Exploring the stakeholder relationships behind the critical success factors for implementing COTS IT solutions in organizations

a case study in Royal Philip's procurement department

Lin, Y.H.

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Exploring the stakeholder relationships behind the critical success factors for implementing COTS IT solutions in organizations: a case study in Royal Philips's procurement department

Name: Y.H. Lin
Student ID: 0926769
Date: 6/1/2020
Research Group: ITEM

Supervision:
TU/e 1st: Dr. N. Raassens
TU/e 2nd: Dr. S. Mullick
TU/e 3rd: Dr.ir. B. Walrave
Philips: Mr. G. Hoser
Philips: Mr. R. Grams
Philips: Ms. N. Mitchell

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Abstract

Commercially-Off-The-Shelf (COTS) solutions are known to be difficult to implement in organizations, and many projects either fail or do not fulfill their original promises (Ahmed, Kumar, & Kumar, 2018; Hailu & Rahman, 2012). Researches in the field of critical success factors are one of the streams of literature dedicated to uncovering this phenomenon. Critical success factors are the terms assigned to the key areas of expertise in an implementation project that needs to manage effectively in order for the implementation to become successful (Françoise, Bourgault, & Pellerin, 2009; Rockart, 1979). However, past researches have not focused on the relationships stakeholders share for accomplishing these critical success factors. This research uses the findings of a case study conducted in Philips to identify and explain the nature of the interdependent relationships between stakeholders for achieving success in the critical success factors that are shared amongst them. These findings are based on interviews with the different stakeholders involved in Philips's COTS IT implementation project, hence the explanations of these interdependent relationships are given from a multi-stakeholder perspective. The results of this research show that focus should be placed on the interdependent relationships stakeholders in this project share for five critical success factors. The nature of these interdependent relationships can be categorized into three types, namely: coordination, execution, and cooperation. Failure to manage these types of relationships could result in negative outcomes such as scope deviations, project delays, the ineffective use of resources, end-user resistance, and customer dissatisfaction, which, in turn, could lead to the failure of a COTS implementation project. Therefore, it is important for practitioners to focus on the critical success factors, as well as the underlying relationships stakeholders share for attaining these critical success factors in order to achieve implementation success.

Keywords: COTS, critical success factors, stakeholder relationships

1. Introduction

It is very challenging to successfully implement Commercially-Off-The-Shelf (COTS) solutions in organizations, and many projects either fail or do not fulfill their original promises (Ahmed et al., 2018; Hailu & Rahman, 2012). Therefore, there is a great amount of research dedicated to the effective implementation of COTS solutions into the bespoke environment of an organization. A recent joint study by McKinsey and Oxford University indicated that the quality of IT implementation projects across industries in general leaves much to be desired. Large IT projects are on average 66% over budget and 33% over schedule (Chandrasekaran, Gudlavalleti, & Kaniyar, 2014). Moreover, 17% of the projects are off the course to the degree that it threatens the very existence of the company (Chandrasekaran et al., 2014).

One of the potential reasons for these poor implementation records could be the large number of areas of expertise that must be managed throughout the implementation process (Françoise et al., 2009). These areas of expertise have now been identified by implementation practitioners and researchers, and they are commonly known as critical success factors (CSFs). Critical success factors have been studied from the individual perspective of stakeholders involved in a COTS IT implementation process (Amoako-Gyampah, 2004; Chen, Law, & Yang, 2009; Hong & Kim, 2002). There are also systematic literature reviews that summarize the critical success factors for the different stakeholder groups (Tarhini, Ammar, & Tarhini, 2015). However, while both types of literature highlight the critical success factors that are relevant to each stakeholder group, the explanations given for these critical success factors are limited to the perspective of a specific stakeholder group. This limitation prevents existing studies from giving insight into the key interdependent relationships that could exist between stakeholder groups for these critical success factors. Without the insights into these relationships, it is difficult for stakeholders in a COTS implementation project to successfully manage these critical success factors, as stakeholders may struggle to establish common ground when cooperating with one another in these key areas of expertise.

Therefore, this research sets out to add to the existing researches by exploring the interdependent relationships that exist between different stakeholders for the critical success factors that are relevant in a COTS implementation project.

1.1 Problem Statement

Critical success factors are identified fields of expertise that need to be properly managed in order to achieve success in a project (Rockart, 1979). For some studies, critical success factors are also seen as the criteria for success (Grabski & Leech, 2007). While current studies in the field of COTS implementation have looked into the critical success factors relevant to different stakeholder groups (Amoako-Gyampah, 2004; Chen et al., 2009; Hong & Kim, 2002; Tarhini et al., 2015), they lack the insight into the interdependencies that could exist between stakeholders for the critical success factors. In order to explore the nature of these interdependent relationships, it requires critical success factors to be studied from a multi-stakeholder perspective. The potential of such a multi-stakeholder study includes the ability to create a dialogue across departmental lines. It also facilitates consensus-building and the sharing of knowledge and expertise, which have both been recognized to bring higher effectiveness for stakeholders (Jenkins et al., 2002; UNRISD, 2002).

This led to the following problem statement:

Organizations experience major challenges in implementing COTS IT solutions into their bespoke environments. One of these challenges is the number of areas of expertise that requires management during the implementation process. These areas of expertise known as critical success factors have been studied extensively from the singular perspectives of a specific stakeholder. However, the critical success factors that are dependent on the performances of multiple stakeholders have not been extensively studied from a multi-stakeholder perspective. Without the multi-stakeholder perspective on this topic, the interdependencies between different stakeholders for these critical success factors are unclear and could lead to the ineffective management of these critical success factors during a COTS IT implementation project. Therefore, by bringing transparency to the interdependent relationships between stakeholder groups, it will help stakeholders to better understand the common grounds that

they share for these critical success factors and become more effective in managing these critical success factors during a COTS IT implementation project.

1.2 Research Questions

As stated in the problem statement, the aim of this research is to explore the interdependent relationships between different stakeholders for critical success factors in a COTS IT implementation project. The main research question to guide this research is defined as follows:

What are the interdependent relationships that stakeholders share in order to effectively manage critical success factors in a commercially-off-the-shelf IT implementation project?

To be able to provide a solid answer to this question, three sub-questions were derived. Sub-questions 1 and 2 are literature-based and the theoretical answers to these two sub-questions are provided in Chapter 3. As for the third sub-question, it is answered empirically in Chapter 4.

1. *What are the key stakeholder groups involved in a COTS IT implementation, according to the existing literature?*
2. *What are the critical success factors that are shared amongst multiple stakeholder groups in a COTS IT implementation project, according to the existing literature?*
3. *What are the critical success factors that are shared amongst the key stakeholders in Philips's COTS IT implementation project?*

1.3 Definition of Concepts

The aim of this section is to provide an overview of the key concepts used in this thesis. This section provides the definitions of "Commercially-off-the-shelf solutions (COTS) and "Critical success factors".

1.3.1 Commercially-Off-The-Shelf Solution

When deciding about the technologies used for realizing application systems, an organization has to make an important decision on whether to adopt a 'make' approach or a 'buy' approach (Grefen, 2016). In the 'make' approach, a system is tailor-made to comply with specifications of

the organization. Whereas in the ‘buy’ approach, the organization buys an existing system that best meets the organization's specifications. Such a bought system is often referred to as a commercially-off-the-shelf (COTS) solution.

Commercially-off-the-shelf (COTS) solutions are market-made solutions offered by vendors trying to profit from a specific market segment (Ahmed et al., 2018; Albert & Brownsword, 2002; Grefen, 2016). Typically, this type of solution can be delivered to the end-users much faster and cheaper than tailor-made solutions (Albert & Brownsword, 2002; Grefen, 2016). Other advantages for the end-user adopting COTS solutions include sharing the development cost with other customers in the market segment and having the opportunity to expand the organization’s capabilities and performances (Albert & Brownsword, 2002). Overall, the attractive features of COTS solutions are cost savings, ease of integration and extension, reliability, and capability (Albert & Brownsword, 2002; Newcomb, 2007). These features make COTS solutions attractive to organizations, as few organizations today can afford the resources and time dedicated to replicating market-tested capabilities in their IT solutions (Albert & Brownsword, 2002).

Despite the advantages offered by COTS solutions, they are not designed to meet the specifications defined by a specific project. Consequently, the assumptions vendors of COTS solutions make on the end-user processes may not reflect the reality of a specific organization. This means that COTS solutions may require additional customization efforts for a better organizational fit, and this kind of tuning is allowed by advanced COTS solutions that are parameterizable (Ahmed et al., 2018; Grefen, 2016; Hong & Kim, 2002). Therefore, the adoption and implementation of a COTS solution to replace legacy systems or to complement existing systems require different tactics and capabilities compared to custom-built, in-house solutions (Ahmed et al., 2018).

1.3.2 Critical Success Factors

Due to the differences in roles and responsibilities, stakeholders in a COTS IT implementation project have different areas of expertise during the implementation process (Françoise et al., 2009). These areas are also known as critical success factors. Critical success factors are defined

as “for any business, the limited number of areas in which results, if they are satisfactory, will ensure successful competitive performance for the organization. They are the few key areas where ‘things must go right’ for the business to flourish” (John F. Rockart, 1979, p.85). In literature, past researchers have interpreted this definition of critical success factors in two different ways.

The first group of researchers placed their focus on the first sentence of the definition, and view critical success factors as areas that, with satisfactory results, could contribute to implementation success. For example, in Wang, Shih, Jiang, & Klein (2008), implementation success from an organizational perspective is defined by the organizational impact of the implemented system. For this definition, they listed critical success factors such as top management support and commitment, training for different user groups, and business process re-engineering as key areas to focus on during the implementation process.

The second group of researchers views implementation success as the successful execution of the critical success factors during the implementation project. Therefore, under this interpretation, critical success factors are also viewed as the criteria for implementation success. This dual existence of these critical success factors as success criteria and as critical success factors was labeled as a two-way interactive relationship by Grabski & Leech (2007).

This thesis adopts Rockart’s (1979) definition of critical success factors and analyzes critical success factors that were presented as key areas of focus during an implementation project or as criteria of success.

1.4 Research Method

In this thesis, qualitative research methods were used to answer all of the research questions. Qualitative methods are suitable for exploring and understanding social or human problems from the perspective of individuals or groups (Cresswell, 2013). As the goal of this thesis is to explore the nature of the interdependent relationships between stakeholders for critical success factors in a COTS implementation project, qualitative methods were used in this research. Cresswell (2013) discusses five qualitative research approaches: narrative research,

case study research, grounded theory, phenomenology, and participatory action research. For this thesis, the case study approach was chosen for its ability to answer questions about developing an in-depth understanding of an issue through a unique case (Cresswell, 2013). The case study approach has also been described as a multi-perspectival analysis (Tellis, 1997). A multi-perspectival analysis is a triangulation research strategy that considers not only the voice and perspective of the stakeholders but also the relevant groups of stakeholders and the interactions between them (Tellis, 1997). In this case, this approach was chosen to obtain a multi-stakeholder view on the interdependent relationships stakeholders share for effectively managing critical success factors in a COTS implementation project.

The data collection of this thesis used the appropriate case study practices of multiple information sources (Yin, 2003). Yin (2003) recommends six types of information: documents, archival records, interviews, direct observations, participant observations, and physical artifacts. For this thesis, documents, interviews, and participant observations were used as the primary information sources.

1.5 Academic and Practical Relevance

The high failure rate of COTS implementation projects led to a growing interest in the critical success factors of COTS implementation. While the critical success factors for COTS implementation are widely studied, there are very few studies that look at these factors from a multi-stakeholder perspective (Finney & Corbett, 2007). While systematic reviews like Tarhini et al. (2015) provide insights into the critical success factors relevant to multiple stakeholder groups involved in a COTS implementation project, they do not identify and explain the interdependent relationships different stakeholders share in fulfilling these critical success factors. Therefore, the academic relevance of this research is to fill this literature gap by first identifying these interdependent relationships and then explain the nature of these stakeholder relationships for the different critical success factors.

From a practical standpoint, the findings of this research bring transparency to the interdependent relationships between stakeholder groups for critical success factors. This consequently facilitates a dialogue between stakeholders that could lead to consensus-building

and the sharing of knowledge and expertise; which have both been recognized to bring higher effectiveness for stakeholders (Jenkins et al., 2002; UNRISD, 2002).

1.6 Research Scope

The scope of this research includes identifying the critical success factors shared by the stakeholders involved in a COTS implementation project. This research also aims to explore the interdependent relationships that these stakeholders share for these critical success factors. As the choice of software technology implemented in this project is pre-determined by Philips, the scope of this research does not include an in-depth analysis of the chosen technology. It also does not compare the chosen technology to alternative COTS solutions that are currently in the market. Even though the new IT solution purchased by the case company is meant for supplier lifecycle management, this study will not include the feedback from the company's suppliers as end-users. The reason for this decision is twofold: Firstly, although the new IT solution plans to enable partial supplier access to the system, that part of the solution will not be completed under the timeframe of this study. Therefore, suppliers cannot be interviewed for feedback. Secondly, the focus of this research is on the implementation process of a new COTS solution in a company, and not on the extended effects that the new IT solution has on the company's relationship with its suppliers.

1.7 Thesis Outline

This thesis report is composed of five chapters, each with its own purpose. The first chapter defines the scope of the research and introduces the topic. The research questions and the core concepts related to this research are also defined in this chapter. The second chapter provides the methodology of the research, containing the methodologies of the practical, theoretical, and empirical analyses. Chapter three presents the results of the literature review used to answer the first two sub-questions. This chapter consists of two sections describing the key stakeholder groups in a COTS implementation project and the critical success factors that were identified to be relevant for multiple stakeholder groups. The fourth chapter provides the results of empirical research. It provides the answer to the third sub-question by identifying the critical success factors shared by the stakeholders in Philips's COTS implementation project. It also answers the main research question by providing insights into the interdependent

relationships shared by the stakeholders for these critical success factors. The final chapter summarizes the findings of the research and provides the main recommendations. Moreover, the research implications, research limitations, and suggestions for further research are also discussed in Chapter five.

2. Methodology

In this chapter, the methodology of this research is discussed. The chapter begins with the case description and it is then followed up by the research framework. Lastly, the different data sources used in this research are discussed, along with the analytical methods applied to them to answer the research questions.

2.1 Case Description

Philips is a multinational technology company whose businesses span various products and services across 100 countries in the markets of personal health, diagnosis and treatment, connected care and health informatics (Koninklijke Philips N.V., n.d.). Philips realized that its existing information systems in the area of supplier lifecycle management (SLM) were not keeping up with their business needs from the results of an audit conducted between quarter 4 (2016) and quarter 1 (2017). Consequently, Philips decided to adopt a COTS IT solution called the Ariba Supplier Lifecycle and Performance (Ariba SLP). This IT solution which enables Philips to have a grand overview of their suppliers' data across the systems.

Supplier lifecycle management in Philips is defined as the management of the entire lifecycle/relationship with a supplier of the company. It embodies the entire process starting from when the need of the company occurs, all the way until the phasing out of the supplier when the supplier either does not meet the company's needs or requirements anymore. The company has a thirteen-part process for supplier lifecycle management, including stages in the following order:

1. Supplier identification
2. Intended use
3. CM approval
4. Registration
5. Supplier registration approval
6. Qualification

7. Qualification approval
8. Selection/ contracting
9. Ready for use
10. Ready for the SME approval
11. Performance
12. Segmentation
13. Phase-out

Currently, the two main shortcomings of the company's supplier lifecycle management capability are that neither the existing IT systems nor the "Supplier Master Record Layout" (SMRL) allows the company's procurement department to manage the supplier lifecycles holistically. While there are around sixty tools that are currently in use for activities related to supplier lifecycle management, the company lacks a software tool that gives an overview of the suppliers' data from the different systems. Such a system is important for the company to make supplier lifecycle management an integrated process. As for the "Supplier Master Record Layout", it is a canonical data model that is used universally across the company's systems related to procurement activities. The SMRL is critical in the standardization of data, as the data from the different systems have to remain consistent with one another in order to be usable in an integrated IT environment.

While the various tools that are already in use are each sufficient for the activities occurring at the different stages of supplier lifecycle management, a fully integrated view towards the progress in each activity is still lacking. As the various functions work with different IT systems and processes that are not universally deployed and understood throughout the company, it is then challenging for information to flow across departmental lines. This leads to scenarios where employees of the company have to step out of their systems and personally find the administrator of a specific software module in order to acquire data of a specific business process. The data is then manually downloaded and given to the requestor. This means that information regarding supplier lifecycle management activities are not in sync and shared on a common interface for the employees of the company to see and access.

Another problem of the current situation is how supplier data are managed in the interconnected information systems. According to the company's protocol, supplier data should only be added, changed, or deleted directly from the master data hub via requests. However, due to the fact that these activities require significant effort from the end-users, the protocol is often ignored and these activities are often done on the tool level out of convenience. The combination of the systematic flaw of poor data access and the end-users' carelessness in maintaining data quality lead to the frequent creation of new profiles for suppliers. These profiles are created as the end-users had a distrust over the quality of existing records in the master data hub. That, of course, leads to more data pollution in the master data hub, as records created in the individual systems are also mass uploaded to the master data hub periodically without extensive review.

Moreover, due to the differences in the layout of records in different IT systems, the problem of poor supplier data quality is worsened by these differences. Layout differences make it even more difficult to match duplicated or incomplete supplier master data records, as differences in the spelling of company names and in the format of addresses add additional complexity to the data cleanup process. The recognition of these organizational malpractices leads to the top management's decision to immediately undergo data cleansing activities and to purchase a new cloud-based IT solution from Ariba, which will give the end users an overview of the company's supplier data.

As the IT solution chosen by Philips is a Commercial off the shelf (COTS) IT solution in this scenario, it is the responsibility of the IT vendor to customize the solution to fit needs of Philips, and it is the implementation team's responsibility to configure the solution to the requirements provided by the end-users. Therefore, it is important for the company to undergo knowledge transfer activities both internally and externally. Internally, the case company needs to engage in knowledge transfer activities to extract the explicit and tacit knowledge embedded in the current processes, systems, and users. With this knowledge transferred internally, the company will also have to transfer this knowledge by providing design and configuration specifications to the external software solution provider in order for them to tune their software module to the

context of the company. Once the new software module is ready for the users, the company also has to focus on integrating the new IT solution into the workflow of the employees.

As there are a number of stakeholders involved in this implementation project, with each of them having their own roles and responsibilities, the manager of this project wants to know how these stakeholders can work together to ensure that the IT system is implemented successfully. To answer this question, this research looks into the critical success factors that are dependent on multiple stakeholders involved in the implementation project, and explain the interdependencies between these stakeholders in achieving success for the critical success factors.

2.2 Research Framework

In order for the researcher to accomplish the practical tasks given by the company and answer the research questions of this thesis, this research consists of a theoretical part, a practical part, and an empirical part. For all three parts, qualitative research methods were used to achieve the objectives of each part of the thesis. The goal of this research is to explore the interdependent relationships between stakeholders for the critical success factors in a COTS implementation project. For such an explorative study, qualitative research methods were chosen for this research due to their nature of involving humans and society (Cresswell, 2013).

In the theoretical part of this research, the researcher first defines the problem statement, formulates the research questions, and identifies the appropriate research methodology through a preliminary desk research. The outcomes of these activities are shown in Chapters 1 & 2 of this thesis. After these parts are done, the researcher then conducts a literature review for answering the first two sub-questions and for building a conceptual model for this research. The findings of the literature review are presented in Chapter 3. Overall, the main goals of the theoretical part of this thesis are to understand the topic, to identify the literature gap, and to identify the appropriate methodology needed to answer the literature gap in the empirical part of this thesis.

For the practical part of this research, as the researcher was involved in the day to day activities of the implementation team as an intern, he was asked by the company to deliver two practical assignments. The first practical assignment was the creation and usage of a section of the Supplier Master Record Layout (SMRL) called the “Qualification Matrix”. The second practical assignment given by the company is to create a supplier master data cleansing process. The details of these two assignments can be found in Appendix 6. While the outcomes of these assignments do not directly answer the main research questions, the knowledge that the researcher gained as a participant-observer in these tasks helps the researcher in formulating the interview questions for the empirical part of this research. Moreover, the knowledge gained from participating in the project team is also used to interpret the interview data collected in the empirical part of this research. Overall, this part of the research uses qualitative methods such as participant observation, process analysis, and document analysis to complete the tasks given by the company.

Lastly, the empirical part of this research answers the main research question of this thesis. The researcher explores the interdependent relationships between different stakeholders for critical success factors by conducting formal interviews with all of the available stakeholders involved in this COTS IT implementation project. From the interview data, the researcher identifies the critical success factors that are dependent on multiple stakeholders to be effective. The researcher further explains the interdependent relationships these stakeholders share in effectively managing these critical success factors. The results of this part of the research are presented in Chapter 4, and the conclusion, discussion points, and managerial advice drawn from these results are presented in Chapter 5.

Figure 1 provides an overview of the research framework, presenting the connections between each part of the research and the corresponding chapters in this thesis. The asterisks shown in the framework are the methods used in each part of the research to come to the results described in the different chapters.

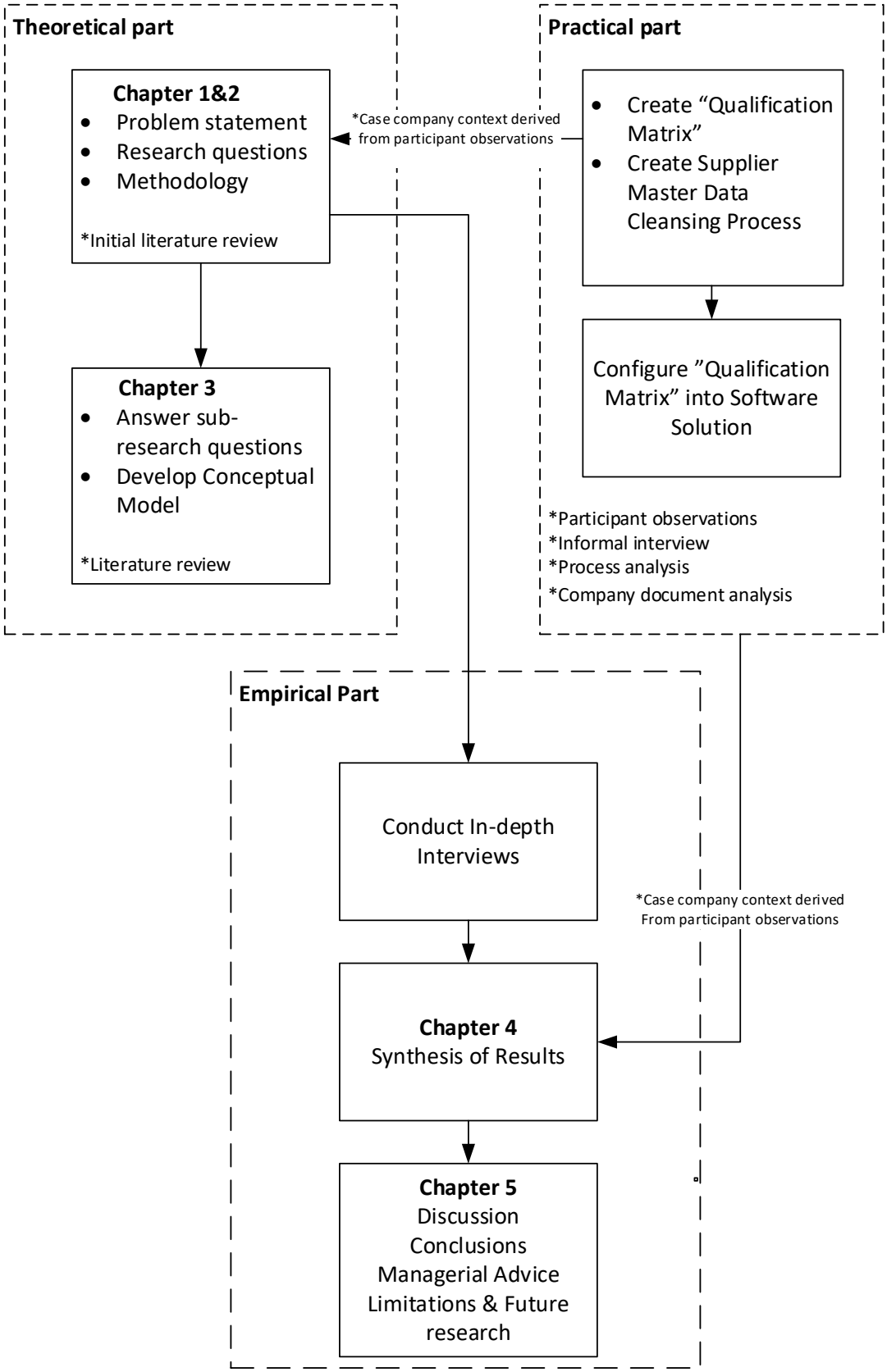

Figure 1 Research Framework

2.3 Data Sources & Analysis

Yin (1994) listed six sources of evidence for data collection for case study research, namely: documentation, archival records, interviews, direct observation, participant observation, and physical artifacts (Tellis, 1997). Out of these six sources of evidence, documentation, interviews, and participant observation are used for this research. In the following sections, the data and data analyses used in each part of the research are discussed.

2.3.1 Theoretical Part

The theoretical analysis provided an answer to the first two sub-questions. Both of these sub-questions were answered using a literature review on the current literature of critical success factors. The selection of the literature used to answer the two sub-questions is based on two criteria. First, these papers have to be written on the topic of COTS or Enterprise Resouce Planning (ERP) implementation. ERP literature is accepted as a source as it is a type of COTS system that has been extensively researched. Second, each paper must contain at least one stakeholder-specific definition of implementation success, as well as the corresponding critical success factors. In this case, the stakeholder definition of success is used to ensure that the critical success factors listed in a paper are directly linked to a stakeholder's goals in an implementation project. The search strategy for the literature can be found in Appendix 1.

In order to answer the first sub-question, the key stakeholder groups of COTS implementation projects were analyzed. This was accomplished by identifying the different stakeholder perspectives that past researchers have adopted when researching critical success factors. The roles and goals of these stakeholders are explained in Chapter 3.1.

As for answering the second sub-question, the critical success factors that are important for the stakeholder groups identified in Chapter 3.1 were analyzed. These critical success factors were inputted into a matrix that categorized the critical success factors based on each stakeholder group. The researcher then cross-checked the critical success factors shown in this matrix and answers the second sub research question in Chapter 3.2 by highlighting the critical success factors that were shared by multiple stakeholder groups. These critical success factors are therefore the ones where different stakeholder groups may share interdependent

relationships. These critical success factors and their respective stakeholder groups that they are affiliated with are then displayed in the conceptual model in Chapter 3.3. While the empirical part of this research does not specifically verify the shared nature of this set of critical success factors, the purpose of the conceptual model is to show the critical success factors whose effectiveness could be dependent on multiple stakeholders in literature.

2.3.2 Practical Part

For the practical tasks given by the company, the researcher used company documents and participant observation as the main sources of data to complete the tasks. Company documents were used to understand the business processes that will be incorporated into the new IT solution. The description of the different types of company documents used for this section can be found in Appendix 7. While company documents give a clear outline of the company's business processes, the company's employees still have their own interpretations of the business processes. This is reflected in their approach in unique business cases that fall in the "grey zone", where hardline rules cannot be applied faithfully. Therefore, in order to capture this human decision aspect into the COTS solution, it is important for the researcher to have a deeper understanding of the works of multiple stakeholders, beyond what is defined in the company documents. This type of knowledge is learned through participant observations in the implementation team's daily operations as well as in the business process re-engineering meetings. This type of participant observation-based case study method has been used by researchers in this field to build a picture of the organization (Pan, Huang, Newell, Wan, & Cheung, 2001). In this case, the researcher used the insights gained as a participant-observer along with insights from existing literature to formulate interview questions used in the empirical part of this research. Moreover, the insights that the researcher gained as a participant-observer are also used to interpret the data collected from the formal interviews. For this part of the research, qualitative research techniques such as process analysis, documentation analysis, and participant observation were used to complete the practical tasks given by the company.

2.3.3 Empirical Part

For the empirical part of this research, qualitative methods were chosen for their suitability to the exploratory nature of this research (Yin, 2015). As the goal of this research is to explore the interdependencies between stakeholder groups for critical success factors, this information was acquired using qualitative methods such as participant observations and interviews.

The empirical analysis was conducted in the procurement department of Philips, with the assistance of the supplier lifecycle management team. For this research, 6 formal interviews were conducted between June 2019 and July 2019, with stakeholders that were directly participating in this COTS implementation project. The interviews were done in person or through skype, subjected to the interviewees' preferences. The interviews followed a semi-structured format and were conducted in English. The interview questions were open-ended, facilitating a free flow of ideas from the interviewee in generating information-rich data (Kurasaki, 2000). Follow-up questions were asked to the interviewees when certain discussion points needed further clarification. All the interviews were recorded and transcribed. On average, these interviews were between 30-50 minutes.

The interview covered three main topics: (1) the background and the role and responsibility of the interviewee (2) the interviewee's definition of COTS implementation success for the project, and (3) the critical success factors that are related to their definition of implementation success.

The selection of the interviewees is based on "purposive sampling", which is described by Silverman (2010) as selecting interviewees based on the groups that the research addresses. In this case, the research is directed towards the stakeholders that are directly involved in the implementation project. These stakeholders also have to be involved in the project for more than six months. This second condition is to ensure that an interviewee has sufficient knowledge over the state of the implementation project and their role within the implementation team.

Another selection technique called 'snowballing' is also used for interviewee selection. Snowballing is the process of acquiring new interviewees by asking initial contacts or

interviewees to recommend other potential interviewees (Kurasaki, 2000). The researcher used this technique by asking the manager of this implementation project for potential candidates to interview. In total, the manager suggested a list of 15 interview candidates. Out of this list of candidates, only ten were directly involved in the implementation project. As for the rest, they were Business Process Experts or Business Process Owners that have previously implemented COTS solutions within Philips. The researcher decided to omit these five candidates, as they were not directly involved in this specific implementation project and therefore could not provide insights into the stakeholder relationships.

At the end of the candidate selection and contacting process, the researcher was able to secure six interviews from the ten remaining candidates. The candidates that were not available for interview, left the company before the interviews were conducted. Three of them are experienced project team members located in Poland, and the last candidate is the implementation consultant hired to assist the project. As for the candidates that participated in this research, their profiles can be found in Appendix 2. All of the interviewed stakeholders have extensive knowledge of the state of the implementation project and are actively involved in the implementation process. The diverse range of roles and responsibilities within the implementation project allows the researcher to understand the interdependent relationship between different stakeholders from a multi-stakeholder perspective for critical success factors key to this COTS implementation project.

In order to avoid the common pitfall of committing systematic and nonsystematic errors throughout the process of developing and applying codes to the qualitative data, the researcher follows the advice from Bernard (1995) when analyzing the interview data. Bernard (1995) suggested researchers use multiple, well-trained coders and establishing high intercoder reliability in their analysis. Intercoder reliability is defined as a measurement of agreement between coders in how they apply codes to the data (Kurasaki, 2000). According to Ryan (1999), agreement can be used to measure the reliability of the coders' ability to identify and document themes from a text, and also acts as a proxy for the validity of the constructs that appear from the data.

Intercoder reliability is determined by calculating the degree to which coders agree across a fixed set of units. However, it is hard to determine the units to be coded for narrative interview data due to its conversational and choppy nature (Kurasaki, 2000). While interviews may be focused on a certain topic, it is also likely to include frequent tangents, digressions, backtracks, and overlaps (Kurasaki, 2000). To mitigate these issues posed by interview data, this research adopts an adapted version of the analytical procedure developed by Kurasaki (2000). This procedure addresses the risks of over-interpretation and pulling information out of its original context by the researcher when consolidating interview data into more manageable text units.

The analytical procedure of Kurasaki (2000) consists of three stages. In stage one, the researcher and his coder identify potential themes and develop a formal codebook. In stage two, the team uses an excerpt from the interviews to establish intercoder reliability for the identified themes in the codebook. Lastly, when the researcher decides that an acceptable level of intercoder reliability is achieved, the researcher and the coder will proceed to systematically apply the codebook to all of the interview data. A more extensive summary of the analytical procedure developed by Kurasaki (2000) can be found in Appendix 3**.**

In this research, the researcher and his assistant adapted the first stage for codebook development in order to take advantage of the available digital tools for coding, and for mitigating the assistant's inexperience in coding. Instead of annotating the transcripts individually on paper copies, the researcher and his assistant annotated the transcripts together digitally. Instead, for the first step of this adapted procedure, the researcher and his assistant annotated all of the transcripts together on Microsoft Word and stored the annotations in a Microsoft Excel file. Each of the annotations is given a preliminary color code when inputted into the Excel file. The color codes given to each annotation is based on its theme. In step two, the list of annotations is filtered based on color in Excel, and the redundancies are removed from the list. Finally, in step three, the different color-coded theme groups are given descriptive titles and number codes. In total, thirteen different themes were identified from the interview transcripts.

These adaptations allowed the codebook development processes to be more efficient, and the researcher was able to disclose the context of the interview data to his assistant as the assistant was not involved in the interviewing process. The researcher and his assistant then followed all of the procedures in stage two and obtained the level of the agreement for the different themes as shown in Table 1:

Theme	**Agreement level**
Definition of success	0.79
Success criteria	0.71
Critical success factors	0.83
Cross-functional stakeholder engagement	0.65
Change management	0.63
Communication	0.69
Data consistency	0.72
Implementation process	0.74
IT solution	0.65
Personal information of interviewee	0.81
Role and responsibilities of project team members	0.74
Standardized methodology	0.71
Team setup	0.63
Overall	0.72

Table 1: Agreement levels for interview themes

The overall agreement level across all the themes is 72%, and since Kurasaki (2000) did not clearly state a threshold for the level of agreement, and the appropriate level of agreement in that paper is subjected to the decision of the researcher.

For this research, due to the exploratory nature of the research and the diverse backgrounds of the interviewees, it resulted in a large number of themes and sub-themes emerging from the interview data. A large number of sub-themes for each theme made it difficult for the coders to assign identical codes, hence lowered the level of agreement. Also due to the small sample size of interviews, it was also difficult for the researcher to streamline the codebook to have more definitive sub-themes. Taking these conditions into account, the researcher and his assistant determine that the level of agreement was acceptable, but also took a cautious approach when writing the results of this research by double-checking whether the quotes used in the results section were pulled out of context.

Finally, in order to answer the main research question empirically, the researcher first identified the critical success factors that were shared by multiple stakeholders in this COTS implementation project. The interdependent relationships between the stakeholders in this project for each of these critical success factors are then identified and explained to answer the main research question.

3. Literature Review

This chapter discusses the findings from the literature and will provide theoretical answers to the first and the second sub-question. The aim of this chapter is to provide an understanding of the available knowledge on the key stakeholder groups and the critical success factors that these stakeholder groups share in a COTS implementation project. This literature review chapter consists of three components. First, the key stakeholder groups of a COTS implementation project are discussed in Chapter 3.1 Second, the critical success factors that are associated with the identified stakeholder groups in Chapter 3.1 are presented in Chapter 3.2. Lastly, the final section presents the combined findings from the previous sections in a conceptual model.

3.1 Key Stakeholder Groups in COTS Implementation

In every COTS implementation project, there could be a different combination of stakeholders involved in it. The purpose of this part of the literature review is to introduce the key stakeholder groups that have been identified in the literature to be involved in the implementation process of COTS solutions. The selection of the stakeholder groups presented in this section is based on two criteria. Firstly, the roles and goals of each stakeholder group in a COTS implementation project were clearly defined in the literature. This is to ensure that these stakeholders have an active role and stance on the critical success factors that they are associated with. Secondly, these stakeholder groups were identified in the literature to share critical success factors with other stakeholder groups involved in the COTS implementation project. This criterion is related to the second part of the literature review, which is to identify the critical success factors in COTS implementation projects that depend on the collective efforts of multiple stakeholder groups. Therefore, this section omits the stakeholder groups that do not fulfill the aforementioned criteria, as they do not fit the scope of this research.

3.1.1 End-User

The role of end-users in an implementation project is to work with the implementation team to create a solution that is satisfactory (Nour & Mouakket, 2011). Consequently, implementation success has been defined or measured in five different ways by end-users in literature. User satisfaction is one of those measurements. It is influenced by the system's stability, the change management during the implementation process, and the information quality of the system (Chao, Wu, Wu, & Garfolo, 2012; Nour & Mouakket, 2011). Similarly, implementation success has also been defined as the smooth operation of the system (Dezdar & Ainin, 2011). Other ways to measure implementation success include assessing the level of system utilization, the level of system performance, and the system's perceived level of success (Chao et al., 2012).

3.1.2 Top Management

The role of the top management in an implementation project is to provide the project team with the necessary support throughout the project (Dezdar & Ainin, 2011; Nour & Mouakket, 2011). Top management support can come in the form of resources or leadership to the implementation team (Dezdar & Ainin, 2011; Nour & Mouakket, 2011). For top management, implementation success is assessed based on user satisfaction and system performance levels (Deghar & Kuzic, 2010; Nour & Mouakket, 2011). Additionally, they also evaluate the success of an implementation project based on whether the system matches the users' expectations and based on the strategic impact of the system (Deghar & Kuzic, 2010; Nour & Mouakket, 2011). Furthermore, implementation success can also be assessed based on the amount of resources required to implement the system. This means whether the implementation project is finished below budget and time estimations (Deghar & Kuzic, 2010; Nour & Mouakket, 2011).

3.1.3 IT Department

The IT department is often responsible for providing the technical resources to the implementation team and for managing and maintaining the system after it is in function (Nour & Mouakket, 2011). For the IT department, implementation success is measured based on the amount of maintenance required by the system as well as the technical skills required to manage and maintain the system (Nour & Mouakket, 2011). The IT department also assesses

implementation success based on the smoothness of the change management process (Nour & Mouakket, 2011).

3.1.4 Project Team

In a COTS implementation project, the project team is responsible for carrying out the implementation (Nour & Mouakket, 2011). While the scope of tasks in a COTS implementation project may vary from each project, implementation success from a project team perspective is generally defined as the completion of the implementation process with reasonable efforts, on time, and within budget (Nour & Mouakket, 2011). This means that an IT implementation project is considered successful if the key areas (critical success factors) that the project team is responsible for are reasonably executed within time and budget constraints. Implementation success can also be measured in terms of the perceived deviations from the expected project goals (Hong & Kim, 2002). These deviations can come in the form of cost overrun, schedule overrun, system performance deficit, and failure to achieve the expected benefits (Hong & Kim, 2002).

Although project managers are usually part of a project team, their perspective on implementation success has also been captured in literature. From a project management perspective, all projects disregarding their nature or size, are limited to three golden constituents (Chen et al., 2009). These three golden constituents are schedule, quality, and budget. Consequently, project managers have to constantly make trade-off decisions on their projects, based on these three constituents. Including these three constituents, the Project Management Institute categorizes the body of project management knowledge into nine areas including schedule, quality, budget, scope management, human resource (HR) management, risk management, communications management, procurement management, and integration management (Chen et al., 2009). Therefore, the definition of implementation success from a project management perspective is the successful management of the nine areas of project management, over the duration of the implementation project (Chen et al., 2009).

3.1.5 Vendor

The vendor of a COTS solution provides the client organization with the COTS as well as support and services that are associated with the COTS solution (Nour & Mouakket, 2011). Therefore, from the vendor's perspective, implementation success is determined by the reputation that the company gains from implementing their system at a customer's organization (Nour & Mouakket, 2011). It is also determined by the overall quality of their system and their support services (Nour & Mouakket, 2011).

3.2 Critical Success Factors

The purpose of this research is to identify and explain the interdependent relationships that stakeholders in a COTS implementation project share for critical success factors that are common amongst them. To do that, this research has to first identify the critical success factors that are dependent on the collective efforts of multiple stakeholder groups according to the literature. Therefore, this section of the literature review presents the critical success factors that are common amongst multiple stakeholder groups in literature. The stakeholder groups mentioned in this section are the ones presented in Chapter 3.1. Moreover, this section of the literature review omits the critical success factors that are only associated with a single stakeholder in the literature, as the realization of those critical success factors is not dependent on the collective efforts of multiple stakeholder groups in a COTS implementation project. Hence, they are excluded as they fall out of the research scope.

3.2.1 Training for Different User Groups

The IT department of an organization and the vendor of a COTS system have both been accredited with the responsibility of training end-users in the literature (Ngai, Law, & Wat, 2008; Nour & Mouakket, 2011).

Training end-users with the new IT solution has two purposes. Firstly, end-users must be trained on the new system in order for them to use it in their day to day operations effectively and efficiently (Deghar & Kuzic, 2010; Gargeya & Brady, 2005). Training and education could

enhance the end-users' level of knowledge and proficiency, leading to better individual performance and subsequently organizational performance (Dezdar & Ainin, 2011).

The second purpose of training is to educate end-users on the implications of the new system, in order to create enthusiasm and buy-in for the project (Gargeya & Brady, 2005). More importantly, it may help end-users adjust to the organizational change taking place along with the implementation of the system (Dezdar & Ainin, 2011). Lastly, training increases the ease of use of the system and reduces user resistance, which increases the likelihood of systems use post-deployment and the project's overall success (Dezdar & Ainin, 2011).

3.2.2 Change Management

The existing organizational structure and processes found in an organization are most likely not compatible with the structure, tools, and types of information provided by the new IT system (Umble, Haft, & Umble, 2003). Therefore, the new IT system may force the organization to reengineer some of the key business processes and/or develop new business processes to support the system and the organization's goals (Umble et al., 2003). These kinds of changes may significantly affect the organizational structures, policies, and employees and should be managed with care (Umble et al., 2003). Change management is related to other critical success factors such as *business process re-engineering* and *organizational culture/culture change/political issues* (Gargeya & Brady, 2005; Nour & Mouakket, 2011).

Although change management impacts most functional areas and many social systems within the organization, it has been explicitly listed as a critical success factor for stakeholder groups including the end-users, IT department, and the project team (Nour & Mouakket, 2011).

3.2.3 Business Process Re-engineering (BPR)

A certain level of business process re-engineering is needed in the implementation of a COTS solution, as packaged solutions may be incompatible with the needs and business processes of the organization (Ngai et al., 2008). In order to improve the functionality of the software in accordance with the needs of the organization, an organization should reengineer business processes to fit the software instead of trying to modify the IT solution to fit the organization's current business processes (Ngai et al., 2008). For this critical success factor, stakeholder groups

including the end-users, IT department, top management, project team, and project manager are all involved in this process (Chen et al., 2009; Hong & Kim, 2002; Nour & Mouakket, 2011). Each of these stakeholders holds their own opinions regarding the appropriate level of business process engineering needed for the COTS solution, and their decisions influence the amount of customization done to the COTS solution for a better organizational fit.

3.2.4 Customization of COTS Solution

As mentioned previously, the level of customization of the COTS solution goes hand in hand with the level of business process engineering. In literature, stakeholders such as the top management, project team, and the IT vendor have been accredited with the responsibility of deciding the level of customization needed by a COTS solution (Deghar & Kuzic, 2010; Hong & Kim, 2002; Wang et al., 2008). While COTS IT solutions are often customized to achieve a higher organizational fit, the minimal customization of COTS IT solutions has been recognized as a critical success factor (Deghar & Kuzic, 2010; Hong & Kim, 2002). This is due to the fact that customizations often lead to increases in the cost of implementation (Deghar & Kuzic, 2010; Ngai et al., 2008). It also increases the implementation time and restricts the system's ability to implement future upgrades and updates easily and efficiently (Deghar & Kuzic, 2010).

3.3 Literature Review Conclusions & Conceptual Model

In this section, the conclusions drawn from the analyses presented in the previous sections are given. This section also provides the answers to the first two sub-questions and provides visual summaries of these answers in the form of a conceptual model.

3.3.1 Key Stakeholder Groups in COTS Implementation

The first sub-question aimed to provide insight into the key stakeholder groups involved in a COTS implementation project:

What are the key stakeholder groups involved in a COTS IT implementation, according to the existing literature?

The literature review indicated that there are five key stakeholder groups in a COTS implementation project. These stakeholder groups are (i) end-users, (ii) top management, (iii) IT

department, (iv) project team, and (v) vendor. Although there are many more stakeholders that could be involved in a COTS implementation project, these stakeholders were omitted from the results of the literature review for either not having defined roles and goals in a COTS implementation project, or they were not associated with critical success factors that are dependent on the efforts of other stakeholder groups.

3.3.2 Critical Success Factors

The second sub-question aimed to provide insight into the critical success factors of COTS implementation projects that are dependent on the efforts of multiple stakeholder groups.

What are the critical success factors that are shared amongst multiple stakeholder groups in a COTS IT implementation project, according to the existing literature?

The literature review indicated that there are four main critical success factors of this nature. These four critical success factors are (i) training for different end-user groups, (ii) change management, (iii) business process re-engineering, and (iv) customization of the COTS solution. While there are more extensive lists of critical success factors compiled by other researchers in this field (Finney & Corbett, 2007; Tarhini et al., 2015), these four critical success factors were chosen for their association with multiple stakeholder groups in a COTS implementation project in the literature.

3.3.3 Conceptual Model

By combining the findings of the two sections of the literature review, it yields the conceptual model shown below in Figure 1. The titles of the critical success factors are shown in the heart of each circle. Surrounding it are the stakeholder groups that are associated with each critical success factor. Each stakeholder group is also assigned a color code. Although each critical success factor is associated with multiple stakeholder groups, the interdependent relationships that these stakeholder groups share for these critical success factors remain unclear due to the limitations of the current literature. Therefore, the empirical part of this research aims to explore the interdependent relationships between stakeholders for critical success factors that were identified in a case study conducted in Philips. The results of the empirical part of this research are presented in Chapter 4.

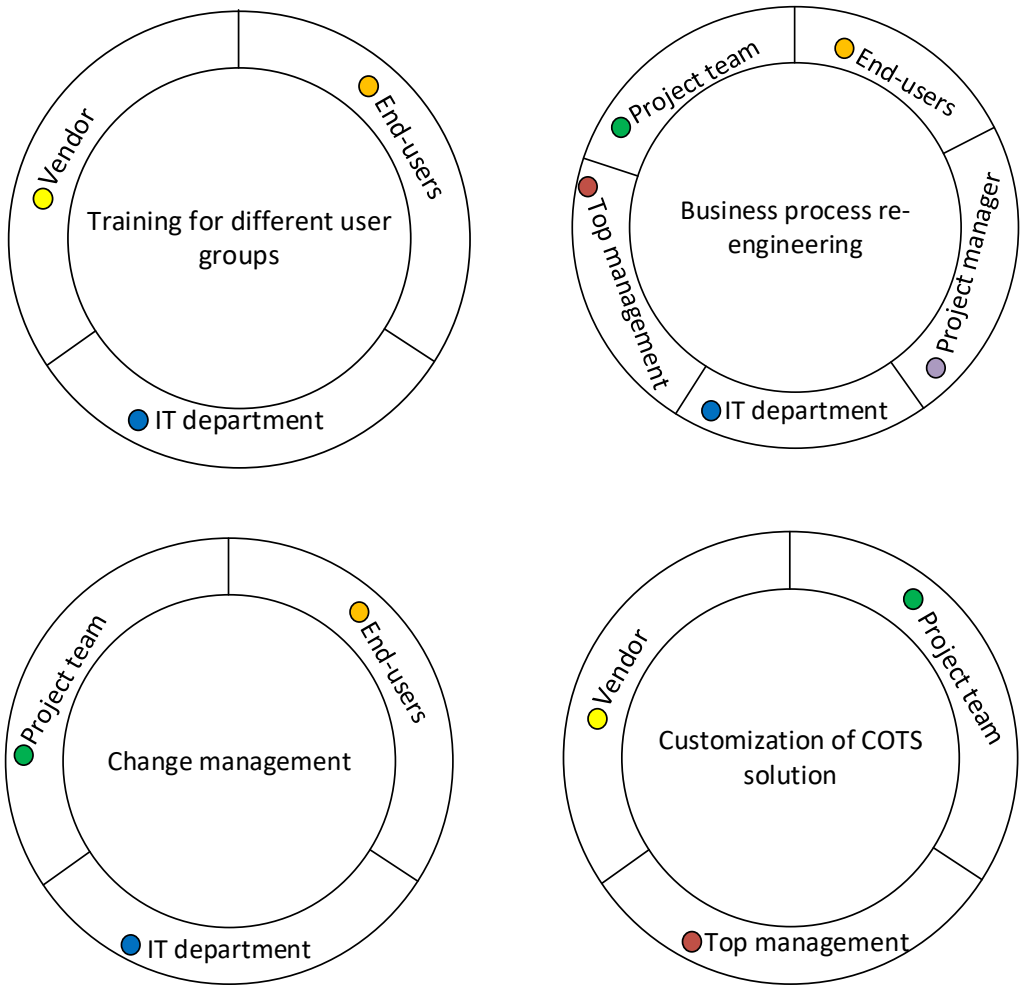

Figure 1 Conceptual model

4. Results

In this chapter, the critical success factors that are shared amongst multiple stakeholders in this case study are presented. The interdependent relationships between the stakeholders for each critical success factor are also discussed. Furthermore, an extensive summary of all of the critical success factors identified for each stakeholder during the formal interviews can be found in Appendix 5**.**

4.1 Use of a Standardized Methodology

The use of a standardized methodology was highlighted by the project manager of this project as a critical success factor. While the project manager admitted that the use of a standardized methodology for project management does not limit to COTS implementation projects, its importance cannot be stressed enough. In Philips, the standardized methodology is called the 'Standardized Implementation Methodology' (SIM). It is an adapted version of the PMO methodology from the PMI Institute, specifically for this organization. The SIM gives a comprehensive guide over the actions and deliverables needed at each stage of the implementation process.

The use of a standardized methodology is specifically highlighted as a critical success factor by the project manager, due to some of the challenges that this implementation team encountered during the project. The project manager pointed out that there is a work culture issue within Philips and described it as an unstructured approach towards solution development. What that means is that the Business Process Owners (BPO) in the organization often do not follow the necessary steps, in the right order, when coming up with a solution to a specific problem. In other words, they do not follow the standardized procedures listed in the SIM. The project manager gave the example that Business Process Owners (BPO) often ask him to implement a solution to a specific problem, without actually validating the solution with the end-users. The project manager explained the flaws of this kind of approach in the quote below:

"If you want to implement something, if the Business Process Owner (BPO) sees a problem in the process, and then he says "I need to address this type of steps". How he should do it is to go to the end-users, try to understand what is the exact problem, then find in the background a solution, meaning having a look at what you have in systems that are in place. Then based on the BPE, which are the business process experts, try to map these processes and come up with a solution. Then they should be involved in designing that solution. They are not doing that, they are designing and wasting a lot of time and come up with a so-called "yes, I have a solution for you". But it is wrongly done, it is done by them in the laboratory, instead of working with [end-users]…"

Unfortunately, from the perspective of the project manager, the Business Process Owner of this implementation project did not always follow this standardized approach and the project suffered consequences such as scope deviations, budget increase, wasted resources, end-user resistance, and general frustrations within the project team. The project manager pointed out the flaws in the Business Process Owner's approach in the following quote:

"He is doing various things in parallel, which is very hard to map due to complex communication. That is why we are delaying, because we are not structured in the approach. While he is now seeing the stakeholder, he is doing it in his own way by spreading too much by having too much detail instead of a top-down approach. He is having a mixture of top-down and bottom-up, going to the details when it is not really needed instead of keeping it simple."

However, the Business Process Owner justified his approach and stated in the following quote that the standardized methodology often does not provide enough insight for him to design the solution:

"…you have the solution design. You have to keep the stakeholder happy, and you need to make sure the business objectives are met. Of course, every Project Manager has their stakeholder analysis, a satisfaction survey and etc, but the real gauging a Project Manager or Project Management methodology cannot do. That lies in the eyes of the beholders [the Business Process Owner], the users in the responses, and in the business process management. But you could have something as absurd as a perfect milestone and execution but the deployment is not

accepted because the users are just all up on the barricade. On the other hand, if you have a lousy or less than perfect solution, a professional project manager can still help you get that done."

Consequently, the Business Process Owner sees a trade-off between following the standardized methodology and creating a solution that the end-users will accept once it is implemented. The BPO stated that:

"Of course it is good to have a project management perspective, because as a BPO I am willing to dedicate another month for user alignment versus from a milestone perspective, as a project manager, I'll have to reach a milestone. So there is an inherent conflict between them.

The Business Process Owner added that the relationship between a BPO and a project manager is like a marriage where the position of power changes hands throughout the project. The BPO stated that:

"BPO is more involved in the design, but once you have design closed PM is extremely important. But at the end of the day it's like a marriage, someone will always have the upper hand for a certain time. It's like after you have the wedding, you need it to work for a long period of time."

Therefore, for this critical success factor, it is important that all project team members including the BPO in an implementation project either make a conscious effort in following the standardized methodology, or the changes in the approach have to be clearly communicated within the team. This way there are no unforeseen discrepancies in the outputs of each member's work that could delay the overall progress of the project team.

In this project, due to the Business Process Owner's unstructured approach in assigning priorities to project tasks and not clearly communicating his approach to his peers, the project manager often found himself as a spectator in the background trying to gather the information needed for the project to advance to the next stage. This greatly affected the project manager's effectiveness in running the team as only the BPO is fully aware of the project's progress and direction.

The burden of being the center point of intelligence for the entire project also overwhelmed the BPO, as he had to dedicate a large amount of his time providing feedback to each project member's work, which should have been the project manager's responsibility. Consequently, members of the team started losing sight of the purpose of their work within the team, as the BPO struggled to clearly communicate his expectations for their tasks as he had too many responsibilities to handle. Therefore, the project manager stresses the importance of a standardized methodology, as it keeps projects from running off the course by having detailed objectives that each project needs to fulfill. By adhering to these objectives, the SIM gives the project manager the regulating powers that the project manager can use to guide or challenge the decisions made by the BPO and prevent the BPO from undertaking more responsibilities than he could handle. The interdependent relationships between the different stakeholders for this critical success factor is shown in Figure 2. The colored boxes represent the stakeholders involved in this critical success factor and the dotted text boxes summarize the relationship between the stakeholders.

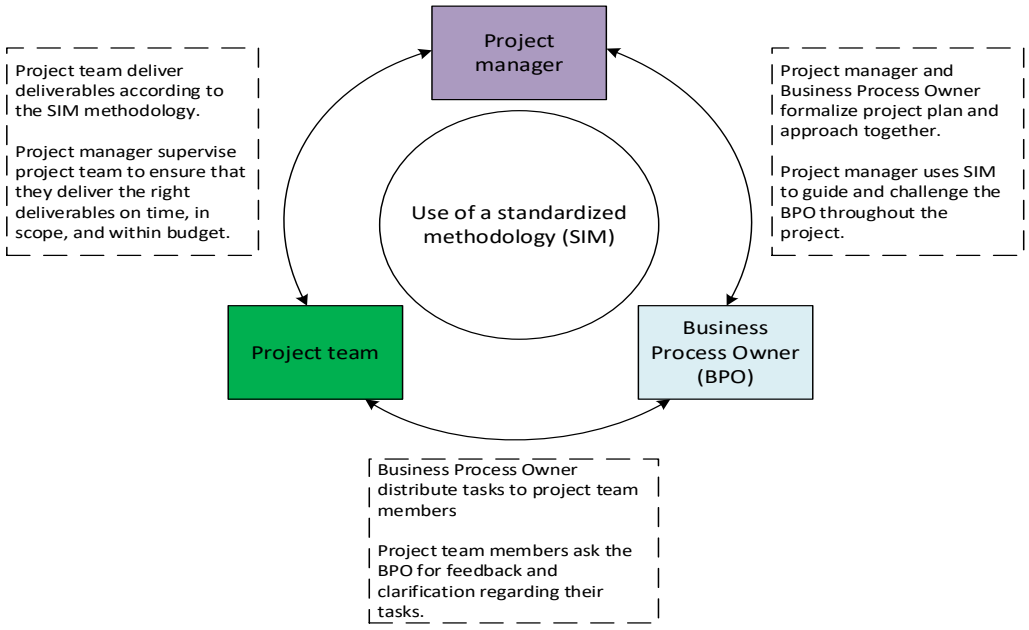

Figure 2 Relational diagram for use of a standardized methodology

4.2 Cross-Functional Engagement

As business processes in the organization are interconnected, changes in one process will undoubtedly affect other connected processes. Since the COTS IT solution is supposed to be a reflection of the real-life business processes, it is crucial that all stakeholders affected by the changes in the business processes are aware and engaged in the business process redesign aspect of the COTS implementation. This way all affected stakeholders could give their support and feedback to the implementation team, or alter their own processes if they are undergoing their own business process optimization initiatives in parallel. The Business Process Owner illustrated the relationship with cross-functional partners in the following quote:

"It's like I have these fields that will impact your processes, and we have a handshake of what needs to change. Then they do it at the same time or else it's like I change it and you didn't change it, hopefully we can deploy."

Therefore, the relationship between the project team and the cross-functional partners is that they depend on one another needs to create and implement mutually beneficial solutions that fit the interests of each party. In order to achieve effective cross-functional engagement, the interviewees offered a few pieces of advice. Firstly, the project manager emphasized the importance of stakeholder communication. Stakeholder communication extends beyond gaining the validation from cross-functional stakeholders, it is also a method of creating transparency and a method of self-promotion in order to gain acceptance for your project. Stakeholder communication is also a vital cog in the establishment of agreements, and in the division of responsibilities between different stakeholders. In order to reach internal stakeholders outside of the core implementation team, it is advised by the project manager for the implementation team to utilize as many internal communication channels within the organization to share the idea of the project. The project manager stated that:

"You need to be transparent, you need to use all of the Philips channels possible upfront with everything that you are doing. If you create transparency, you gain acceptance upfront. If you are promoting yourself and your work upfront, you gain acceptance and recognition, people know what you are talking about. You don't need to suddenly appear on the table with a

solution that has not publicity. You need to have a very good communication strategy, and that's quite simple because Philips is very mature as an organization in the perspective. You have so many channels that you can communicate with stakeholders."

Additionally, the project manager also advised implementation teams to communicate with cross-functional partners before everything is perfectly in place. That takes away the shock factor when the implementation team approaches cross-functional stakeholders for support or cooperation, as they will already have an idea over the mission of the project.

The second piece of advice given by the project manager for cross-functional engagement is to have all of the affected stakeholders together in one room, instead of interacting with them individually. The project manager stated that:

"I have suggested not to do this silo with SQ (supplier quality department) and put them [affected stakeholders] all together because when you are deploying the solution, they will actually work together in that solution. It's a process, it's a flow, they need to be together, to argue and to fight together, and we are organizing that to extract what we need and map. Well, he [the BPO] didn't do that, and that's why we are still scoping, clarifying over and over again. When you do it in this silo approach, it is very difficult to piece all of the information in this big puzzle and make it work."

This approach gives the affected stakeholders the motivation to be involved in creating mutually beneficial solutions, as it is in their best interest to have a solution that fits their respective business processes. Whereas if engaged individually, it becomes a back and forth dialogue between the implementation team with each stakeholder, as the requirements of one stakeholder may not fit with the requirements of another stakeholder.

The end-user also offered a few pieces of advice for the project team with regard to cross-functional engagement. In Philips, the project team engages the end-users though software demonstration sessions. For the end-users, these demonstration sessions are independent of their day to day jobs, so all of their recommendations and requests are based on the version of the COTS solution displayed during these sessions. Therefore, the end-user recommended the implementation team to display as much content as possible for end-users to absorb and

reflect on during these sessions. Another point for improvement highlighted by the end-user is the long interval between each demonstration session. Regarding the execution of the demonstration sessions, the end-user stated that:

"We had a number of demos, which is good. But the demos were spread over time. To me personally, I have a lot of things in the meantime. We had 1 hour of the demo showing the start of the process, which was obviously too short. Then two weeks later we have another hour of 90% of what was shown the first time. This is what I was missing, it should be more…I understand it's difficult to get people for a longer time, but planning ahead of time to have a longer demo is better than having 4 demos of one hour."

The long interval between each session and the shortness in time for each session lead to the ineffective use of the demonstration sessions. The time allocated for a software demonstration was instead used as a content recap of the previous sessions. Consequently, more demonstration sessions were required by the end-users, which resulted in delays for the implementation team.

In summary, cross-functional engagement is key to the consensus-building and information sharing between different stakeholder groups. It is therefore crucial for the project team to create an environment where the cross-functional stakeholders are motivated to create mutually beneficial solutions. The relationship between the end-users and the project team for cross-functional engagement is summarized in Figure 3.

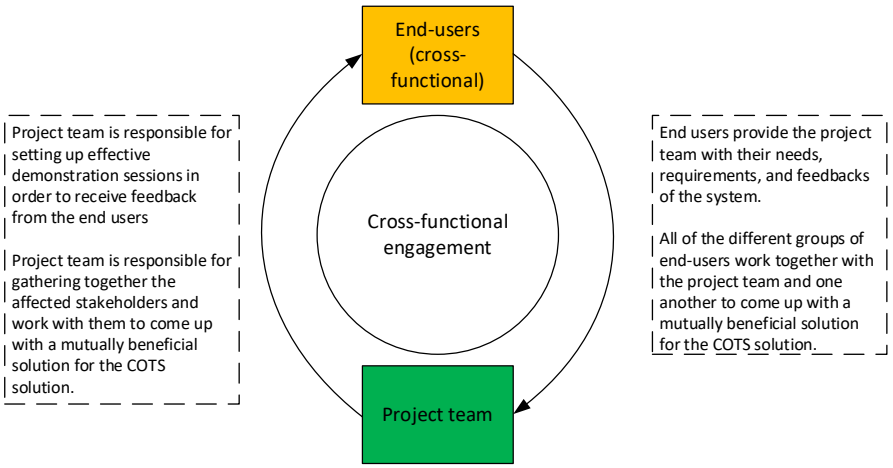

Figure 3 Relational diagram for cross-functional engagement

4.3 Change Management

Change management is another major theme that emerged from the interviews as there is an inherent aspect of organizational change that comes with the introduction of a new IT solution. Change management is therefore crucial for the smooth implementation of a software solution and is related to previous themes such as communication with stakeholders and cross-functional engagement. Some examples of change management mentioned in the interviews include finding the right stakeholders for validation. It also covers how to find the appropriate support needed to push changes in the business over the line.

For finding the right places for end-user validation, the project manager indicated that cultural factors have a profound impact on the smoothness of this process. He indicated that countries in Asia are more likely to be compliant with organization rules and provide less resistance than counterparts in North America or Europe due to their work cultures. The Business Process Owner agreed with the project manager on the impact of cultural factors on change management. The BPO added that for a global solution, end-user validation has to come from end-users for different regions as the solution will be adopted globally. The BPO stated that:

"for example, Asia is instrumental because their culture of resisting is different and their meticulousness is different. But also in a world where everything is more standardized and efficient, the impact is lower. But in general, you just have different cultures in different areas, something as simple as an evening call is more difficult. But since this project involves interconnected, so it is not like I could change the master data of a supplier for Asia and not the rest. So we influence the process for the front end, but it is not like we could deploy in one area and other areas catch up later. So the option of redeployment is not there. So for me, vendor master data has to be in sync when we go live, and I don't have the option of it not being consistent for just North America for example."

The next topic related to change management is the level of abstraction and the granularity of the business process change. The Business Process Owner indicated that it is often challenging to bring cross-functional partners or end-user to agree on the business process changes as there is an inherent conflict between adopting highly strategic objectives and executing

meticulous changes over the business process. This conflict can be caused by stakeholder's unwillingness to accept the change or caused by the stakeholder's inability to understand the benefits of the change. Nevertheless, it is the implementation team's responsibility to let the stakeholders see the impact of the changes proposed by the implementation team and convince them to adjust their own processes accordingly. According to one of the Business Process Experts (BPE) of this project, *"that's the biggest learning because you can have a holistic approach and you can have strategies in place, but if you do not test it out in the real world, it'll never be accepted."*

From the perspective of the end-user, it is crucial for the implementation team to validate the needs of the end-users when designing a new business solution with a COTS IT system. This is due to the fact that the COTS IT system may have inbuilt functionalities that are not that relevant for the end-users in Philips. Therefore, it is key for the implementation team to know exactly what the end-users need for their work, in order to present a new IT system that does not add additional complexity to the end-users work.

Once the solution is in place, the project manager indicated that the implementation team is dependent on the end-users for adopting the COTS solution, in order for the implementation project to be considered successful. One of the approaches is to have a top-down order in which the top management mandates the end-users to integrate the project's key performance indicators (KPIs) into their project portfolio management (PPM). The project manager stated that:

"…you just need to transfer the project KPI into their PPMs. Formalize that and then they will follow. In the business industry, in the financial, in the banks that I have worked for, it was always 100% acceptance. Why? Because projects are always driven by the need of the end-users. They came to us and demanded a solution, and the solution is always accepted after I finish validating them [with the end-users]. Here you are passing everything, go to the closure and realize after go-live that they [end-users] are not following the process. Why? Because it is not enforced in their PPMs. So they have an option, but they choose to ignore it."

In simple terms, the end-users' job profiles have to be adapted in a way that they are obligated to use the new system to complete their work. This is crucial as Philips cannot run the old system and the new system in parallel, so the end-users have to be motivated to make the jump to the new system.

Overall there are a few dependencies between stakeholders for change management. The implementation team is reliant on the end-users for feedback and adoption, and the end-users are reliant on the implementation team to deliver a solution that does not complicate their processes with unnecessary features. Moreover, the top management has a role in securing resources and adoption from the end-users for the implementation team. The relational diagram for this critical success factor is shown in Figure 4.

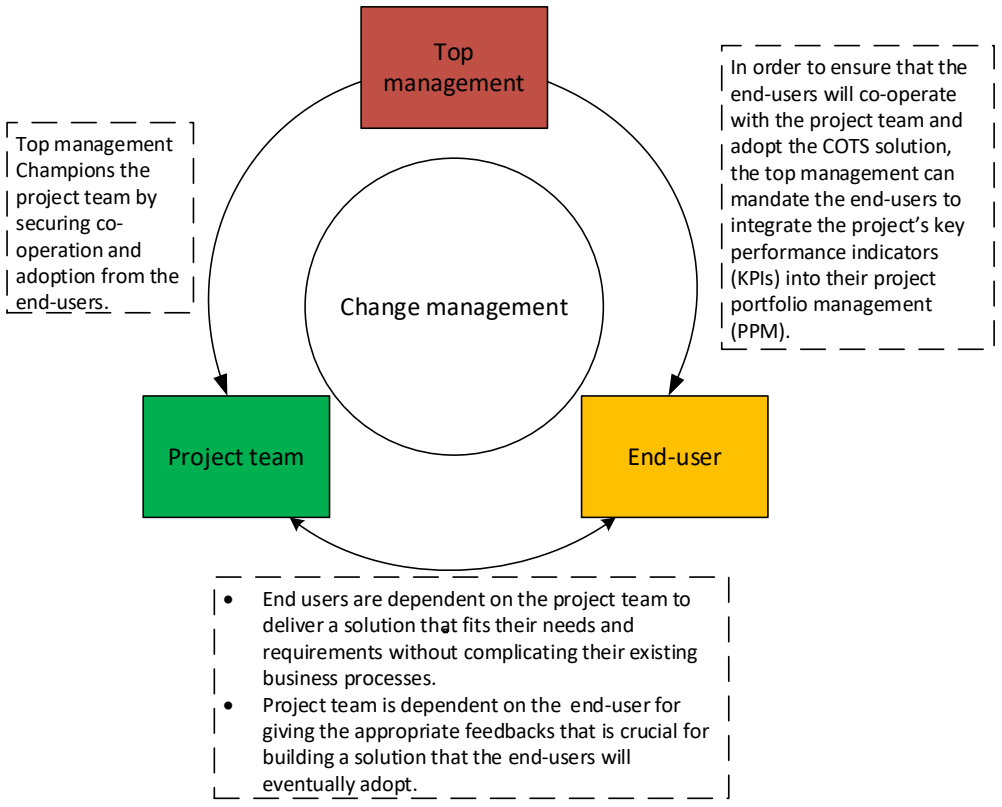

Figure 4 Relational diagram for change management

4.4 COTS IT Solution Selection

Moving onto the critical success factor related to the COTS solution itself, the interviewees indicated that choosing the right COTS solution, to begin with, is a critical success factor.

The IT architect stated that Philips's ultimate vision for this COTS IT solution is to have a system where employees of the company can look up the information of suppliers and interact with the suppliers. However, the chosen COTS solution is currently not mature enough to fulfill all of Philips's requirements for such a system. Therefore, Philips requested customizations on the current version of the system and also co-innovates with the vendor so that future versions of the COTS IT solution fits more closely with Philips's vision of the system.

Therefore, it is crucial for the Business Process Owner to have a thorough understanding of the capabilities of the chosen IT solution. This was one of the points reflected by the Business Process Owner of this project as a critical success factor, as some of the delays are attributed to the software not being completely ready at the given timeline. Knowing what the standardized solution is able to offer at a specific time is crucial, as it has a profound impact on the planning of the project and the expectation management of the users.

The timeline of the software release of the COTS solution is also partly dependent on the number of customizations requested by the company, as additional customizations lead to longer development cycles for the vendor. Therefore, the implementation team has to figure out the extent of the customization needed by the COTS IT solution in order to fit into Philips's business processes.

Customizing a COTS solution quickly adds a lot of costs. These costs are not only the money Philips pays upfront to have the solution customized, but they also include the additional costs added to the total cost of ownership. These additional costs include the cost of upgrading the system, the cost of hiring specialists to maintain the system, and the cost of training these specialists. Furthermore, customizing a standardized solution also makes it difficult to upgrade and maintain, as the developer could not provide the generic support to the system. Without

this generic support, the COTS IT system also loses its advantage as a standardized solution. The IT architect of this project pin-pointed the trade-offs of customization in the following quote:

"…Because if you add customization, if you make it Philips specific, you quickly add a lot of costs. So it is the initial cost of making the change, making the announcement. But it also quickly drag costs up like in the upgrade. You also always have to go through these things. If you hire people to support the processes, and they know the off-the-shelf-capabilities, but then they have to get training or made aware of those little "well in Philips the button is blue, for us its red" kind of deviations. So you add [training] costs down the line. It's a tradeoff we are more consciously making, with the question "are you differentiating by having this additional capability? Getting more deals. Getting substantially lower interval costs and etc. Are we close to or getting a higher deal or higher turnover based on this differentiation? Most functions this is not the case, then we turn the envelope around and "ok the rest of the world use the blue button, ok then make it simple again. Having a red button which is better since its more identifiable, but [it] doesn't save us a cent."

Co-innovating with the developer also has its disadvantages as multiple companies will also try to push their requirements to the developer, leading to longer release times of subsequent versions of the system. The IT architect illustrated the trade-off of co-innovation in the following quote:

"Yes, because you are pushing for better features, more innovative features, so there is for sure a positive impact on adoption. There is a slight off side to that coin since you are working with an official product, the timeline of the adoption becomes different. We are not the only ones working with vendors pushing for more innovative processes, there are others as well. So again, we go back to the situation of the different colored buttons [customized features] to put it in simple terms, but you have to give or take in those discussions for the future as well. Those off the shelf software don't only work in Philips, but also to the rest of the world. and they [rest of the world] also have to clear the mix of what the [software] requirements are."

Therefore, at the end of the day, Philips needs to decide whether the specific requirements that they seek in the system is worth the time and resources that they have to invest to obtain it.

Moreover, they also need to effectively plan the implementation process according to the development timeline of the vendor. This way the implementation project does not suffer delays caused by the developer. This learning point was highlighted by the IT architect, as Philips had bad experiences in the past when they tried to be an early adopter of a COTS IT solution.

While the IT architect points out that there is a direct relationship between the level of customization and the expected use of the tool, the end-user added that over-customization is also not favorable for the user. Therefore, it is a balancing act for all stakeholders to agree on the right level of COTS solution customization versus business process re-engineering, as end-users do not want a generic solution but are also against re-engineering their own business processes. The relationships between the different stakeholders for COTS IT Solution selection is summarized in Figure 5.

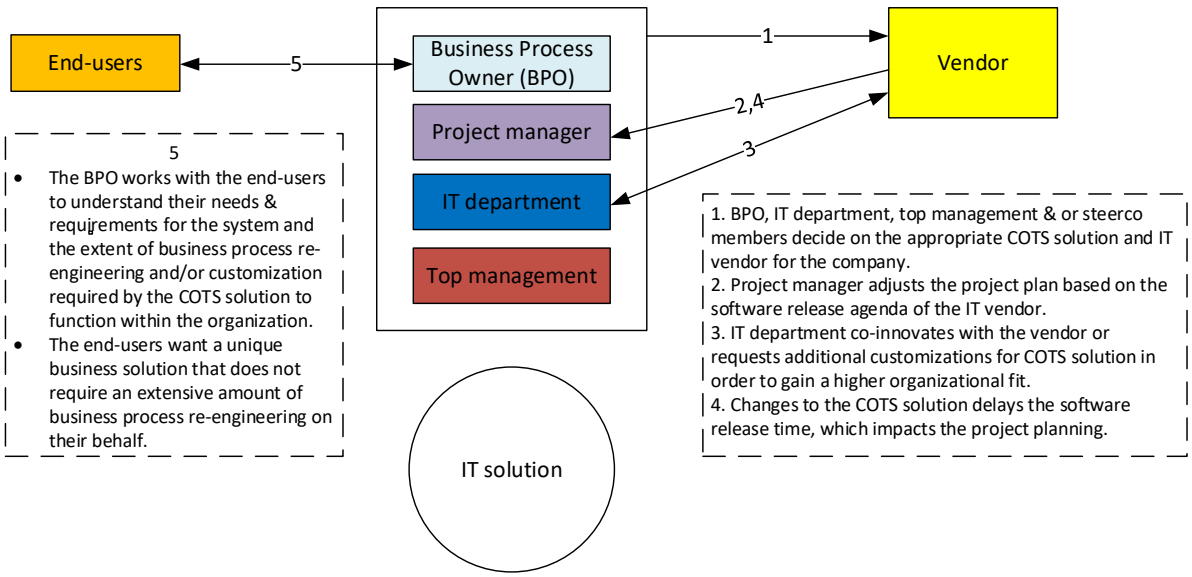

Figure 5 Relational diagram for COTS IT solution selection

4.5 Data Quality

Data quality is another critical success factor that emerged from the interviews. In this project, the new COTS IT solution will be introduced into Philips's integrated IT landscape. In this integrated IT landscape, data constantly flow in and out of each system. Therefore, clean and standardized data is extremely important for the COTS solution to function alongside the other systems in this integrated IT landscape.

In order to have clean and standardized data, one of the Business Process Experts (BPE) indicated that it starts off with having the right data rules. This means the format, the spelling, and the use of abbreviations in records has to remain consistent for each system. This is also known as data standardization. To ensure that data is standardized within the company, the BPE pointed out that *"It always starts with the cross-functional alignments, but you first need to have your own strategy and your view upon what is possible. What do we need actually? What is then possible? And how do we keep it simple?"* In this quote, the BPE emphasized the importance of cross-functional engagement in this process, as changes in the data model are only applied after all the affected parties establish mutual agreements on what to standardize. The BPE also mentioned the importance of having a clear vision of what to change, as every change made in the data model is driven by a vision and a mission. This makes data standardization a never-ending process, as it is always trying to adapt the records to the changes that are happening in the real world.

However, in Philips, the Business Process Owner pointed out that it is often hard for employees of Philips to gauge the impact of the data they input into the systems. The Business Process Owner gave the example that *"it could be the KPI of a person to fill in all of the data, while 50% of the organization's KPI is to use 8% [of the data]."* Due to the lack of insight over the impact of data, data quality is often a topic that is overlooked by the employees of Philips. This results in poor data quality in Philips's supplier master data, as many employees do not take data quality seriously when they input data into the company's systems.

As a follow-up question on the topic of data standardization, the researcher asked the BPE on the scope of the data that needs to be standardized and cleaned. The BPE indicated that, as

Philips is in the medical industry, they are obligated to keep fifteen years of records for compliance reasons. Therefore, these records are within the scope of the supplier data that needs to be constantly standardized and cleaned. However, this is done in phases and active suppliers are prioritized in the data standardization and cleansing process. The researcher then asked a second follow up question regarding the activities that are included in the data cleansing process. The BPE answered that the data cleansing process consists of activities such as data de-duplication, data enrichment, and other administrative activities. The BPE also admitted that Philips needs a support team to maintain data quality as illustrated in the following quote:

"With a little bit of shame on my cheeks here, it is that I wish to say apparently we do everything on an ad hoc basis. It would be good if we have a support team doing this almost on a standard basis, so that in data management somebody is always working on standardizing the data, making sure that it stays clean, that nobody is polluting it again, and if so, that it will be an interaction with the support team with that person who's actually initiating the pollution."

Overall data quality as a critical success factor cannot be achieved by the individual ad hoc initiative that this project team has undertaken. It is a company-wide effort where multiple stakeholders are dependent on one another. It starts with end-users inputting the data correctly, and different businesses agreeing on a canonical data model. Data quality is also dependent on maintenance teams (Enterprise Information Management department) to standardize and clean the data. Therefore, in a COTS implementation project, the implementation team must educate users on the use of data in the new system, co-create new data models with cross-functional stakeholders, and ensure that the data maintenance team properly maintains the data in order for the solution to go-live. The key relationships between the different stakeholders for maintaining data quality are summarized in Figure 6.

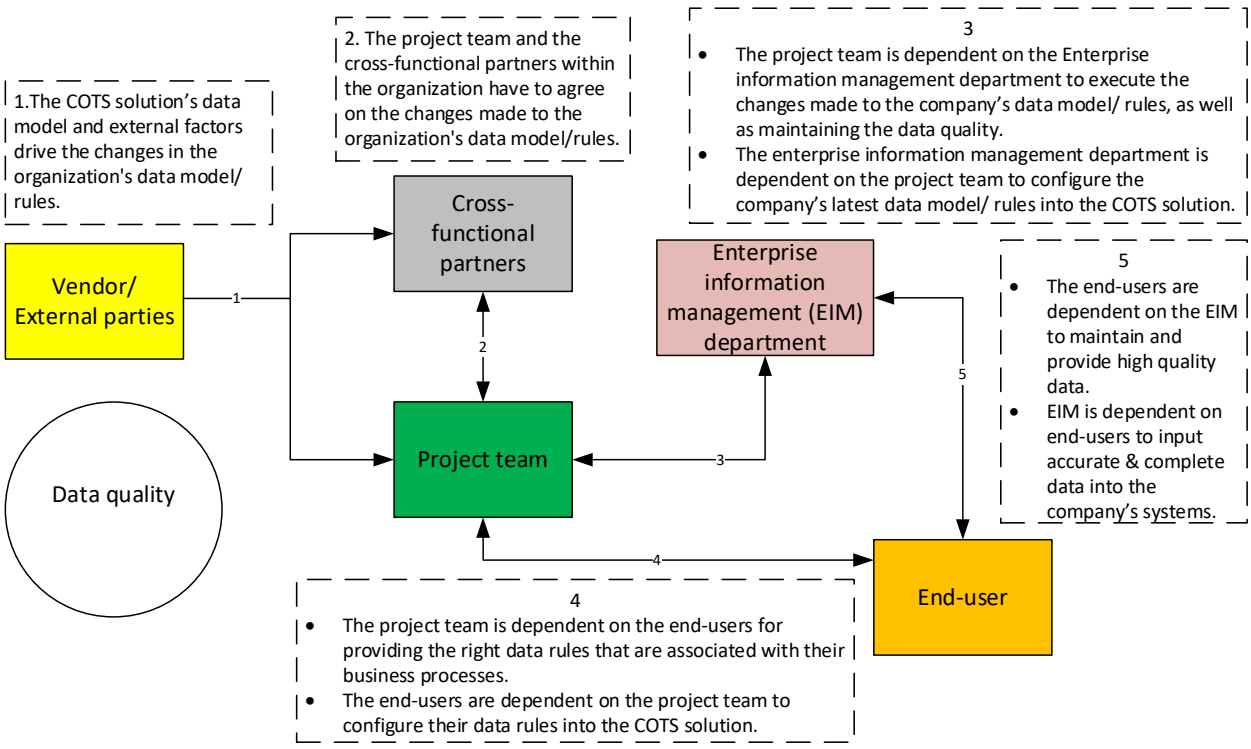

Figure 6 Relational diagram for data quality

5. Conclusion

COTS implementation projects are complex IT projects that have been well documented to suffer from high failure rates and falling short from original expectations (Ahmed et al., 2018; Hailu & Rahman, 2012). Researches in the field of critical success factors of COTS implementations is one of the streams of literature dedicated to investigating this phenomenon. While there is an extensive body of literature on critical success factors discussing the effects of critical success factors in COTS implementations in general, this research focused on exploring the nature of the interdependent relationship stakeholders in COTS implementation projects share for critical success factors from a multi-stakeholder perspective. The research was conducted using the case study approach. Data were collected by interviewing stakeholders involved in a COTS IT implementation project in Philips, analyzing the data collected, and presenting the findings and conclusions.

This research answers the main research question by first identifying the critical success factors that are dependent on the collective efforts of multiple stakeholders in Philips's COTS IT implementation project. It then explains the interdependent relationships that these stakeholders share for these critical success factors. In total, the results of this research focused on five critical success factors that were shared by the interviewed stakeholders, namely the Business Process Owner, project manager, IT architect, end-user, and the Business Process Experts (project team members). For these critical success factors, the nature of the interdependent relationships between stakeholders differed per critical success factor and per stakeholder to stakeholder relationship.

Overall, this research found three main types of interdependent relationships between stakeholders in achieving shared critical success factors. The first type of interdependent relationships is coordination. This type of relationship can be seen in the example of the project manager coordinating the project team and the BPO using Philips's standardized methodology called SIM (Chapter 4.1). It can also be seen in the example of the project manager adapting the

project plan according to the software release time of the vendor, as a result of the customizations requested by the IT department for the COTS solution (Chapter 4.4).

The second type of interdependent relationship occurs when stakeholders are dependent on each other to execute their individual tasks in order to achieve collective progress. This type of relationship is evident in Philips's pursuit of data quality excellence, as stakeholders such as the end-user, the project team, and the Enterprise Information Management (EIM) department all have their respective roles in ensuring that the company's data remains clean and consistent (Chapter 4.5).

Lastly, the interdependent relationships between stakeholders can also come in the form of stakeholders cooperating with one another in order to achieve mutually beneficial outcomes. This kind of cooperative effort is seen when the project team works with cross-functional partners to come up with changes to the company's data model and rules (Chapter 4.5). It is also seen when the project team engages with cross-functional partners to create a mutually beneficial business solution with the COTS solution (Chapter 4.2). The nature of this type of cooperative relationship can stem from both the partners' intrinsic motivation to cooperate, or it could be from the direct order of the top management.

Overall, the main takeaway of this research is that the management of the interdependent relationships between stakeholders has a profound impact on the success of the critical success factors that are shared amongst these stakeholders. Failure to manage these relationships can result in negative outcomes such as scope deviations, project delays, the ineffective use of resources, end-user resistance, and customer dissatisfaction, which, in turn, could lead to the failure of a COTS implementation project. Therefore, it is important for practitioners to focus on the critical success factors as well as the underlying relationships between stakeholders for these critical success factors in order to achieve implementation success.

5.1 Managerial Advice

The relationship of the team discussed in Chapter 4.1 was one of the topics all members of the implementation team indicated to be a major factor in the challenges that they have faced throughout this project. The Project Manager questioned the approach and structure imposed by the Business Process Owner, by saying that the Business Process Owner (BPO) has a spread approach to project implementation that deviates from the company's standard methodology for implementation projects, while the Business Process Experts questioned the level of alignment within the team. Both of these concerns merit further investigation into the root cause.

Regarding the concerns of the Project Manager, the BPO admitted his willingness to push certain objectives based on the priority of the business needs, even when these objectives are not listed in the standardized methodology. This consequently leads to delays as the BPO often looks at a wider scope of topics compared to the scope listed in the standardized methodology. Therefore, it is possible that the root cause of this issue stems from the ideological mismatch between the BPO's approach and the organization's approach (SIM) in implementing new solutions.

The SIM follows the waterfall model which is a sequential design process (Li, n.d.). Therefore, having the scope, the budget, and the deliverables are important for the assessment of the project at each stage. However, because the BPO applied a spread approach, the Project Manager stated that he often struggled with documenting the progress of these deliverables. Without these deliverables, it is hard for him to assess the progress of the project according to the standardized methodology. On the contrary, the BPO may have a more agile mindset when it comes to running the team. In an agile development environment, there is an emphasis on continuous delivery of the end product, and changes in requirements are welcomed even in later stages. This approach coincided with the BPO's approach to managing the team, as he often asked the project team to perform different tasks on a weekly basis, based on his interpretation of what are the most pressing issues in the project.

In order to successfully adopt the BPO's agile approach, the project team also has to adopt the key principles of agile development. One of the key principles of agile development is the daily cooperation between the business people and developers throughout the project (Li, n.d.). In this case, the business people are the cross-functional partners that were mostly located in the Netherlands, and the developers are mainly the team located in Poland. However, due to the geographical distances between these two parties, the cross-functional engagement needed in this project was not optimal. This led to a lot of back and forth dialogue between the implementation team and the cross-functional partners, and the implementation team itself was frustrated by this process. The lack of face-to-face communication within the team also leads to some misalignments over the purposes of certain tasks and the project mission and development path. This has led to some team members feeling lost in terms of their role in this project, which greatly affected their ability to contribute to the project.

In summary, the misalignment between the BPO's approach and the organization's approach for IT implementation as well as the suboptimal team setup of the project team are the two root causes of the challenges that this project team has experienced. To solve these issues, the researcher offers two pieces of managerial advice.

The first piece of managerial advice is that the BPO needs to concede his position as the center point of intelligence in this project. The researcher observed that the BPO often struggled to communicate his expectations of the tasks given to the project team. This is due to the sheer number of tasks that the BPO personally allocate to each team member, and he struggled to track the progress of these tasks and to remember the instructions that he gave to each task. This became frustrating for both the BPO and the project team, as the BPO often found the tasks to be completed below its standards, while the project team found the standard to be inconsistent with the instructions that were given. Therefore, it is important for the BPO to allocate the responsibility of communicating the tasks to more members of the project team. This way the BPO does not have to allocate as much time and energy into tracking the progress of each task, but also the project team can communicate with each other over the expectations of each task. This also indirectly improves the alignment within the team, as project team members can clarify the purpose of their work to more members within the team.

The second piece of managerial advice is that the BPO needs to redesign the job functions for members of the implementation team. In an agile development team, cross-functional teams consisting of the end-users should be in place. In this way, the chance of miscommunication is minimized and members can collaborate and come up with mutually beneficial solutions (Medinilla, 2012). As the project team was going through a phase where many members were on from the project team, it is a good opportunity for the BPO to enlist candidates with specialized skills that were lacking in the team. This way the new members can be the experts of their domain, and guide the rest of the team in that domain. This is a job function that was missing from the team, as the BPO was responsible for leading all the different workflows. With this new structure, the BPO can again allocate his managerial responsibilities to more members of the team and focus on designing the business solution.

5.2 Discussion

This case study was able to identify and explain the interdependent relationships between stakeholders for five critical success factors. All five of these critical success factors have also been identified in past literature (Finney & Corbett, 2007; Tarhini et al., 2015), meaning that these critical success factors are not unique to this COTS implementation project. Therefore, the findings of this research may be applicable to other organizational contexts, however, future practitioners should still be conscious in applying the learnings from this study to his or her organization, as an organization's unique context and its combination of relevant stakeholders may yield different relationship dynamics that requires management. For example, for change management in this case study, the key stakeholders involved in this critical success factor are the project team, end-users, and the top management. However, as seen in the conceptual model presented in Chapter 3.3.3, rather than the top management, the IT department of an organization was one of the key stakeholder groups for this critical success factor in the literature. This only goes to show that the composition of each project may vary, hence the relational dynamics between the stakeholders may differ and require different management approaches.

Furthermore, the findings of this research were able to build on top of the existing researches by providing insight into the stakeholder relationships for three of the critical success factors (change management, business process re-engineering, customization of COTS solution) presented in the literature review. This adds an additional layer of analysis onto the preexisting understandings of these critical success factors, as this study presents the role of stakeholder relationships on the success of these critical success factors.

Overall, there are three main types of relationships shared by the stakeholders for these critical success factors, namely: coordination, execution, and cooperation. As for the remaining critical success factor, this case study was unable to identify the relational dynamics between the stakeholders for training different user groups, as the project was not in the stage to undergo such an activity.

5.3 Limitations & Future Research

Every research suffers from limitations, and this research is no exception. In this research, the researcher aimed to uncover the definitions of success and the critical success factors of the implementation of a COTS software solution from a multi-stakeholder perspective. However, due to the unavailability of potential interviewees, the researcher was unable to obtain the insights of a few key stakeholders. Firstly, the perspective from the implementation team in Poland was lacking, as the experienced members in that team left throughout the implementation project. Secondly, the supplier's perspective was lacking as well, as the representative of the supplier was unavailable for an interview. Lastly, the implementation consultants hired externally by the BPO were also unavailable for interviews, as they all left the team months before the interview sessions were planned.

For future researches investigating the interdependent relationships between stakeholders in a COTS implementation project, the researcher suggests expanding on the scope of critical success factors included in the research. This research only focused on the five critical success factors that were shared by the stakeholders in this case study, while in reality, there could many more critical success factors that are dependent on the collective efforts of multiple stakeholders. The researcher also suggests future researches to include a more diverse range of

stakeholders in their case study, as this research was unable to capture the viewpoints of several key stakeholders.

Lastly, to build on top of the findings of this research, future researchers should investigate further into the strategies and approaches that stakeholders use to manage these interdependent relationships for critical success factors. While this research presented bits and pieces of advice from the interviewed stakeholders, this research is mainly focused on identifying the nature of these interdependent relationships. However, more comprehensive research into the management strategies and approaches can greatly benefit future practitioners by equipping them the knowledge to proactively manage stakeholder relationships in COTS implementation projects. This way practitioners will not only know the critical success factors that require their attention during a COTS implementation project, but they will also be able to effectively manage the stakeholder relationship coupled with these factors.

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Appendix

Appendix 1: Search Strategy

As for the literature used in this chapter, they were obtained through a number of search engines including Google scholar and Eindhoven University of Technology's very own library database. Those search engines direct the researcher to articles listed in prominent scientific databases such as Elsevier, Wiley online library, Emerald Insight, Taylor & Francis Online, and Science Direct. Many of the papers came from, but not limited to journals including:

- Business Process Management Journal
- Journal of Enterprise Information Management
- Journal of Industrial Information Integration
- Journal of the International Federation for Systems Research
- Canadian Journal of Administrative Sciences
- Systems Research and Behavioral Science

The keywords selected for this search were chosen from the keywords supplied by the researchers of some of the relevant articles identified in a preliminary literature review. The list of search terms are listed in the table below:

Searched terms

Individual Journal searches	Database searches
Critical success factors COTS implementation	Critical success factors "AND" enterprise systems
Critical success factors ERP implementation	Critical success factors "AND" ERP
Stakeholder perspective ERP implementation	Critical success factors "AND" COTS
Knowledge transfer ERP	Critical success factors "AND" Commercially off the shelf solution
Commercially off the shelf solution	ERP implementation "AND" success
Common-Off-the-Shelf solution	COTS "AND" implementation
Industry 4.0 definition	
Software implementation	
Enterprise resource planning business model	

Appendix 2: Interviewee Profiles

Job title	Expertise	Relevant experience	Role(s) within the Implementation project
Business Process Owner (BPO)	Process owner of Philip's supplier lifecycle management process	A former consultant in the Boston Consulting Group, Former program manager at Siemens	Business process owner, project team manager
Business Process Expert (BPE)	Expert in Master data linkages between the different IT systems	32 years of experience handling Philip's master data.	Business Process Expert, project team member
Business Process Expert (BPE)	Business process optimization specialist	Implemented a supplier management IT solution in former company	Business Process Expert, project team member
IT Architect	Defining the IT architecture for the COTS solution	Worked in the corporate IT department of Philips for the past 21 years. Responsible for all IT architectures in procurement	IT architect
Supplier Quality Manager	Define global processes for the Supplier Quality department	Supporting the development of an IT solution in the Supplier Quality department has a background in software development.	End-user, cross-functional stakeholder
Senior Project Manager	Project management	Successfully delivered a program in the procurement department in 16 months. Joined Philips in December 2017	Project manager, project team member

Appendix 3: Kurasaki (2000) procedure for intercoder analysis

In the first stage of Kurasaki's (2000) analytical procedure, six different steps are included in the development of the codebook. In step one, the researcher and his or her colleagues annotate the text together by writing short notes on the margins of the interview transcripts. The notes summarize the main points expressed in a particular segment of a text. Once the coders come to an agreement on how to annotate the texts, the coders then start to annotate the remaining transcripts independently. For step two, the coders sort the list of annotations to eliminate redundancies and establish the preliminary hierarchy of thematic categories. The different thematic categories are then given descriptive titles in step three. Using the theme list as search criteria, the research will then search the digitalized copies of the interview transcripts for relevant sentences in step four. This will generate separate reports based on the different themes, and these reports are annotated again to find redundancies that weren't caught in previous steps in step five. Finally, numerical codes are assigned to different themes.

Moving onto the next stage of establishing intercoder reliability, Kurasiki (2000) begins the second stage with a training round where the coders mark a few randomly selected interview transcripts with the theme lists. Their intercoder reliability is measured and assessed to see if the coders are familiar with the task at hand. Once an agreement on the coder's ability to carry out this task is achieved, each coder is then instructed to independently coder the same set of twenty transcript pages. They are instructed to assign each text unit with a numerical code or codes. A text unit is defined as a segment of conversation that represented a single message (McFadden, Seidman, and Rappa- port 1992), a distinguishing feature (Pennartz 1986), or a change of subject (Dapkus 1985).

To calculate the agreement level of the different coders, Kurasaki (2000) randomly selects ten different lines per coded page and examined the marking behavior of the different coders for agreement. 1 is used to indicate that a code had been applied to the randomly selected line (or any line within five lines above or below the randomly selected line), and a 0 indicated that the code had not been applied (Kurasaki, 2000). Agreement across the different coders for each of the themes was calculated by using a ratio of agreements to disagreements. An overall agreement across all the themes was calculated by averaging the agreements obtained for each theme.

In the final stage, the codebook is systematically applied to the data once an acceptable level of agreement is achieved. The entire set of data is indexed using the themes that were agreed-upon in stage two. This enables the researcher to perform keyword searches on the data, making it easier to retrieve specific quotes to be used in presentations and writing.

Appendix 4: Interview Questions

1. 1. What is your role in this company, and how are you involved in this software implementation project (Ariba SLP)
2. How would you define implementation success for the Ariba SLP or other Common-Off-the-Shelf solutions in Philips?
3. What do you think are the critical success factors to achieve implementation success for the Ariba SLP or other Common-Off-the-Shelf solutions in Philips?
4. For COTS solutions that are introduced to an existing IT landscape as a replacement, does that affect your definition of implementation success as given previously?
    a. How?
5. Do you think there are additional or fewer critical success factors under this context? If so, what are they?
6. For COTS solutions that are introduced to an existing IT landscape as a complementary system, does that affect your definition of implementation success as given previously?
    a. How?
7. Do you think there are additional or fewer critical success factors under this context? If so, what are they?

Appendix 5: Interview analysis

Business Process Owner (BPO)

The Business Process Owner (BPO) is responsible for Philips's supplier lifecycle management processes. The BPO is also the manager of the IT implementation team in this case. From the BPO's perspective, the implementation success of a COTS IT solution is dependent on the value that the IT solution brings to the company, as well as the reasons for the company to adopt it. He noted that while the company may have a vision for an IT solution, it is often hard to determine the exact value that the IT solution brings to the end-users. Using this project as an example, the BPO stated that: "…. implementing supplier lifecycle management takes a lot of transforming from the businesses, and users might not like doing things not the way they did before." Therefore, it is part of the BPO's responsibility to translate Philips's business objectives into business process improvement plans that the end-users are willing to accept.

When asked about how implementation success can be measured, the BPO stated that it could be measured based on the downtime of the system during the transition phase, and based on the user retention rate. The BPO also stated that the ultimate success of this implementation project is to deliver upon the business objectives while keeping the users as aligned as possible. Again using this project management as an example, the BPO stated that the business objective of the implementation project is to transform local procurement processes into a centralized global procurement process. This means that the business processes related to these

procurement process will have to be re-engineered, and keeping the end-users aligned with these changes is part of the objectives of this implementation project.

The BPO then mentioned a number of critical success factors that are relevant to this COTS IT implementation project. The roles that these critical success factors having in achieving implementation success for this project are explained in the following sections.

Clear and meticulous analysis of the as-is situation

The first critical success factor is to undergo a clear and meticulous analysis of the as-is situation. A part of this analysis is to understand the capabilities that the new IT system could bring the end-users. The other part of this analysis is to identify the gaps in the needs of the end-users. The purpose of this analysis is to ensure that the functionalities of a COTS IT system are actually capable of answering to the needs of the end-users.

The BPO also mentioned the importance of communicating and validating the needs of the end-users directly with the end-users. This is important as the implementation team could easily make assumptions on the end-users' needs during the analysis. Furthermore, the BPO also emphasized the importance of delivering a final solution that answers to the needs and requirements of the end-user, as "at the end of the day, you need to bring value [to the end-users]."

Selecting the right end-users for validation

When BPO mentioned the importance of validating end-user needs and requirements, the researcher asked for the selection criteria of these end-users as a follow-up question. The BPO indicated that it is a tradeoff between impact and resistance, as the goal of the project is to bring as much impact with minimal changes. The BPO explained this tradeoff using the example of getting feedback from end-users in different parts of the world.

> "For example, Asia is instrumental because their culture of resisting is different and their meticulousness is different. But in a world where everything is more standardized and efficient, the impact is lower. But in general, you just have different cultures in different areas, something as simple as an evening call is more difficult. But since this project involves global processes, so it is not like I could change the master data of a supplier for Asia and not the rest. So we influence the process for the front end, but it is not like we could deploy in one area and other areas catch up later. So the option of redeployment is not there. So for me, vendor master data has to be in sync when we go live, and I don't have the option of it not being consistent for just North America for example."

From this quote, the BPO makes the argument that while it is possible to validate a design with end-users that provides minimal resistance, the impact of the IT system could also be less for these end-users. Therefore, it is important also to validate the design of the IT solution with end-users that are highly resistant to change, especially since all of these end-users will have to conform to the changes in the end.

During this implementation project, the end-users from the Supplier Quality department unexpected scrapped the proposed design of the IT solution prior to the initial go-live date. The researcher was curious about the details of this event and asked the BPO to clarify the situation. In the BPO's explanation, the BPO highlighted the importance of getting the validation from end-users at the right organizational level. In this case, the implementation team got feedbacks from end-users that were not in the position to define the business processes incorporated in the tool. Consequently, the business processes that were configured into the tool were at the wrong level of abstraction. This resulted in a massive delay in the go-live date, and the implementation team had to return to the design phase to figure out a new end-user need that this COTS IT system could fulfill. From this experience, the BPO learned that while the direct feedback from the end-users is important, the implementation team needs to get the validation from stakeholders of different organizational levels in order to design a solution that will be accepted by all stakeholders.

Data quality

In this project, the new COTS IT solution will be introduced into Philips's integrated IT landscape. In this integrated IT landscape, data constantly flow in and out of each system. Therefore, the quality of the data is extremely important for the functioning of all systems in this integrated IT landscape. However, the BPO pointed out that it is often hard for employees of Philips to gauge the impact of the data they input into the systems. The BPO gave the example that "it could be the KPI of a person to fill in all of the data, while 50% of the organization's KPI is to use 8% [of the data]." Due to the lack of insight over the impact of data, data quality is often a topic that is overlooked by the employees of Philip. This results in poor data quality in Philips's supplier master data, as many employees do not take data quality seriously when they input data into the company's systems. Therefore, in order to improve the quality of Philips's data, the BPO pointed to critical success factors such as data housekeeping and data standardization to keep Philips's data consistent and complete.

The organizational fit of the COTS IT solution

For this critical success factor, the BPO stated that the COTS IT solution should be a mirror image of the business processes within the company. Therefore, the implementation team has to figure out how to fit the COTS IT solution to Philips's business processes. This could either be achieved by customizing the COTS IT solution to fit the company's business processes, or by redesigning the company's data structures and business processes to accommodate the COTS IT solution. Therefore, in order to improve the organizational fit of a COTS IT solution, business process re-engineering and/ or COTS customization are also critical success factors in this project.

Top Management Support and End-User Support

During the interview, the BPO emphasized the importance of gaining support from both the top management and the end-users. Top management support is needed when the implementation team requires the influence of the top management to push through changes

from a top-down approach. At the same time, the implementation team also need end-users to come up with suggestions on how to improve the status quo.

The BPO also stated that the viewpoints of these two groups are drastically different. For the top management, “they don’t care if it is called SLM or SLP (name of COTS IT system), but if it achieves the business objectives. As for people on the shop floor, it doesn’t really matter what this tool does beyond the usability, and that can be great or horrible. They couldn’t care less what it does for the rest of the company, but more in the sense of does this turn a two hours task into one hour.”

Due to the differences in viewpoint, the BPO indicated that the way to gain support from these two groups is different as well. For the top management, the BPO sells the concept of the new IT solution based on the business objectives that the system could fulfill. To the end-users, the sales pitch is focused on the performance enhancements that this new IT system could bring to the end-users’ business processes.

Cross-functional engagement

As the business processes in Philips are interconnected, changes in one business process may require changes in another business process. Therefore, it is crucial to establish mutual agreements with cross-functional partners on where and when these changes will be made. The BPO described these interactions in the following quote:

> “It’s like I have these fields that will impact your processes, and we have a handshake of what needs to change. Then they do it at the same time or else it's like I change it and you didn’t change it, hopefully we can deploy.”

The main message of this quote is that business process re-engineering initiatives require the support and cooperation of cross-functional partners. Without the support of these cross-functional partners, changes made in one business process can not carry over to the rest of the business processes, and run the risk of creating disjointed processes in the company.

Team structure

In this implementation project, the implementation team is split between Poland and the Netherlands. This type of team structure made it challenging for the implementation team to be fully effective, and the BPO highlighted the combination of three factors that are behind these difficulties. “The fact that you have a part of the team in another country is not an unusual problem for today, but the challenge is that you have one part of the team working in the new world and one working in the old world. On top of that, there are years of different types of mentality, as in one is more of an intellectual area and one is an operational work hub. Having one of the three you can overcome, but having all three is really difficult to overcome. “

In this quote, the BPO highlighted the geographical distance, the working environment, and the cultural differences between the two teams as the main factors behind the challenges that the implementation team is facing. The BPO also added that it is very difficult to overcome all three

factors at the same time. Moreover, the BPO indicated that under this setup, many project team members start to lose sight of the objectives of the project, which greatly affect their effectiveness in contributing to the goals of the project.

Business Process Expert 1

In this research, the researcher interviewed two Business Process Experts that are both parts of the implementation team. This section will discuss the interview results of the first Business Process expert, who will be referred to as BPE in this section.

The BPE's role in this implementation team is to manage the master data linkages from this new system to the other systems in the IT landscape. It is also the BPE's responsibility to manage the quality of the data that will be fed into this new system. Therefore, from BPE's perspective, the COTS IT system is successfully implemented if it has the correct linkages to the systems in the IT landscape. The BPE also determines implementation success based on whether the IT solution fulfills its purpose and that end-users can easily use it in their work.

Throughout the interview, the BPE mentioned a list of critical success factors that are related to these definitions of implementation success. The roles of these critical success factors in achieving implementation success will be explained in the following sections.

Data quality

Much like the BPO in the last section, the BPE also emphasized the importance of data quality in this implementation project. Data quality is crucial for this implementation project, as the master data has to flow in and out each system consistently, in order for the new system to be properly connected to the other systems in the IT landscape.

On the topic of data consistency, the BPE indicated that it starts off with having the right data rules. This means the format, the spelling, and the use of abbreviations in records has to remain consistent for each system. This is also known as data standardization. Moreover, the BPE stated that Philips is currently facing challenges in data standardization, and consequently struggles to maintain data consistency for supplier records. In relation to the practical tasks given to the researcher during his internship, the Supplier Master Record Layout (SMRL) captures the data rules for data standardization, and the process maps document the process for cleansing supplier records.

In order to achieve data standardization, the BPE pointed out that "It always starts with the cross-functional alignments, but you first need to have your own strategy and your view upon what is possible. what do we need actually? what is then possible? and how do we keep it simple? " In this quote, the BPE emphasized the importance of cross-functional engagement in this process, as changes are only applied after all the affected parties establish mutual agreements on what to standardize. The BPE also mentioned the importance of having a clear vision of what to change, as every change made in the data model is driven by a vision and a

mission. This makes data standardization a never-ending process, as it is always trying to adapt the records to the changes that are happening in the real world.

As a follow-up question on the topic of data standardization, the researcher asked the BPE on the scope of the data that needs to be standardized and cleaned. The BPE indicated that as Philips is in the medical market, they are obligated to keep fifteen years of records for compliance reasons. Therefore, these records are within the scope of the supplier data that needs to be constantly standardized and cleaned. However, this is done in phases and active suppliers are prioritized in the data standardization and cleansing process. The researcher then asked a second follow up question regarding the activities that are included in the data cleansing process. The BPE answered that the data cleansing process consists of activities such as data de-duplication, data enrichment, and other administrative activities. The BPE also admitted that Philips needs a support team to maintain data quality in the following quote:

> "With a little bit of shame on my cheeks here, it is that I wish to say apparently we do everything on an ad hoc basis. It would be good if we have a support team doing this almost on a standard basis, so that in data management somebody is always working on standardizing the data, making sure that it stays clean, that nobody is polluting it again, and if so, that it will be an interaction with the support team with that person who's actually initiating the pollution."

Lastly, the researcher asked if unstandardized data is a bottleneck to this project. The BPE answered that unstandardized data are not the bottleneck, but unclean data are. Clean data are records that are consistent from the "A level" data perspective. "A level" data are the basic fields such as name, street, and location that every record must provide. So in a clean record, all of the information listed in the record has to be consistent with the "A level" data. For example, the address listed on a supplier's certificate has to be the same address listed in Philips's record of the supplier.

Validating end-user needs and requirements

Much like the BPO, the BPE also emphasized the importance of validating the end-users' needs and requirements when designing a business solution with the COTS IT system. The BPE indicated that as the implementation team approaches many tasks on an ad hoc basis, it is key to have the viewpoints of different key stakeholders. These key stakeholders can fill in on the information missed out by the team, and they can also validate the implementation team's plan for addressing the needs of the end-users. According to the BPE, "that's the biggest learning because you can have a holistic approach and you can have strategies in place, but if you do not test it out in the real world, it'll never be accepted."

These key stakeholders are not only the ones from the same department but also the cross-functional stakeholders. The BPE suggested to engaged the end-users first before engaging with stakeholders higher up in the organizational chain. This way the implementation team can identify the real issues that the end-users face in their daily interactions with the existing systems.

Political Issues & user resistance

The BPE stated that the role of the implementation team as a disrupter causes some tensions within the organization. The BPE stated that: "… one of the goals should be that you make it simple and that you create visibility upon what is going on. By having different islands and different modules and different setups, then each and every person in their own islands can do the things they want. But if you now bring it to a higher level you combine everything together, and you make it visible of what is missing, that means if somebody's losing to control their island. That's the main issue." Therefore, it is crucial for the implementation team to manage these tensions in order to get the support of these internal stakeholders for the implementation project.

The fear of losing control described in the BPE's quote is not only experienced by the employees in the company, but it is also experienced by the vendors. For the vendors of COTS IT solutions, they fear the changes that the new system or module will bring to the existing setups of their tools in the company. This fear is even experienced by vendors that have multiple COTS IT systems implemented in the company, as they will also have to figure out a way to adapt their existing tools to accommodate the functionalities of the new IT system. As the vendors are also affected by the changes proposed by the implementation team, the implementation team has to ensure that there is a good partnership between the project team and the vendor, in order to apply the changes effectively.

Expectation management

For this critical success factor, we have to revisit the event that was mentioned in 4.1.2. To give a quick summary, the end-users of this new COTS IT system unexpectedly rejected the proposed configurations of their business processes in the tool, prior to the go-live date. On this topic, the BPE offered a different explanation for this event compared to the BPO.

From the BPE's perspective, the implementation team was not effective in communicating the delays that the project was facing. At the same time, other business units are also implementing new systems in their own domain. Therefore, what happened was that the Supplier Quality department (end-user) decided to incorporate their business processes back into their own system since the implementation team failed to incorporate these business processes into the tool on time.

The main takeaway message is that while mutual agreements between the different parties do hold their weight in Philips, it is also important to openly discuss the progress and manage the expectations of the different parties. If these kinds of communications are not done effectively, implementation teams can suffer the unexpected consequences that this implementation team had to endure.

Team setup

During the interview, the BPE voiced concerns over the global setup of this implementation team. The BPE stated that "from a team perspective if you want to get something done you

need to be in one room all together making it happen. Have the interaction with each other and not doing it in silos already in the team. That is a big learning because what I miss is the testing, the steerco meetings, all hands-on saying okay now we have created this field on the software, does it make sense? what does it do? Can we sit together and can we do the testing immediately? That is something I'm really missing this one." Or to put it plainly, the BPE misses the close line of communication between all of the team members in this project.

Having this close line of communication enables the implementation team to take swifter actions after every discussion. It also enables members of the team to share their expert knowledge on different topics more effectively, specifically to the new members of the team. From the BPE's experience in the team, she stated that: "from the fact that I'm already working solo with master data, I know what needs to be done. But if you're new in the company and you do not get the right directions in the structure [of master data], so how does it then come in your brain alive on what needs to be done? Are you then doing staccato tasks and when you're done and that's it? Or are you connected to actually what the software will bring, what the program will do for each and every business that needs to jump on it? that is really something I missed. " From this quote, we could see the severity of the situation as the BPE suggests that certain members of the team are not fully aligned with the project's mission due to this setup. Without a vision for the project, these members are relegated to doing staccato tasks, which greatly inhibits their ability to contribute to the implementation project.

Business Process Expert 1

For the second Business Process Expert interviewed in this research, the BPE's role in the implementation team is to redesign the business processes that are in the supplier lifecycle management domain. Therefore, BPE sees this COTS IT implementation project as a business process optimization project as well.

From the BPE's perspective, there are two definitions of COTS IT implementation success. In the first definition, a COTS IT implementation project is deemed successful if the system is running with the right connections to the tools in the landscape. In the second definition, implementation success depends on the goals that are defined at the beginning of the project. The BPE stated that these goals "could be a faster process, a better-connected process, improved data quality and etc." Additionally, the BPE mentioned that this project's goals are to enable supplier access to data and better throughput times for supplier creation. To put in simple terms, the second definition of implementation success is defined by the impact that the system brings to the business. The BPE further clarified the second definition by stating that the goals of a project often do not remain consistent throughout the entire project.

"In real-life you always have changes. The market can change. Your company can change. You can buy additional companies to your company as [part of] a merger and acquisitions. You can sell it [part of a company]. Or there could be a change in the market that customers will not buy your products anymore and therefore you have to shift. So it's not like in theory [where]

everything will stay the same. No there are changes, sometimes there are changes from outside influence [on] your program or project. Sometimes you really have [changes] in your program, you have influences that, for example, that the desired IT solution is not mature enough. Which you only figure out during implementation. Or you have other challenges which you have not foreseen because other programs which go in parallel maybe they have a delay or they reduce your scope which then also influences your program."

Therefore, the second definition of success is not as strict as fulfilling every single goal set at the beginning of the project. It can be interpreted as whether the COTS IT system delivers the type of impact that it was expected to give to the organization.

For these two definitions of success, the BPE mentioned a number of critical success factors that will be explained in the following sections.

The organizational fit of the COTS IT solution

When Philips decided to improve its supplier lifecycle management process, they decided to be in an industry-leading position and be an early adopter of a COTS IT solution. However, being an early adopter comes with the risk that the IT solution is not mature enough to fulfill certain requirements. These types of risks are often hidden in the early stages of implementation, and it is a challenge for the implementation to find ways to work around them. Therefore, the BPE stated that picking the right COTS IT solution from the start is a critical success factor, as it could potentially save the implementation team from the troubles of business process re-engineering and/or requesting customizations done to the COTS IT system via the vendor.

Cross-functional engagement

According to the BPE, cross-functional engagement is crucial in aligning the company-wide vision of the implementation project. For example, although this project originated from the procurement department, the IT solution interfaces with the Supplier Quality (SQ) department's systems, and it is dependent on the Enterprise Information Management (EIM) department for maintaining the master data. Therefore, it is crucial that all of these cross-functional stakeholders are on the same page in terms of the objectives that need to be achieved and the strategy to achieve these objectives.

Furthermore, In terms of the level of support required from these cross-functional stakeholders, the BPE stated that it is crucial that these stakeholders have KPIs within their teams that are dedicated to assisting the implementation team. These KPIs are there to ensure that the implementation team gets sufficient support from these stakeholders, even when these stakeholders have resource capacity issues.

Align project team with the vision and mission of the project

The final critical success factor mentioned by the BPE is the project team itself. Much like the first BPE, this BPE also emphasized the importance of aligning the project team members to the direction that the project is going towards. This has an effect on the attitudes of the project

team members, as it gives purpose to their individual tasks. Without knowing the vision of the project and the purpose of their individual tasks, the BPE observed that some members of the team feel left out and confused. Both of which greatly reduced their effectiveness in contributing to the implementation team.

Senior Project Manager

The senior project manger's role in this implementation team is to guide the BPO on the project management aspect of the implementation project. The project manager's work is supported by Philips's standardized methodology for project management. This methodology is called the Standardized Implementation Methodology (SIM), and it is an adapted version of the PMO methodology from the PMI Institute, specifically for this organization. The SIM is an elaborate methodology that includes templates and step by step guidance on the actions that a project team has to take to implement a project within Philips. It also provides guidance on the types of stakeholders that a project needs to involve and on the deliverables required for each project phase. Therefore, from the project manager's perspective, implementation success is defined as fulling all of the requirements that are listed in the SIM.

In order to achieve the requirements listed in the standardized methodology, the project managers mentioned a number of critical success factors that will be explained in the following sections.

Use of a standardized methodology

The first critical success factor mentioned by the project manager is to use a standardized methodology when implementing a COTS IT system. This critical success factor was specifically highlighted by the project manager, due to some of the challenges that this implementation team encountered during the project. The project manager thinks that by flowing the standardized methodology more faithfully, the project team could have easily avoided these problems.

The project manager pointed out that there is a work culture issue within Philips and described it as an unstructured approach towards solution creation. What that means is that the employees in the organization often do not follow the necessary steps, in the right order, when coming up with a solution to a specific problem. In other words, they do not follow the procedures listed in the standardized methodology. The project manager gave the example that managers often ask him to implement a solution to a specific problem, without actually validating the solution with the end-users. The project manager explained the flaw in this kind of approach in the quote below:

"If you want to implement something, if the BPO sees a problem in the process, and then he says "I need to address this type of steps". How he should do it is to go to the end-users, try to understand what is the exact problem, then find in the background a solution, meaning having a look at what you have in systems that are in place. Then based on the BPE, which are the

business process experts, try to map these processes and come up with a solution. Then they should be involved in designing that solution. They are not doing that, they are designing and wasting a lot of time and come up with a so-called “yes, I have a solution for you”. But it is wrongly done, it is done by them in the laboratory, instead of working with [end-users]….”

In this quote, the project manager stresses the importance of conducting a thorough analysis of the current situation by looking into the existing systems and mapping the existing processes with the Business Process Experts. This way the project team can identify the gaps that are in the current IT systems and business processes. The project manager also emphasized the importance of validating the needs and requirements of the end-users, both before and after designing a solution. This is important as the design process should be an iterative process that incorporates the feedback of the users, instead of being a one-time presentation of a solution to the end-users.

The project manager also listed a few benefits of working with end-users to come up with a solution.

“You are gaining acceptance, buy-in, support, and you make your life much easier throughout the project life cycle by working with them from the beginning. If you are doing that yourself, thinking that it's good enough and try to deploy, they will come to you and complain and say that they don’t need the solution and that it’s much more complicated than the existing solution and I [end user] won't accept it.”

Unfortunately, this BPO of this implementation project did not always follow this standardized approach and the project suffered consequences such as scope deviations, budget increase, wasted resources, end-user resistance, and general frustrations within the project team. The project manager pointed out the flaws in the BPO’s approach in the following quote:

“He is doing various things in parallel, which is very hard to map due to complex communication. That is why we are delaying, because we are not structured in the approach. While he is now seeing the stakeholder, he is doing it in his own way by spreading too much by having too much detail instead of a top-down approach. He is having a mixture of top-down and bottom-up, going to the details when it is not really needed instead of keeping it simple. “

Due to the BPO’s unstructured approach, the project manager often found himself as a spectator in the background that is trying to gather the information needed for the project to advance to the next stage. Therefore, the project manager stresses the importance of a standardized methodology, as it keeps projects from running off the course by having regulating powers that the project manager can use to challenge the decisions made by the BPO.

Change management

On the topic of change management, the project manager mentioned two critical success factors that contribute to a successful change management process. The first critical success

factor is to select the right end-users for validation. On this topic, the project manager offered similar arguments made given by the BPO in terms of the geographical locations that are favorable for end-user validation. Both of these stakeholders recognized that Asian countries are more respectful of organizational rules, and are more willing to embrace change. While European countries and North American countries have more of a culture to resist change. Therefore, the project manager prefers to start the validation process with end-users that are less resistance, as it makes the validation process much faster and gives the project manager a good start to a project.

As for the second critical success factor, the project manager indicated that it is critical that end-users actually adopt the new system, in order for the implementation project to be considered successful. Therefore, in order to achieve high user adoption, the project manager suggested that the project's key performance indicators (KPIs) have to be integrated into the end-users' project portfolio management (PPM). In simple terms, the end-users' job profiles have to be adapted in a way that they are obligated to use the new system to complete their work. This is crucial as Philips can not run the old system and the new system in parallel, so the end-users have to be motivated to make the jump to the new system.

Communication

The project manager sees communication as a critical success factor for a couple of reasons. The project manager stated that "If you create transparency, you gain acceptance upfront. If you are promoting yourself and your work upfront, you gain acceptance and recognition, people know what you are talking about. You don't need to suddenly appear on the table with a solution that has no publicity." From this quote, the project manager indicated that communication with external stakeholders is not only for the purpose of validation. It can also be used to gain recognition and acceptance, as well as taking away the shock value of a solution. The project manager added that although a stakeholder may not understand the details of a project, it is always important to communicate with stakeholders even before a solution is made. This way there is a constant flow of information that is reaching the stakeholder, which makes the stakeholder less likely to be overwhelmed when presented with the actual solution.

Cross-functional Engagement

On the topic of cross-functional engagement, the project manager indicated that it is always better for the project team to interact with all of the relevant stakeholders together in one room, instead of interreacting with them individually. By placing all of the stakeholders in one room, the stakeholders are pressurized into creating mutually beneficial solutions, as it is in their interest to have a solution that fits their own business processes. Whereas if these stakeholders are engaged separately, it becomes a back and forth dialogue between the implementation team with each stakeholder, as the requirements of one stakeholder may not fit with the requirements of another stakeholder. This makes it hard to piece together all of the requirements from the different groups of end-user, making it an extremely inefficient process.

End-user (Supplier Quality Department)

The end-user interviewed for this case study is from Philips's Supplier Quality department. The end-user is a supplier quality manager and is involved in the Supplier Quality department's team for defining global processes. These global processes include supplier creation, supplier classification, and supplier qualification for performance monitoring. As these processes are also incorporated in the new COTS IT system, the end-user supports the implementation team by defining these global processes from a supplier quality perspective.

From the perspective of this end-user, the new COTS IT system can be considered as successful if it fits with Philips's data model. This means the new COTS IT can be connected to the other systems using the company's master data structure (SMRL). The end-user also stated that implementation success is determined by whether the IT system supports the business processes and improves the performances of these business processes. For this second definition, the end-user added that it could be measured based on the number of requirements that the IT system fulfills, the number of businesses that the system is deployed in, the number of issues related to the system, and the severity of the reported issues. Furthermore, all off these measurement dimensions are usually captured in the end-users' feedback to the implementation team.

Focus on the needs and requirements of the end-users

During the interview, the end-user highlighted the importance of keeping the scope of the IT system simple, so that it doesn't complicate the end-users' work. Shes stated that: "I get the impression that by simplifying our way of working, we are only complicating it. So if one tool can take over 2 or 3 others, or take over some manual work, that is of course a successful tool. If its an addition to existing tools, I would say to stop with it." This critical success factor is directly linked to the second definition of implementation success defined by the end-user. In that definition, the end-user highlighted the performance aspect of an IT system. While the performance of an IT system can be judged by the actual speed of the system, it can also be judged by the level of complexity that it adds to the business processes. Therefore, what the end-user is trying to convey in this quote, is that the new system should not add complexity to the existing business processes. Instead, it should focus on the end-users' needs and requirements in order for it actually support the works of the end-users.

Validating needs with end-users

The end-user indicated that it is crucial for the implementation team to validate the needs of the end-users when designing a new business solution with a COTS IT system. This due to the fact that the COTS IT system may have inbuilt functionalities that are not that relevant for the end-users in Philips. Therefore, it is key for the implementation team to know exactly what the end-users need for their work, in order to present a new IT system that doesn't add additional complexity to the end-users work.

In terms of the method used for end-user validation, the end-user stated that system demonstration sessions are the most suitable. System demonstration sessions have the advantage of visually presenting the functionalities of the COTS IT system, using the sandbox development tools of the vendor. For end-users, it is then easier to judge these functionalities as they could see how the system works with their own eyes, as opposed to reading them on a document.

Despite the advantages of system demonstration sessions, the end-user provided a few points improvements that the implementation team can work on to make these demonstration sessions more effective. The first point of improvement is to shorten the interval between the demonstration sessions. The end-user indicated that as these demonstration sessions are their main source of exposure to the new IT system, they often forget certain details of the system during these extensive intervals. Therefore, she proposed that the demonstration sessions need to be executed more frequently, this way the implementation team can just focus on presenting the functionalities of the system, instead of wasting time on explaining the functionalities that have already been shown in previous sessions. T

he second point of improvement mentioned by the end-user is to improve on the communication away from the demonstration sessions. The end-user mentioned that the implementation team should communicate with the end-users on topics such as the content of the next demonstration session, the goals of the presented functionalities, and the support needed from the end-users. This way the demonstration sessions can really be used for the purpose of demonstrating the functionalities of the system, instead of being used to explain all of these extended topics related to the content of the demonstration.

IT Architect

The IT architect interviewed in this research is from Philips's corporate IT department. The IT architect is responsible for designing the IT architectures for the systems in the procurement department, which also includes the architecture of this new COTS IT solution. From the IT architect's perspective, implementation success is determined by the system's ease of maintainability and the ease of support.

For this definition of implementation success, the IT architect focused on one critical success factor throughout the entire interview. This critical success factor is the level of customization made on the COTS IT solution, and the IT architect discussed the tradeoffs that Philips had to make in this respect. For Philips, they had to determine the level of customization based on four dimensions. These four dimensions are innovativeness, cost, speed, and quality.

The IT architect stated that Philips's ultimate vision for this COTS IT solution is to have a system where employees of the company can look up the information of suppliers and interact with the suppliers. However, the COTS IT solution is currently not mature enough to fulfill all of

Philips's requirements for such a system. Therefore, Philips asked the developer of the COTS IT solution for some customizations on the current version of the system and also co-innovates with the developer so that future versions of the COTS IT solution fits more closely with Philips's vision of the system.

However, customizing a COTS IT system quickly adds a lot of costs. These costs are not only the money Philips pays upfront to have the solution customized, but they are also the additional costs added to the total cost of ownership. These additional costs include the cost of upgrading the system, the cost of hiring specialists to maintain the system, and the cost of training these specialists. Furthermore, customizing a standardized solution also makes it difficult to upgrade and maintain, as the developer could not provide the generic support to the system. Without this generic support, the COTS IT system also loses its advantage as a standardized solution. Furthermore, co-innovation with the developer has its disadvantages. As multiple companies will try to push their requirements to the developer, asking for additional features will only push back the release times of subsequent versions of the system.

Therefore, at the end of the day, Philips needs to decide whether the specific requirements that they seek for the system is worth the time and resources that they have to invest to obtain it. Moreover, they also need to effectively plan the implementation process according to the development timeline of the vendor. This way the implementation project doesn't suffer delays caused by the developer. This learning point highlighted by the IT architect, as Philips had bad experiences in the past when they tried to be an early adopter of a COTS IT solution.

Appendix 6: Details of Practical Assignments

The first practical assignment was the creation and usage of a section of the Supplier Master Record Layout (SMRL) called the "Qualification Matrix". The "Qualification Matrix" is a matrix that indicates the information (data points) that different internal stakeholders collect from suppliers during the company's supplier qualification process. The "Qualification Matrix" also presents the logic behind the collection of the data based on the given profile of the supplier. The creation of the "Qualification Matrix" was crucial as the logic behind the matrix was used to configure the new software solution for the users to test and understand the purpose of this new IT solution. So before this matrix is completed and configured into the IT solution, the team could not show the new IT solution to the end-users.

The second practical assignment given by the company is to create a supplier master data cleansing process. The researcher was involved in data cleansing activities during his internship, and the case company asked the group of interns involved in these activities to translate their data cleansing procedures into a process map. This process map contained three interconnected processes including the deduplication process, the enrichment process, and the grinding process. The deduplication process illustrates how to merge a group of fragmented supplier records into one complete record. The enrichment process describes how a record can

be enriched with internal and external sources. Lastly, the gridding process shows how a record is assigned with a new identification number after it is enriched and deduplicated from other records. This practical assignment is crucial to the success of the implementation project, as the cleanliness of the supplier master data is a bottleneck in this IT implementation project. Without a clean set of records migrated into the new system, the new IT system will face the same data quality issues faced by legacy systems.

Appendix 7: Details of Company Documents

The case company provided an extensive list of organizational documents for the purpose of learning and analyzing the company's current practices. These documents come in the form of work instruction texts, process maps, PowerPoint presentations, compendiums, intranet pages, and the "Supplier Master Record Layout (excel). Overall, these documents are mainly used by the researcher to deliver the practical tasks given by the company. However, these documents also give the researcher an understanding of the project and the concept of supplier lifecycle management in Philips. However, the researcher's knowledge of the different elements in this project is also used as a basis to open further discussion with relevant stakeholders during the in-depth interviews. The following sections give a brief description of all the different types of company documents used in this research. These documents are stored in Philip's intranet and will not available for the readers of this thesis due to the company's data confidentiality protocol.

Process Maps & Work Instruction Texts

The process maps are graphical outlines of the company's business processes, and the work instruction texts are the literal descriptions of the purposes, steps, and logical rules of the business processes shown in the process maps. These process maps and work instruction texts are saved in Philip's Architecture of Integrated Information Systems (ARIS) web page. The main value of the process maps is the knowledge of the sequential order and relationship between the different business process steps. This knowledge is used in the creation of the "Qualification Matrix". The work instruction texts reveal more information on the underlying purpose, steps, and rules of the processes. These process steps and logical rulesets are built into the new IT solution, and information on the purpose of a business process can be used to determine the granularity of a process step that is implemented in the software.

Supplier Lifecycle Management Team's Compendium & PowerPoint Presentations

The Compendium and PowerPoint presentations provide valuable background information concerning the project, as well as the summary of different workflows within the project (Philips, 2017). They also record the progression and choices that had been taken by the project team over the duration of the project. The Supplier Lifecycle Management team's compendium includes information such as the mission statement of the project and details regarding the different work packages that are required for the implementation of the COTS IT solution. The

information in these two types of documents allows the researcher to be aligned with the work progression of other members of the team and allows the researcher to have a glimpse of the different challenges members of the team face in their respective roles. Insights from these sources are used by the researcher in follow up questions during the in-depth interviews.

Supplier Master Record Layout (SMRL)

The Supplier Master Record Layout (SMRL) is the canonical supplier data model for which all supplier data in Philips should conform to. A canonical data model is a data model that covers all of the data of a group of connected systems (Paasschens, 2016). The canonical data model is able to contain data from all of the data models by having a one way, unambiguous translation of data from the canonical data model to the connecting data models, and vice versa (Paasschens, 2016).

The SMRL outlines the data fields that are included in the new IT system. It is part of the researcher's practical task to check the correctness of the data fields in the SMRL with the cross-functional stakeholders involved in this implementation project. Moreover, it is also the researcher's responsibility to update and change a section of the SMRL called the "Qualification Matrix" for the case company.

Qualification Matrix

The company has an existing "Qualification Matrix" made by the Supplier Quality (SQ) department. However, that version of the "Qualification Matrix" does not incorporate all of the guidelines used by the SQ department for the supplier qualification process. It also does not have written rules for specific cases that fall off the normal profile of suppliers. The company's supplier qualification process consists of three main stages, namely: supplier selection, supplier classification, and supplier qualification (Philips, 2019). In the supplier selection stage, the capabilities of a supplier are assessed and the results are recorded and stored (Philips, 2019). In the supplier classification stage, suppliers are categorized based on their roles, market segment, product type, risk level, geographical location (Philips, 2019). The information recorded in the supplier classification stage is important to determine the types of certifications, audits, and agreements that the company requests from suppliers in the supplier qualification stage (Philips, 2019).

In order to make sure that all data points that are collected in the supplier qualification process are properly documented, it is part of the researcher's practical task for the company to update the "Qualification Matrix " created by the SQ department. This new version of the "Qualification Matrix" has to capture all written guidelines, as well as capturing the heuristics that employees in the department use to tackle the special cases. The updated "Qualification Matrix" will then be used to configure the new IT system.