice or product, which will typically reside at the buying firm
- Knowledge about the idea, practice or product, which will typically reside in the supply network. Potentially with one supplier, but also with different suppliers
- To find exploration success it requires the same view on the dimensions of the ‘problem that is being solved’
- Requires a mutual language same definitions etc.

The process of exploration resembles a moderate interrelated problem, in some sense it is decomposable but parts of it require the integration of knowledge from different knowledge field that may be hard to define. In this context the primary type of search to identifying a successful solution will be heuristic search (Nickerson & Zenger, 2004). Heuristic search requires knowledge sharing to facilitate the development of heuristics that derive from multiple and dispersed knowledge sets. Because, it is characterized in this way, it is argued that knowledge sharing between the supplier and firm will lead to increased exploration success.

P1: Dyadic Knowledge Sharing with the supplier will increase Exploration Success

Because of the many possible knowledge sets are involved which may reside in different places in the supply network. Exploration will benefit from suppliers sharing knowledge with each other instead of sharing knowledge with the firm, which then needs to integrate all this knowledge. So Network Knowledge Sharing involves suppliers, sharing knowledge. We assume this will enhance the value of the solution and thereby increase the level of exploration success. Also it will enhance the exploration speed and efficiency.

P2: Network Knowledge Sharing will increase exploration success
2.5 Knowledge Management

To better understand what drives knowledge sharing between buyer and supplier in a market environment this chapter will look at specific aspects of knowledge sharing and relate this to the context of markets. This section is based on work in the area of knowledge management and will provide more insight in the unique characteristics of knowledge, the characteristics of the knowledge transferred, the source of knowledge, the recipient of the knowledge and the context in which knowledge is shared are discussed.

First discuss the characteristics of the knowledge transferred. Three characteristics of knowledge will be discussed, these are: transferability, causal ambiguity and unproven-ness. The issue of transferability of knowledge is important, both between firms and within the firm and in literature a distinction is made between knowing how and knowing about. This is also referred to as tacit and explicit knowledge (Grant, 1996; Nonaka, 1991). The distinction between these two types of knowledge lies in transferability and the mechanisms to transfer. Tacit knowledge cannot be codified and can only be observed through its application and acquired through practice. Explicit knowledge can be codified and can be transferred via most forms of communication. Causal ambiguity (Szulanski, 1996) relates to the idea that sometimes precise reasons for success or fail of production function of knowledge cannot be determined even ex post, causal ambiguity is present and it is impossible to produce an unambiguous list of factors of production. Key to causal ambiguity are high degrees of tacit knowledge (Szulanski, 1996). Similar to this concept is unproven-ness of knowledge (Szulanski, 1996), this relates to the idea that knowledge with a proven record of past usefulness is less difficult to transfer. Without such a record it is more difficult to induce potential recipients in transfers.

Second the characteristics of the source of knowledge sharing. In this group the following characteristics were identified in literature: lack of motivation, not perceived as reliable. A knowledge source may be reluctant to share crucial knowledge for the fear of losing ownership or a position of privilege. It may resent not being adequately rewarded for sharing hard won success, or it may be unwilling to devote time and resources to support transfer (Szulanski, 1996). This is specifically difficult with knowledge, and sometimes referred to as ‘knowledge appropriation’ or ‘the knowledge paradox’. The value of knowledge to its potential acquirer is not known until after the knowledge is revealed, the potential acquirer has no need to pay for it and can resell it at near marginal cost. The second characteristic of the source of knowledge is ‘not perceived as reliable’: expert or trustworthy source is more likely than others to influence the behavior of a recipient. A source that is seen as trustworthy or knowledgeable is easier to initiating a transfer than a source that is not.

Third are the characteristics of the recipient of knowledge. In this group the characteristic of lack of motivation is again present (Szulanski, 1996), also a lack of absorptive capacity is found as to be important in literature (Cohen & Levinthal, 1990; Grant, 1996), and finally a lack of retentive capacity (Jensen & Szulanski, 2004). Again, a lack of motivation at the recipients’ side can lead to dragging, passivity, hidden sabotage or outright rejection in the implementation and use of new knowledge. The lack of absorptive capacity is an important construct in knowledge management literature (Cohen & Levinthal, 1990). Recipients might be unable to exploit outside source of knowledge because they lack absorptive capacity. Such capacity is largely a function of their preexisting knowledge. The efficiency with which knowledge can be transferred depends on the knowledge potential for aggregation of the individual. This concept has been identified at the individual and at organizational level. Finally a lack of retentive capacity can
lead to ineffective transfer. When knowledge is transferred but not retained, this more or less means that the knowledge is not remembered. The ability of a recipient to institutionalize the utilization of knowledge is referred to as the recipient's retentive capacity (Szulanski, 1996).

Fourth and final, is the context of the knowledge shared. Here two concepts are identified, barren organizational context (Szulanski, 1996) and an arduous relationship (Nonaka, 1991). Exchange of knowledge is embedded in an organizational context. This has to do with organizational culture and the exchange of knowledge may be affected by an unproductive, barren organizational context for knowledge sharing. Finally there might be an arduous relationship (Nonaka, 1991). Transfer of knowledge, particular when it has tacit components requires individual exchanges. Success of these exchanges depend on the ease of communication and intimacy of the overall relationship.

So far we have discussed the process of innovation and the importance of knowledge sharing in innovation. We proposed that both: buyer-seller knowledge sharing will improve exploration success and ‘Supplier knowledge’ sharing or ‘network knowledge sharing’ would increase exploration success.

The first part of this chapter provide an extensive overview of characteristics in the process of knowledge sharing. The second part of this chapter will discuss governance ‘market’ form and its effects on knowledge sharing.

Governance forms differ fundamentally in their use of three organizational futures 1) decision rights over the path of solution search. 2) Communication channels to support knowledge transfer 3) incentives to motivate search. In Grant (2004) considers two governance forms, markets and hierarchies, Nickerson & Zenger (2004) discuss three governance forms: markets, authority based hierarchies and consensus based hierarchies. The scope of this research is limited to market form of governance because we consider buyer seller relations.

In markets prices provide high-powered incentives to motivate search that motivate actors to search for solutions that both exploit and enhance their specialized knowledge and that can be formed into saleable products. Within a market actors will choose paths of search independent of each other of which they believe that will lead to valuable marketable solutions. Markets provide little protection against knowledge appropriation and no clear disincentives against self-interest seeking behavior. Knowledge sharing requires the formation of a common language by which to communicate knowledge. Markets provide weak incentives to invest in the formation of such language. The efficiency of markets in governing decomposable problems is that they avoid knowledge-exchange hazards by severely restricting knowledge exchange. Instead markets offer powerful incentives for individual actors to make efficient use of knowledge. Markets provide a rather problematic and costly mechanism for knowledge sharing (Nickerson & Zenger, 2004). Independent actors governed by the market could in theory contractually agree to particular patterns of search, but potential problems would require intervention of courts and contract law. The capacity for markets, even when supported by contracts, to manage heuristic search development is limited. When markets are matched to decomposable problems where actors possessing independent knowledge sets can make independent design choices, commonly shared heuristics are unnecessary and such disagreements are unlikely to arise.

Based on the text above markets are considered a highly ineffective way to share knowledge. This image is not always reflected by practice, as there are examples of knowledge sharing in markets in literature.
Several authors have discussed phenomena of organizational knowledge sharing. Here a short overview is presented. Nooteboom et al (1997) discuss motivators for firms to ‘collaborate’.

- To share fixed costs (for instance R&D, production and distribution, sales)
- To share the risks of development
- To enhance their own competencies
- To acquire access to complementary competencies
- To increase speed of market entry

Another study of Oliver (1990) discusses other reasons for organizational knowledge sharing.

- Necessity in the sense of meeting legal or regularity requirements
- Asymmetry referring to the potential of an organization to exercise power or control over another organization
- Reciprocity, referring to the collaboration cooperation rather than exercise of power
- Efficiency referring to the effort of the organization to increase its internal input-output ratio
- Stability as an adaptive response to environmental uncertainties

Pittaway, Robertson, Munir, Denyer & Neely (2004) identified several factors by a literature review on networked firms in the UK. The identified factors in this study were

- Risk sharing
- OGammaaining access to new markets and technologies
- Speeding products to market
- Pooling complementary skills
- Safeguarding property rights
- OGammaaining access to external knowledge

Finally, Ericson and Jacoby provide two arguments for organization for networking and knowledge sharing:

- Enhancing access to knowledge and promoting awareness and early adoption of innovation
- Promoting social interaction, generating trust and reciprocity that is conductive to knowledge transfer.

In conclusion on the part of firm specific motives, across the borders of the organization individual firms have motives to share knowledge. This contradicts the view of the market as a mode of governance that is not supporting knowledge sharing at all.

First we discussed what characteristics play a role in knowledge sharing. From this analysis the main conclusion is that motivation, trust and the knowledge level of the recipient plays an important role. Second we discussed how governance forms influence the process of knowledge sharing. From this body of literature the main conclusion is that markets provide an ineffective way to share knowledge. The main motivator in markets are price incentives and in essence markets are a way to capitalize knowledge and not share it. Finally this section has cited a body of empirical work on organizations that do share knowledge in a market environment. This is a contradiction and shows to the reader that there are specific motivators for organizations in a market environment to share knowledge. Overall the contribution of section to the research objective and questions is that by examining the concept of knowledge sharing in
detail we can better identify factors that will increase knowledge sharing between buyers and sellers in a market governance. The next sections will now look in to the role of procurement and how knowledge sharing can be facilitated in multi supplier projects.

2.6 Supplier Networks
This literature review has linked dyadic knowledge sharing and network knowledge sharing in buyer seller relations to exploration success. Subsequent a review of knowledge sharing was done and particularly focused market governance. This chapter will look in to theory of supplier networks to identify concepts in literature that will increase the process of knowledge sharing. This can be compared with an input – process – output logic. If the output is innovation and the linked process to innovation is knowledge management than this chapter is focused on the input. The chapter deals in essence with the question: ‘what policies, network aspects increase knowledge sharing in buyer seller projects?’ To answer this question an overview of relevant network literature is provided. A scan of literature resulted in several concepts relating to networks and knowledge sharing, these will be discussed below.

The concept of structural holes is developed by Burt (1992) who argues that the competitive advantage of firms rests on their ability to fill structural holes between dense groups of firms. Most social networks are characterized by clusters of strong connection; the information in such a cluster is often rather homogeneous and redundant. If a network of a firm bridges dense clusters, delivering non redundant information, this will provide benefits to that firm.

![Figure 7 Example of Structural Holes](image)

Low structural holes, and therefore high level of redundancy in ties make information exchange inefficient and not beneficial for competitive advantage. The author asserts that the two signs of redundancy are cohesion and equivalence. Contacts that are strongly joined to one another are more likely to have redundant information as are contacts that are positioned similarly in structure. Burt (1992) uses two measures to evaluate a person’s connections: network constraint and network betweenness. Network constraint “measures the extent to which a person’s contacts are redundant” while network betweenness measures “the extent to which a person brokers indirect connections between all other people in a network.” A person with a higher network betweenness score has greater access to information as well as less redundancy of information. A person who is in this position will be considered for more opportunities, because they will have information and control over these opportunities.

Coleman introduced the term network closure, which refers the number of ties between actors in a network (interconnectedness). In his view, he contrasts to the theory of Burt and his theory of structural holes by arguing that more closure in a network will result higher social capital and social welfare, due to three main benefits.
1) Obligations, expectations and trustworthiness of structures: If A does something for B and trusts B to reciprocate in the future, this establishes an expectation in A and an obligation on the part of B (credit slips). This form of social capital depends on two elements: trustworthiness of the social environment, which means that obligations will be repaid, and the actual extent of obligations held. 2) The second benefit according is that it affects access to information, since a lack of information could be resolved by gaining it via other people in your surrounding environment. Note however that information quality deteriorates as it moves from one person to The next in a chain of intermediaries. 3) Third, network closure facilitates sanctions that make it less risky for people in the network to trust one another due to norms and effective sanctions. “The consequence of this closure is a set of effective sanctions that can monitor and guide behavior”. Thus, in order to build up a reputation, the precondition of a closed structure is viable so that norms and sanctions can be applied. This suggests that this “reputation effect” is preventing an actor in a network to perform in any counteractive way and therefore increases trust with other people/firms. It all depends on social capital: relations between people which facilitate an action.

Walter Kogut and Shan (1997) find that a firm’s position in the network determines its access to social capital. They identify high levels of social capital with dense networks, and as for the structural holes they state that network position with highest income lie within dense regions of relationships (Gordon Walker, Bruce Kogut, & Weijian Shan, 1997). Social capital is a better predictor than structural holes in this paper.

Beckman and Hansschild (2002) find that firms’ acquisition performance increases when its network patterns are diverse in their experiences. Different types of partners are associated with benefit from network diversity such as universities, research institutes, rivals. Hagedoorn and Duysters (2002) find that the effect of networks on learning depends on the type of network, exploratory networks are better for innovative performance.

Ahuja (2000) assesses the effects of a firm’s network of relations on innovation. The paper elaborates a theoretical framework that relates three aspects of a firm’s ego network: direct ties, indirect ties and structural holes to the firm’s innovation output. Two benefits a firm requires through networks, access to resources which may be physical, skills, knowledge of other firms, and second networks enhance firm’s access to outside developments. They find that the more ties (both direct and indirect) a firm maintains the greater the innovation output of the firm. Another finding is that the effect of indirect ties on innovation output is moderated by the firm’s direct ties. The greater the number of direct ties, the smaller the benefit from indirect ties. Another finding of interest is the effect of structural holes on innovation output, here both a positive and negative hypothesis are tested, and support is found for a negative relation between structural holes and innovation output. Hite & Hesterly (2001) find that the resource
needs of firms change in the various stages of evolution of the firm. When a firm is in the emergent to a
growing stage the network shifts in response to changing resource needs. Initially the firm benefits from
a dense network structure, and as the firm grows filling structural holes is more critical for success.

A detailed case study of Dyer & Nobeoka on the Toyota production network has shown that structural
holes are beneficial for exploration especially in uncertain technological environments and that strong
ties are beneficial for exploitation (Dyer & Nobeoka, 2000). The findings of this chapter are summarized
in table 6. The findings will be discussed in the next section which builds the conceptual model of this
thesis. In the conceptual model relationships between the different concepts are proposed. The concepts
from table 6 will be included there as well.

<table>
<thead>
<tr>
<th>Concept</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Ties</td>
<td>More direct ties relate to greater innovation output (Ahuja, 2000)</td>
</tr>
<tr>
<td>Indirect Ties</td>
<td>More Indirect Ties related to greater innovation output and a Great Number of Direct Ties means a smaller effect of indirect ties (Ahuja, 2000)</td>
</tr>
<tr>
<td>Network Stability</td>
<td>The degree to which a network stays the same and has a perspective of staying the same and not falling apart (Wilkinson Ian, 2008)</td>
</tr>
<tr>
<td>Network Diversity</td>
<td>Performance increases when partners are diverse in experience (Beckham &amp; Hanchfield, 2002)</td>
</tr>
<tr>
<td>Closure</td>
<td>Relates to the interconnectedness of the network. Coleman more closure will increase social capital because it will increase access to information + a close network improves communication and sanctions that make trusting another person in the network less risky (Coleman)</td>
</tr>
<tr>
<td>Structural Holes</td>
<td>Relates to ‘a bridge’ between dense clusters. Structural holes deliver non redundant information to the firm (Burt, 1992)</td>
</tr>
<tr>
<td>Centrality</td>
<td>Centrality in a network is associated with greater power and influence. Hun firms uses prominence and power as much as possible to establish a leadership role (Dhanasai &amp; Parkhe, 2006)</td>
</tr>
<tr>
<td>Network Identification</td>
<td>Relates to the idea of reinforcing a common identity among network members (Dyer &amp; Nobeoka, 2000)</td>
</tr>
<tr>
<td>Socialization</td>
<td>Formal and informal linkages between organizations. Nature of innovation makes it impossible to predict the timing of innovation output</td>
</tr>
<tr>
<td>Procedural Justice</td>
<td>A championing role with building trust levels and communication clear and pre-established sanctions</td>
</tr>
<tr>
<td>Risk And Benefit Sharing</td>
<td>Degree to which risks and benefits are identified and shared.</td>
</tr>
</tbody>
</table>

Table 6 Summary of Concepts Identified in Literature

2.7 Conceptual Model

Terms of procurement, purchasing, sourcing and supply management are used interchangeably. A
definition of procurement by van Weele (2010): “The management of the company’s external resources
in such a way that the supply of all goods, services, capabilities and knowledge which are necessary for
running maintaining the company’s primary and support activities is secured at the most favorable
conditions”. A procurement process typically involves certain steps, activated in a certain order. This
typical process is described by van Weele (2010) and referred to as the ‘purchasing process model’. The
steps in this process are: 1) Determining specification, 2) selecting supplier, 3) contracting, 4) ordering, 5)
expediting and evaluation and 6) follow up and evaluation. For the sake of structuring the findings from the previous part we reduce the six step process to 3 steps: Partner Selection, Relationship Design and post formation dynamics. See table 7 for a description of these steps.

Table 7 Overview of Procurement Stages in Relationship Formation

<table>
<thead>
<tr>
<th>Process</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partner Selection</td>
<td>The process of partner selection involves the selection of partners for contracting. The characteristics of the chosen partners influence the capability to collaborate in a network setting and the availability of new information in a network.</td>
</tr>
<tr>
<td>Relationship Design</td>
<td>The process of relationship design consists of formal and social mechanisms. This part will focus on social mechanisms that will influence the relationship design.</td>
</tr>
<tr>
<td>Post Formation Dynamics</td>
<td>As the partners in the network are selected and the foundation of a good relationship are designed the post formation dynamics capture the embeddedness of the relation. As discussed earlier, relationships have a history which influences the context of the relationship.</td>
</tr>
</tbody>
</table>

Diversity is associated with different types of organizations and different motivators to form networks. A diverse set of suppliers will increase the array of motives to collaborate and therefore increase the motivation to share knowledge. Network Research associated high density and close networks with increased trust in the network and the capacity to collaborate. These concepts relate to the degree of network partners maintain relations with one another relative to the total possible amount of relations. In the context of supply networks this is seen as ‘collaboration Experience’. If suppliers in a network have a history of collaborating with one another this means there are more ties in the network, instead of only ties to the integrating firm. This is associated with increased knowledge sharing between suppliers. From work on innovative supply networks it was identified that the stability of a network is an important factor for participants to collaborate (Dhanasai & Parkhe, 2006). Stability and a sense of futurity of a supply network increases the motivation to collaborate. We argue that diversity, collaboration experience and network stability will be positively associated with exploration success of the organization.

P3: The Procurement function can in the phase of partner selection, by maintaining high degree of Diversity, Collaboration Experience and Network stability increase (A) dyadic and (B) network Knowledge Sharing for the Organization

Ahuja (2000) found that direct & indirect ties increase the innovative outcome of an organization by providing non redundant information to the supply network. Non redundant information increased the innovative outcome of the integrating firm. A Diverse Supply Network is associated with a broader array of knowledge domains and unique information. Also certain types of partners such as start-ups and universities are associated with radical innovations and high upward potential of collaboration activities (Cui, Loch, Grossmann, & He, 2012). Based on these two concepts; diversity and information the following proposition is formulated:

P4: The Procurement function can in the phase of partner selection, by maintaining High degree of Diversity and high degree of non-redundant information in the network Increase Exploration Success for the Organization
The process of relationship design consists of formal and social mechanisms. This part will focus on social mechanisms that will influence the relationship design. A firm is distinct from a market because coordination, communication and learning are situated not only physically in locality but also mentally in an identity; this shared identity does not only lower the costs of communication but established tacit rules of coordination. Knowledge is most effectively shared by individuals who identify with a larger collective creating an identity for a collective means that the individual members feel a shared sense of purpose. A network perspective better captures the notion that the boundary between the firm and its environment is much more diffuse. A high network identity is expected to lower the knowledge formation hazards: Barren organizational context and increase the motivation of both sender and receiver of knowledge, and therefore increase knowledge sharing in the network. The market governance form has price as its main motivator for action, contracts provide the formal mechanisms to secure each parties interests. However direct compensation for work, can be to risk full for the integrating organization, while unlimited collaboration by a supplier without compensation is also to risky. Therefore, considering Risk Sharing and Value Sharing activities are expected to increase knowledge sharing in the network. Knowledge transferability was identified as a knowledge formation hazard. Knowledge can be explicit or tacit, the latter can only be shared in face to face situations. Socialization in a network is therefore associated with increased knowledge sharing. Sharing knowledge also means a risk for the parties involved. By mechanisms of knowledge appropriation and strategic behavior can cause a lack in motivation for knowledge sharing in the network. Participants in the network must know that the integrating firm will not violate their trust, and must know that violation of other parties trust will also be have consequences. It is not in the power of the integrating firm to totally control this process, however by promoting norms this knowledge sharing hazard can be reduced. These concepts lead to the following proposition:

**P5: The Procurement function can in the phase of Relationship Design, by establishing practices that increase sharing of risks and benefits, network socialization, network identity and championing norms Increase dyadic and Network Knowledge Sharing.**

As the partners in the network are selected and the foundation of a good relationship are set, we expect that via post formation dynamics, the procurement function can also influence knowledge sharing and exploration. Section 2.5 discusses knowledge formation hazards. As the partners are clear and the basics for the relationship are there most likely the collaboration will set of in a good way. Maintaining a good relation between the supplier and the organization is expected to keep source of knowledge perceived as reliable and the sender and receiver of knowledge motivated. Besides relationship quality the vision of the supplying parties and the integrating organization should be aligned to keep both parties motivated and willingly to implement and use the knowledge for the integrating party.

**P6: The procurement Function can in the Post Formation phase, by steering on and maintaining high relationship quality with supplier and the organization and maintaining an alignment of vision increase dyadic and network knowledge sharing.**

In conclusion of this chapter we can now compose a conceptual model, see figure 11.
This chapter has discussed the findings of the literature review. Based on these findings six different propositions are formulated. These propositions are theory informed and empirical research is needed to find support and see which propositions are supported and which are not supported by the case studies. The result of this will guide the answering of the research questions. In the next chapter we start with discussing the empirical research methodology, than we discuss the empirical findings in the next chapters.
3. Empirical Research Design

The aim of this research is to increase understanding multi-vendor IT projects in exploration performance. Following this aim the research can be described as practice oriented. This section will provide argumentation for the selected type of research and the associated research design.

3.1 Type of Research

Selecting the appropriate research methodology for a study depends on the type of question, the control the researcher has over behavioral events and if the to be studied events are contemporary or historical (Yin, 2003). These three elements will be discussed in this section, this discussion provides the arguments for the chosen research method.

- Research Question: The research is focusing on how and why questions. We try to understand the success in multi-vendor IT projects and introduce new concepts based on analysis of literature in explaining success. This means the research explores new concepts and tries to add to our understanding of problems, rather than confirming certain theories.
- Control over events: The unit of analysis in the study is dyadic and network relationships which cannot be controlled by the researcher. Both a survey and a case study method would be applicable to these events.
- Contemporary / Historical: In this research the unit of analysis is observable and therefore contemporary. The events are historical but the relations and people can still be accessed and interviewed.

Based on this discussion it is argued case study is the research method that will gain most understanding and results. Following the thought Verschuren & Doorewaard (2010) and Yin (2003) who describe case study as relevant when the objective of the research is to identify underlying motivations and detailed relations. Therefore it deals with the goals of exploratory research. Also considerations of the unit of analysis lead to Case study as the preferred research method. While a survey method outperforms a case study in generalizability via statistical inference, the trust worthiness of this measure can also be doubted in the current practice of Procurement & Supply Management (PSM) (Weele & Raaij, 2013). PSM exist at the level of the purchased item, the group, the organization, the dyadic relationship between organizations, or the network. Only in cases where the phenomenon of interest concerns a feeling opinion or behavior of the individual involved, is this person to be considered as a true “respondent” (Weele & Raaij, 2013). Single Informants can only provide limited insight as a secondary source, when the unit of analysis is a group, a dyadic relationship, or a network. A case study method provides more means, such as triangulation, to measure at the appropriate unit of analysis being the dyadic and network relationship. A case study is a particularly suitable research method when the research is on a contemporary phenomenon and the boundaries between phenomenon and context are not clearly evident as is the case in this research.

3.2 Issues in Case Study Research

This section discuss what typical issues there are with case study research. These issues need to be addressed in the research design up front. This section is based on the work of Yin (2003) and the work of Verschuuren & Doorewaard (2010).

Construct validity relates to identifying correct operational measures for the concepts identified from literature review. In case study the issue of construct validity can be addressed by i) making use of
concepts and identify the measures preferably based on other published studies. ii) Using multiple sources of evidence, also referred to as triangulation (Yin, 2003). iii) Establish chains of evidence (Yin, 2008). A chain of evidence shows how an observation lead to support or rejection of a proposition.

Internal Validity needs to be addressed. Internal validity relates to seeking and establish causal relationships are believed to lead to other conditions. With case study this cannot be done via statistical methods as in survey based research, where significance measures can be obtained. Therefore this needs to be addressed in the research design. Yin (2003) proposes four analytic strategies to improve the internal validity. i) pattern matching, this requires a multiple case method. If in more than one cases the same patterns between concepts can be found this improves the internal validity of the research. ii) Explanation building, Yin (2003) refers to this as showing the line of thought that shows how one leads to another. iii) Address rival explanations, to build the case for internal validity it is powerful analytic strategy to discuss how other concepts do not influence the proposed relationship. IV) Logic models in a logic model there will be a complex chain of events over time. These events are repeated cause-effect patterns.

Another issue in case study research is external validity. External validity relates to the extent to which the study's findings can be generalized. In survey methods this is based on the method of statistical inference from a random sample to a population. However, in case study the sample is not random and therefore generalization should be dealt with great precaution. Yin (2003) identifies two ways to increase the generalizability of case study findings. First is make use of existing theory, this gives your arguments more premises. Second make use of replication logic in multiple case studies. Multiple case studies can be compared and if the context and concepts are well understood and can be compared. The findings can be generalized in an analytical way instead of a statistical generalization.

The last issue is reliability which relates to demonstrating that the operations of a study can be repeated with the same results. Here two ways to increase reliability are discussed, use of a case study protocol and the use of a case study database.

3.3 Research Design
The research design will provide a summary of matters of case selection, data collection and data

Case Selection
In this research the approach is taken to select cases on basis of comparability in characteristics of the problem. A set of criteria is defined. Deliberate sampling of the three cases was applied, meaning that the cases were selected on maximal variation of the dependent variables. The selection process was guided by the following criteria:

- Innovation – The project should involve an innovation. Innovation is defined as something perceived as new by its unit of adoption, in this case Philips or a customer of Philips
- Task Complexity – The project should have a task that is perceived complex to fulfill. Complexity is defined as internal dependency on knowledge sets to fulfill.
- Multiple vendors – Multiple vendors needed to take part in the project.
- Outcome – how is it the outcome of the dependent variable perceived.

The second step was asking experts to identify projects and discuss the characteristics described above. This resulted in a series of 7 potential cases.
The second shift was based on the availability of respondents including the suppliers. This is a very practical consideration but the argument to still make this shift is that direct access to the stakeholders in a case was preferred and key to quality of the research. Finally the cases were in consultation with Prof Dr. A.J. van Weele selected from a list of seven to four cases.

The follow up process was an introduction meeting with a key person in the cases and relevant stakeholders in the case were identified. After the introduction interview the researcher was introduced via a standard letter to the stakeholders. Finally interviews were arranged. Please see appendix 2 for overview of the letters & case selection characteristics used. The tables 8 & 9 discuss the selected cases briefly.

Table 8 Case Descriptions part 1/2

<table>
<thead>
<tr>
<th></th>
<th>Case 1: Unified Communications</th>
<th>Case 2: DCO Case NAM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Problem Description</strong></td>
<td>Strategic Exercise involving: technology choice, preparing business case for UC solution Philips Enterprise level.</td>
<td>Assignment of the two suppliers, one leaving and one entering a new region. The case covers the moment of new contract to starting operations. In this time of the process from new contract to the moment were suppliers need to install the new solution until it is ready for operations.</td>
</tr>
<tr>
<td><strong>Team</strong></td>
<td>Management &amp; Solution Experts Collaboration Cloud Management &amp; Solution Experts Communication Cloud Architect Senior Sourcing Specialist Infrastructure &amp; Operations</td>
<td>Executive Steer Committee Global Program Management Project Manager in North America</td>
</tr>
<tr>
<td><strong>Suppliers</strong></td>
<td>Alfa Beta Gamma</td>
<td>Delta E-PSILON</td>
</tr>
<tr>
<td><strong>Problem Complexity</strong></td>
<td>Medium – High Interaction Problem</td>
<td>Medium Interaction Problem – Suppliers depend on each other and on Philips to solve this problem.</td>
</tr>
<tr>
<td><strong>Interviews</strong></td>
<td>7 Interviews (Avg. Length 60 minutes)</td>
<td>6 Interviews</td>
</tr>
<tr>
<td><strong>Interviewees</strong></td>
<td>Manager Collaboration Cloud Manager Communication Cloud Philips IT Architect Account Management Suppliers Solution Expert Procurement Professionals</td>
<td>Program Management Account Management Technical Specialist Supplier Performance Manager Procurement</td>
</tr>
</tbody>
</table>
Table 9 Case Descriptions part 2/2

<table>
<thead>
<tr>
<th>Case 3: DCO Case EMEA</th>
<th>Case 4: CityTouch</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Problem Description</strong></td>
<td>Assignment of the two suppliers, one leaving and one entering a new region. The case considers the part of the process from new contract to the moment were suppliers need to install the new solution until it is ready for operations.</td>
</tr>
<tr>
<td><strong>Team</strong></td>
<td>Steerco with executive support Global Program Management Project Manager in North America</td>
</tr>
<tr>
<td><strong>Suppliers</strong></td>
<td>Delta Zéta Iota Kappa Labda Mu</td>
</tr>
<tr>
<td><strong>Problem Complexity</strong></td>
<td>Low Interaction Problem</td>
</tr>
<tr>
<td><strong>Interviews</strong></td>
<td>5 Interviews</td>
</tr>
<tr>
<td><strong>Interviewees</strong></td>
<td>Program Management Account Management Technical Specialist Supplier Performance Manager Procurement</td>
</tr>
</tbody>
</table>

3.4 Data Collection

In this section three types of data collection will be discussed, Literature, Interviews and Company Documents. The process used to guide the literature review is described in Chapter 2. This literature review resulted in a conceptual model and research framework which guided the other form of data collection which was a series of interviews. In the cases study business practitioners and experts were interviewed. This qualitative approach is chosen because the objective is to unravel relations between concepts and the implications for strategies adopted by organizations. To increase reliability of the data collection an interview protocol was developed, this can be found in appendix three. This interview protocol was followed in all the interviews, the interviewer remained the freedom to deviate from questions if it was necessary for understanding at that moment. The third and final source of data collection is company documents. Both interviews and company documents are used to describe the case findings.

3.5 Data Analysis

For the analysis of the data produced by the multiple case study the design of Yin (2003) is followed. This implies a review of theory and the development of the conceptual framework after which the cases are selected and the data is collected.

The data analysis process started with transcribing the interviews. The interviews were literally typed out and stored. Next, the transcripts were used to create a case study data base. This database was ordered
along the different constructs in the conceptual model. The interviews transcripts consisted of facts. Facts were checked in documents or cross verified in other interviews. Perceptions in the interviews were dealt with as less interpretation from the researcher as possible. The different perceptions combined provided insight in a shared perception to what extent a certain construct was present in a case etc. These are described in the Empirical Research Findings.

The final part of the data analysis is the cross case comparison. As the researcher developed a view of the different concepts and their relationships in each case, these are compared. Comparison adds insight to the research. Special attention to similar patterns, or differences that allow for conclusions that may exceed the knowledge present in one case. After the cross case analysis the process of data analysis was finished.

This chapter provided argumentation for the selected type of research and associated type of research-design. First, we identified that Case Study Research is the preferred research type for this study, the main arguments for this choice are the exploratory nature of the study, the phenomenon of interest that involves behavior, boundaries of the phenomenon of interest and the context not clearly evident. Next we addressed validity and reliability issues in Case Study research, based on earlier work we identified analytical techniques that increase validity and reliability of case study research. Finally the process of case selection, data collection and data analysis were discussed.

With the type of research and research design discussed we have the foundation of the research outlined. The next chapter will fill in a specific part of the research, namely the data collection in form of Empirical Research Findings.
4. Empirical Research Findings

This chapter will discuss the different cases and the findings from the structured case interviews. For all four cases two aspects will be discussed. First, a description of the case explaining the background and the problem central to the case will be discussed, this gives the case depth and rich context. Second, the findings will be discussed accordingly to the constructs in the conceptual model. See figure 12 how the conceptual model relates to the case outline. Finally a conclusion will be given per case.

**Figure 10 Research Framework & Case study findings**

For each case the results will be discussed as outlined in figure 12. Except for case 2 and 3. These cases share the same ‘description & Problems Case #’ this part will be similar for both cases. The Empirical Findings and Conclusion will be unique per case.

### 4.1 Case 1 Description & Problems

Philips has several technologies and tools in place to enable communication between its internal employees and between them and the outside world, like chat, phone, mail, etc. Due to development of ICT technologies this landscape has been subject to many changes over the past decades. The latest development in this area is Unified Communications (UC). Unified communications can be seen as an umbrella for- and integration of several communication technologies. This introduction discusses how UC is defined, where Philips stands in UC adoption and what bridges still need to be made.

UC entails the integration of real time communication technologies and their integration with non-real-time communication technologies. Real time communication technologies such as presence information, Chat, Telephony, video conferencing, application sharing and data sharing. And non-realtime communication technologies like integrated voicemail, email. Unified communication UC entails the integration of these real and non-real time communication technologies. Over the years Philips has not deliberately chosen for a specific UC solution. Quoted from one of the interviews:
“How Philips moved to its current communication and collaborations offering is more like an evolution while some companies have chosen for a revolution. When you choose for evolution you give away pieces of the business case over time.”

For example, Philips first offered mailing services and over time added certain functionalities like presence or chat because they became available from their current supplier. They improved their communication and collaboration functionalities with business specific and company wide solutions until the point that they offer most of the above described UC functionalities.

Philips is now looking to upgrade its UC capability with External Audio which would have higher impact than the previous upgrades. With this capability Philips would be able to integrate telephony with other communication capabilities. Some example make outside calls with your personal computer or receive voicemails via mail. Such a capability will have several benefits for Philips. First, looking at cost calling via a UC solution will be cheaper and it will reduce the need to manage and maintain an ‘extra’ telephony network at the Philips sites because traffic would run on the WAN / LAN network. Second, looking at functionality, a productivity increase is expected people would be more productive as calls can be handled from pc’s. The market is moving in this direction and Philips does not want to be slower with adoption compared with competition. For these reasons Philips started a project with the aim to develop and start executing a unified communication solution for the coming years.

Problem

The problem that the suppliers needed to tackle has several sides these will be discussed here.

- Technological Uncertainty

Philips did not have the technological know-how or vision how to integrate their current solutions with new capabilities, while also realizing cost savings. In the interviews there is a shared sense by interviewees that the market of telephony is changing but it isn’t sure in which direction it is moving. Either they should develop the knowledge in house, instead they chose to look at their suppliers for a solution. A Philips IT manager on this topic said:

“On this matter it is Philips strategy to not commit to a certain technology for a long period of time. Therefore it was chosen to go for a broad scope and both Beta, Alfa and Gamma were asked to take a seat at the table.” (Philips Manager)

The market is also moving. Suppliers that have emerged in the consumer space like Google and Apple are moving to enterprise markets. In this moving market Philips does not want a lock in with a technology for a longer time and combine leading technologies in the current market. For that reason Philips started with three suppliers and asked them to tell how they could best further develop Unified Communications. Alfa interpreted this as:

“Tell Philips what they need, as they hear different definitions from suppliers. The idea was to let them sit together in a partnership and collaborate. Initially discussions went about the total spectrum of UC and later focused on telephony, which is part of that” (Supplier Account Manager)

A key aspect for Philips to solve was an answer to the question which technologies to choose.
- Creating a business case

Besides choosing technology Philips needs to operate its IT activities in a way that maximizes value for the shareholder. Therefore it needs to select projects that will yield results for the company in a reasonable time frame. As there is a focus on savings on short term the projects with shortest payback time will be preferred. To understand how the UC project will generate business results the current situation needs to be described. At the moment Philips has invested in an ‘old’ environment for +/- 600 sites. Some characteristics of this environment are: no service level problems, the contracts for these environments are local. The current situation is laborious but there are no significant issues with the quality of telephony.

The shift from this environment to a new integrated UC environment would require a long migration and transition program. In the interviews some numbers on the duration of a typical site transition was two weeks. If every week two sites would finish it would take around five years to do the total migration.

“We are in the circumstance that we already have a UC solution. The only thing missing is a break out to the traditional telephony network. We try to integrate that part of communication. “

“In our current environment we have a lot invested in PBX solutions, these are company telephone exchanges. That’s an infrastructure in a traditional way and it is falling out of favor. We want to use more information from systems in applications. Think of CRM like suites. The trend is going to software oriented solutions, this already started and the business is asking for this movement, to integrate it with business applications.”

To create a business case the transition should also save money and not only provide productivity increase that is considered too soft by IT management. Therefore to create a viable business case a business model is with reduced investment needs is a requirement. This is part of the problem that the suppliers need to solve.

- Telephony & quality

Currently the infrastructure within Philips is operating with a separate enterprise PBX phone exchange, at about 600 sites. Every phone exchange is connected to wires which are connected to phones in a building and this network is separate from the IP network. Besides this technology you have the newer IP telephony, with this technology the data is transported over the IP network like WAN LAN or wireless. While providing benefits with regard to cost and some functionality there are also some quality risks. With IP telephony you need to think about data prioritization as voice data needs a priority over other data, because disruptions in voice are less acceptable then for example slow internet. This can be solved with software algorithms, however the network needs to have enough capacity. Telephony over Ip network is also introducing more links in the total system which potentially disturb the quality of the experience. Phone quality can also depend on headphone quality, internet connection, CPU of your notebook etc. With regard to quality there are different demands within Philips. For standard day to day between employee communications require a less reliable than in professional functions relating to telephony, like call centers this is not an option. In creating a UC solution for Philips the suppliers need to deal with the telephony quality.
4.2 Case 1 Findings

In this section the observations regarding the constructs exploration success, knowledge sharing, partner selection, relationship design, relationship quality will be discussed.

**Exploration Success**

As a result of the UC project the three suppliers developed a concept solution. The process leading to this solution was troublesome as will be discussed in the further empirical findings. The developed solution is not adopted by Philips, this makes it harder to describe the time to market and cost savings for this project.

**Newness** - The innovation is perceived an improvement over the previous technology. Unique for the solution is the combination of different technologies Beta for high quality and Alfa for medium quality. Currently Philips already adopted most of UC functionality, the current solution would be new to Philips but not new to the world. In the interviews was mentioned that other companies already adopted such solutions.

**Time to Market** – this relates to the timely completion of the project result. The end result in mind for the project was the implementation of a UC technology with telephony capability. This status is not reached in this case, a solution was created but not adopted in the end. The time to market for the intended project completion is therefore not applicable to this case. If the scope is reduced to the time it took Philips to create a concept. Philips is among the first to adopt this type of communication but not ahead.

**Cost Savings** – For cost savings only the business case behind the concept can be analyzed and not the implemented result. The associated cost savings for the solution were dependent on assumptions: first, calling via IP network would be cheaper than telephony network. This claim is associated with behavior because users should start to use their PC or Smartphone App instead of their normal telephone. Also users would start to gain productivity with this solution based on experience of supplier with other clients. Both claims are not hard up front.

**Knowledge sharing**

This section will describe the dyadic knowledge sharing between Philips and Suppliers and the knowledge sharing between suppliers. The section tries to give an overview of the knowledge sharing process based on the interviews and on survey questions.

![Figure 11 Knowledge Sharing in Case Unified Communications](image-url)
First Philips initiated a strategic assessment of UC and selected suppliers. Philips recognized that they want to change their Unified Communication solution. Philips then decided to organize a strategic exercise with three suppliers. As a kick off Philips did a series of workshops with suppliers. In the beginning phase they wanted to make clear that this is not a commercial project. Then a phase was initiated where Suppliers worked together on the assessment without Philips in the room. Philips was not actively involved and expected the suppliers to find a solution direction which would be the basis of a tender. The result of this phase was there is no shared architecture. This means the suppliers could not solve the technical problem upfront. Then Philips took the lead again in the project and build their own reference architecture, helped by the knowledge from the process so far. This reference architecture was shared with the suppliers, and was aimed to work as a new solution. The outcome of this was that Suppliers did not find a solution that met all functional requirements or the goals regarding the business case.

The table below shows the main findings and links them to quotes in the interview transcripts. Based on these findings the author forms an assessment on the behaviors and their relative success in knowledge sharing.

*Table 10 Knowledge Sharing in Case Unified Communications*

<table>
<thead>
<tr>
<th>Process</th>
<th>Dyadic Knowledge Sharing</th>
<th>Data</th>
<th>Network Knowledge Sharing</th>
</tr>
</thead>
</table>
| **Workshops** | * Philips sees this as an open minded strategic exercise not as a commercial track.  
* Information regarding inventories, business case is shared according to Philips  
* Suppliers think Philips focus too much on technology and too less on the business case.  
* No Representatives from Philips Businesses | Philips Manager: “We were open minded, we wanted to put all the cards on the table”  
Manager Supplier Account: “They go 100% for technology, I think you leave more than half of what it is about off the table…. We pulled on that information to create a business case to think along about the solution” | * Knowledge sharing regarding business case is problematic, in beginning phase already. |
| **Phase 1** | * No Knowledge sharing with Philips.  
* The role of Philips is passive here they expect suppliers to find solution  
* Certain Supplier wants to share 5Y technology roadmap with Philips but not with other Suppliers | Philips Manager “Suppliers were arguing or talking behind each other’s back. With other words you’d get a complete opposite story without consensus as a result” | *Suppliers have meetings together  
* knowledge about business case and technology is not shared  
*Disputes on who manages the call control part  
*All suppliers go for a win or nothing strategy | Quote Manager Supplier Account: “You cannot expect to place two competitors into a room and let them work together, It is Ajax-Feyenoord”  
Philips Technical Specialist: “You saw the suppliers could not agree on what was an architecture” |
In the workshops Philips aimed to initiate an open minded exercise. They were keen to share knowledge especially in the technical domain and they perceive this was done extensively. Suppliers debate this statement, they recognize that Philips shared technical knowledge but refused to bring the right people (business etc.) and the associated knowledge to really create a business case. After the workshops suppliers were expected to collaborate on a solution, Philips expected they would develop something like the blue print of the final solution. This assignment failed but during the process knowledge was shared with Philips about possibilities and solution directions. Overall, Dyadic knowledge sharing in phase 1 and 2 was limited. Overall dyadic knowledge sharing is perceived by Philips as good, they took an open minded approach and suppliers shared insights with them. This is similar to the perception of the supplier, with the note that Supplier felt they didn’t know enough about the business case.

Network knowledge sharing started in the workshops and continued in phase 1 and phase 2. The findings show that knowledge sharing was problematic. Especially knowledge regarding the business case was problematic. The actors operate strategically in these phases. By not sharing knowledge they try to oGammaain a better position than the other suppliers. In the interviews there are examples that suppliers want to share knowledge, for example a technology roadmap, only with Philips and not with the other suppliers This has to do with uncertainty about the pay-off of sharing knowledge which leads to strategic behavior. Network knowledge sharing in this case is by suppliers perceived as low and by Philips perceived as low.

**Partner Selection**

The construct Network Diversity relates to the evolution of the suppliers and considers the three suppliers as a ‘network’. GAMMA, Beta and Alfa are established players with an existing account at Philips. All organizations are operating long in the market of Information and Communication Technology. Beta is ahead of Alfa in developing its telephony capabilities. For both Alfa and Beta it is attractive to move to full service provider models, this was also indicated in the interviews. GAMMA is a typical service provider and has experience with that with customers including Philips. The partners have similar expertise and are diverse in terms of service or technology provider.

With regard to Network Non Redundant Information, the interviews showed that both Alfa and Beta had a large overlap in access to information. They both provide front end and back and for unified communication technology. Exactly where they do not have an overlap in knowledge is similar to were their competitive advantage lays. Beta has a more reliable telephony capability, Alfa has a more integrated
collaborations suite. The non-redundant information in the network is increased by GAMMA, they provide skills regarding management of services and are indifferent to technology. The amount of non-redundant information in the network might is low to medium.

With regard to Network Collaboration Experience, GAMMA has a relationship with Philips for over 7 years and is one of the ECO suppliers (see introduction chapter for definition). Alfa has a relationship with Philips with ups and downs for decades. For some years the Philips strategy was to reduce the amount of Alfa in their IT. Since a couple of years this is no longer the case and the Alfa account has increased. There is also a strong history with Alfa in the area of communication and collaboration and they are the largest provider in Philips’s current Unified communication portfolio. Beta has a long relationship with Philips. They are a provider in their telephony operations. Also Beta is a relatively large ‘indirect’ supplier of Philips, which means that other suppliers are buying Beta hardware / software and reselling it to Philips. It is therefore perceived that there is a collaboration experience between the three suppliers and Philips is high. Also between suppliers there is a lot of collaboration. For example, Alfa is known to extensively work with Beta and GAMMA, but not in the area of Unified Communications.

As last construct Network Stability. There is no network history as it is the first time that these suppliers are used to come up with a joint solution. Philips intention has two sides, they state there is a share for all parties in the domain of UC. However they don’t guarantee that the initial partners will get the business. Throughout the interviews it is mentioned that ‘the pie’ is big enough and that there is a share for all the vendors.

Relationship Design

This section will discuss the findings regarding four constructs. Risks & benefit sharing, socialization, Knowledge sharing norms, and Network identity.

In the interviews the following risks were identified for Philips. First, if Philips does not move with their UC technology they could lag behind competition. When they do not move with the newest technology while competitors Philips is at risk losing competitive advantage. Second risk for Philips is too low quality of telephony. Philips is used to high standards of quality regarding telephony with their current network. A move to the IP network can reduce the quality and functionality. The causes could be problems with the network and also less control over the user environment. Third risk is supplier capability, the current environment Philips is managing is very complex and large. They should assess if the supplier can manage this network and transfer it to a new solution, outsourcing means a risk for underperformance. For Alfa the identified risks are they make investments while they potentially do not get the contract. Also they are expected to share information with the other suppliers which could decrease their relative position to that of Beta. Thirdly, Alfa already being a supplier of many aspects of Unified collaboration can lose business. For Beta the risks are partially the same, they could make investments and not get the returns. Also if they share information could harm their position relative to Alfa. For GAMMA should assess the price of a worldwide transition, there is a risk to choke in the size of this particular case. The benefits for Beta, Alfa and GAMMA are gaining the business. There are no extra benefits identified from the interviews. For Philips the benefits are, operating in a service business model which is preferred to managing an own infrastructure. Also potential savings and increased functionality that would give them an advantage or at least keep up with competitors. In this case Philips did not actively reduce the risk for the suppliers. There was an intention to share the value of the total UC solution among the suppliers but no measures to reduce risk for the suppliers.
The vendors have had workshop meetings with Philips and some meetings with vendors only. There were no other examples of events were all partners were together. Most of the meetings were initiated by Philips and not by the suppliers.

Philips did not explicitly communicate knowledge sharing norms. There expectations regarding knowledge sharing of the suppliers were different. Some interviewees suggested that they expected them to share technical and business case related information. In some cases this thought was said to be naïve. Philips tried to set an example by sharing a lot of knowledge in the beginning of the project. The suppliers did not perceive it in this way. They thought Philips only shared technical knowledge.

Finally network identity, this relates to the feeling of belonging to a group with shared interest and shared values. While both Alfa and Gamma are part of the supplier ecosystem they did not mention this when asked if they felt to be part of a Philips family. Philips recognized this and said they might send two messages to the suppliers. First a military approach, where they strictly demand and manage performance and lose focus on more soft side. And then sometimes a soft approach, during break out meetings or at conferences this might be an unclear message for the suppliers.

**Relationship Dynamics**

The relationship between Alfa and Philips has changed over the years. There was a period when Philips tried to reduce its Alfa offerings but this changed. Alfa is part of the IT ecosystem. There is a governance in place with executive sponsorship and regular governance meetings. The relationship quality with this partner is also measured according to the construct relationship quality of de Vries (2013). Philips rates relationship quality at 5 on a 7 point Likert scale. Alfa rates relationship quality on a 3.5/7. Compared with the other Ecosystem vendors this is a relative low score.

Beta has been both a direct and indirect supplier for Philips for hardware and software. There is no extensive relationship with Beta on executive level. Beta seems to have built a good impression especially at telephone group. Alfa and Beta are working together in different areas, they are both satisfied with these collaborations as stated in the interviews. However in the area of unified communications they are competitors.
GAMMA has been a main outsourcing partner for Philips for the last 7 years. GAMMA is described to know Philips IT really well. GAMMA has been part of the IT Ecosystem. The relationship is measured and perceived by Philips as on 4.8/7 and by GAMMA as 5.5/7. GAMMA has a relationship with both Alfa and Beta as a service supplier using their technology. One interview spoke of a good collaboration between Alfa and GAMMA in the area of Dutch defense. There is no further information in the interviews on this matter. Overall the relationship quality with the suppliers in this case is low to medium.

In summary of Case 1; In the Unified Communications (UC) case, three suppliers were asked to work on Philips’s next step in adoption of UC technology. This step entails a break out to the telephony network. The problem central to the case is broken down in three aspects: i) technological uncertainty, in the UC market several technologies are available and new entrants are expected, ii) the business case, the project would require investment with associated risk which needs to be balanced between Philips and Supplier iii) Telephony & Quality, certain cases like call centers require high quality for which a technical advanced solution is required. The outcome of the solution finding process is an innovative solution but not attractive from business case point of view at the moment of time, therefore it was chosen to hold the project. The way Philips and the suppliers came to the solution process is described in detail in the case. In the project all parties indicate there was knowledge sharing between Philips and the Supplier but limited knowledge sharing between the suppliers. Below the summary of the variables is given. The main findings regarding independent variables is the strong overlap in expertise regarding two out of three suppliers. The network identity among the suppliers is low.

Table 11 Summary Findings Case Unified Communications

<table>
<thead>
<tr>
<th>Exploration</th>
<th>Success</th>
<th>Knowledge Sharing</th>
<th>Partner Selection</th>
<th>Relationship Design</th>
<th>Relationship Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newness</td>
<td>Medium</td>
<td>Dyadic KS</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Time</td>
<td>Low</td>
<td>Network KS</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Cost</td>
<td>Low</td>
<td>Collaboration Experience</td>
<td>Low</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>Stability</td>
<td>Low</td>
<td>Medium</td>
<td>Low</td>
</tr>
</tbody>
</table>
4.3 Case 2 and 3 Description & Problems

The general description and problem for case two and three are similar. These cases are projects in the same Data Center Outsourcing (DCO) program. They relate to two comparable situations but with a different geography and a different set of suppliers. They share the same description and problem with some minor differences. The opportunity to look at two different problems under different circumstances is really unique and a great opportunity to learn from.

- Case 2 entails the DCO project in North America (NAM). For this project E-PSILON and Delta are the suppliers.
- Case 3 entails the DCO Project in Europe, Middle East and Asia (EMEA). For this project Zèta and Delta are the suppliers

Philips had a global outsourced contract for its datacenter services. These services include the hosting of data on which applications of the Philips businesses are running and storing data. The supplier providing these services was Delta (TSI). When TSI received this global contract agreements on performance were made and the performance should improve over time. After several years Philips was experiencing problems with TSI. First, TSI was expensive the global contract had global prices, so while these prices made sense in some parts of the world they did not in other parts. Therefore certain Philips regions were unhappy with the TSI pricing. Also regions did not commit to the contract. They did not recognize the contract and thought the supplier did not understood their business. For example, TSI had its home market in Germany and knew the European market very well, however other parts of the world TSI was a newcomer. For example, agreements regarding decommissioning were not recognized by growth market Asia, decommissioning was not part of the strategy of Asia. In summary there was unhappiness regarding TSI in general. Certain commitments were not respected by the supplier. For example, the supplier would transfer to regional datacenters but this paused in 2011 and never completed. As a result the reduction through centralization and the anticipated savings never materialized.

These circumstances led to a disturbed relationship between Philips and TSI and eventually escalated and led to the decision to stop the contract and again outsource the DCO. It was agreed to leave the Delta Data Centers before Jan 1st 2014 and to contract the new DCO regional. The regions identified were: Greater China, Asia Pacific (APAC), Europe, Middle East & Africa (EMEA), North America (NAM) and Latin America (LATAM). Philips wanted to increase the service levels in the regions in an environment with declining demand for the new suppliers. These regions would be locally invoiced and governed by local law.

Case 2 contains the regional contract in EMEA. In this region the new local contract was won by Zèta. The case considers the assignment of the two suppliers Zèta and TSI to create planning and execute on the transition from the old contract to a new contract of Zèta. Case 3 contains a similar assignment however the geography is North America instead of EMEA and the involved suppliers are TSI and E-PSILON.

Problem Description in Case 2&3

The DCO NAM and EMEA case share the same challenges that need to be solved. However the location is different and the suppliers are different. This section will discuss the problem that needed to be handled in the two cases by the two suppliers.

- Transfer assets and responsibilities Philips Sites
Philips owns sites around the globe where data centers are placed. At these sites Philips owns the building but the supplier owns most of the hardware and has the responsibility to manage it. To migrate the sites the assets and the knowledge regarding managing these sites need to be transferred from the old to the new supplier. To illustrate this with a quote from the interviews:

“There is a real asset transfer, one laptop is standing in a Philips building managed by us (Philips) and tomorrow it remains to be in the Philips building but it is managed by the supplier.”

In both cases Philips nor TSI did not exactly know what assets they owned or what purpose each piece of hardware at a certain location had. The new suppliers had to get grip on the new environment in order to be successful.

- Moving Regional Data Centers

Beside Philips sites there were data centers owned by TSI. In the DCO NAM case there was one datacenter in Houston USA owned and managed by Delta that needed to move to Raleigh USA owned and managed by E-PSILON. In the DCO EMEA case there was a data center in London owned and managed by TSI that needed to move to Eindhoven owned and managed by Zêta. Moving these datacenters can be done virtual and physical. In a virtual move the data is transported to the new data center over the internet. In a physical move, the data needs to be moved to new servers at the old side, these new servers need to be physically transported to the new data center.

- Technical Adaptively

During the transition the supplier might have had ways to manage the data centers which involve software that they don’t want to share with the other party. For example, TSI made use of a UNIX environment of which they said it was intellectual property in both NAM and EMEA. That created extra technical difficulties. Also both E-PSILON and Zêta had processes to transfer the data, which TSI refused to adapt to. Therefore these processes needed to be changed.

- Managing close deadline

The deadline for the project was set at December 1st. From the beginning this deadline was to be said as tight. The global contract with TSI was planned to end at December 31st 2014. Beside that some of the servers are hosting business critical data, this data needs to be moved during times that the business does not need it, for example in the weekend.

In the interviews it was also asked if the problems in EMEA and NAM were different. From the perspective of Philips there was a consensus that problems were more or less the same size. Both had to move regional data center and Philips sides. EMEA was the largest in terms of scale. NAM had more regulatory issues.
4.4 Case 2 Findings

In this section the variables of the conceptual model will be discussed finally a conclusion will be given.

Exploration Success DCO EMEA

The exploration success of the transition will be analyzed in terms of newness, savings and time. In terms of technology the result is the same as in the old situation. In certain areas the supplier improved from the old situation.

"Technically the solution will be more or less the same, however the service-level in the new solution will be higher due to proximity of the supplier in the market."

In the interviews it was found that in the new situation the supplier will be closer to the customer and better able to adapt to needs of the customer but this is not a direct consequence of the collaboration between Zèta & TSI.

The savings generated from this project are perceived to be good in the interviews. Zèta was perceived very customer focused also with regards to cost. An example of a tradeoff between functionality and cost that was shared in one of the interviews.

"For example, in a city in Mongolia, the functional requirement and SLA says the supplier has 4 hours for active site support. You can say as a supplier we cannot do that, you can also say I increase the price. In these types of choices Zèta was very customer focused and thinking along with Philips."

This example shows that Zèta actively addressed cost issues which saved Philips money. Another example is that Zèta actively addressed issues with regard to shadow periods in handover moments. Shadow periods are the periods in which the customer is charged for the same function by two suppliers because one is closing off and the other is starting supplying that function. Zèta addressed these proactively which saved Philips cost.

The deadline for the project was set on December 1st 2013. ZÈTA and TSI finished later with the total transition. However Zèta said from the very beginning that the deadline was not feasible and needed to shift to March 1. This second deadline was eventually made by Zèta, not in the other projects.

Knowledge Sharing DCO EMEA

- Dyadic Knowledge Sharing

Zèta was from the beginning of the project motivated to share knowledge with Philips. They shared information with Philips in the RFP phase and were well prepared to start the transition. For example they shared a very detailed planning. There are examples of knowledge sharing in the benefit of Philips.

"In handover moments there is an overlap between the supply from one supplier to the other, this is called a shadow period. The longer this shadow period takes, the more cost there are for Philips. TSI at one point in time tried to use these shadow periods to earn money. E-PSILON was never interested in that, Zèta actively thought along with Philips in that sense”
Also examples of Philips sharing knowledge with Zèta are present. Zèta has a seat at the table in certain bi-weekly IT MT meetings. In these meetings or part of these meetings there is room for the supplier to sit in, listen and give his perception on certain matters. Another finding is the initiative and motivation to share knowledge and come to a solution. A quote that illustrates this point:

“Not everything can be captured in contracts and there are always multiple interpretations possible Zèta tried to think along with Philips and come to a solution”
(Philips Procurement Manager)

“Zèta sees it as its obligation to observe and flag issues and share that with Philips sometimes that is without the scope of contracts” (Account Manager)

Overall the dyadic knowledge sharing between Zèta and Philips is perceived positive by both sides. Both parties have the motivation to share knowledge and do that on different organizational levels. There are meetings, sessions with executives, all is done in a pro-active manner.

- Network Knowledge Sharing

Early on Zèta understood there was a frustrated relation between TSI and Philips, they also understood that the success of their transition partly depended on TSI. This was also advised to the supplier by Philips. The need to collaborate is illustrated by the following quote:

“In certain cases ZÈTA started to play an Intellectual property game. We tried to sweep that of the table in negotiations but we had difficulties with that”

Zèta had experience in collaboration with TSI. They knew TSI was a formal and strict party with rigorous processes. They did two things to improve knowledge sharing with TSI. They tried to influence them legally. They did that by keeping them to appointments made in the association of outsourcing parties.

“We called them to account for not keeping appointments to agreements in the outsourcing business. We did not play that via the Philips contract but right with TSI and since then the behavior of TSI Changed”

They also tried to build a relation with TSI on different organizational levels. By investing in a better relation the knowledge transfer also increased. Especially the motivation to accept solutions of the new supplier. Sharing knowledge between the two suppliers however cumbersome in the beginning changed positively during the transition.

Partner Selection DCO EMEA

This section will discuss the constructs diversity, non-redundant information, collaboration experience and network stability. Diversity is low in this case as both companies are established and market leaders. Collaboration experience between Philips there is a long history of collaboration between Philips and Zèta. There was also collaboration experience between Zèta and Delta:

“We have experience in many projects. It is a very formal party. Their processes are very rigorous and strict and their network security is huge. That makes a transition very complex. You need to request a change five days ahead, otherwise they refuse”
Like in the other DCO case the stability is very low. It is a fact that TSI eventually will stop being a supplier of Philips and there is no stable environment.

**Relationship Design DCO EMEA** - Network Socialization is high in this case. From early on Zèta invested in building a relationship with Delta. They had contact on operational and executive level. This added to building a relation which is mentioned by both sides.

Knowledge sharing norms. Philips has the philosophy that strategic suppliers should know what is going on, what is changing, so that they can timely adjust and think along with Philips on the new landscape. This ‘norm’ was explicitly shared with the supplier and mentioned in the interviews. Another norm is that Zèta believes that sharing knowledge pays off. This can be explained by an example

“It is not that we share knowledge for a good purpose. If things need to change you are a trusted partner and it pays itself off”

Network identity, in this case there is a sense of network identity. Philips Executive always says: “You are part of my IT organization”. This quote illustrates that Zèta feels they are part of more than the contract and buyer seller relation and there is high trust.

**Relationship Dynamics DCO EMEA** - With respect to the relationship with TSI refer to the part in DCO NAM Case, as there is no difference. Philips and KPN outsourced a large part of their IT organization in 1996, this became the company Origin. In 2000, Origin merged with Zèta, and Philips remained to be a shareholder. This has not been a guarantee for good relationship quality between the two companies. Zèta had almost no engagement with Philips before the DCO project. In the DCO project it was a chance for Zèta to become a new player in the IT landscape which they took with two hands. Result is a very positive shared experience that was shared in the interviews. Zèta and TSI work together in several transition programs, the relationship quality between them was not at the start. Zèta had made investments in building a relationship with TSI for this project. They tried to build trust and show cooperation.

In summary the success of this project was high, both in time and cost the project met and sometimes exceeded expectations of the Philips stakeholders. Interestingly both dyadic and network knowledge sharing were high in this project. With regard to relationship design we find especially high network socialization, knowledge sharing norms and network identity in the network. Also the relationship quality is high.

**Table 12 Summary Findings Case DCO EMEA**

<table>
<thead>
<tr>
<th>Exploration Success</th>
<th>Knowledge Sharing</th>
<th>Partner Selection</th>
<th>Relationship Design</th>
<th>Post Formation Dynamics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newness</td>
<td>Low</td>
<td>Dyadic KS</td>
<td>High</td>
<td>Non Redundant</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Information</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Diversity</td>
</tr>
<tr>
<td>Time</td>
<td>High</td>
<td>Network KS</td>
<td>High</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Risk Benefit</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>sharing</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Network Soc.</td>
</tr>
<tr>
<td>Cost</td>
<td>High</td>
<td>Collaboration</td>
<td>High</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Experience</td>
<td></td>
<td>Knowledge Sharing</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Norms</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Network Identity</td>
</tr>
</tbody>
</table>

High
4.5 Case 3 Findings

In this section the variables of the conceptual model will be discussed finally a conclusion will be given.

Exploration Success DCO NAM

The exploration success of the transition will be analyzed in terms of newness, savings and time. In terms of technology the result is the same as in the old situation. In the interviews it was found that in the new situation the supplier will be closer to the customer and better able to adapt to needs of the customer but this is not a direct consequence of the collaboration between E-PSILON and TSI.

“Technically the solution will be more or less the same, however the service-level in the new solution will be higher due to proximity of the supplier in the market.”

With regard to savings the project in North America was not very successful. Extra cost were made due to the transfer of Assets. E-PSILON had roll backs which means they started part of a migration and found out the new solution would not work, than they needed to roll-back to the old situation. The execution took E-PSILON more time and money than planned. Several Philips employees mentioned the roll-backs E-PSILON experienced in the transition:

“During waves [moving data physically or via the cloud] E-PSILON had to do more than one roll-back. Sunday at 4 in the afternoon they would see they don’t make it and then they had to work until Monday morning to get the old systems up and running” (Philips Manager)

Such examples led to increased cost for E-PSILON. Illustrated by the following quote:

“For us a risk is that the transition was more expensive than calculated, and that also happened” (E-PSILON Account Manager)

The planned time to go live was not met by this project. The deadline was set on December 1st 2013. E-PSILON and TSI finished later with the total transition. The exact moment of completion is hard to define as from transition the project moved to operations, so minor actions remained needed between TSI and E-PSILON which finished around April 2014.

Knowledge Sharing DCO NAM

Network Knowledge Sharing

In the interviews with Philips the Knowledge Sharing between E-PSILON and Delta has been little to none at the start of the project.

“E-PSILON has never took the initiative to talk with TSI. Eventually we [Philips] have organized an escalation in Houston. Everyone was sitting at the table there, Philips IT, E-PSILON & TSI. It more or less went like this: TSI said something, E-PSILON said something. They looked in each other’s eyes and you could see they never spoke with each other.”

In the interview questions regarding knowledge sharing between TSI and E-PSILON it was remarkable that organizational culture was often mentioned. Both E-PSILON and T-System are described by a professional
and strict, hierarchical attitude. Both companies depend on authority in decision making. This harms the knowledge sharing and solution finding process, because they lose time waiting for decisions. In later stages of the project the knowledge sharing between E-PSILON and suppliers is becoming more frequent, however the role of Philips remains being mentioned consistently. In all interaction between E-PSILON and TSI Philips need to act as a mediator. In an interview Philips project manager describes a typical way of solving problems in the project:

“In most cases such issues were resolved by getting together with suppliers and Philips, get deadlines on the table with the incumbent supplier about transferring the knowledge and manage the new supplier’s side to what they are willing to accept and deal with.”

In summary the network knowledge sharing in this case is very limited. Most interaction between the suppliers happens via Philips.

Dyadic Knowledge Sharing

Although the suppliers mention the willingness might be there with Philips to share knowledge the amount of relevant knowledge possessed by Philips was disappointing. Philips was not able to tell everything about the current inventories, or technical details. An explanation for this could be that Philips manages the contract in an output based way and does not know all the details about the environment.

“If a supplier has been performing badly in a particular area. They are reluctant to disclose that, so they are not willing to tell you that they haven’t been doing stuff that they were supposed to be doing. So that’s one of the problems, it looks like they are not willing to share knowledge but in fact they don’t have any knowledge to transfer.”

Dyadic knowledge sharing between the supplier and Philips was limited. Partly due to the lack of knowledge because the process was outsourced. Philips intention to share knowledge in best possible way was there.

Partner Selection DCO NAM

This section will discuss the constructs diversity, non-redundant information, collaboration experience and stability. Diversity is low in this case. Both are established companies and there is no start-up or challenger between the partners. Collaboration experience between E-PSILON and Philips is high. Philips has been a customer of E-PSILON for a long time. Collaboration has not always been optimal. Several interviews indicated neither good nor a bad relation with E-PSILON. E-PSILON recognized this and stated that it is also a cultural issue, especially between Netherlands and USA, and that E-PSILON can do a better job at communication. E-PSILON and Delta lack a collaboration history. Especially in the market North America TSI was a newcomer when they initially gained the contract. They gained market share quickly in North America but they are a small player compared with E-PSILON in the area of data center outsourcing. E-PSILON has in that sense no collaboration experience with TSI. Stability in this set of suppliers is low. It is a fact that eventually TSI will stop being a vendor of Philips. In conclusion with regard to partner selection there is low diversity, non-redundant information and stability in this network. There however is collaboration experience between E-PSILON and Philips but no further collaboration experience in the network.
Relationship Design DCO NAM

With regard to risk benefit sharing. The primary risk identified in the interviews was the risk of investing in the assets. It was not clear how many assets there were and what their price was. Fact was that the assets needed to transfer from one supplier to another. To buy assets with this kind of uncertainty is a huge risk for any supplier, therefore Philips took this risk. In the old contract with TSI all the risks of the assets were on suppliers. In the new contract if Philips wants to shut something down and there is still value on that asset Philips agrees to either redeploy or impair that asset so the remaining depreciation is shared. Another risk identified in the interviews was that TSI was performing weak in North America, therefore the risks of taking over for E-PSILON were high.

Network socialization was low in North America Case. There were regular meetings with Philips and the new suppliers on the table. These all had an official character and were planned and part of the governance structure organized by Philips. The interviews showed no signs of the supplier contacting each other. In the Netherlands there is a presence of E-PSILON on the High Tech Campus and the contacts between E-PSILON and Philips are frequent. It was mentioned in the interviews that certain layers between the organizations all the contact is per telephone due to a lot of traveling.

Knowledge Sharing norms, Philips expects the suppliers to share knowledge proactively and show ‘partnership behavior’. A Procurement manager shared his view on knowledge sharing with strategic suppliers in one of the interviews.

“Strategic suppliers I need to feed with information so they can innovate for us and they know on time were Philips is heading and so they can move with the dynamics of Philips”

The extent to which E-PSILON see these values the same way is different. The following quote shows how an opportunity to share knowledge at high organizational level failed.

“During the contracting I said make a seat available at the management team table for E-PSILON so they can hear what is going on in the US. But this is not happening.... E-PSILON would never give feedback in such a meeting the openness and sharing of information is interpreted differently”

This also reflects to how E-PSILON sees TSI and Philips. They had a strong believe in their own capability which is justifiable since they have the largest market share in outsourcing business and are rated as best supplier. There are no comments that they recognize the need to share knowledge or are motivated to do so, which is described as an attitude by Philips in the interviews.

With regard to Network Identity in this case there is no feeling of being part of a ‘network’ or a ‘client team’. There are more signs of disliking each other than identifying to a group solving a problem for a customer in the best way possible.

Relationship Dynamics DCO NAM

The relationship between Philips and E-PSILON has been there for a long time in different types of IT projects. They are part of the IT supplier ecosystem. When you look at the relationship quality there is a lack of cooperation, trust and assurance. Within Philips E-PSILON is perceived as a very strict, professional
organization. During the interviews high trust in the initial technical competence of E-PSILON was mentioned. But also problems with cooperation, also often related to cultural differences.

“If you look at E-PSILON they are much more disciplined, strict, may be something like professional, what I mean is that they have standard policies and procedures they don’t deviate. They believe they have the best practice in the industry in everything they do.”

The relationship between Philips and TSI started with the engagement in the data center outsourcing project in 2009-2010. In terms of spend they were one of the biggest IT suppliers and member of the IT supplier Ecosystem. With this project this collaboration ended. During the years of TSI as a main vendor the performance was constantly under debate. The relationship quality between TSI and E-PSILON is perceived as troublesome. Cooperation is zero as indicated in one of the interviews.

In conclusion of the DCO NAM case, this case the supplier needs to improve the Data Center functionality in North America for Philips. The case entails the collaboration between Delta and E-PSILON to transfer this functionality. The outcome solution finding is in technical terms not new, the deadline for the project is exceeded and the cost for Philips and E-PSILON are higher than expected. The success for exploration is therefore considered low. With regard to Knowledge Sharing between Philips and the suppliers it is perceived there is some but not proactive from the supplier side. The network knowledge sharing in this case is perceived to be low.

*Table 13 Summary of Findings Case DCO NAM*

<table>
<thead>
<tr>
<th>Exploration Success</th>
<th>Knowledge Sharing</th>
<th>Partner Selection</th>
<th>Relationship Design</th>
<th>Post Formation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Newness</strong></td>
<td>Low</td>
<td>Dyadic KS</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td><strong>Time</strong></td>
<td>Low</td>
<td>Network KS</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td><strong>Cost</strong></td>
<td>Low</td>
<td>Collaboration Experience</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>Stability</td>
<td>Medium</td>
<td>Low</td>
</tr>
</tbody>
</table>

*Figure 13 Relationship Quality Philips IBM*
### 4.6 Case 4 Description and Problem

The information regarding this case was not as complete as for the other cases. The primary cause was a delay in information gathering. The project team does not exist anymore, members have moved working in very dispersed and international environments. For this case it took longer than for the other cases to get access to the right persons for interviews. Three stakeholders in this case were available for an interview in the required time period.

Philips has a long history in selling light to a diverse portfolio of customers. For professional customers the assortment quickly extended from not only the light bulbs to the control systems for lighting, extending the offering to their customers. One of the latest developments in this regard is CityTouch.

CityTouch started as a spin-off or ‘venture’ with Philips being the owner. This venture focused on developing an asset management system developed for lighting. For example Cities, face strict budgets and high energy and maintenance cost regarding their lighting. CityTouch software platform provides the monitoring, functionality and control to better manage lighting in cities and increase efficiency.

To fully describe the CityTouch project in the project some background is needed. Typically a lighting system consists of: a Light source; a control system; software. For an overview of how the system developed see table 14. Philips was already offering lighting systems to its customers, until 2011 Philips developed the light source and control systems, and outsourced the software used to control light. When CityTouch venture became more mature it developed into an alternative for the 3rd party software that Philip was using. However several problems arise from the combination of Philips light-source and control system with CityTouch software. Philips decided to change the control system they offered. The result of this is an updated version which is now commercially available. For a complete view it is also mentioned that a new development to improve on the outsourced system has started.

#### Table 14 Project Phases CityTouch

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Scope of Case Light Source:</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Philips</td>
<td>Philips</td>
<td>Largely Outsourced</td>
<td>Increase functionality</td>
</tr>
<tr>
<td>Network / Control System:</td>
<td>Philips</td>
<td>Philips</td>
<td>CityTouch</td>
<td>CityTouch</td>
</tr>
<tr>
<td>Software:</td>
<td>3rd party</td>
<td>CityTouch</td>
<td>CityTouch</td>
<td>CityTouch</td>
</tr>
</tbody>
</table>

### Problem

In 2012 CityTouch was chosen as software platform working with a control system and light source of Philips. A typical solution at that time would exist of a city divided in several areas, in these areas an access point would connect all the light sources for this area. The access points were connected to a central control system with the application to control the lights. There were several disadvantages for this particular set up: i) This system was complicated, setting it up required highly skilled workforce; ii) the system has high set up cost requiring high initial investment, this is a barrier for purchasing such systems;
iii) did not match the strategy of service business model. The decision was made to further develop the solution and change the network / control system. New requirements were added relating to quicker easier installing and switching to a CityTouch system. Part of the decision was also that this specific part would not be developed in-house as it was not something Philips wanted to develop its business in for strategic reasons. This was organized as a project and took place between 2013 and 2014.

4.7 Case 4 Findings

Exploration Success

The result of the project was innovative and unique. No other lighting system makes use of a public telephone network. The installation time and complexity relating to the setup of the system were reduced significantly. The business model behind the solution is also unique as the lighting can be bought as a service, meaning that a city can pay for its light with reduced investment and risk. From a business perspective and from a technology perspective this is a highly novel innovation. In terms of cost the cost for end user are going down. One interviewee mentioned that the operating cost of the system may have slightly increased due to the use of telephony network. One cannot speak of cost reduction with this system as the functionality and business model have also changed. Philips was first to the world with this particular solution. Other businesses are trying to offer similar systems, some niche players also provide these type of solutions. Not on the scale of Philips in a global market.

Knowledge Sharing

Knowledge sharing between suppliers is not recalled in the interviews. It is mentioned that there were no sessions with all parties around a table and there was no need to do this. It is mentioned that a rather diverse knowledge was needed but that this would interface clearly and therefore there is no need to sit with multiple suppliers. Were alignment was needed the problem could be split up, for example:

“We gave the supplier of the modem a SIM card and the supplier of the SIM card the modem and you ask them to test certain parts. Eventually the integration and end-2-end tests are done by us [PHILIPS]”.

Figure 14 Overview CityTouch Solution
Between Philips and suppliers much knowledge was shared, in all the different stages of the project. In the interviews it is recalled there is a very diverse set of knowledge needed in the project. There is knowledge of the customer and market, software, network, SIM-card, internet-modem. Finding a solution required integration of all these different domains.

Philips has a strong vision how to develop the product, the solution and the role of suppliers in the solution can be seen as a puzzle. By interacting with different suppliers pieces of the puzzle started to get together. A vision how the solution should look like was developed strongly inspired by the possibilities of the software. Both with regard to vision how the solution should work and software there was much knowledge within the Philips team.

“CityTouch exists for about 5 years. We had a very strong vision, namely, the current system is too difficult for customers we need to go to simpler plug & play delivery”

The software part of the total solution is mostly developed in-house. With the different suppliers for the network, SIM-card modem there were discussions how the solution should look like. Issues regarding safety, interfaces were discussed in sessions with the suppliers. Another remark is that details regarding the business case were shared. Overall knowledge sharing with suppliers in all the phases of the project from concept to development. Suppliers shared knowledge regarding their specific functional domains, Philips shared knowledge regarding the business case.

**Partner Selection**

At the start of the project it was not clear for Philips how they wanted to solve the problem. In the process of finding a solution they started looking internally and externally and got to know different companies along the process. One interviewee described how that shaped the eventual suppliers selection. It was mentioned that ‘trust’ and ‘shared belief in business case’ were critical for supplier selection. Also suppliers are selected for technical capability in a certain area. Two quotes from the interviews illustrate the supplier selection process:

“For me it is about trust in the people you’re working with. You invest in them and they invest in you. Especially when you are doing stuff for the first time, you are not going to source for second suppliers for sake of money.”

“We made all kinds of matrixes for purpose of supplier selection, but eventually that is not the final criteria. The criteria is more that there is trust; in each other, and in the business case”

With regard to partner selection the variables identified in the literature model are not mentioned or explicitly recognized in this case.

**Relationship Design**

In this specific case there is a high sense of risk and reward sharing. The quote below illustrates the behavior between a supplier and Philips:

“We developed our own data profile on a SIM-Card. To develop and test that requires a lot of work from three different parties. You are not going to invoice all that to one
Another, that’s based on trust in each other and in the business case. It’s critical to share the business case and talk good about that.”

Everything depends on success of the business case, only then there will be a reward for Philips and the supplier. They share the risk and their goal is highly aligned. Network socialization is something that did not happen during the time of the case. Philips tried to prevent suppliers having direct communication with each other. For example in the case of Amazon and Aspider, Philips wants to understand what happens and is the interface between those two suppliers so it is not locked in. With regard to knowledge sharing norms there are very clear examples that relate to the attitude and intentions of Philips. It is explicitly mentioned that the right attitude leads to an open environment. It is mentioned that ‘being open’ is critical from the beginning. The below quote relates to the attitude in the project with regard to knowledge sharing:

“To me suppliers are my friends which I need because I can’t do certain stuff. From a procurement perspective there is often superstition. Having that idea and talking to those people means it is not going to work.”

Network identity could not be asked to the suppliers because they were not part of the interviews. From the internal interviews within Philips it became clear that at the venture there was a high identification with the venture. For certain suppliers this probably also was the case.

**Relationship quality**

Through the case there is a high sense of relationship quality with all suppliers mentioned. For all these suppliers Philips is a strategic partner and not a typical buyer – supplier relationship. Suppliers were involved early and the relationship is characterized by high levels of trust with the suppliers.

In summary the CityTouch Case we can call the exploration success high. The result of the project is very new and the completion of the project is timely, no other organization has launched such a product in the world. Interestingly in this case the dyadic knowledge sharing with suppliers is very high, a lot of examples in the interviews that tell about close collaboration and knowledge sharing with the suppliers. Controversial there are no examples of network knowledge sharing in this case. With regard to partner selection the stability in the network is there, comments of the interviewees suggest that there is high trust between the partners also in the continuation of business.

**Table 15 Summary of Findings Case CityTouch**

<table>
<thead>
<tr>
<th>Exploration Success</th>
<th>Knowledge Sharing</th>
<th>Partner Selection</th>
<th>Relationship Design</th>
<th>Post Formation Dynamics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Newness</strong></td>
<td>High</td>
<td>Dyadic KS</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td><strong>Time</strong></td>
<td>High</td>
<td>Network KS</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td><strong>Cost</strong></td>
<td>*</td>
<td>Collaboration</td>
<td>Low</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Risk</th>
<th>Benefit sharing</th>
<th>Network Soc.</th>
<th>Knowledge Sharing</th>
<th>Experience</th>
<th>Stability</th>
<th>Knowledge Sharing Norms</th>
<th>Network Identity</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Medium</td>
<td>Low</td>
<td>Medium</td>
<td>Low</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td></td>
</tr>
</tbody>
</table>
With this last conclusion the chapter discussing the findings ends. This chapter provides an analysis of the findings in the pre-defined cases, for this analysis the structure of the conceptual model was used. The next chapter will provide more insight in what this means and how we should understand these findings.
5. Cross Case Comparison

5.1 Introduction

Four cases have been described in detail in the previous chapter. The observation is detailed and context rich based on the outcomes of interviews. The previous chapter has been of an observing nature and primarily focused on giving the reader information and describing the observations done in the case study. This chapter will take the analysis one step further and focus on interpretation of the findings. The chapter will analyze the four cases from different along two angles.

- The analysis in this chapter looks at the scoring of the variables in the four case studies. The first part of the analysis covers at the general case characteristics, such as type of innovation, number of suppliers etc. As a second step in the analysis we look at the scoring of the different variables from the conceptual model.

- Then we look at the propositions formulated in the literature review and captured in the conceptual model. By reflecting and comparing the four cases we are able to see which relationships between concepts are similar and were differences are between the cases. Which leads to concluding which propositions are supported and not supported by the empirical research.

- As a last part of the thesis the cases will be reflected up on, for example the validity will be discussed, extra observations and their implications will be addressed.

In the remainder of the chapter we will refer to the Unified communications as Case 1, Data Center outsourcing EMEA as Case 2, Data Center Outsourcing NAM as Case 3, and City touch as Case 4.

5.2 Analysis

The analysis will cover a general part and a specific part. In the general part the characteristic of the problem and the availability of information for the case will be discussed. In the specific part we will discuss the loadings of the variables in the conceptual model and look at the extent to which the cases support or reject the propositions defined in the literature review.

Considering the general part, the problem characteristics show similarities and differences between the four cases. An important similarity is that the cases share that there is a problem at the center of the case that needs to be solved by multiple suppliers. The cases cover a process of solution search and the role of knowledge sharing in this process. With respect to the characteristic of the problem differences can be seen between the four cases. Another similarity is that in all cases the suppliers were separate entities than Philips. This means that Philips and the suppliers were working in a market governance form which has specific characteristics as described in the literature review.

First the novelty of the solution found differs per case. Case 1 describes finding a solution that is new to industry and 4 required a solution that was new to world. Case 2 and 3 describe finding of a solution new to Philips. The impact of this observation on the study may be that the risk in project 1 and 2 for the suppliers is higher because the combination of their efforts and the payoff is less certain. Second the type of innovation is different. In case 1,2 and 3 the innovation is related to a ‘service’ which will be used by the Philips businesses. In case 4 the innovation is related to a ‘product-service’ combination which will be sold to customers of Philips. This difference between the cases is closely aligned to the third difference which is a difference in context and environment of the cases. In case 1 – 3 the context is the IT department of Philips which can be compared with a service provider and in case 4 the context is related.
to one of the Philips Businesses. This difference was also observed in the interviews, the business has for example more focus on the customer. The fourth difference observed has to do with problem decomposability. Case 1 and 4 score high on interaction of knowledge and are non-decomposable, while case 2 and 3 are better decomposable up front. There is a relation between the type of solution search and the decomposability of the problem, this has been described in the literature review. The implication is that non decomposable or high interaction problems benefit more from knowledge sharing than decomposable problems.

Table 16 General Overview Case Comparison

<table>
<thead>
<tr>
<th></th>
<th>Case 1:Unified Communication</th>
<th>Case 2: Data Center Outsourcing EMEA</th>
<th>Case 3: Data Center Outsourcing North America</th>
<th>Case 4: City Touch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Innovation</td>
<td>Service</td>
<td>Service</td>
<td>Service</td>
<td>Product &amp; Service</td>
</tr>
<tr>
<td>Novelty</td>
<td>New to Industry</td>
<td>New to Philips</td>
<td>New to Philips</td>
<td>New to World</td>
</tr>
<tr>
<td>Context</td>
<td>IT</td>
<td>IT</td>
<td>IT</td>
<td>Business Lighting</td>
</tr>
<tr>
<td>Problem Type</td>
<td>High Interaction Problem</td>
<td>Medium Interaction Problem</td>
<td>Medium Interaction Problem</td>
<td>High Interaction Problem</td>
</tr>
<tr>
<td># of interviews</td>
<td>7</td>
<td>6</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Degree of collaboration for interviews</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>Low</td>
</tr>
</tbody>
</table>

With respect to information richness the cases do also differ, for case 1-3 the number of interviews is on avg. 6. This results in a rich source of information and lots of information with regard to the context and variables of the conceptual model. Case 4 the number of interviews was 3, this results in less information on this particular case. This has implications on the validity of the case since it was less possible to cross check observations reducing the possibility to triangulate the findings. The understanding of the case was enough and no big enough differences in the interviews were noted to decide to exclude the case from the research paper.

Considering the specific part we will first have a look at the different variables identified in the conceptual model. Then we will look at the propositions and compare the results for the four different cases.

With respect to newness we see in case 1 the solution is new to the industry. In case 2 and 3 the solution is new for Philips but not for the industry in which Philips is operating, besides that Philips was already used to working with this type of solution only the intended performance of the solution would be improved as result from the project, therefore the newness of these two cases is relatively low. In case 4 the solution is new, the newness is high, actually the solution is first in the world.
With respect to cost, case 1 – 3 up-front were identified to save money while case 4 was more focused on creating new demand and less on the cost part of the business case. Case 2 and 3 are very comparable in terms of problem and therefore also in the cost performance of the projects. If we compare them we see that Case 2 has delivered better cost results than case 3, prove is in documentation and was mentioned in several interviews. Not enough information is available to develop a clear understanding of the cost performance of case 4.

With respect to timing, in case 1 the project never reached the ‘exploitation’ stage. According to Philips knowledge this solution was not implemented with large competitors, most large enterprises are working on fully integrated Unified communication solutions. For case 2 and 3 the timing compared to industry is not interesting as this solution is provided to similar companies as Philips. Due to the similarity of the cases we can compare them very well and we see that case 2 finished earlier. Case 1 exceeded the deadline of the project with 1 month while case 3 crossed the deadline with several months. The time to market of case 4 is new to market and so per definition the time to market is setting the benchmark, and scoring high performance.

The overall picture of the interviews that results from counting the number of high loading examples on the concepts under consideration (see figure 17) we can see a clear difference between case 1, 3 and case 2, 4. Case 1 and 3 show less prove for exploration success than case 2 and 3.

![Image showing graphs for Partner Selection, Relationship Design, Knowledge Sharing, and Exploration Success with high loading examples of Study Concepts.](image-url)
If we compare the cases with respect to knowledge sharing the first similarity is that in all cases there were examples of knowledge sharing. If one looks at figure 17 the counting of knowledge sharing cannot be seen as a measure of how much knowledge sharing was present in the case as that is something that is hard to objectively measure or retrieve. The interesting point from figure 17 is the division between network and dyadic knowledge sharing. With respect to knowledge sharing in the cases one big difference is that case 4 had no evidence of network knowledge sharing. Another interesting conclusion is that case 2 has a lot of examples with regard to network knowledge sharing. Case 1 and 3 show a combination of dyadic knowledge sharing and network knowledge sharing. Explanations for these differences will be addressed later this chapter.

With regard to partner selection the examples across the cases have been scattered. For case 4 there are high loadings of stability and non-redundant information which is an interesting finding because such examples lack in the other cases. Collaboration experience examples are consistently found in case 1, 2 and 3.

*Table 17 Comparison Loading Cases*

<table>
<thead>
<tr>
<th>Construct / Grouping</th>
<th>Case 1: Unified Communication</th>
<th>Case 2: Data Center Outsourcing EMEA</th>
<th>Case 3: Data Center Outsourcing North America</th>
<th>Case 4: City Touch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exploration Success</td>
<td></td>
<td>Low</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Newness</td>
<td>Medium</td>
<td>Low</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Time</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Cost</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Knowledge Sharing</td>
<td>Dyadic Knowledge Sharing</td>
<td>Medium</td>
<td>High</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Network Knowledge Sharing</td>
<td>Medium</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Partner Selection</td>
<td>Diversity</td>
<td>Low</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Non Redundant Information</td>
<td>medium</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Collaboration Experience</td>
<td>Low</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Stability</td>
<td>Low</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Relationship Design</td>
<td>Risk – Benefit Sharing</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Network Socialization</td>
<td>Medium</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Knowledge sharing norms</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Network Identity</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Post formation dynamics</td>
<td>Relationship Quality</td>
<td>Medium</td>
<td>High</td>
<td>Medium</td>
</tr>
</tbody>
</table>

*not enough information available to develop substantiated view on this variable.*
So far we compared the cases with respect to the loading of variables. Now we will compare the cases based on the propositions formulated in the literature review. The text will consist of the observations and argumentation behind observations to support or reject the propositions. To get an overview per case if support was found for the propositions please see table 18.

Table 18 Support for Propositions

<table>
<thead>
<tr>
<th>Proposition</th>
<th>Case 1: Unified Communication</th>
<th>Case 2: Data Center Outsourcing EMEA</th>
<th>Case 3: Data Center Outsourcing North America</th>
<th>Case 4: City Touch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proposition 1: Dyadic Knowledge Sharing with the supplier will increase exploration success</td>
<td>Supported</td>
<td>Supported</td>
<td>Supported</td>
<td>Supported</td>
</tr>
<tr>
<td>Proposition 2: Network knowledge sharing with the supplier will increase exploration success</td>
<td>Supported</td>
<td>Supported</td>
<td>Supported</td>
<td>Not Supported</td>
</tr>
<tr>
<td>Proposition 3: The procurement function can in phase of partner selection by maintaining high degree of diversity, collaboration experience and network stability increase dyadic and network knowledge sharing for the organization</td>
<td>Not Supported</td>
<td>Not Supported</td>
<td>Not Supported</td>
<td>Not Supported</td>
</tr>
<tr>
<td>Proposition 4: The procurement function can in the phase of partner selection by maintaining high degree of diversity and high degree of non-redundant information increase exploration success for the organization</td>
<td>Not Supported</td>
<td>Not Supported</td>
<td>Not Supported</td>
<td>Not Supported</td>
</tr>
<tr>
<td>Proposition 5: The procurement function can in the phase of relationship design by establishing practices that increase sharing of risks and benefits, network socialization, network identity and championing norms increase dyadic and network knowledge sharing</td>
<td>Supported</td>
<td>Supported</td>
<td>Supported</td>
<td>Supported</td>
</tr>
<tr>
<td>Proposition 6: The procurement function can in the post formation phase by steering on maintaining high relationship quality with supplier increase dyadic and network knowledge sharing</td>
<td>Not Supported</td>
<td>Supported</td>
<td>Supported</td>
<td>Supported</td>
</tr>
</tbody>
</table>

**Proposition 1: Dyadic knowledge sharing with the supplier will increase exploration success**

For this proposition support is found in all cases. It is suggested there is a relationship between the level of dyadic knowledge sharing and the exploration success in the cases under consideration. This relationship is a-symmetrical which means that absence of dyadic knowledge transfer also leads to reduced exploration success.
In case 2 and 4 a high level of dyadic knowledge sharing between the suppliers and Philips while also high exploration success is observed. In case 1 and 3 lower level of dyadic knowledge sharing is combined observed with lower level of exploration success. This at least establishes a positive relationship between both variables.

It follows that dyadic knowledge sharing precedes exploration success. In the interviews several relationships were found. For example in Case 4; it was argued that knowledge sharing with the suppliers led to greater insight on the possibilities for a solution. Knowledge sharing also provided insight in certain paths and processes that were stuck and knowledge sharing in that case led to a new path in finding a solution. Knowledge sharing created more alignment between the supplier and the buyer meaning that there was greater understanding of the desired solution which enabled the supplier to achieve better results. In case 2 there are examples of knowledge sharing with regard to availability of hardware at sites which directly led to impact on reduced cost for the buyer.

Based on the proposed relation in theory and the explanations in the interviews this study finds a support for proposition 1.

**Proposition 2: Network knowledge sharing with the supplier network will increase exploration success**

For this proposition support is found in case 1, 2 & 3 while case 4 does not follow this proposed pattern. Case 1 and 3 show limited knowledge sharing between suppliers and a limited exploration success, while in case 2 there is a high scoring on network knowledge and high exploration success.

This effect becomes clear and visible if we compare case 2 and 3. These two cases involve the same task and problem, namely the outsourcing of a data center from one to another supplier. While these two cases differ a little bit in dyadic knowledge the biggest difference is seen in network knowledge sharing. The largest difference in exploration success seems to be explained by network knowledge sharing. Network knowledge sharing led to efficiency. It is found that in case 2 the high loading on network knowledge sharing leads especially to cost and time benefits for Philips. In the interviews we have seen that alignment of suppliers leads to reduced communication channels and efficiency in solution search. If a supplier needs to align a task or an idea with another supplier sharing this knowledge directly is more efficient than doing this via the buying firm.

**Table 19 Example Support Proposition 2**

<table>
<thead>
<tr>
<th></th>
<th>Network Knowledge Sharing</th>
<th>Exploration Success</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Case 1</strong></td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td><strong>Case 2</strong></td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td><strong>Case 3</strong></td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>

The findings in case 4 contrast this proposition. In case 4 the network knowledge sharing is low while exploration success is high. For case 4 the proposition is either rejected or other variables need to be identified that explain the observation. Dyadic and network knowledge sharing alone are not enough to explain exploration success in these cases. Additional findings might play a role in explaining this observation. Discussing this will be a topic for the reflection in this chapter.

In conclusion that we find support for the proposition in case 1 – 3 and no support in case 4.
Proposition 3: The procurement function can in the phase of partner selection by maintaining high degree of diversity, collaboration experience and network stability increase dyadic and network knowledge sharing.

The findings in the interview lead to conclude there is no support for this proposition in the four cases. The findings in the cases are scattered, meaning there are no clear patterns observed that hint a relationship between one of the independent variables and dyadic and network knowledge sharing. The logic of building the arguments for the proposed relationship also not found in the cases. In literature these were found, the theory behind the proposition was that the procurement function in the phase of partner selection could influence the ‘supply network’ of a buyer. In Network literature we found that certain networks were more able to facilitate knowledge sharing or ideas than others. Based on this theory we proposed that the variables of diversity, collaboration experience, network stability, increase dyadic and network knowledge sharing. In the study we found that there is not a positive relation between the independent and the dependent variables. Several explanations for this observation are possible which will be discussed later this chapter. Preceding this discussion, the main idea is that the unit of analysis for these variables really should be the network and not a sub-set of a network.

Proposition 4: The procurement function can in the phase of partner selection, by maintaining high degree of diversity and high degree of non-redundant information, increase exploration success for the organization.

As in proposition 3, for this proposition the findings were too scattered. No patterns were found that indicated confirmation of the proposed relationship. Also the logic behind the proposition was found in literature but not observed in the empirical research. In conclusion, no support was found for this proposition across the four cases. It was observed that the cases differed with respect to diversity and non-redundant information. However these differences cannot be related to increased exploration success.

Proposition 5: The procurement function can in the phase of relationship design by establishing practices that increase sharing of risks and benefits, network socialization, network identity and championing norms increase dyadic and network knowledge sharing.

The claim in this proposition is that there is a relationship between high sharing of risk and benefits, network socialization, network identity and championing norms increase the dyadic and network knowledge sharing. Support for this proposition is found in all 4 cases.

In cases with low scoring on the independent variables we observed that there was less knowledge sharing than in cases with high scoring on the independent variables. Looking into why this was observed we found arguments for the causality of the relationship. Below two examples will be given, one regarding risk/benefit sharing and one regarding knowledge sharing norms:

In case 1 as answer to an interview question regarding risk / benefit sharing, it was argued that there was fear knowledge was shared and it would be used against their own interest. The risk was too high and the pay-off too low. In case 4 the finding was that the suppliers had strong believe in the benefits of the project, in this situation the suppliers were more willing to take risk and share knowledge.

An interesting finding with regard to knowledge sharing norms. In the cases we observed a relation between the norms stakeholders had towards knowledge sharing and how much knowledge was shared.
If these norms are positive and open and the supplier, there is likely to be more trust, and therefore more knowledge sharing. In cases where these norms were stated very explicit and attention was given there was also more knowledge sharing, case DCO EMEA is a good example of this, while case DCO NAM it is the other way around. Network Identity was particularly high in case 2 and 4. Here the suppliers felt that they were part of the Philips, the word identity and partner were mentioned from a Philips and a supplier perspective. This led the supplier to sharing knowledge in the best interest of Philips on dyadic and network level.

Overall the support for proposition 5 is found in all the cases

**Proposition 6: The procurement function can in the post formation phase by maintaining high relationship quality with the supplier increase dyadic and network knowledge sharing**

This proposition is supported in all four cases. High relationship quality was associated with higher dyadic knowledge sharing. If we compare case 2 and 3 the relationship design variables are the same, the same management, procurement, project managers were involved with both cases. This creates ideal conditions to compare the effect of relationship quality on knowledge sharing in this study. It is observed that in case 2 the relationship between the suppliers and Philips and the knowledge sharing scores higher in case 2 than in case 3. Relationship quality makes the difference in these cases, especially trust was mentioned as a high scoring attribute of relationship quality in these cases. What becomes really apparent in the comparison between case 2 and 3 is that relationship quality has two sides. This can be best explained with an example: The buying party proposed the supplier to sit in at management team meetings. In case 2 the supplier was highly prone to participate while in case 3 the same was suggested but the local management of both supplier and Philips were less enthusiast about the idea and did not practice it. Asked about the reasons, the explanation often referred to the relationship between the companies, one being more culturally aligned, more trust and the other being more formal strict etc. For case 2 and 3 the proposition is therefore confirmed. In case 4 during from very early on relationships were built with suppliers, suppliers whom shared a belief in the idea were continued their relationships, almost evolutionary a set of suppliers evolved for this case with very early on supplier involvement. Subsequently there was high knowledge sharing with the suppliers that remained in the portfolio here the proposition is also confirmed.

In case 1 there is relationship quality but the finding is that the competitive attitude among suppliers was really impacting the ability to share knowledge. Low relationship quality seems to obstruct effective knowledge exchange among network partners. Here the proposition is rejected.
5.3 Reflection

In this section we reflect on the findings and propositions discussed in this chapter. The text will discuss the impact and what can be learned from the findings. The reflection is structured in four points: i) the full support of proposition 1 and proposition 5; ii) no support of proposition 3 and proposition 4; iii) the partly support of proposition 2; iv) The partly support of proposition 6.

The findings show that proposition 1 and proposition 5 are fully supported. Dyadic knowledge sharing leading to better innovation performance again confirmed as in earlier studies (de Vries 2014, Sjoerdsma, 2013), again finding support for a similar proposition increases the reliability of the proposition.

The rejection of proposition 3 and 4. Following the theory we expected support for these two propositions. The theoretical foundation for the proposition was coming from network theory. An explanation for lack of evidence in this study could be the scale of the networks studied. Smallest network in this study had 3 and the largest 7 nodes. Network or sample size may influence these findings.

Proposition 2 is supported in case 1,2,3 but rejected in case 4. While there is a high scoring of exploration success in case 4 the scoring on network knowledge transfer is almost zero. This is directly the opposite of the proposed relationship in literature review. Due to this difference we reflect on the findings in case 4. In the CityTouch case Philips has been building a lot of knowledge themselves with regard to the integration of the knowledge of the different suppliers. They were able to split the problem in such a way that it could be solved by the suppliers. Due to alignment Philips was able to express what exactly they wanted from the supplier and how their part should fit in the bigger picture. Another thing present in the CityTouch case was a strong project coordination, for example practices like project management, testing scenarios and interface managers were put in place. The buying firm was really leading and coordinating all the activities in the network. If we look at case 4 it is suggested that exploration success is not completely explained by dyadic and network knowledge sharing, constructs like project coordination and the level of functional / integration knowledge in the buying firm determines success in this case in combination with strong dyadic knowledge sharing and almost none network knowledge sharing. If we compare these two observations with case 1: Unified Communications, the other highly complex case, we see absence of the above described practices: integration knowledge, project coordination. In case 2 (highly successful, high dyadic and network ks) network knowledge sharing explained a great deal of exploration success. These findings suggest that to manage a multi-vendor project there are two coordination modes: i) in low / moderate problem complexity, the buying firm seem to work with a model relying on the knowledge sharing between suppliers, with less project coordination practices and functional knowledge. This type of management of multi-vendor projects seems to be providing benefits to the buying organization. ii) in highly complex multi-vendor projects, this approach seems to be not enough, relying on network knowledge sharing to contribute to exploration success does not seem to be enough in these particular situations. In these type of projects, strong coordination practices, and high functional knowledge seem to contribute to exploration success, and, interestingly reduce the need for network knowledge sharing. In conclusion of this reflection on proposition 2, further studies could provide more insight in the effect of project coordination practices and knowledge level of the buying firm directly on exploration success. Also the reducing need for network knowledge sharing could be an avenue of further research. An interesting view is to see network knowledge sharing as a grey area between market and organizational governance. In theory market governance mode removes the incentive for suppliers
to share knowledge, especially with each other. This study has shown that relationship design, relationship quality influence the willingness of suppliers to share knowledge, also in market governance mode. Stimulating network knowledge sharing seems to be an attractive approach for organizations, as such a model reduces coordination effort and need to invest in knowledge for the buying organization. However, this only is true for low / moderate complex problems, if problems tend to become very complex, the incentive for a supplier and the motivation needed simply is not present the buyer seller relationship or the buyer seller network. In these cases buying organizations should invest in coordination and knowledge to achieve success in multi-vendor projects.

Idea for future interaction effect of complexity (independent variables are not shown in this figure)

![Diagram showing Low and High Project Complexity](image)

Figure 16 Ideas for interaction effect (in this figure the independent variables are not shown)

An additional finding in the cases is that opportunism of suppliers is also of higher influence than expected. Opportunism was identified in the literature review as a variable but the effect in the cases was larger than expected. Competition and eagerness to win play a crucial role to how much a supplier is willing to risk for the needs of the buying organization. Case 1 provides clear examples in this respect. In this case two highly competing suppliers are involved in the same project, these suppliers have the feeling they are fighting for the same share of the pie. The findings in these case is that the effect is very strong and reduces knowledge sharing. This variable helps in understanding the motivation of suppliers, if their position at the buyer is at stake, they can increase their share this has a high effect on knowledge sharing which can work out either positive or negative. If we include this variable in the model it would intervene the relationship between relationship design, relationship quality and dyadic knowledge sharing.

Overall the model from the literature review helped in explain success of projects with high success and low success in settings with multiple suppliers. After the empirical analysis and the cross case analysis 4 of the 6 propositions seem valid in these four cases. In reflection introducing 2 more variables and taking task complexity into account would improve the conceptual model.

The theory in the literature review discussed how performance of a supplier often is studied in terms of a contract or a relation with this supplier. The results of this thesis show that the unit of analysis can extend the dyadic relationship in researching performance in purchasing and supply chain research. In the
literature review multiple bodies of work were studied, such as knowledge management, network literature, innovation management and purchasing and supply management. The combination of these works led to a similar conclusion. So both the literature review and the empirical research emphasize the importance a supplier network or portfolio to performance of sourcing projects.

Except the results regarding networks, which did not confirm the view of literature review. The propositions relating the supply network did not show the results as expected. We have discussed several explanations for this, for example the size of the network studied may play a role, or case study methodology covers only limited examples. It is not expected that the type of network does not play a role the effect of the constructs is not big on this level.

Overlooking the theory discussed in the literature review and the results some observations can be made. The study is of an explorative nature, this starts with the literature review where uncommon fields of literature are combined. This is combined in the conceptual model as well and to a large extend supported by the case studies. Due to the explorative nature of the study the generalization is limited, we cannot conclude that the current state of knowledge should be disputed. In reflection we can say that a relatively new approach is used which generates insights in the area of ‘buyer seller projects’ ‘innovation’ ‘market governance’ ‘supplier networks’. Based on this study empirical models could be drafted that further test suggested relationships in this area of research.

6. Conclusion

The central question to this study is: “How can the IT Supply Network contribute to a successful innovation process and how can this be influenced by the procurement function?” by reviewing literature 6 propositions were formulated and tested. The knowledge gained from these propositions will now be used in answering the central question to the study. First we will answer the 5 sub research questions, than we will come to the central question.

6.1 Research Questions

Sub Question 1: “What factors determine the success of IT Innovation process in general?”

In the literature we identified that the innovation in an organization consists of a phase of exploration and of exploitation. Exploration is related to the idea generation and innovative capability in an organization, while exploitation is related to the execution. Exploration Success is defined as the end state of the exploration phase, which mean finding a solution to a problem. From literature we identified three factors relating the exploration phase that increase the outcome value for the organization. The factors identified are: i) Speed, which means that finding a solution faster than competition increases success of the Innovation Process, ii) Newness, finding a solution that is a major improvement from previous technology increases success of the innovation process, iii) cost savings, especially valid in the context of corporate IT buyer seller relations, what is the result for the organization in terms of cost savings.

Sub Question 2: “How do suppliers contribute and influence the success of IT Innovation process?”

In this paper the IT Innovation process is conceptualized as a problem solving process (Nickerson & Zenger, 2004). Following this, the solution finding process has attributes: there is a complex problem, and a process of search, combination of knowledge domains in the search process leads to finding a solution. Considering these aspects we argued that the suppliers are also part of this search process. Sharing knowledge with the supplier (dyadic knowledge sharing) therefore contributes to finding a solution.
Sharing knowledge between suppliers (network knowledge sharing) is expected to also contribute to finding a solution and making this process more efficient as the communication is direct. In conclusion of theory, we proposed that suppliers contribute to the IT innovation process via dyadic and via network knowledge sharing. In the empirical research we have found confirmation for both propositions.

Sub Question 3: “How is the contribution of suppliers and procurement to the IT Innovation process organized?”

We have studied four different cases and looked at the contribution of suppliers and procurement and the success of IT Innovation process. The first case considers a project regarding unified communications, in this case we have seen three suppliers who were expected to come up with a solution. In this case the knowledge sharing and value of the solution both were low. The primary causes for this was commercial opportunism between the suppliers.

The second and third case consider the implementation of a new data center outsourcing partner for North America (NAM) and Europe, Middle-East & Asia (EMEA). Due to the similarity of the problem these can be compared. Regarding the outcome we see the case in EMEA performing better in terms of speed and cost than NAM. A difference is seen in dyadic knowledge sharing which was less in NAM case. But a much larger difference is seen in knowledge network sharing, this was high in the EMEA case than in the NAM case. The variable network knowledge sharing seems to explain the difference in performance in these cases. If we look what causes this difference the most important factor seem to be relation quality which was on all levels better in the EMEA case than in the NAM case. Also variables in the grouping ‘relationship design’ were found to have an impact: risk & benefit sharing, network socialization, knowledge sharing norms and network identity.

The fourth and final case we looked at a different project this considered a highly innovative project within Philips Lighting Business. In this project there was high dyadic knowledge sharing and low network knowledge sharing. We also made observations out of the scope of the conceptual model, that compared to the other cases the knowledge regarding the solution and the level of project management coordination practices were higher in this specific case. This project can also be considered as a high success scoring high on newness and speed.

Sub Question 4: “How can procurement best organize involvement of suppliers in IT Innovation Process?”

The answer to this question contains of two parts, first is how it should be structured and second how it should be facilitated by the buying organization.

The buying firm can focus on dyadic knowledge sharing and on network knowledge sharing. The results of the study have shown that dyadic knowledge sharing consistently contributes to exploration success in the four cases. Network knowledge contribute as well as seen in the first three cases. It seems that in certain situations, like in case 4, an alternative approach is to have much functional and interface specific knowledge as a buying organization and focus on coordination of the project. This approach is more resource intensive.

About facilitation in principal buyer-seller relationships are governed by a market form of governance, which provides price incentives that hinder knowledge sharing. The literature review identified several knowledge formation hazards such as, knowledge appropriation and opportunistic behavior. Actors are
not motivated to share knowledge in these situations. The motivation of actors can be improved. First variable considered in our study is relationship quality which improves the knowledge sharing with suppliers. The second grouping is ‘network relationship design’, these variables influence knowledge sharing and are, risk- benefit sharing, network socialization, practicing knowledge sharing norms, shared network identity.

The research findings suggest there are two strategies for managing multi-vendor IT projects.

- The first is a strategy with high dyadic knowledge sharing, high coordination, high specific knowledge at the buying firm, high relationship quality with suppliers. This particularly suited for highly complex problems.
- The second strategy is a model with high network knowledge sharing, less coordination, less specific knowledge, high scoring on relationship design variables. This is particularly suited for less complex problems. The benefit of this strategy is that it is less resource intensive for the buying organization.

Research Question: “How can the IT supply network contribute to a successful IT innovation process and how can this be influenced by the procurement function?”

By answering the sub questions the research question to a large extent has been answered. In the scope of IT projects with multiple suppliers we have identified that dyadic and network knowledge sharing contribute to successful IT innovation process by improving speed, newness, and cost of the solutions found. Based on the findings it is found that network knowledge sharing not in all cases is contributing to exploration success. As an explanation we give the suggestion that it might depend on the complexity of a project. Finally several practices have been studied that contribute to knowledge sharing, both dyadic and network, these are relationship quality, risk benefit sharing, network socialization, practicing knowledge sharing norms and shared network identity.

The procurement function influences the policy towards the suppliers and therewith influences the relationship design and the network identity. The procurement function also influences the parties selected for different projects. We suggest that based on our findings the procurement function can also advise on these project management issues. They can inform their stakeholders about the effects of competition on willingness of suppliers to share knowledge. And guide the strategic choice how to go about solving a certain problem.

6.2 Implications for Practitioners

This thesis contributed to our understanding of performance in Multi-Vendor IT Projects. By a review of literature we proposed that in addition to knowledge sharing between a buyer and a seller, also knowledge sharing between suppliers contributes to the performance projects. The propositions were studied in empirical research setting and zoomed in on four of these type of projects within Philips, relating IT. This study generated several insights that can help Procurement professionals and stakeholders in their jobs. The advices involve Multi-Vendor IT Projects and can be applied in similar contexts.

1. Improve ‘Supplier Buyer Knowledge Sharing’ and ‘Cross Supplier Knowledge Sharing’ to increase Speed, Innovativeness and Cost Savings in sourcing projects.
In the four projects performance was looked at in terms of Speed, Innovativeness and Cost Savings. The results of this study indicate that knowledge sharing between the buyer and the supplier is a phenomenon that consistently drives performance in these type of projects. Knowledge sharing is a behavior that cannot be contracted, it is hard to grasp and codify, it involves risks, and to a large extent it depends on the motivation of stakeholders involved. In line with these observations the relationship with a supplier is what can extend and drive the performance in these type of projects. Several studies, within Philips (de Vries, 2014; Sjoerdsma 2013) have indicated that the quality of relationship between organizations improves knowledge sharing and innovation performance.

Philips faces many situations in which the performance of services and innovations depends on multiple suppliers. In these situations this study shows that knowledge sharing between suppliers contributes to the speed, savings and innovativeness of solutions.

The idea of knowledge sharing between suppliers is becoming an interesting construct to study. There are two arguments why this type of knowledge sharing can benefit. First, more organizations will have access to different knowledge domains, if different knowledge domains interact and share their knowledge, the quality of ideas and solutions will improve. Second, between supplier knowledge sharing can be a more efficient approach in finding a solution than sharing knowledge with the buyer and depending entirely on their capability to integrate the knowledge.

- Improve relationship quality. Philips can select partners that share a similar Culture, Philips can extend suppliers with which it maintains a good relationship (supplier development), Philips focus on increasing the relationship quality with those suppliers that improve innovation and are of strategic value by actively cooperating, being responsive, showing empathy, work on a trustful relationship
- Stimulate knowledge sharing in its supplier network by reducing risk and increase motivation to share knowledge. By sharing part of the risk with a supplier and create benefits for suppliers, by best practicing knowledge sharing behavior as Philips towards suppliers and penalize violation of this behavior, by facilitating and participating in events that create a shared identity of suppliers, by facilitating the means for suppliers (events, platforms) to communicate.

2. **Apply best practice strategies in organizing knowledge management and innovation in IT dependent on the goal and context of the sourcing project**

This study has shown that the way in which knowledge contributes to projects and how it is organized is different, in other words there are multiple ways to achieve success, depending on several factors such as the type of projects and supplier network. With this study we identify two best practices that Philips can adopt in the context of IT and Innovation. In the following text we provide information about the best practices, we suggest the choice depends on the environment.

- **Orchestrate the network: Coordinating a knowledge sharing supplier network**

The first strategy the buying organization acts as a ‘supply network coordinator’. The network orchestrator should focus on continuously improving the quality of relationships with suppliers. Philips should communicate Goals and Champion desired behavior in the network, attached to this consequences and benefits should be clearly set and communicated. Simultaneously the network coordinator should work on establishing communication routines between suppliers, by organizing meetings, or facilitating
communication elsewhere. By acting in this manner the organization maximizes knowledge sharing in the supplier network, by using the variables identified in the model of this study (risk & benefit sharing, network socialization, knowledge sharing norms, network identity).

This strategy provides as a benefit that there is a more efficient and better process to find solutions as communication is more direct, different knowledge domains can be integrated, without the requirement to invest heavily in the knowledge yourself. This approach results in benefits in terms of project speed, innovativeness and project savings as shown in the thesis.

The thesis discussed that this type of model is not beneficial in any type of project. Knowledge is a resource that provides competitive advantage and organizations capitalize on their knowledge. In the end organizations compete and knowledge sharing between organizations is not rewarded by the structure of a market. In the cases two contingent effects where observed that provide insight when to apply this strategy: First the project is low to moderate in terms of complexity, as complexity is too high a project requires different forms of knowledge integration as will be discussed later. Second, there should not be a large overlap between suppliers in terms of expertise as commercial opportunism has a strong and negative effect on the relation between network governance and knowledge sharing.

- Keep control: Investing in knowledge and coordination

The second strategy also involves multiple suppliers, but the buying organization acts as a ‘knowledge integrator’. Suppliers are communicating with the buying organization but not with each other. Similar to the first strategy the organization should focus on continuously improving relationship quality with suppliers. In this strategy suppliers are typically involved early, and the relationships build are characterized by high levels of trust and a shared belief in benefits. Knowledge sharing between the buying organization and the supplier is very high. The buying organization determines the direction of solution area, and is the overall expert regarding the project result. They are able to separate the bigger problem into smaller ones, try to solve these parts of the puzzle separately with involvement of suppliers, and then integrate them into one solution.

This requires high levels of knowledge and coordination by the buying organization, more than in the first strategy. Reason for this is that the first, right partners need to be selected next, knowledge sharing should occur on a high and professional level, and finally, knowledge is required to develop and integrate the final solution. This requires high levels of coordination is needed because communication should be managed continuously, project management methods need to be applied to reach success.

This second best practice strategy is more resource intensive than the previous. The benefit is that the knowledge sharing that can be achieved is higher, and the project result is also improved especially in terms of innovativeness.

6.3 Future Research

Based on this work I see opportunities for future work. Two relate to extending this work and increase understanding, the other relates to focus of this research and what other angles there are to understand the IT innovation process better.
In this work studied knowledge sharing in multi-vendor IT projects and the effect on exploration success. In the case study we found that the knowledge residing in the organization and that coordination practices also affected exploration success. Future studies could focus on these or other variables increasing our understanding of antecedents of exploration success. For example, future studies could identify what type of knowledge or what type of coordination mechanisms work.

Another opportunity for future research is looking for contingencies which strategy to apply in which situation. The current studies provide insight in at least two strategies with benefits and drawbacks for the buying organization. Future studies could identify more strategies and/or identify contingencies when to apply which strategy.

This study focused on the role of multi-vendor IT projects. The idea for looking at a scope wider than one vendor, and look at more small networks of vendors started by the first interviews within Philips procurement and IT. This paper focuses on projects with multiple suppliers. Other papers could identify different scopes instead of projects. For example the role of the network of IT suppliers in strategy development.

6.4 Limitations
Construct validity can be improved, the study was of an exploratory nature, the variables and understanding of the variables have developed during the writing of the thesis, further studies should incorporate these results and let these guide the development of constructs increasing the construct validity of a future research.

External validity can be improved by using other empirical methods. The study has evidence from 4 cases in which theory informed propositions were tested. To a large extend the theory and logic expected was followed in the empirical findings. On this basis we do not foresee serious troubles regarding the external validity of this case study. However, future research should establish higher external validity by using more empirical / quantitative measures by which conclusions can be drawn based on statistical inference.

In the study we also included a grouping of variables relating partner selection. In the end the unit of analysis for measuring these variables was not right. We tried to apply these on very small networks of suppliers but eventually these did not yield results.
7. Bibliography


