Tampere University

Joni-Pekka Rouvali

IMPROVING INFORMATION TECHNOLOGY DEMAND MANAGEMENT PROCESSES

Master's Thesis
Faculty of Management and Business
Examiners: Professor Miia Martinsuo
and Associate Professor Tuomas Ahola
February 2022

ABSTRACT

Joni-Pekka Rouvali: Improving information technology demand management processes
Master of Science Thesis
Tampere University
Master's Degree Programme in Industrial Engineering and Management
February 2022

Strategically important information technology can affect a company's value chain through many mechanisms. Information technology is often approached from the supply side, such as improving processes to deliver information technology faster and with better quality. However, by improving the information technology demand management processes, companies can "do the right things", avoid invaluable information technology development and save resources in analysing business needs. Information technology demand management covers tasks from demand collection to deployment, and during management, it is decided whether the demand is rejected or approved. Well-defined information technology demand management act as a bridge between information technology and business.

In this study, information technology demand management is studied in a company operating in ten countries. Target company's information technology department delivers digital services, internal systems and information technology infrastructure solutions and receives highly different demands from several sources, making the information technology demand management environment complex. The constructive research strategy is used to build an information technology demand management process framework. First, theoretical background related to information technology demand management, processes, and demand management improvement is examined based on previous literature. Second, the phenomena are studied empirically in the research context to answer the research questions and complement the construction. Empirical research is implemented by interviewing representatives involved in the information technology demand management in the target company and collecting previously documented materials related to the topic.

During the research, programs, projects, software requirements, change requests, and operational software requirements are identified as demand items for the strategically important information technology demand management. These items are divided into three demand levels: strategic, tactical and operational. Findings show that different information technology demand management processes are needed to manage different demand levels. These processes can be improved by adding cross-process tasks: (1) In the demand collection phase, it is beneficial to check received demand quality, complete early demand rejection, recognise multisystem demand and assign the demand. (2) In the prioritisation phase, it is important to cross-examine the processes because the same resources and budget are used in the information technology department. Centralised prioritisation enables equal and transparent prioritisation throughout different processes. Also, resourcing is found as one of the needed improvement areas. Two practicalities are proposed to improve resourcing: (1) reduce information demand at the front-end of the process and (2) allocate resources efficiently. In efficient resource allocations, the importance of knowledge and ownership from both business and technical sides is highlighted. Also, centralised responsibilities for the overall coordination and facilitation of the information technology demand management are needed.

The unique information technology demand management process framework is built for the target company's purposes. The development of the construction is carried out throughout the study, and the execution of the study is built around the construction creation. The construction collects best practices from the literature and empirical research, making it a theoretically and practically unique and valuable framework.

Keywords: information technology, information technology demand, information technology demand management, information technology demand management process, and process improvement.

TIIVISTELMÄ

Joni-Pekka Rouvali: Tietotekniikan kysynnänhallinnan prosessien kehittäminen
Diplomityö
Tampereen yliopisto
Tuotantotalouden diplomi-insinöörin tutkinto-ohjelma
Helmikuu 2022

Strategisesti tärkeä tietotekniikka pystyy vaikuttamaan yrityksen arvoketjuihin monella tapaa. Tietotekniikkaa lähestytään usein tarjonnan puolelta, eli harkitaan esimerkiksi, kuinka prosesseja voidaan kehittää, jotta tietotekniikan sovelluksia pystytään toimittamaan nopeammin ja parempilaatuisina. Kuitenkin kysynnänhallinnan prosesseja kehittämällä yritykset pystyvät valitsemaan oikeita asioita kehitykseen, välttämään arvottomia kehityshankkeita sekä säästämään resursseja liiketoimintatarpeiden analysoimisessa. Tietotekniikan kysynnänhallinta sisältää tehtäviä kysynnän keräämisestä käyttöönottoon ja hallinnan aikana päätetään, hylätäänkö vai hyväksytäänkö kysyntä eteenpäin prosessissa. Selvästi määritelty tietotekniikan kysynnänhallinta toimii siltana tietotekniikan ja liiketoiminnan välillä.

Tässä tutkimuksessa tietotekniikan kysynnänhallintaa tutkitaan yrityksessä, joka toimii kymmenessä maassa. Kohdeyrityksen tietotekniikasta vastaava osasto toimittaa digitaalisia palveluita, sisäisiä järjestelmiä ja infrastruktuurin ylläpitoa sekä vastaanottaa erilaista kysyntää lukuisista lähteistä. Täten tietotekniikan kysynnänhallinnan ympäristöä voidaan pitää erittäin monimutkaisena. Konstruktiivista tutkimusotetta käytetään tutkimuksessa tietotekniikan kysynnänhallinnan prosessiviitekehyksen rakentamiseen. Tutkimuksessa käsitellään aluksi teoreettinen tausta tietotekniikan kysynnänhallinnasta, sen prosesseista ja kehittämisestä aikaisemman kirjallisuuden pohjalta. Seuraavaksi ilmiöitä tarkastellaan empiirisesti tutkimusympäristössä, jotta vastaukset tutkimuskysymyksiin ja konstruktio pystyttään täydentämään. Empiirinen osuus toteutetaan haastattelemalla henkilöitä, jotka ovat osallisena tietotekniikan kysynnänhallintaan kohdeyrityksessä sekä keräämällä aikaisemmin dokumentoituja materiaaleja aiheeseen liittyen.

Tutkimuksen aikana moniprojektihankkeet (programs), projektit, järjestelmävaatimukset, muutospyynnöt ja operationaaliset järjestelmävaatimukset tunnistetaan erilaisiksi kysynnöiksi strategisesti tärkeälle tietotekniikalle. Erilaiset kysynnät jaetaan kolmeen tasoon: strategiseen, taktiseen ja operatiiviseen. Löydökset osoittavat, että erilaisia prosesseja tarvitaan kysynnänhallinnan eri tasoilla. Näitä prosesseja voidaan kehittää lisäämällä prosessien välisiä tehtäviä: (1) Kysynnän keräämisvaiheessa on hyödyllistä keskitetysti tarkastaa kysynnän laatu, toteuttaa aikainen hylkäys, tunnistaa monikysyntä eli kysyntä, jonka toteuttaminen vaatii useaan järjestelmään muutoksia, sekä kohdentaa kysyntä oikeille tahoille. (2) Priorisointivaiheessa on tärkeää priorisoida kysyntää yhteisesti, sillä priorisoinnissa sama budjetti ja resurssit ovat käytössä koko tietotekniikan osaston laajuisesti. Keskitetty priorisointi mahdollistaa tasevertaisen ja läpinäkyvän priorisoinnin läpi prosessien. Myös resurssointi nähdään tärkeänä kehityskohteena kysynnän hallinnalle ja kaksi käytäntöä sen kehittämiseen ehdotetaan löydösten pohjalta: (1) Kysynnän vähentäminen prosessin alkuvaiheessa sekä (2) tehokkaat resurssiallokaatiot. Tehokkaassa resurssiallokaatiossa korostetaan ymmärrystä ja omistajuutta sekä liiketoiminnallisesti että teknisesti. Myös keskitetty omistajuus koko kysynnänhallinnan koordinoinnista sekä fasilitoinnista on tarpeellista.

Uniikki tietotekniikan kysynnänhallinnan prosessiviitekehys rakennetaan kohdeyrityksen tarpeisiin tutkimuksen aikana. Konstruktion kehittäminen kulkee mukana läpi työn ja tutkimuksen toteuttaminen rakentuu konstruktion toteuttamisen ympärille. Konstruktio kerää parhaat löydetyt käytännöt niin kirjallisuudesta kuin empiriasta, mikä tekee siitä uniikin ja arvokkaan mallin sekä teoreettisesti että käytännöllisesti.

Avainsanat: tietotekniikka, tietotekniikan kysyntä, tietotekniikan kysynnänhallinta, tietotekniikan kysynnänhallinnan prosessi ja prosessin kehittäminen.

PREFACE

My years as a student have been the best years of my life. I have made many new friends, had many great student life experiences, seen the world, and truly enjoyed my studies. My studies would not have been anything without great friends. I want to thank Hypesquad, Ipe, and all the other wonderful people I have met during my study years.

I have to admit that this thesis was the most challenging part of my studies. Even two months ago, it seemed like an endless document without a clear destination – but here I am, writing the last words of it. Realising that these words are ending my studies, an unforgettable era of my life, makes me sad. I enjoyed my years at Tampere University and in Tampere. However, memories do not disappear, and a new era with bright opportunities is ready to start.

My thesis would not be here without significant help. I want to thank you, Kimmo, for this thesis opportunity. You have been my mentor at the workplace, and I will never forget your lessons. I want to thank you, Miia Martinsuo, for your accurate and quick help whenever I needed it. You guided me to reach the finish line. Thank you, Tuomas Ahola, for your comments on improving this thesis. I want to thank you, Anniina, for your help in every manner, especially with proofreading the thesis. You were my support every day, cheering me up from the start until the end. Finally, I want to thank my family for believing in me.

Helsinki, 2 February 2022

Joni-Pekka Rouvali

CONTENTS

1. INTRODUCTION 1
1.1 Background of the study 1
1.2 Research context 2
1.3 Research objective, questions and scope 4
1.4 Thesis structure 5
2. LITERATURE REVIEW 8
2.1 Information technology and demand management 8
2.1.1 Information technology 8
2.1.2 Information technology demand 11
2.1.3 Information technology demand management 16
2.2 Information technology demand management processes 21
2.2.1 Process description and improvement 21
2.2.2 Information technology demand management processes 23
2.2.3 Information technology demand management roles 29
2.3 Improving information technology demand management 31
2.3.1 Faced challenges and solutions 31
2.3.2 Improving processes and roles 35
2.4 Synthesis 38
3. RESEARCH DESIGN, DATA COLLECTION AND ANALYSIS 40
3.1 Research design 40
3.2 Data collection 42
3.2.1 Interviews 42
3.2.2 Documented materials 44
3.2.3 Workshops and meetings 45
3.3 Data analysis 46
4. RESULTS 48
4.1 Information technology demand management in the target company 48
4.1.1 Demand sources and items 48
4.1.2 Processes and practicalities 50
4.1.3 Roles and responsibilities 54
4.1.4 Successes and challenges 57
4.2 Improving information technology demand management in the target company 63
4.2.1 Critical success factors 63
4.2.2 Identified risks 65
4.2.3 Solution proposals 66
4.3 Process framework – the construction creation 72
5. DISCUSSION 77
5.1 Information technology demand management for strategically important information technology 77

5.2 Improving Information technology demand management for strategically important information technology 79
5.3 Future development proposals for the target company 82
6. CONCLUSIONS 85
6.1 Relevance – Practical success 85
6.2 Rigour – Theoretical contribution 86
6.3 Research limitations 87
6.4 Proposals for future research 88
REFERENCES 90
APPENDIX A: INTERVIEW QUESTION OUTLINE 95
APPENDIX B: PROPOSED SOLUTIONS INCLUDED AND EXCLUDED IN THE CONSTRUCTION 97

LIST OF FIGURES AND TABLES

Figure 1. Summary of information technology demand management..... 20
Figure 2. The preliminary construction based on the literature review..... 39
Figure 3. Research design summary. 42
Figure 4. Information technology demand management challenges. 62
Figure 5. Information technology demand management process framework for the target company. 76
Figure 6. Future development proposals roadmap for the target company..... 84

Table 1. The evolvement of information technology department roles..... 10
Table 2. Summary about information technology demand. 16
Table 3. Information technology demand management and its position. 19
Table 4. Summary of information technology demand management processes..... 28
Table 5. Roles and responsibilities in the demand management process (Gentle, 2007, p. 107-110)..... 30
Table 6. Barriers or limitations to effective information technology demand management. (Quichiz & Oré, 2017)..... 34
Table 7. Information technology demand management success factors (Quichiz & Bayona-Oré, 2016). 35
Table 8. Completed information technology demand management roles. 37
Table 9. Interview structure with the help of Rohleder and Silver's (1997) process improvement framework..... 43
Table 10. Summary of interviewees..... 44
Table 11. Data collection from documented materials..... 45
Table 12. Overview of workshop and meetings..... 46
Table 13. Processes high-level descriptions. 53
Table 14. Success factors in information technology demand management. 64
Table 15. Risks in information technology demand management. 65
Table 16. Proposed solutions combined with challenges, risks, and success factors..... 71
Table 17. Construction roles and responsibilities. 75

LIST OF SYMBOLS AND ABBREVIATIONS

CIO	Chief Information Officer
CPU	Central Processing Unit
CRM	Customer Relationship Management
ERP	Enterprise Resource Planning
SPOC	Single Point of Contact

1. INTRODUCTION

1.1 Background of the study

Information technology development is known as one of the most complex, costly and unsuccessful areas in many companies. On the other hand, it is often business-critical, and organisations strive to increase information technology development success rate. (Al-Karaghouli et al., 2005) Previously information technology was used to provide services to the company via the client-vendor model (Gentle, 2007, p. 41). Lately, the information technology role has become more strategically important in many organisations as it can affect the organisation's value chain by many mechanisms. Information technologies can help organisations reduce costs, grow revenue, improve business processes and create competitive advantages. (Roberts & Gerow, 2020) For example, many successful businesses have highlighted information technology and business alignment in strategy implementation (Xiang et al., 2008).

Information technology governance has seen the important theory for information technology value delivery and strategic initiative implementation (Alonso et al., 2017). The companies are targeting to deliver the most valuable services and products with the help of information technology by improving the delivery and development processes. However, solutions cannot be delivered successfully if the front-end of the lifecycle of activities is not working, meaning that an incoming demand is managed poorly (Gonzalez et al., 2012). Thus, information technology demand management has been seen as one of the most important information technology governance processes to reach its goals (Alonso et al., 2017; Symons et al., 2006).

Information technology demand is all kinds of requests that the department responsible for developing information technology is receiving and managing (Legner & Löhe, 2012). Requests are usually made by technology users, requestors (Alonso et al., 2017). The demand scope can vary from strategic information technology landscape changes to operational system requirement requests (Legner & Löhe, 2012). Demand can come from the business environment to the information technology department itself, and it can be unplanned or planned (Gentle, 2007, p. 41-42). Information technology demand management covers tasks from demand collection to deployment, and during management, it is strived to select the right things for development (Gonzalez et al., 2012; Legner

& Löhe, 2012). Demand management enables companies to objectively choose and fund the most business beneficial demand items (Gentle, 2007, p. 54). In addition, the information technology demand management position between information technology and business enables it to increase alignment between sides (Pombinho et al., 2013).

Many companies pay too little attention to information technology demand management, translating business needs into beneficial information technology solutions (Gonzalez et al., 2012). Business needs or needs in general means what potential user of the software needs from the technology to have wanted job done (Toyama, 2018). Also, many companies are missing the consolidated view of requests from all demand channels. Successful demand management creates a basis for alignment between information technology and business and the generation of value from information technology solutions. (Legner & Löhe, 2012) The essential decisions related to future information technology delivery are made in the information technology demand management processes (Gonzalez et al., 2012).

1.2 Research context

In this research, demand management is studied in the business-to-business technology asset industry. A target company offers a technology lifecycle management solution that follows circular economy principles. A business model includes services from asset purchasing to asset recycling and reselling. The company is operating in 10 countries and has remarkable growth targets. In the centre of the solution offering, various services are offered to customers. Many valuable services are digital services, which the target company's information technology department delivers. In addition, the information technology department provides internal system development and information technology infrastructure services to the whole company. It is also noticeable that all development work is not happening inside the company, so some development is outsourced, making operations even more complicated to manage.

Target company's information technology department is operating in a highly complex environment, and it has several stakeholders to which it should deliver products and services as efficiently as possible. Thus, it faces demand from many sources: group functions, business units, a joint venture and an international business office. Group functions are responsible for company-wide solutions and services, and they support and develop main business processes in a centralised way. Business units or more commonly spoken countries are enabling business execution in market areas, so it is clear that much demand is coming from these sources, for example, from customer needs or

the business environment changes. Countries can collect demand straight from the customers or collect it from inside the business unit. The information technology department receives a demand from the joint venture organisation, which can be seen as a straight customer due to its contractual position. In addition, the international business office, which offers global solutions to international customers, can be seen as an individual demand source.

Demand from several sources has no one form, and it can vary in many ways. In the beginning, the focus product or services of the demand vary due to the diversity of delivered services and products. In general, the focus area can be divided into three areas: internal systems, digital services and products, and information technology infrastructure. Even though the focus can differ significantly, demand itself has huge differences in scope and other characteristics. E.g., demand can be just a bug-fix for one functionality or be a new complex project request. These facts make the demand very difficult to manage in the same way in all possible situations. On the other hand, the importance of more detailed specifications is highlighted when strategic and business-critical demand is handled.

The information technology department's stakeholders in demand management are not limited to demand sources. Also, an essential part of demand management is to decide how approved demand is developed. Several vendors and external resources are critical stakeholders in this phase. In practice, it means that demand should be modified and communicated to answer the vendor needs. The number of different sources, focuses on demand, variety of demand scopes, and demand development complexity make information technology demand management complex and wide-area to manage successfully.

Even though demand implementation has been challenging throughout several vendors and internal development teams, collecting and prioritising information technology demand have appeared as bottlenecks. As mentioned before, demand management in the field of information technology is highly complicated and incomplete. The research environment sets a very complex basis to do the processes efficiently. The main challenges are visible in the everyday working environment: prioritising, combining, and modifying various business needs to be valuable information technology solutions for the business – for the customer. Also, internal system development must be considered to ensure efficient operations throughout the different business units and functions. A target process framework development and implementation, clarified roles and responsibilities, transparent communication, better business and information technology alignment, and more efficient tool usage are needed to answer the company's challenges.

1.3 Research objective, questions and scope

Constructive research strategy is chosen in this research due to its practical approach to solving challenges. In constructive research, real-life problem solving is conducted via the construction of models, diagrams, plans, organisations or mathematics algorithms etc. (Kasanen et al., 1993) A construction is the **information technology demand management process framework** in this study. The construction is built based on the latest literature and data collection from a target company (Oyegoke, 2011). Also, the construction needs to be tested to work within a task it is designed for (Kasanen et al., 1993). There can be two different tests: weak and strong market tests. The weak market test is done in this research due to the limits of research and timeline. The test is passed if the decision-maker accept the construction and want to take the construction in use (Kasanen et al., 1993).

The research objective is to create an information technology demand management process framework consisting of the target company's current processes and new approaches to solving the identified challenges. The construction is designed for a global and complex environment where the information technology department is delivering services and is a crucial part of business development and customer value creation. It means that information technology is strategically important in the company. The study aims to find new academical insights in an area. In a practical manner, study goals are to 1) to create a better understanding of the target company current information technology demand management environment and roles and create documented descriptions about the process(es), and 2) to recognise current challenges or improvement points and propose solutions for them via the construction. Based on previous objectives, the research questions are identified. The first research question is:

RQ1: How is information technology demand management currently handled for strategically important information technology?

Concepts related to information technology demand management are presented by going through the most relevant literature on the topic at the beginning of the study. Increasing the understanding of strategically important information technology and information technology demand management concepts are essential in this phase. Also, knowledge about the demand management process opinions in different environments must be created based on literature findings. In addition, the construction goal is to propose improvements for information technology demand management. Thus, only understanding and defining the processes is not enough, and the second research question needs to be answered to create construction:

RQ2: How can information technology demand management be improved for strategically important information technology?

The second question aims to collect a set of advice that every company can use to develop their information technology demand management. On the other hand, the second question aims to create new theory findings related to improving complex processes. Therefore, it can be noticed that solving the challenges and advising the target company can require new theory creation and ideas, making the part the riskiest but most potential in terms of rigour and relevance.

Answering the research questions is done by following constructive research principles. Information is gathered from the previous literature and the target company. The literature review aims to create an inclusive understanding of how research questions can be answered to create knowledge about the concepts, processes, and improving processes. Data collection from the target company is more focused on the research context. Data collection goals are to understand the current practices and the process and how these can be improved in different demand levels. Also, it is essential to create an understanding of current responsibilities and roles defined in different processes and collect all available data to answer research questions.

The study is limited by the size and timeline of the master's thesis. Also, the study is the first research for the researcher, which set its own challenges. Data collection is limited to the target company environment. The target company is operating in a specific industry, and on the other hand, information technology department demand is limited to the target company's offered services and internal information technology systems. Also, company size and especially information technology department size limits information technology demand management scope, processes, and roles.

1.4 Thesis structure

This thesis consists of six chapters: 1) introduction, 2) literature review, 3) research design, data collection, and data analysis, 4) results, 5) discussion and 6) conclusion. The introduction chapter sets up the research goals, questions, context, objectives and structure. Also, the background of the study is handled in the first chapter.

The second chapter, the literature review, handles the study's theoretical background. The theory chapter presents the theoretical background of the thesis environment based on previous academic literature and creates a basis for the study. The second chapter

handles information technology roles, demand, demand management, demand management processes, and process improvement in more detail. Based on findings, the research questions and the construction are approached as far as possible.

The third chapter covers the methodological research choices. It consists of research design like research strategy, research process, research philosophy, time horizon, and research method. The methodology chapter identifies why decisions are made in defined areas in more detail. In addition, practical definitions of how the data is collected and analysed during the research process are presented. The data collection section represents how the data is collected, from which channels and how it is done. Finally, the data analysis section presents how data is analysed to conduct research results.

The fourth chapter presents the research results based on the case study. The chapter starts with the section focusing on how information technology demand management is currently handled in the target company by collecting current demand sources and items, processes, roles, and success areas and challenges. The second section focuses more on the potential improvement areas by identifying the most important success factors in demand management, which risks exist in the contexts, and how interviewees would develop the processes. Finally, the third section discusses construction creation. It describes made selections comprehensively, presents the construction, and discusses weak market test results.

The fifth chapter, discussion, dives more deeply into the results and discusses how they are connected to the findings of the literature review. During the first section, the first research question is answered by defining the basic concept of information technology demand management, different processes, and roles based on literature and empirical findings. The second section answers the second research question. The question is answered by defining practices to improve strategically important information technology's demand management based on common and differing findings in literature and empirical research. Also, the uniqueness of the research context and the construction is discussed during the first two sections. The last section discusses the target company's future development needs and proposes an action roadmap to improve information technology demand management.

The last chapter concludes and estimates this study's most significant findings and results. The first section presents how the study reached its practical goals. The section discusses how the study created understanding about the target company's information technology demand management and how it proposed solutions to recognised chal-

lenges. The second section presents this study's contribution to previous academic literature in information technology demand management's roles, processes, and improvement areas. The third section defines limitations of the implemented research process, the data collection method, the interviews, the researcher role, and how these limitations affect the study results. Finally, the last section proposes further research in the research context as well as the study's results in different contexts. Also, the section proposes that the customer value and different fundamental approaches in information technology demand management need to be researched further.

2. LITERATURE REVIEW

The chapter starts with general definitions of the essential terms, information technology and its supply and demand, and connects them to the research context. Next, information technology demand, its sources and categories are defined in more detail to understand better the input and levels of the information technology demand management. Then information technology demand management processes are disguised. Finally, improving different processes is discussed, and the preliminary construction is presented.

2.1 Information technology and demand management

2.1.1 Information technology

Information technology projects and investments have been seen as one of the organisations' most complex and unsuccessful areas (Serrador & Turner, 2015). However, many businesses invest in information technologies more than ever, and information technology's strategic impact has increased during the digitalisation trend. Companies have strived to connect information technologies to business as much as possible to achieve higher business benefits. For that, companies are enhanced to use information technology for searching new business opportunities, e.g. new offerings, services and products. (Chau et al., 2020) In addition to customer-facing business opportunities, information technology is known as the organisation's area responsible for information technology infrastructure, data, application systems, and delivering information and communications services in an organisation (Davis, 2000).

Information technology is defined as a strategically important area that can contribute to the organisation's value chain in existing and new markets in this research (Quichiz & Oré, 2017). Information technology can affect the organisation value chain by many mechanisms. Information technologies can help organisations reduce costs, grow revenue, improve business processes and create competitive advantages. (Roberts & Gerow, 2020) Information technology is a strategically important factor that creates business value and to which senior managers are willing to invest.

The role of an information technology department can be divided into five categories in the organisation: business partner, architecture builder, project coordinator, systems provider and technological leader (Roberts & Gerow, 2020). The role is a business partner when is actively participated in business transformation and innovation. Information

technology that reduces complexity in architecture and increases business agility is architecture builder. The project coordinator creates business value by sourcing strategy. The system provider supports organisational needs and supply systems according to demand. The technological leader role drives new information technologies based on strategic opportunities. (Guillemette & Paré, 2012; Roberts & Gerow, 2020) Roberts and Gerow (2020) argue that business partner and architecture builder roles enhance organisational ambidexterity.

The role of the information technology department is not unequivocal and has evolved during the time. At the beginning of the century, Tallon et al. (2000) researched information technology department roles by interviewing over three hundred professionals and concluded that the function might have four roles: market, operations, dual or unfocused. Tallon et al. (2000) argue that a clear role is more beneficial for the business than unfocused. Chen et al. (2010) defined three roles of the information technology department based on the previous literature: 1) innovator, 2) conservative, and 3) undefined. The innovator has a well-positioned information technology strategy that drives business strategy. The conservative's information technology strategy is driven by a well-positioned business strategy (Chen et al., 2010).

Mithas and Rust (2016) listed three different strategies for the information technology department in the company, which are 1) reduce costs by improving productivity and efficiency 2) increase revenues by finding or creating new customers, channels, and products or services and 3) dual where costs are reduced and revenue increased. Mithas and Rust (2016) concluded, based on their research, that the dual strategy will be the most profitable when companies invest more money in information technologies. From the previous definitions, the information technology department role is a business partner as it actively participates in business transformation and innovation in the target company. The evolvement of information technology roles is summarised in Table 1 below.

Table 1. *The evolvement of information technology department roles.*

Year (Source)	Information technology department roles	Research findings
2000 (Tallon et al.)	Market, operations, dual & unfocused.	Information technology with a more focused role creates higher benefits across the business value chain.
2010 (Chen et al.)	Conservative, innovator & undefined.	Information technology innovators have a higher impact on company competitive advantage than conservatives.
2016 (Mithas & Rust)	Cost reduction, revenue expansion & dual.	The dual function role has the highest profitability when information technology investments are more than four percent of revenue.
2020 (Roberts & Gerow)	**Business partner**, architecture builder, project coordinator, system provider & technological leader.	Partner and builder information technology roles increase organisation ambidexterity when competence is high. Coordinator role not.

Information technology is usually approached on the supply side - how it can deliver better products and services to the business. It can be done, for example, by focusing on project management, software development and asset management. However, the question about what is needed to be delivered is often forgotten. (Gonzalez et al., 2012) The information technology department is only focusing on the delivering system right, not delivering the right system. Thus, the demand side of information technology is needed to capture and prioritise demand and assign resources for the most beneficial projects and items. (Gentle, 2007, p. 37-38) One commonly known and researched model to help information technology supply and demand and reach business goals is information technology governance.

Ebert et al. (2020) argue that information technology governance drives information technology strategic decisions considering business value. Information technology governance must be business-oriented to deliver the most value to the business. To reach that goal, Ebert et al. (2020) define two main objectives for information technology governance which are 1) adding value to the business through information technologies and 2) mitigating risks related to information technologies. Gregory et al. (2018) define information technology governance as a framework of decision rights and accountability consisting of structural, processual, and relational mechanisms. The goal of the framework is to ensure organisation and information technology alignment (Gregory et al., 2018). According to Gregory et al. (2018), information technology governances differ in three definitions: focus, scope, and patterns.

The focus, scope, and pattern vary in four key information technology governance areas: strategic alignment, value delivery, resource management, and performance management (Ebert et al., 2020). In strategic alignment, the most critical factor is ensuring that

information technology and business strategies are connected. In value delivery, the information technology governance goal is to ensure that information technology generates expected benefits for the business. The resource management area is essential in prioritising information technology investments regarding people, applications, and infrastructure. The performance management area is needed to monitor information technology strategy execution, value delivery, and other key performance indicators. (Ebert et al., 2020)

Information technology delivery has been seen as the critical area in implementing business alignment and benefits in many sources. However, it cannot deliver successfully if the front-end of the lifecycle of activities is not working. The front-end means the activities that are taken to manage demand for information technology. Thus, information technology demand management has been seen as one of the most important information technology governance processes to reach its goals. (Alonso et al., 2017; Symons et al., 2006)

2.1.2 Information technology demand

Information technology demand is all kinds of requests that the department responsible for developing information technology is receiving and managing. The demand items scope can vary, for example, it can be the new whole system, changes the current system functionalities, or something that is affecting the information technology infrastructure. (Legner & Löhe, 2012) The demand can be categorised into different levels meaning the requested items might be strategically important or just daily operational activities (Gonzalez et al., 2012). Demand can also be planned or unplanned. Planned demand is triggered, for example, during the annual planning process, resulting in an annual information technology delivery plan, and unplanned demand is mostly unpredictable requests, e.g., change requests, feature requests, and bug fixes. In addition, the source of information technology demand can vary from the business environment to information technology itself. (Gentle, 2007, p 41-42)

The different sources mean that the different stakeholders can trigger the demand. According to Alonso et al. (2017), customers should be a centre of demand management, meaning that demand is generated based on a need of the customers. For example, changing customer processes can generate new business needs and be a source of demand. On the other hand, seeking benefits and cost reduction can be one of the sources of demand. (Alonso et al., 2017) However, other company's departments often

have requests to internal systems. For example, they can request new systems or functional improvements to perform their daily operations more efficiently. (Gonzalez et al., 2012)

Sometimes the demand comes from the business environment. One good example from the environment was general data protection regulation (GDPR) which set new regulations. The regulation could cause much demand for information technology if they were not following principles beforehand. (Laybats & Davies, 2018) Also, operational demand consists of requests for information assets and their maintenance, which means that demand can come from inside the information technology department if they find out some needs (Gonzalez et al., 2012). Thus, one demand source for the process can be the information technology department.

Information technology demand can be divided into three levels: **strategic**, **tactical,** and **operational** (Alonso et al., 2008; Thomason, 2004). According to Thomason (2004), at a strategic level, organisations manage total demand by making changes in infrastructure, technologies or acquiring new skills. At a tactical level, the goal is to maximise customer value most efficiently by allocating resources for the proper demand. Finally, for operational demand the goal is to ensure that delivery performs well in a constrained environment. (Thomason, 2004)

Strategic demand consists of significant opportunities to create business value, and due to its characteristics, it is usually managed through project portfolios (Alonso et al., 2008). The demand can require new products, services, or changes, meaning that more complex items like projects and programs are needed to manage it. The nature of project portfolio management as an event-based process where new project ideas can be evaluated, prioritised, and monitored support strategic demand management. (Alonso et al., 2008) On the other hand, the strategic alignment between the information technology project portfolio and business can be formed during portfolio management activities. Thus, portfolio management characteristics support strategic demand management through it. (Ajjan et al., 2016) In summary, strategic demand can be defined as a request with significant strategic impact or innovation of new products or services (Legner & Löhe, 2012).

Tactical demand includes items that are hard to forecast but has a scope of routine or daily activity. This kind of request might mean unexpected requests like helpdesk calls for information technology services or change requests for a development team. (Legner & Löhe, 2012) Tactical demand has a narrower scope than strategic demand, but on the

other hand, have an essential role in strategic execution. For example, when the information technology department has a system development project deployed, demand change to a tactical level. The department has an essential role in that the system is continuously improved in its environment (Gentle, 2007, p. 38).

Operational demand focuses on information technology operations and activities that the department drives. The operational demand target is information technology assets and their maintenance. Operational demand can be, for example, requests to add storage capacity or software patches. (Legner & Löhe, 2012) Operational demand can be forecasted and is usually visible in everyday tasks. Operational demand management mainly answers to requests which are targeted to the information technology operative environment. (White, 2009)

It is important to consider all levels in demand management in this research. Business critically, it can be argued that the most significant changes are made with strategic demand. However, when the strategic demand, e.g. new system, is delivered, the demand changes to tactical and operational levels. As an example, suppose these other two levels of demand management are not working correctly. In that case, it will cause problems to daily operations inside and outside the information technology, and, for example, the system is not working as it should. Thus, all levels should be managed well. However, levels are not defining well characteristics of different demand items. Next, different demand items are identified to find out the main characteristics of items. Items presented in more detail are **software requirement, project, program, and portfolio,** with different sizes and scopes.

One of the most common items which go through the information technology demand process is a **software requirement**. Thakurta (2017) defines that system requirements usually describe how the system operates in its operating environments. These requirements describe system characteristics, attributes, specifications, constraints and domain information (Thakurta, 2017). IEEE (1998, p. 3) define five categories where system requirements can belong to: 1) functional, 2) external interface, 3) performance, 4) attributes and 5) design constraints imposed on an implementation. In general, requirements can be categorised into functional and non-functional requirements. Software requirements should be defined extensively so that the requirement handler knows how to satisfy all stakeholders to enable the successful outcome of software development. On the other hand, too much information makes requirements heavy to handle and might drive outcomes in the wrong direction. (Dömges et al., 1996)

It is important to notice that system requirements are one of this research main demand items, but the received requirements are not limited to specific or existing systems. For example, some requirements coming from customers need actions in many software or can be solved by offering process changes that expand requirements types. Due to various software requirements, they can be in every demand level, but more commonly in the tactical or operational level because strategic demand often needs a project to be delivered.

A project is usually defined as a unique and temporary way to organise a chain of tasks needed to reach project goals. Projects usually need a certain amount of resources, e.g. money and people, to be completed. What is interesting about the projects is that it is unusual to implement the same project twice. Projects can have considerable differences in scope, resource usage and timescale, but projects also have some main characteristics. Project common main characteristics are the uniqueness of deliverables, time limit, cost plans and quality requirements. (Campbell, 2014)

According to Rouvali (2019), information technology projects mainly follow the project general rules and management. Information technology projects can be seen as more complex and diverse to deliver, and organisations usually have the highest unsuccess rates (Rouvali, 2019). It is noticeable that information technology projects often continue as used applications (post-project phase) after the project ends, and the costs after the project can be five times more than project implementation costs (Gentle, 2007, p. 53). The research about project management has also expanded to discuss pre- and post-project phases. Previously the focus has been on the project implementation lifecycle. However, for example, much value is collected in post-project phases, which means that project success cannot be measured comprehensively in implementation phases (Artto et al., 2016). A successful project can be defined in different ways, but for example, Serrador and Turner (2015) define that the project is successful when it meets key stakeholder value creation targets. On the other hand, Martinsuo (2020) argues that project value is dynamic and how it is experienced evolves depending on the time.

In this research environment, the post-project (operations phase) is many times called a continuous improvement phase. The continuous improvement starts after the development phase has ended. In this phase, new system releases are developed, including new features and bug fixes. The exciting thing about this phase is that the development can continue as before, and the only difference is that the software usage has started. (Lu et al., 2017) Also, the project's strategic demand might change to tactical and so forth operational levels in the continuous improvement phase. On the other hand, levels

do not limit demand so that the same item can meet demand from all levels at the same time.

Sometimes project and project management are not enough to control more comprehensive wholeness. One way to control this kind of wholeness is to start **programs**. According to Cambell (2014), programs are groups of projects related to each other and are managed in a coordinated way. Also, Turkulainen et al. (2015) define that programs consist of interrelated projects and pursue higher-lever objectives as a common goal. Due to several projects and higher-level objectives, programs duration is usually longer than projects, and different practices are needed. (Turkulainen et al., 2015) Programs helps organisations to reach complex goals and make changes in the organisation. These kinds of significant changes are made usually with change programs which are a specific type of program. Vuorinen and Martinsuo (2018) define that the change programs are used to achieve pre-defined change objectives and transform the organisation.

Demand can be that complicated that the new program is needed. On the other hand, demand for multi-project programs rarely focuses only on the information technology department. These items usually break department boundaries, and many parts of organisations are involved. Also, the frequency of program demand is very low due to their characteristics. The question related to this study is: are programs special cases that are not needed to be involved in the demand management process. Programs need certain management practicalities and consist of several projects, so can the program projects be operated by the same process path in demand management than alone projects. However, programs as demand must be considered because this significant objective can be generated from strategic level demand to have information technology landscape as a scope.

Another more significant item that consists of various projects is a **portfolio**. The portfolio is a collection of projects, sub-portfolios, programs and other activities. Differentiating from programs, the portfolio consists of related and unrelated items. (PMI, 2014, p. 3-4) The portfolio can also include other items that are not projected, such as support, operations, and non-labour cost items. Balancing and prioritising work within portfolios helps companies to make more optimised investment decisions. (Lock & Wagner, 2019, p.4) Usually, the portfolio is structured based on organisational strategic goals, which guide portfolio direction (PMI, 2014, p. 3). For example, Chao & Kavadias (2008) define that a new product development project portfolio is beneficial to create based on strategic objectives because then managers are able to follow how each strategic area is running. On the other hand, there are different ways to generate portfolios in the organisation, e.g., they can be generated based on projects phases and project types.

Portfolios are even larger items than programs. On the other hand, they do not break boundaries as much as programs. For example, the information technology department can have its own portfolios that have no items from other departments. However, portfolios are as large items that a new portfolio demand occur rarely. For example, they can occur when new strategic goals are implemented in the organisation. It means the need for a new portfolio can come only from the strategic demand level. However, the relevance to take consideration portfolios as demand must be examined later.

In summary, information technology demand can be separated into three different levels: strategic, tactical and operational. Demand items were divided into four categories: software requirement, project, program and portfolio. The main sources for demand are customers, internal stakeholders, the business environment, and the information technology department. Below in Table 2 can be found a summary of all findings and their linkages to each other.

Table 2. *Summary about information technology demand.*

Demand level	Demand item	Main Source
Strategic	Project, program & portfolio.	Business environment, customers, and internal stakeholders.
Tactical	Software requirement & project.	Internal stakeholders and customers.
Operational	Operational software requirements.	Internal stakeholders and information technology department originated.

2.1.3 Information technology demand management

Before defining what information technology demand management means, it is good to understand why demand should be managed. Thomason (2004) argues that each business consists of a set of capabilities, including processes, skills, technologies, products, and relationships. This same theory can be used when dealing with information technology departments or companies delivering information technology solutions. The set of capabilities limits how much they are willing to deliver at a general level (Croxton et al., 2002; Gonzalez et al., 2012). The delivery capacity sets boundaries for handling demand, so how much can the information technology department approve and handle to deliver items successfully.

However, all demand cannot be forecasted, and information technology faces planned and unplanned demand (Gentle, 2007, p. 41-42). Companies can respond to higher demand by making decisions to increase capacity (Thejendra, 2014, p. 181-183). For example, companies can add internal capabilities to increase their capacity. On the other hand, adding external capabilities for delivering certain types of projects or increasing

project delivery speed can be more beneficial for the company than adding internal capabilities in some cases. By controlling how much the information technology department can deliver is a way to cover the demand (Thejendra, 2014, p. 181-183). However, for the company, all demand is not beneficial to cover. Thus, information technology demand management is needed. (Gonzalez et al., 2012)

Information technology demand management covers tasks from demand collection to deployment, and during management, it is decided to reject or approve the demand to deployment (Legner & Löhe, 2012). In demand management, the main goal is the handle demand as the “right things are done” in information technology development (Gonzalez et al., 2012). Pombinho et al. (2013) define information technology demand management as a bridge between information technology and business. The bridge connects business initiatives with information technology development and supports value creation in an organisation. Information technology demand management helps organisations optimise performance when technology and the organisation have a mutual understanding about another part. Information technology demand management’s position between information technology and business enables it to increase alignment between sides. (Pombinho et al., 2013) Also, demand management enables companies to objectively choose and fund the most business beneficial projects and items (Gentle, 2007, p. 54).

Information technology demand management has many connections with more widely researched areas: requirement engineering, project portfolio management and information technology governance (Legner & Löhe, 2012). As discussed before, information technology governance can be seen as a parent concept for information technology demand management. Information technology demand management is seen as one of the main processes for reaching information technology governance goals. (Alonso et al., 2017) The connections of requirement engineering and portfolio management to Information technology demand management are not that simple, and some overlaps are disguised in more detail next.

Requirement engineering is a well-known research area in the software system development area. Requirement engineering is positioned at the front end of the system development lifecycle. Mistakes made in this phase of the lifecycle will cumulate during the lifecycle and cause huge losses when the system is deployed. (Dömges et al., 1996) In the requirement engineering phase, a system investigation is made. All needs and requirements from the stakeholders or system users are collected and documented to understand the system (Dömges et al., 1996). Even though requirement engineering is the first phase of the system engineering process, it is uncommon that all requirements are described before other phases (Ernst et al., 2014). Due to that, requirement engineering

should be ongoing activity during the whole system development lifecycle and continue in post-deployment phases when continuous development is done.

Requirement engineering is a set of activities, like requirement elicitation and analysis, that helps identify and communicate the system purpose in the context where it is used. Requirement engineering activities connect stakeholders' real-world needs to the software system and its technologies. (Reddivari et al., 2017) However, requirement engineering focuses on conditions, capabilities and specifications for a specific system or project, but demand management has a wider scope. Information technology demand management considers all kinds of requests that affect a single project to the entire information technology landscape. (Legner & Löhe, 2012)

The project portfolio management focuses more on the big picture as demand management does (Legner & Löhe, 2012). Meskendahl (2010) defines a project portfolio as a set of projects that share and compete for scarce resources. Projects are evaluated, prioritised, and selected in project portfolio management to align with the strategy. Choosing the most beneficial projects is one of the main activities in project portfolio management. (Meskendahl, 2010) Still, only a few ideas, concepts, and project proposals can be selected due to limited resources. Thus, previously mentioned items have to be managed to create a balanced, prioritised, and value maximised portfolio. (Heising, 2012)

The area in portfolio management where new ideas are handled is in some sources called demand management. For example, Romano et al. (2016) approach demand management from a portfolio management point of view and define demand management as the process of collecting new ideas, projects, and needs. The collection of items is mainly done internally, but external factors and organisation strategy should also be considered. On the other hand, demand management takes into consideration ongoing components. (Romano et al., 2016) Romano et al. (2016) argue that demand management is successful when the output of the process is a prioritised and strategically aligned portfolio.

Nevertheless, project portfolio management and demand management defined by Romano et al. (2016) are too narrow of scope for information technology demand management in this research. These definitions handle project proposals against strategic goals but do not consider requirement engineering tasks or contain tactical and operational demand, as demand management does. (Legner & Löhe, 2012) On the other hand, project portfolio management and requirement engineering continue further than information

technology demand management because they also contain activities in specification and realisation of items (Legner & Löhe, 2012).

Information technology demand management is for understanding, coordinating and controlling all sources of demand to ensure efficient delivery of products and services on time to satisfy customer needs (Alonso et al., 2017). The demand management manages all customer requests from software requirements to the whole information technology landscape with business alignment (Alonso et al. 2017; Legner & Löhe 2012; Pombinho et al. 2013). Pombinho et al. (2013) argue that information technology demand management can reformulate business-information technology alignment more like business/business alignment. The overview of findings of information technology demand management, portfolio management and requirement engineering is summarised below in Table 3.

Table 3. *Information technology demand management and its position.*

Item	**Scope**	**Tasks** (According to Legner and Löhe (2012))	**Role**	**Source**
Information technology demand management	From a single project to entire information technology landscape.	Elicitation, collection, evaluation, prioritisation and planning.	Align information technology and business. Handles all sources of demand to ensure efficient delivery of products and services.	Alonso et al., 2017; Legner & Löhe, 2012; Pombinho et al., 2013.
Project portfolio management	Project portfolio(s).	Collection, evaluation, prioritisation, planning, specification and realisation.	Maximise value, balance and prioritise the portfolio.	Heising, 2012; Legner & Löhe, 2012; Meskendahl, 2010; Romano et al., 2016.
Requirement engineering	Single project or information technology system.	Elicitation, collection, evaluation, prioritisation, planning, specification and realisation.	Ensure that the information technology system respond to customer requirements.	Dömges et al., 1996; Legner & Löhe, 2012; Reddivari et al., 2017.

Based on the information technology demand management findings and its connections to portfolio management and requirement, it can be argued that there are different ways to manage demand. Currently, it is looking that project and requirement demand can be managed by using theories from requirement engineering and project portfolio management, which are more researched areas. Still, with demand management, more comprehensive coverage can be achieved. All findings from characteristics of information technology demand and its management discussed in section 2.1 are illustrated in Figure 1 below.

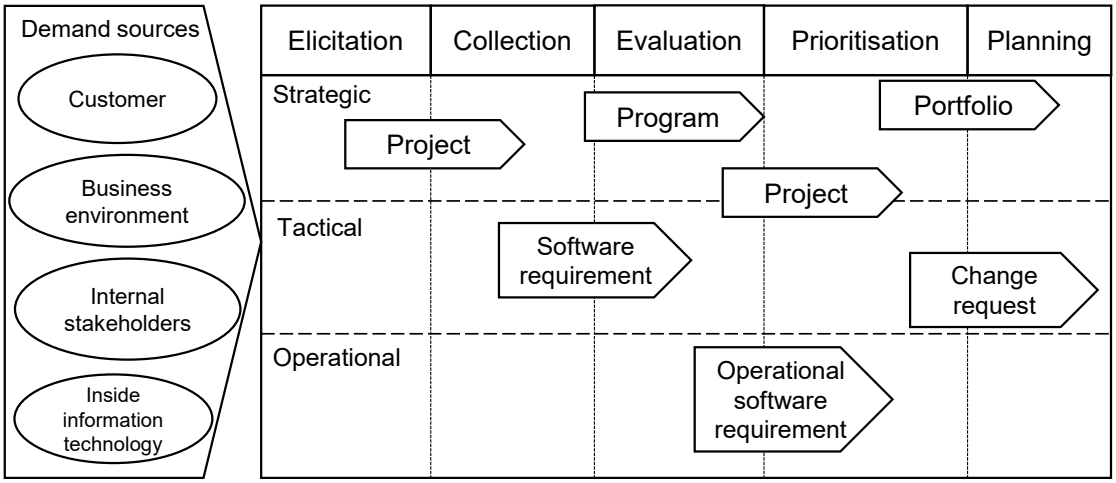

Figure 1. *Summary of information technology demand management.*

2.2 Information technology demand management processes

2.2.1 Process description and improvement

The construction will be built around processes, making understanding the concept of process important in reaching the research goals. Usually, the process is built around the customer of the process, meaning that the process customer inputs something inside the process and gets processed output as an outcome. Laamanen and Tinnilä (2009, p.121) define process transforming the customer input to output with a set of related activities and resources. The set of activities is structured and measurable, and the process implies how something is done within an organisation (Davenport, 1993, p. 5). In general, the process can be categorised into a core process or support process. The core process delivers value to business customers, and the support process enables the efficient execution of the core process. (Laamanen & Tinnilä, 2009, p. 122-123) The information technology demand management process can be categorised as a support process because the straight value to the business customer is not delivered during the process. Still, it enables maximised value creation in core processes. For example, by selecting the most beneficial customer requirements, it is defined which requirements increase the most customer value in the core process where the requirement is implemented.

Processes can be described at a high level by defining certain process areas. Laamanen and Tinnilä (2009, p.123) define that process description usually consist of resources, personnel, methods, tools, input, output and dependencies with the environment and other processes. Vanwersch et al. (2016), in turn, define main process areas as aim, tool, technique, actors, input and output. Based on these two points of view and the research context, input, output, aim, actors, tools, and dependencies are the most important process areas to describe. In addition, a set of activities is usually described by presenting the flow of process tasks, phases or activities to achieve target output.

Process improvements and innovations have been seen as ways to improve operational efficiency and cut costs in many companies. (Davenport, 1993, p.11) Also, by focusing on business core processes, companies can create business process improvements like, for example, improving service levels or decreasing service cycle times (Grover & Malhotra, 1997). In addition to previous, process quality management is one of the most common areas where companies have focused on when it comes to process improvements (Davenport, 2005). Nowadays, digital technologies are seen as one of the most

potential ways to improve processes, and organisations have strived to exploit their potential (Seethamraju & Marjanovic, 2009). Thus, supporting business processes with digital technologies has become general in every functional area. (Denner et al., 2017)

In general, it can be defined that process innovation is more radical change than process improvement and usually starts from a clean table. However, process improvement requires less time to be implemented and can be done continuously as process innovation needs a longer time to be implemented and is practically done once. (Davenport, 1993, p. 11) As mentioned before, several processes are strived to be improved and described in the framework. The complexity of the research context means that radical innovations are not the scope of the research at a process level, but the scope is to find improvement points. Thus, the process improvement point of view is more suitable in this study.

Process improvement can be defined as a structured way to improve an organisation's performance where the focus is on a disciplined design and execution of end-to-end business processes (Siha & Saad, 2008). According to a case study by Siha and Saad (2008), companies can reduce time, increase profits, reduce costs, improve customer service, increase revenue, increase productivity, reduce staff etc., by improving processes.

Popoff and Brache (1994) listed seven main mistakes which must be avoided during process improvement: 1) process improvements are not connected to business's strategic challenges, 2) right people are not involved, and especially top management is not involved, 3) clear process charter is not given to an improvement team, and they are not accountable for filling the charter, 4) leadership team thinks that without re-engineering existing organisation, significant improvement cannot be made, 5) change's effect on the people in the process is not considered, 6) focus is more on redesign than implementation and 7) measurement system and other infrastructure that enable continuous process improvement is not implemented. Previous mistakes are essential to consider during the research as they affect how successful construction can be for the target company.

In the literature, numerous approaches are presented to process improvements. Vanwersch et al. (2016) approach process improvement with a framework for generating ideas for process improvements. In the framework, the main questions are answered to redesign six key process areas, aim, actors, input, output, technique, and tools. By going through the main questions, to goal is to find process improvement points. (Vanwersch et al., 2016) On the other hand, if data is available from the process, the data-driven approach for process improvement can be used. Buer et al. (2018) define five steps for data-driven process improvement, where 1) data is collected, 2) data is shared with the

right actors, 3) data is analysed, 4) process is optimised based on findings and 5) feedback from changes are collected.

However, as less data is usable in the research environment and the process connections need to be understood, a more qualitative approach must be used. Thus, Rohleder and Silver (1997) defined framework for process improvement is used in this study. To simplify the framework to be more applicable, the steps for process improvement in this study are:

1. Establish support from managerial level to improvement,
2. Select and identify a process that needs to be improved,
3. Find and format team for improvement with right skills and capabilities,
4. Define and understand the process,
5. Streamline obvious wastes and challenges,
6. Check if all relevant data is available,
7. Identify problems,
8. Solve problems, and
9. Implement changes (Rohleder & Silver, 1997).

It is noticeable from the process steps that process changes need to be deployed, so only drawing a new process will not make any changes. Nevertheless, the implementation of changes is out of the scope in this study, meaning the last applied process improvement phase is number eight.

2.2.2 Information technology demand management processes

This section focuses on understanding and finding different processes and models from literature and comparing them to each other. The section approaches especially the first research question by identifying how demand management is handled in different contexts. The processes and models are described in this section by defining the process flow and the process aim. Six processes and models are presented and defined in more detail, and findings are summarised together at the end of the section.

Information technology demand management is usually seen as a strategically important process where it is decided which of the items are the most beneficial to be implemented. Alonso et al. (2017) present an information technology demand management framework to solve this challenge. They designed the artefact using existing literature and their previous case study where the current state of strategic demand management was presented. It was figured out by 130 respondents that there are not usually standards or methodologies used in strategic demand management (Alonso et al., 2013). Based on

these findings, the author approached the problem by creating an artefact that they tested via survey. The survey had 42 professional answers, and participants approved the framework. (Alonso et al., 2017)

The framework consists of six phases: 1) *Business plans* including information technology ne*eds*, 2) *Analysis of portfolio investments in business projects*, 3) *Prioritisation of business programs and projects*, 4) *Information technology department operational capacity*, 5) *Information technology demand management operational plan,* and 6) Information technology *infrastructure and business process deployment*. During the first phase, the business situation is assessed, business vision, objectives and policies are determined, information technology needs of the business are determined, and the strategic business plan is developed. In the second phase, the risks assessment for business assets is conducted, the overall costs of business assets are estimated, and benefits and business value are determined. In the third phase, business demand is filtered, business programs and projects requirements are determined, business requirements are consolidated, and a proposal for the information technology plan for the business is prepared. (Alonso et al., 2017)

After the first three phases, the focus moves from business requirements to information technology capacity and implementation plan. In the fourth phase, operational capacity plan, modelling and simulation scenarios are developed, and information technology infrastructure use and performance are monitored. In the fifth phase, key work team is collected, and project schedules, allocations and financial plan are made. In the final phase, monitoring and maintenance action are identified, and final reporting is implemented. (Alonso et al., 2017) The model illustrates well how business and information technology can be connected and aligned. On the other hand, the model does not consider one demand item lifecycle and different practicalities between different demand items.

On the contrary, Legner and Löhe (2012) present the process from one demand item lifecycle point of view. They researched end-to-end demand management processes in 31 months in a big company with a considerable effort in information technology development. The company’s information technology was very complex, and it had several information technology environments. The authors designed a new process model for managing demand based on findings. The goals were to minimise overhead and redundant effort, process demand in adequate time, enhance resource allocation effectiveness, tighten information technology-business alignment and facilitate the information technology landscape and its controlled development. (Legner & Löhe, 2012)

Legner and Löhe (2012) present nine phase process model for information technology demand management based on their longitudinal study. During the first phase, *Collect and classify demand*, demand is collected in the continuous or yearly planning cycle, classified and pre-prioritised. The second phase is *Pre-specify demand*, which goal is to scope demand and develop pre-specification. The third phase is *Evaluate and prioritise demand,* where the evaluation is made based on enterprise architecture and financial perspective. The outcome of the phase is commercially evaluated and prioritised demand. The fourth phase's, *Plan information technology project proposals*, targets are to consolidate demands, create budget allocation, portfolio planning and implement release planning. The fifth phase is *Initialise information technology project*. In this phase, the project is classified into one of the four groups: change request, small project, standard project and complex project. The first two groups skipped previous phases and moved straight to this phase. The outcome of the phase is initiated demand. The sixth phase is *Develop functional specifications* where functional architecture and specifications are made. During the seventh phase, *Develop technical specification*, product requirements are identified, technical architecture and specifications are made. The eighth phase is information technology *solution development and testing,* which tasks are to realise the solution, conduct testing and defect management and conduct approvals. After the phase, demand is approved. The final phase is information *technology solution deployment*, where the solution is deployed, stabilisation is made, and demand is closed. (Legner & Löhe, 2012)

The previous process is complex as it contains a lot of different tasks. Pombinho et al. (2013) define a simpler model for information technology demand management. They studied demand management in a case company for three years. The case company was a market leader in pay television, cinema markets, and the second-largest internet provider in Portugal, having over a million customers. Pombinho et al. (2013) approached demand management by defining the current state, and during the research, they added new tasks which highly focused on the value delivery of the process. The process focuses on project requests and their management, so it is not considered all levels of demand.

According to Pombinho et al. (2013), information technology demand management process consists of six main phases in the case company. The phases are 1) *Project request*, 2) *Quickscan*, 3) *Detailed solution*, 4) *Planning*, 5) I*mplementation and delivery* and 6) *Runtime*. Pombinho et al. (2013) argue that benefit qualification is an important task in the first phase, enabling a more rational approach to investment decisions. In addition, value modelling and requirements are collected during the first phase. In the

second phase, *Quickscan*, the business case including integrated value model and information technology cost estimate is made. This phase makes the process more efficient because the third phase, *Detailed solutions*, takes much time to implement, and now many requests can be rejected before the phase with *Quickscan*. The third phase implements the detailed functional unit specification, architecture, and value map. The fourth phase, *Planning*, includes dependency analysis and value rationale. The fifth phase is *Implementation and delivery*, where the coding and testing are done. The final phase, *Runtime*, focuses on the PIR and value model validation to learn from demand value for future decisions. (Pombinho et al., 2013)

Alonso et al. (2009) approached demand management with current literature. The authors focus on the strategic demand level in the research and argue that strategic demand is managed efficiently when the information technology department can deliver quality products within budget, schedule, and scarce resources. Strategic demand consists of significant opportunities to increase business value. (Alonso et al., 2009) On the other hand, it needs to be remembered that delivery of information technology depends on supply and demand management, so demand management can be a basis for successful information technology delivery but does not guarantee it.

To deploy business value, Alonso et al. (2009) define six main phases that are important in strategic demand management: 1) *Strategic planning units*, 2) *Strategic process planning*, 3) *Resource location*, 4) *Budget location*, 5) *Project selection and implementation* and 6) *Project post-phase metrics*. They defined that successful implementation of areas requires that strategic goals are identified, the event-based decision-making process is used, and the whole lifecycle of investment is taken into consideration (Alonso et al., 2009). In addition, Alonso et al. (2009) define phase five, *Prioritisation and funding*, as one of the key areas to have efficient demand management. According to Alonso et al. (2009), the project prioritisation phase enables companies to implement the project with the highest value, deliver the project successfully in capacity boundaries, and compare the clearly defined scope and goals of the project. The project prioritisation process consists of determining project value, incorporating other factors, project prioritisation, and assessing the capacity and commission of the project (Alonso et al., 2009).

As Alonso et al. (2009) highlighted the strategic importance of the information technology demand management process, Gentle (2007, p.42) has a different approach to identifying the process. Gentle (2007, p.42) defines the demand management process as a daily continuous process. The approach is formatted without a specific environment, modified to make it more generalised and focused on the demand from all levels. According to Gentle (2007, p. 42), when something is ready, e.g., project, demand management will

not end for the project target but continues at a different level. For example, if a new customer relationship management tool is delivered to the business, the demand management changes more operational after the project.

The information technology demand management process consists of three main phases, *Idea*, *Project request* and *Project* (Gentle, 2007, p. 40-43). During the *Idea* phase, the demand is captured and identified. High-level information is handled like timescales, costs and benefits, but the more detailed analysis is not made. After filtering and screening ideas, approved demand moves to the *Project request* phase, the second phase of the process. Cost and benefits information is gathered during the phase, enabling more detailed cost-benefit analysis, business case building and planning. If the business case is approved, demand moves to the last phase – *Project* phase. More detailed budgeting, planning, and resource allocation are made in the project phase. The process ends for approved demand, which moves to implementation. (Gentle, 2007, p. 40-41) Gentle (2007, p 43) also argues that all demands should not go through the same pipeline. The main reason is that a project request approval can take several weeks or even months, but operational requests need quicker handling times to satisfy customers. Thus, Gentle (2007, p 43) identifies that all tasks are not necessary to execute for operational requests or change requests. For change requests, tasks are needed during the first two phases as the third can be skipped. On the other hand, operational demand requires handling only during the first phase. Gentle (2007, p 43)

In addition to previous processes, Symons et al. (2006) define three-phase model. The first phase is *Aggerate and reveal*, where authors propose that strategic demand is managed through project portfolio management, tactical demand is managed with service portfolio management, and operational demand is used to build and maintain infrastructure. During the second phase, *Price and charge*, it is important to think via product and services, not via assets, costs are understood and exposed, and a measurable approach is used. During the last phase, *Optimise and align*, the resources must be scheduled, managed and planned in the short term, and the capacity managed in the long term. (Symons et al., 2006) However, the model does take not into account demand management at the item level and focuses on the higher-level definition of different approaches.

In this section, six processes and models were presented to understand better how demand management is handled. It can be argued that a common way cannot be identified based on the findings. However, models and processes covered a wide range of different contexts and approaches. These presented processes and models are collected in Table 4 below. In the table, relationships to other processes, focus, and tasks are presented. The focus area refers to the demand management level and how the model or process

is defined. Processes are compared to each other to better understand the big picture and understand when each of them can be beneficial to apply in the construction. Also, findings are used to build preliminary construction in section 2.4.

Table 4. *Summary of information technology demand management processes.*

Source	Tasks/Phases	Focus area	Relationship to other researches
Alonso et al., (2017).	1) Business plans including information technology needs, 2) Analysis of portfolio investments in business projects, 3) Prioritisation of business programs and projects, 4) Information technology department operational capacity, 5) Information technology demand management operational plan, and 6) Information technology infrastructure and business process deployment.	Strategic demand management. Framework generated by using current literature and previous case study.	The framework has a high degree of abstraction and includes three different levels. It does not describe the flow of decision made for the one demand item but describes how the overall information technology demand management should be managed. The framework is defined for strategically important information technology. The business side of demand management is identified more detailed than in other processes.
Pombinho et al., (2013).	1) Project request, 2) Quickscan, 3) Detailed solution, 4) Planning, 5) Implementation and delivery, and 6) Operation.	Strategic demand management. The process is created based on longitude research in business to consumer company.	The approach concentrates on business value modelling and definition, which might be valuable later in this study. Otherwise, the approach is straightforward and does not include conflicts with other approaches.
Legner and Löhe, (2012).	1) Collect and classify demand, 2) Analyze demand and develop pre-specification, 3) Evaluate and prioritize 4) Plan information technology project proposals, 5) Initialize information technology project 6) Develop functional specification, 7) Develop technical specification, 8) Information technology solution development and testing, 9) Information technology solution deployment.	All levels of demand management are included. The process is created based on longitude research in strategically important and complex information technology environment.	The process describes end-to-end demand management, meaning that the deployment phase is also included. Different routes are defined for different demand items based on demand classification. Compared to other processes and models, the process is specifically described.
Alonso et al., (2009).	1) Strategic planning, 2) Portfolio management, 3) Delegation of authority, 4) Financial planning, 5) Prioritisation and funding, and 6) Value management.	Strategic demand management. The process is built based on previous literature.	The study describes high-level strategic demand management and prioritisation of the items. The approach highlights the importance of prioritisation and defines potential practicalities for demand prioritisation.

Source	Tasks/Phases	Focus area	Relationship to other researches
Gentle, (2007, p.42).	1) Idea: Capture demand and identify opportunities, 2) Project request: Build a business case and seek for executive approval, and 3) Project: perform detailed budgeting and planning.	All levels of demand management are included, but the focus is especially on project ideas. The process is built based on previous literature.	Different routes are defined to projects, change requests and operational requests. Using the same process framework but different routes might be a potential approach later in this study.
Symons et al., (2006).	1) Aggerate and reveal, 2) Price and charge, and 3) Optimise and align.	All levels of demand management are included. The model is built based on previous literature.	The model does not consider one item demand management, but it proposes practicalities for managing demand at different levels.

2.2.3 Information technology demand management roles

In the previous section, actors of the processes were not highlighted because they were not defined in all descriptions. Still, actors or roles are an essential part of information technology demand management, especially because most work is qualitative and the demand varies significantly. Findings from process roles are collected together in this section to understand who is suggested to participate in the demand management.

According to Gentle (2007, p. 56), the customer must be aware of the status of the idea or request during the process. Continuous visibility makes the process more transparent and trustworthy. To enable customer visibility and successful process, Gentle (2007, p 107-110) identifies the most important roles and responsibilities during the process: Information technology client manager, Application manager, Investment committee, Executive sponsor and Information technology project manager. Roles, phases, and responsibilities of roles are presented in Table 5 below.

Table 5. *Roles and responsibilities in the demand management process (Gentle, 2007, p. 107-110).*

Role	Phases	Responsibilities
Application manager	Idea, project request & project	Capture demand in the form of ideas, direct collection of demand to save estimation time, jointly review demand with Information technology client manager and own minor requests.
Executive sponsor	Project request & project	Owns approved and funded project, responsible for the realisation of the business case.
Investment committee (information technology key players & business participants)	Project request & project	Handles planned project request and important change request demand, evaluate and score demand based on business and information technology criteria, check duplications and approve funding.
Information technology client manager	Idea, project request & project	Single point of contact in the information technology side, jointly review demand with Application manager, manage the business relationship (demand, supply, quality of services and finance).
Information technology project manager	Project	Perform detailed project plan.

Table 5 describes different roles extensively and defines roles outside the information technology department. The business roles are important because the demand management is extended from the information technology department to customers and company strategy. On the other hand, the previously defined roles are not centralised, and it is possible that the complex environment might have various managers to handle the demand.

Centralising demand management can be the answer to solve the challenges related to decentralised demand management. Pombinho et al. (2013) studied demand management in a case company for three years. Information technology demand management function or team is responsible for analysing business needs and prioritising them based on available resources (Pombinho et al., 2013). Pombinho et al. (2013) identify roles in more detail inside the demand management team. The team consists of business account and requirement manager, business analyst and architecture, delivery management and operations manager roles that work seamlessly together. In addition, the information technology director is seen as an essential role in demand management to support the team's work. (Pombinho et al., 2013) Pombinho et al. (2013) also define that it is essential to consider roles from the business side in demand management. Roles from the business side are divided into sponsors and users. Sponsors approve business

changes that demand causes and fund the demand. In turn, users specify requirements for the systems and operate them. (Pombinho et al., 2013)

Also Legner and Löhe (2012) define some important roles in their process description. The nine phase demand management process has three upstream phases 1) *Collecting and classifying,* 2) *Analysing and pre-specifying*, and 3) *Evaluating and prioritising* demands. In phase *Collecting and classifying*, demand is collected from all sources centrally by the demand management team. After collection, the content and quality of demand description are checked, and demand is assigned to the responsible person of the handled system. In *Analysing and specifying* phase, the demand manager is responsible for analysing content and scope of demand, and the manager creates high-level specifications. In the *Evaluating and prioritising* phase, multiple stakeholders prioritise and evaluate demand based on resource capacity and priorities. (Legner & Löhe, 2012)

Collecting demand centrally and checking the quality is logical because if the front end of the process is not working, the bad quality demand behaves like a “rolling snowball” by collecting a lot of unnecessary work and resources. On the other hand, when more detailed specification evaluation is needed, the importance of section or system knowledge increases, making directing the demand to the right person essential. After evaluation, all references see the business side roles important, for example, in prioritising demand. Overall, the importance of width knowledge from technical functionalities to overall business strategy is seen as necessary in demand management, making both the business and information technology side roles and responsibilities relevant during the process. Roles are connected in the construction in section 2.3.2 as the following section findings of process improvements might affect how roles should be positioned in the process framework.

2.3 Improving information technology demand management

This section handles challenges and respective solutions for improving information technology demand management. The section consists of two sub-section: faced challenges and solutions and improving different processes and roles. Based on the section findings, the preliminary construction will be finalised and presented in section 2.4.

2.3.1 Faced challenges and solutions

Successful information technology demand management is not simple to achieve, and there are different challenges to solve. A big challenge in improving different practicalities arises when the demand is forced to go through the same flow of tasks regardless of the demand characteristics. For example, if the change request goes through the same

heavy process as the project, it makes handling the change request heavier than it should be, and the process lead time will be relatively long for the request. (Gentle, 2007, p. 42) Also, if it is considered that change requests need a few hours of work while the project needs hundreds of hours, it does not make sense to use hours to analyse change requests. Thus, different practicalities are necessary for demand management. Different practicalities mean different processes for different demands, as Symons et al. (2006) presented in the demand management model, or different process flows for different demands, as Legner and Löhe (2012) identified in their study.

Even though different practicalities are applied for different demand types, transparent prioritisation and approval are difficult if demand management is uncontrolled and inconsistent (Legner & Löhe, 2012). For example, if different organisation units and project teams collect demand in different ways, the outcome of the process will be probably different. One way to solve this problem is to centralise information technology demand collection, e.g., one team is responsible for the front-end process (Legner & Löhe, 2012).

Another challenge that often appears is that the demand is poorly documented and analysed in the first place, making management challenging (Legner & Löhe, 2012). This challenge can be tackled by adding a quality check to demand specifications or improving guides and help documents offered to requestors. Even if the demand was well documented, Pombinho et al. (2013) highlight that sometimes the problem or the opportunity related to demand is not clear but are still being requested. Legner and Löhe (2012) argue that the previous two can be solved by understanding business processes and interviewing the most important stakeholders to increase knowledge about the problem.

Business needs often trigger the demand, so the requestors most likely need information technology to complete or enhance their work. In relation to this, requestor visibility is seen as one of the challenges. When the visibility to demand progress disappears, and the demand takes much time before realisation, the requestor cannot plan work or do other tasks related to the need. (Legner & Löhe, 2012) One way to improve transparency during demand management is efficient tool usage where the requestor can follow the progress of the process. (Symons et al. 2006)

The capacity of the information technology department is a prevalent problem, and Symons et al. (2006) argue that the demand is always higher than capacity. Challenges with capacity can cause delays to demand realisation and, if the demand implementation is moved forward repeatedly, the made specification can expire or the solution value decrease (Pombinho et al., 2013). One way to solve this challenge is to do proper resource analysis and capacity planning. Also, the number of skills must be considered.

Even though the information technology department has available resources for demand, external skills are needed if the department does not have the right skills. (Gentle, 2007, p. 43-49)

The solution for too much information technology demand can also be to reduce it at the beginning of the process, meaning that fewer resources are used to manage the demand, and more of the demand going through the process will be implemented. Cramm (2008) presents four ways to reduce overall demand. The first way is to analyse if the demand directly supports business strategy and makes business value. If the answer is no for either of the questions, the demand must be re-generated and tied to business better. The second way is to make the process more business self-service oriented. It is essential to check if the capability already exists or if there is an optional way to solve it by using data and reporting tools or making changes to the business process. The third way is to ensure that the organisation has the necessary resources to implement demand. If the resources do not exist, it is vital to ensure that the requestor can devote external resources. The fourth way is testing or piloting the idea by using available tools to validate the value and finding out if there are other problems, e.g., in business processes. (Cramm, 2008) However, the demand items might affect how the abovementioned practices work in reducing the demand amount.

Challenges vary considerably depending on the demand item, meaning that managing, for example, project or requirement demand have different challenges. Pombinho et al. (2013) examined challenges from a project point of view and found that prioritisation of projects is one of the main problems because the criteria for prioritisation is not transparent. One way to approach this challenge is an investment committee where all investments are prioritised centrally (Gentle, 2007, p. 107-110).

Previously, it was highlighted that it could be inefficient if different items go through the same flow of tasks. On the other hand, if multiple similar items go through the same process from the beginning till the end, but only some of them can be implemented, the process becomes time- and resource-consuming (Pombinho et al., 2013). The importance of early rejection of demand is highlighted to solve this challenge. For example, Pombinho et al. (2013) present that the *Quickscan* makes the process more efficient before more detailed planning. Also, the practices to reduce the demand amount presented by Cramm (2008) can help with the challenge.

Another faced challenge occurs when the investment control and visibility are missing, and the benefits of the information technology are not followed (Pombinho et al., 2013). Especially, this challenge appears if the information technology is seen in its old role,

service provider and not as a strategically important part of the business. In this case, the information technology department is seen as just a cost centre. On the one hand, the business must understand the roles and the opportunities of information technology, and on the other hand, information technology investments need proper investment monitoring and visibility.

The challenges related to information technology demand management are not limited to the challenges presented above. Quichiz and Oré (2017) researched current models and general limitations and barriers in demand management. They found eight limitations and barriers from the literature, which are presented in Table 6 below. The table summarises the barrier or the limitations as well as the number of how many mentions were found for them in different sources.

Table 6. *Barriers or limitations to effective information technology demand management. (Quichiz & Oré, 2017)*

Barrier or limitation	#Count
Incompetent management or lack of control and monitoring	3
Unprepared leaders	3
Unrealistic expectations or lack of business knowledge	3
Inadequate budgeting	2
Informal information technology governance or business assumes no responsibility in the process	2
Lack of alignment between business and information technology	2
Project overloading and heavy maintenance	2
Technology changes or lack of strategic planning	1

It can be noticed that limitations and challenges often commence from the business side and from unrealistic expectations. For example, if the expectation or business knowledge is inclined, it is incredibly challenging to get the outcome from the process that fulfils customer requirements. Also, it is noticeable that many of the limitations are coming from a higher level than just a process level. Alignment between information technology and business, information technology governance processes and strategic planning cannot be only solved by improving demand management. Thus, the organisation must have a robust base for efficient information technology demand management.

Many factors need to be implemented well to achieve a robust base for demand management. Quichiz and Bayona-Oré (2016) collected information technology success factors from the current literature finding ten different success factors. A factor and how many mentions were found for the factor in different sources are presented as a count in Table 7 below.

***Table 7**. Information technology demand management success factors (Quichiz & Bayona-Oré, 2016).*

Success factor	#Count
Aligning with the business	5
Aligning leadership	2
Aligning with information technology portfolio	2
CIO (Chief Information Officer) involvement	2
Prioritisation model in place	2
Strategic initiative	2
Well designed process and maturity evaluation	2
Communications, connectivity	1
Properly used tools	1
Well prepared staffing	1

From the table, it can be noticed that many previously presented limitations are also seen as success factors when operated well. For example, alignment with business and strategic initiatives was mentioned as a limitation. Also, prioritisation and staffing were seen as challenges for demand management. Highlighting them as both challenges and success factors means that it is essential to turn them into process advantages – not just solving them. In addition to the previously mentioned success factors, aligning leadership and portfolio, CIO involvement, well-designed process, properly used tools, and communications need to be considered. Supporting information technology demand management with properly used tools is essential because in the process, much data, e.g., information technology assets, application softwares, projects, services, people, skills and costs, are handled (Symons et al., 2006). Improving information technology demand management in the organisation requires that the information technology and business communication and alignment must be working well. However, information technology demand management is a complex area, meaning that applicable solutions to challenges are dependent on the context.

2.3.2 Improving processes and roles

Improving different processes and practicalities requires considering different levels of information technology demand and demand items. On the other hand, the differences in demand characteristics set various requirements for demand management depending on the case. Thus, using one process for handling all the demand is not the most efficient way to handle demand in a complex environment.

The literature review identified six different comprehensive processes and models to handle the demand. However, three of them focused only on strategic demand management, leaving the other levels outside of the discussion. Models, which included all of the levels, followed the same formulation – different levels and items need different paths in

the process. The bigger and more strategically important the item is, the more handling is needed. For example, Legner and Löhe (2012) proposed that small items can jump over three of the phases in their nine-phase process model. Similarly, Gentle (2007, p. 42) presented that one item needs just a few tasks during the first phase before it is approved.

It can be argued that different demand items require different paths for efficient and improved demand management. However, only having different paths might not be enough, and the more complex the environment is, the more there is a need for different processes. For example, at a strategic demand management level, the importance of management involvement, value delivery modelling and business case increases. On the contrary, at an operational level, operational software requirements might need just a one-point check before deployment. This said different processes enable more improved information technology demand management.

Nevertheless, for the demand requestor, it can be complicated to understand in which category the demand belongs. For example, suppose that organisation has three different processes for different demand levels. The requestor wants a new functionality that enables customers to create reports in digital service. The requestor thinks it is just one functionality that is needed, making demand tactical but not strategic. During the process, it will be understood that the demand requires changes in three different softwares due to its needed integrations and requires an addition to the company's offering as it needs the whole new section in the software, thus making it strategic demand. The question that arises from this example is how much the requestor can understand the demand and its connections. One way to improve this part is to centralise demand collection using one entry point and centralised roles (Legner & Löhe, 2012).

Different practicalities also set a challenge in prioritisation because many times, decisions made during the demand management affect the whole information technology resource and budget allocations. For example, Quichiz and Bayona-Oré (2016) noticed that centralised prioritisation might be a key success factor for information technology demand management. In centralised prioritisation, demand can be assessed in an equal and transparent manner.

Based on the section findings of information technology demand management challenges, solutions and improvements, the demand management roles can be completed. Process roles, positions and responsibilities are presented by using Figure 1 phases. In addition, a *deployment* phase is added, defined as a phase in many process descriptions in section 2.2.2. A complete description of roles is presented in Table 8 below.

Table 8. *Completed information technology demand management roles.*

Role	Phases	Responsibilities	Source
Application manager	Evaluation, prioritisation, planning & deployment	Jointly review demand with Information technology client manager and is responsible for the demand's business side.	Gentle, 2007, p. 107-110.
Demand management team	Elicitation & collection	Collect demand centrally from all sources, check demand content and quality, reject demand if already it exists and assign demand to Information technology client and application manager.	Legner & Löhe, 2012; Pombinho et al., 2013.
Executive sponsor	Planning & deployment	Owns approved and funded project, responsible for the realisation of the business case.	Gentle, 2007, p. 107-110.
Investment committee	Evaluation, prioritisation, planning & deployment	Evaluate and prioritise demand based on business and information technology criteria, check duplicates, approve funding and monitor demand.	Gentle, 2007, p. 107-110; Legner & Löhe, 2012.
Information technology client manager	Evaluation, prioritisation, planning, & deployment	Single point of contact in the information technology side, jointly review demand with Application manager, manage the business relationship, analyse content and scope of demand, and create high-level specifications.	Gentle, 2007, p. 107-110; Legner & Löhe, 2012.
Information technology project manager	Planning and deployment	Perform a detailed project plan and manage the project.	Gentle, 2007, p. 107-110.

In summary, successful information technology demand management requires different practicalities and processes for different demand items. These different processes need connection points so that an overall understanding of the demand can be formed. The connection points are beneficial in the collection phase, where demand response can check demand quality and direct the demand to the correct paths. In addition, a connection point is needed in the prioritisation phase where demands can be assessed fairly and openly. Also, taking advantage of the tool usage where the demand information is handled and the process flow can be followed can improve the whole process.

2.4 Synthesis

In this literature review, information technology demand management was defined comprehensively. The literature described information technology and its roles to help understand what is really required for successful information technology demand management. Also, the demand and its different characteristics were comprehensively presented. Finally, demand management and its connection to other more widely researched areas were identified to understand the concept.

When moving further in the demand management processes and models, it was found that information technology demand management is not a widely researched area. However, different processes designed for a specific environment or high-level demand management were identified, but the standard way to manage demand was not recognised. On the other hand, these models mainly focused on the flow of tasks, aim and roles, meaning that other identified process areas were left with less attention. Thus, input, output, dependencies and tools need to be researched in more detail in a case study to comprehensively answer the first research question: How is information technology demand management currently handled for strategic important information technology?

The second research question of improving information technology demand management was approached by going through common challenges and success factors. It was proposed that improving demand management requires different processes for different demands. Also, the importance of connection points was highlighted. However, the findings need to be completed during the case study to get a more comprehensive answer to the second research question – How can information technology demand management be improved for strategic important information technology?

The comprehensive construction of the information technology demand management process framework for the target company cannot be built based on the literature review. However, the construction was approached as far as possible based on the findings and is summarised in the following figure. Figure 1, which included the basic concepts of information technology demand management, worked as a base for the preliminary construction. Figure 1 was completed by high-level process tasks and roles based on sections 2.2 and 2.3. Overview of tasks and roles was created in section 2.2, and they were selected based on the findings of demand management improvements and primary challenges in section 2.3. Still, findings left room for this empirical research to complete research questions and the construction. The preliminary construction is illustrated in Figure 2 below.

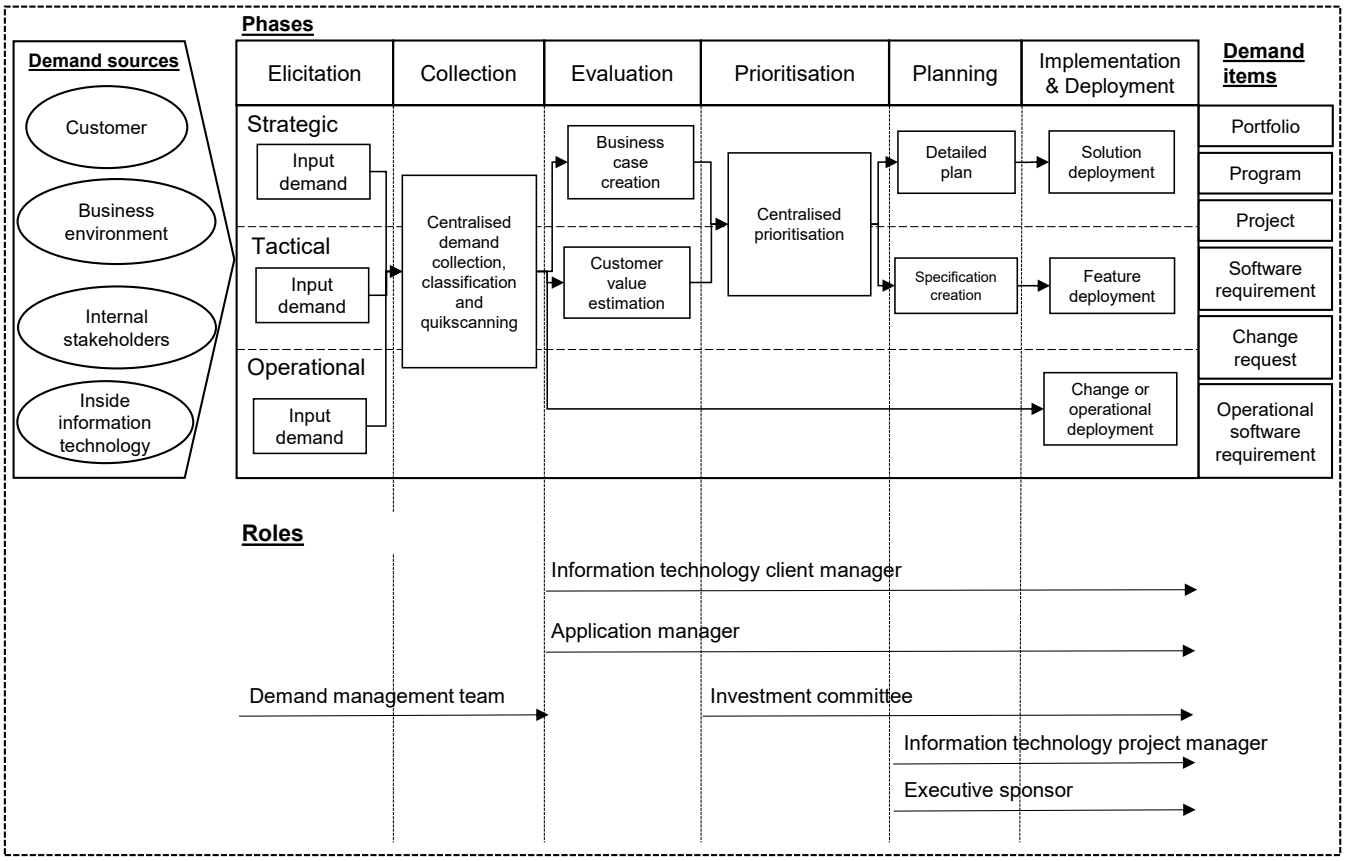

Figure 2. *The preliminary construction based on the literature review.*

3. RESEARCH DESIGN, DATA COLLECTION AND ANALYSIS

3.1 Research design

In this research, **constructive research** is used as a research strategy that defines how research questions are approached (Saunders et al., 2016, p.177). Constructive research aims to create a practical solution for identified problems and challenges that fit well with the research contexts. However, constructive research is not only about practical problem solving, but it also needs to be approached with accumulated theoretical knowledge. (Kasanen et al., 1993; Oyegoke, 2011) The previous literature review left some unsolved areas and need for extensions, thus leaving space for new theory creation and findings. For these purposes, constructive research is appropriate.

The constructive research process includes six main process phases, which are the basis of this study:

1. Finding a practical problem with research potential,
2. Obtaining an understanding of the topic with literature review and data collection and analysis,
3. Innovating solution to the problem – the construction creation,
4. Demonstrating that the construction works,
5. Showing theoretical connection and researching the contribution of the solution concept and
6. Examining the scope of applicability of the solution (Kasanen et al., 1993).

The first phase of the process is conducted in the introduction section, where the problem environment is presented, the problem is identified, and the research goals are set. The second phase, obtaining understanding, is addressed with a literature review and data collection and analysis. The second phase is positioned in this document's second and fourth chapters.

The third phase includes construction creation, presented at the end of the fourth chapter. The construction can be a model, diagram, plan, or organisation, solving a specific challenge. The construction fits the task it is designed to, has novelty value, and is better than the existing solution in some criteria. (Kasanen et al., 1993) In this study, the construction is the **information technology demand management process framework**.

In the fourth phase, the construction is tested to find out whether it works for the task it is designed. In this research, a weak market test is done due to the limits of the research. The test is passed if the decision-maker accept the construction and want to take it into use. (Kasanen et al., 1993) The result of the market test is presented at the end of section 4.3. The two last phases of the standard constructive research process are not implemented in this research due to the nature of the time horizon as **cross-sectional** research.

This constructive research is implemented based on a **pragmatism** research philosophy because of its practical nature (Oyegoke, 2011). Research philosophy itself identifies the assumptions and beliefs of knowledge development, the nature of reality, and the role of the researcher in the research. (Saunders et al., 2016, p. 127-128) Pragmatism defines ontology, the nature of reality, as complex, rich and external, where reality is the practical consequence of ideas. Pragmatism defines epistemology, assumptions about the knowledge so that the acceptable knowledge is built from the theories and knowledge that enable successful actions. (Saunders et al., 2016, p. 137) In this research, the goal is to create a construction that works in practice and solves identified challenges. Thus, theories and knowledge that support solving identified challenges can be assumed to be most appropriate. Also, as the researcher has long experience as an employee in the research context and the results can affect the researcher's work, the values held by the researcher cannot be excluded from the research process. (Saunders et al., 2016, p. 137).

A **case study** is chosen as the research method to build the construction for the target company. The case is information technology demand management processes in the target company. These processes are essential for the target company as all future information technology development items go through them. Processes affect several employees working inside the target company, and many employees are somehow involved in them. In addition, information technology is a big part of the costs and the business in the target company, making success in this area strategically important. The qualitative case study method suits research information technology demand management well due to the complex research context (Baxter & Jack, 2008).

The case study is a comprehensive way to understand the topic in constructive research due to a few reasons. First, according to Voss et al. (2002), via the case method, the phenomenon of processes can be studied in their natural setting as the construction needs to work in the target company's environment. Second, the case method allows the researcher to understand the nature and complexity of the complete phenomenon by answering questions of why, what, and how (Voss et al., 2002). Third, the case

method enables exploring variables and phenomena that are not comprehensively known, which is required to succeed in this study (Eisenhardt & Graebner, 2007; Voss et al., 2002). The research design is summarised in Figure 3 below.

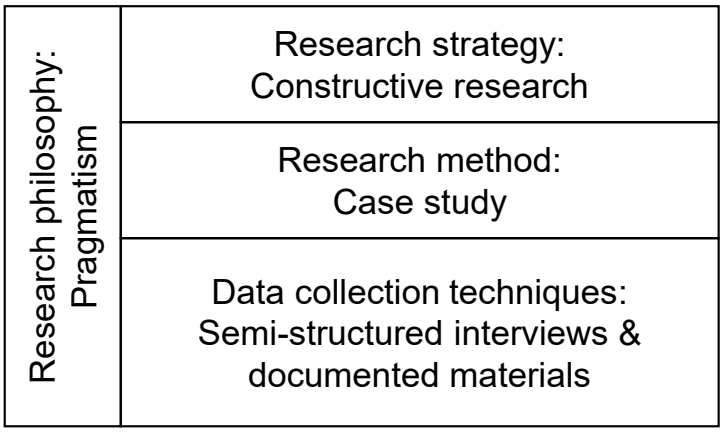

Figure 3. *Research design summary.*

3.2 Data collection

In this research, data collection was done by using two main methods. The first and primary method was interviewing, where information technology and business representatives were interviewed. The second method was internal data collection, where the intranet information and internal document information were collected. Also, meetings and workshops were held during the research process to support the primary data collection methods. Using multiple data sources in data collection supported understanding the case and increased the study's triangulation (Eisenhardt & Graebner, 2007; Saunders, 2016, p. 207).

3.2.1 Interviews

A semi-structured interview was selected as a data collection method from different interview categories because it enables the researcher to direct the interview in a specific direction but, on the other hand, leaves the door open for new, unexpected insights. Semi-structured interviews leave space for digression from the original question outline if the discussion goes deeper into the researched topic. Also, more open-ended and complex questions are possible in semi-structured interviews than in structured interviews, which helps to dive deeply into the research topic. (Saunders et al., 2016, p. 390-394)

The interview question outline was approached with the help of Rohleder and Silver's (1997) framework for process improvement and innovations. This research used the framework to understand what is needed to be known for process improvements. The

framework itself was presented in more detail in section 2.2.1. Based on the framework, four interview themes were defined: 1) Defining and understanding the process, 2) Identifying obvious wastes and challenges, 3) Identifying documented materials and their challenges, and finally, 4) Defining solution proposals. The questions between themes were divided so that the first theme contained twelve questions and other themes other twelve questions, meaning the first theme had the highest focus in the interviews. The interview question outline can be found in appendix A. The themes are defined in more detail in Table 9 below.

Table 9. *Interview structure with the help of Rohleder and Silver's (1997) process improvement framework.*

Theme	Definition
Defining and understanding the process (phase 2-4)	Creating understanding about the current processes and practicalities. Is there a process at all, or is the process innovation needed?
Identification of obvious wastes and challenges (phase 5, 7)	Collecting data about the current wastes of processes like duplications and inefficiencies. On the other hand, increasing understanding of what is missing.
Identification of documented materials and their challenges (phase 6)	Collecting all possible data sources which might help to answer the research questions. For example, if the documented processes or templates are available.
Defining solution proposals (phase 8)	Defining how the current situation can be done better and what needs to be improved. Are process improvements enough, or is innovation needed?

Sampling was done using the non-probability sampling – in more detail, homogeneous purpose sampling. The reason behind the selection was the focus of the research on a specific topic drove the sample to select interviewees with in-depth knowledge about the topic. (Saunders et al., 2016, p. 296-300) The sample was selected based on one criterion – the interviewees have a role in information technology demand management (Saunders et al., 2016, p. 302). On the other hand, the aim was to interview as diverse a sample as possible to collect different viewpoints. It meant that interviewees were invited from the information technology department to business units. It was necessary to interview both the business and information technology sides because the information technology demand management is breaking the department boundaries.

Finally, twelve interviewees were conducted. Seven of the interviewees represented the information technology side and five the business side of the process. The interviewee code, process side, and interview duration are presented in Table 10 below.

Table 10. *Summary of interviewees.*

Interviewee code	**Process side**	**Duration** (minutes)
I1	Information Technology	58
I2	Business	55
I3	Business	55
I4	Information Technology	67
I5	Information Technology	56
I6	Information Technology	51
I7	Business	59
I8	Information Technology	54
I9	Business	65
I10	Information Technology	60
I11	Business	59
I12	Information Technology	44
		Avg. 57

One hour time slots were booked for all interviews and the average time used was 57 minutes. All interviews were done using Microsoft Teams. The interviews were held in Finnish or in English, preferring the native language of the interviewee to dive deeper into the topic. All interviewees agreed to record the interview, and thus all interviews were transcribed after the interview. Also, the notes were taken during the interview to mitigate the risk of record failure. Transcription was made verbatim in related answers, but all expletives were omitted. The transcription was made straight under the topic or question in an Excel file. The choice meant that data sampling was made during transcription, meaning that only those sections that handled research topics were transcribed (Saunders et al., 2016, p. 573).

3.2.2 Documented materials

The documented materials were collected into a centralised document to get an overview of the processes. The materials were reviewed and validated in workshop one that is presented in more detail in the following section. The goal of collecting the materials was to support interview data collection, especially when the current research context understanding was created. Documented materials illustrated visually how information technology demand management processes are handled in the target company. Materials helped to answer the first research question and worked as a visual basis for the construction.

Overall, eight documented materials were found, four process descriptions, one operating model framework, two demand templates, and one guideline. Unfortunately, documents cannot be attached to this study due to their confidential nature. However, information about materials is presented in Table 11 below, where the code, title, type, focus and definition are given.

Table 11. *Data collection from documented materials.*

Code	Title	Type	Focus	Definition
D1	Strategic semi-annual prioritisation process	Process description	Strategic information technology investments.	Strategic demand is handled in the organisation-wide planning process where the next half-year roadmap is approved. Strategic decisions are based on the process.
D2	Development request template 1	Demand collection template	Definition of the demand.	Used for internal use and work as a template to collect information from requestor.
D3	Development request template 2	Demand collection template	Definition of the demand that is modified for the joint venture.	Used for the joint venture use and work as a template to collect information from requestor.
D4	Change request process (for incidents)	Process description	Change request demand handling in information technology infrastructure point of view.	Describes how information technology infrastructure change requests are handled.
D5	Digital service operating model	Operating model description	Digital services demand management from a feature and functionality point of view.	The operating model describes the end to end digital service development process, including demand management.
D6	Development request process	Process description	Internal systems demand management from feature and functional points of view.	Describes how development requests are handled. Start from inputted development request template and end to development start.
D7	Global review process	Process description	Global reviews for requests. Information technology side excluded.	Identifies how development requests are cross-checked with business units and functions.
D8	Information technology playbook	Company guideline	Overall operating model.	In the playbook, information technology demand is defined at a high level.

3.2.3 Workshops and meetings

Four different workshops and meetings were held in different phases during the research. Two first of them focused on the collected materials and validated that all relevant current materials were collected and understood. The third meeting handled construction creation. The fourth meeting was for the weak market test of the construction, where the proposed construction was approved for future use. Workshop and meetings are presented in Table 12 below, where the workshop or meeting, research phase, participants, focus and outcome are defined.

Table 12. *Overview of workshop and meetings.*

Workshop /Meeting	Code	Research Process phase	Participants	Focus	Outcome
Workshop 1	W1	2. Obtaining an understanding	Digital service demand management representative and Information technology governance director	Create and clarify understanding about current processes.	All current materials were identified, and the big picture of the current situation was created.
Meeting 2	M2	2. Obtaining an understanding	Information technology leadership team	Go through the current high-level information technology demand management.	No additions. It was approved that the collected practicalities were described correctly.
Meeting 3	M3	3. Innovating solution to the problem - construction	Information technology governance director	Create a construction.	Research results and solution proposals were discussed.
Meeting 4	M4	4. Demonstrating that the construction works	Information technology governance director	Weak market test for the construction.	Process framework approved, and the target company would be willing to take it into use.

3.3 Data analysis

Interview data analysis was conducted qualitatively and quantitatively. In the qualitative approach, the goal was to understand the main phenomenon of the researched areas deeply. Categorised and transcribed data was divided to follow the structure of the research questions, meaning that the first question was handled first and the second research question second. At first, the current information technology demand management was analysed. This part of the analysis was supported with the documented materials where the current processes were visualised. The second part of the analysis focused on the solution proposals, risks, success factors and connections between different processes. Content analysis was applied in both areas when possible. In the content analysis, qualitative data were analysed quantitatively. During the content analysis, the data was approached objectively and systematically, for example, by finding recurring mentions of the same phenomenon in different interviews and listing and counting them (Saunders et al., 2016, p. 608-609).

Identified **documents** were collected in one file to make it easier to understand the big picture of the information technology demand management in the target company. The

materials were discussed in the interviews according to the interview structure, and the data was analysed alongside other interview data. All identified materials were gone through in workshop one, and materials were validated in meeting two. The result of meeting two was that all current materials were identified successfully during the interviews. Also, the summaries of the documents were defined with the help of workshop one to list documents key points and purposes from the research point of view. The summaries (Table 10) helped find the correct document for the analysed demand management area in the analysis phase. (Saunders et al., 2016, p. 577) **Workshops and meetings** supported the data analysis as they functioned as validity checkpoints for the research. In addition, in construction creation, they supported to validate ideas from literature and empiric.

Data analysis results are presented in the following chapter. Results description is supported by using quotations from interviewees to add visibility to data. If something is cut from quotation, for example, due to its irrelevance, it is presented using two lines (- -). However, quotations were handled carefully to keep their original format and message. All data sources are coded by using letters D (Document), I (Interviewee), M (Meeting) or W (Workshop) and randomly generated running numbers from one onwards. At first, coding was added to interviewees to maintain anonymity but later to other data sources to guarantee consistent format. Codes are used as data references to add transparency about the origin of the data.

4. RESULTS

This chapter presents the empirical results of the research. The first section presents the current information technology demand management situation in the target company. The second section moves focus on demand management improvement. The last section defines the construction building choices, reasoning, and final construction.

4.1 Information technology demand management in the target company

This section handles the current information technology demand management by presenting current processes and practicalities, roles and responsibilities, as well as successes and challenges in the target company's demand management. In the target company, information technology demand management covers demand in three strategic areas: digital services, internal systems, and information technology infrastructure (D8).

4.1.1 Demand sources and items

The scale of the potential demand sources is wide, and the demand can come from everywhere, from the information technology department itself to governmental regulations (I11). Also, the interviewee mentioned that the demand could be divided into planned demand generation and unplanned demand (I9). Four main demand sources are defined based on the interviews and the documents: business environment, customers, internal stakeholders, and information technology department (D8).

Business environment as a demand source means that the demand comes from changes in the business environment, markets, regulations, laws, or technology trends (I1; I2). Also, benchmarking other companies and the environment might trigger this kind of demand (I2). Customers as a demand source refer to customer requirements and ideas from all business areas. For example, customer demand is collected through sales, customer services, or financial administration (I3). Sometimes customers send straight feedback and ideas, or demand is collected from customer surveys (I9). I2 describes customer as a demand source as below:

> *"- - Customer surveys are one way to collect demand, e.g., end of customership and yearly feedback surveys are done. Then we have an internal feedback collection channel where everyone who has contacted the customer can log customer feedback. - - Also, we have internal workshops where representatives from*

> *customer interface are participating like sales, customer service and service manager, but this is only one channel to collect customer demand related to products and services. Same logics are used for internal systems."*

Also internal stakeholders are important demand management sources. Internal stakeholders can be divided into business units, functions, international business, and joint venture (I5; I6). Internal stakeholders can generate demand by having workshops, using software, and identifying new business process needs (I2). In addition, the information technology department can be the source if they notice new systems requirements, but demand is usually technology-driven (I8).

The demand items that are identified to go through different processes are programs, projects, new software requirements, change requests (including feature enhancements, resource addition to disk, memory and central processing unit (CPU) or new server) and software bugs (D8). During the interviews, it was asked which kind of demand is most usual in information technology demand management. As mentioned before, items vary greatly and do not appear equally often. I5 defines the frequency of different demands for digital services:

> *"The most frequent demand is feature level demand. Next comes functionality level, e.g. invoicing renewal. The last most frequent demand is solution level including projects like deployment project which includes several other projects."*

I4 agrees with the previous point of view and adds that:

> *"- - Another frequent demand is small bugs and usability items which are daily basis items to develop and solve. These will not come if the bigger item is done well, but mistakes are made in development due to tight deadlines. - -"*

From the comments, it can be concluded that smaller items appear more often than bigger items. For internal systems, most demand focuses on the enterprise resource planning system (ERP), customer service system, and customer relationship management system (CRM) (I3; I7). From the internal system's point of view, the frequency of different demands reminds that of digital services. I11 describes the environment demand items for internal systems:

> *"Reporting is most cases, meaning changes in current reports or a whole new report. I would estimate that covers approximately 50% of the demand. Other demand includes fields to be added, new dropdown lists, integrations for business and customer needs. Demand varies from small changes to larger project work."*

Especially internal stakeholders from the business side mention that most demand is focused on the systems and how the business processes are implemented. I2 describes the items and has a somewhat different point of view than what was mentioned in the previous comment:

> *"I am answering from the customer operations' point of view. Demand is focused on the operations management systems, so how we can simplify and cut required work. The demand can be single requirements like adding a column, but the real need is often that, e.g., the whole excel can be removed instead of adding the column. We are requesting small items because bigger items we will not get."*

From the information technology infrastructure's point of view, it is mentioned that most of the demand is change requests which can be minimal changes (I12). In summary, smaller improvements are the most frequent demand in demand management processes. Many times, if the new system is built to replace an old legacy system, many demand items are coming from the functionalities of the old system, which are, for example, critical for customers or internal stakeholders (I9). Also, it can be summarised that the bigger the item, the less frequently it appears in the demand management.

4.1.2 Processes and practicalities

In the target company, information technology demand management is conducted from demand collection to approved demand to development (D8). However, many interviewees see that demand management ends when the solution to the demand is released (I2; I4; I5; I6; I10; I11). Four different processes and one operating model are identified during the research. One of the processes handles the strategic level, two processes and the operating model tactical level, and one operational level demand management. (M2; D8)

The strategic information technology demand management process handles and prioritises demand via semi-annual planning, where all business units and functions prioritise the semi-annual information technology investments (D8; W1). The process describes how planned demand is handled (D1). However, unplanned strategic demand might occur during the planned half-year, causing delays to other demand items and re-prioritisation of the demand (I10). The inputs of the process are strategic information technology investment requests that the information technology department leaders log into the system (W1). The process starts with a high-level proposal that includes all collected investment requests. The proposal includes a list of strategic demand items that directors have collected from their responsibility areas. The list collection is a continuous activity even though it is delivered on a semi-annual basis. After the delivery, the list is gone

through with business units and functions, and the information technology department receives a prioritised list of the strategic demand. The information technology department prioritises items based on available resources and creates a roadmap based on the prioritised list for the next half-year. The department delivers the roadmap for management approval which is the last phase. (D1; D8) From the item's point of view, the process output is the rejection or the approval of the investment (D1).

During the process, the project portfolio management tool is used to collect and follow the progress of the request (I6). However, the list itself is handled as an excel list. The process participants are mainly from the management level, meaning that the leadership team, country, and function managers participate in the prioritisation of the strategic proposals. Also, the information technology governance team is responsible for the coordination of the process. (D1) All other demand management processes are dependent on this process because the outcome of the process is driving other processes' prioritisation on different items (W1).

At the start of the tactical and operational processes, demand is collected in the business units, joint venture, and other functions (I4; I6). There are different input channels for processes. Global review, development request, and change request processes start from logged demand in the information technology portal as a tactical or operational demand (I3). Demand is collected in the weekly meetings for digital services (I3; I9). It can be noticed that the input to operational or tactical requests might trigger strategic needs (W1). Also, it can be noticed that there are different practicalities to collect and prioritise demand before it is logged in the systems. For example, business units go through, modify, and prioritise different items before they are logged into the systems. (I2; I7) However, the early discussions and collection phases are out of the scope of this research.

There are two processes for internal system development and operating model for digital services at the tactical level (D8). Two of the processes overlap. Roughly, the development request process describes how the demand is handled on the information technology side, while the global review process describes how demand is handled on the business side. (D6; D7)

The development request process is triggered when a new development request is filled in the information technology service portal by using the development request template (D2; D6). It means that the input of the process is the filled template. The development request process describes how the demand is handled from filling to development starting (D6). Sometimes requestors do not recognise that the demand is operational, so the process is connected to the change request process because the incorrectly categorised

items need to be transferred to the change request process (W1). Interviewees define that the process ends when the requested development item is released (I5; I6). The service portal is the used tool when request handling and following up is conducted (I1; I5). The process is run by the information technology department (W1). Global review is one of the tasks during the development request process, so it could be assumed that the global review process describes the task (D6). Nevertheless, the global review has been defined as a process, making the development request and global review highly dependent on each other (D7).

The global review process defines tasks at the front end of the demand management, creating, collecting, and cross-checking demand between different stakeholders (D7). Development requests are reviewed by representatives of business units and functions in global review before the information technology department receives them (I11). However, the information technology department participates during the reviews to collect business requirements for further technical and resource planning (I1). Based on the interviews and documented materials, the process starts from the input template in the service portal, like the development request process (D7; I11). Also, the output is defined as approved demand that moves to the development queue (D7). A question that arises and is not clarified based on the interviews is how much these two processes complete each other and how much they overlap each other. However, the global review is run by the operations department and country and function representatives making the responsibilities different between processes (I11). The tools that are used are the service portal and communication tool (I11).

What comes to digital services, demand is handled by following the operated model developed only recently (I4). The operating model describes how the demand is handled from collection to release, making it a comprehensive model (D5). The model is designed to follow agile principles as the development is happening with agile methodology (I9). Demand is collected and prioritised in weekly meetings that the system's product owner organises. Also, it is defined that the input is cross-checked, and the demand is added to the product backlog. The interviewees said that demand management ends when a feature is released and all critical documentation is created (I2). There are two main demand management tools used during the process: product management tool where the backlog is handled and feature analysis tool (I9; I10). In addition, the customer poll for the demand collection will be added to the product management tool in the future (I9).

The backlog order can change based on new requests and strategic decisions meaning that strategic decisions in the strategic demand management process have a solid con-

nection to the operating model. Digital services demand management is run by the product management team, which is not inside the information technology department. (I9) Also, a digital service team from the information technology department is working closely together with product management and country, and function representatives are participating in the demand prioritisation and weekly meetings (I4; I10).

Finally, operational demand is managed mainly through information technology change request and incident management process. Items are handled through change management which is triggered when new incidents are opened and categorised as change requirements in the information technology service portal. (D4) The portal is the same for development requests, but the demand must be filled in different locations. The output of the process is delivered change and closed case. (I3) The process is run by the information technology department (I12). All five processes are collected in Table 13 below, where the actors, aim, input, output, tools, and dependencies are described according to process description structure by Tinnilä (2009, p.123) and Vanwersch et al. (2016). Processes are described comprehensively, which increases the understanding of the current demand management in the target company.

Table 13. *Processes high-level descriptions.*

Process	Actors	Aim	Input	Output	Tools	Dependencies
Change request process (for incidents) (D4)	Information technology department (I12).	Operational and tactical level demand (D8).	Added incident in the portal, which is defined as change request (D4).	Case closed and fixed (I3).	Information technology service portal (I3).	Strategic semi-annual prioritisation process and Development request process (W1).
Development request process (D6)	Information technology department (W1).	Internal systems tactical demand from information technology's point of view (D8; W1).	Added demand in the service portal by using development request template (D6; I3).	Released functionality (I5; I6).	Information technology service portal (I1; I5).	Strategic semi-annual prioritisation process, Global review process, and Change request process (for incidents) (W1).

Process	Actors	Aim	Input	Output	Tools	Dependencies
Digital service operating model (D5)	Product management, digital services team, country, and function representatives (D5).	Digital services tactical demand (D8).	Cross-checked demand, which is relevant for several stakeholders. Customer idea poll in the future. (I9)	Ready functionality, including all needed documentation (I2).	Product management tool (backlog handling) and feature the analysis tool (I9; I10).	Strategic semi-annual prioritisation process (W1).
Global review process (D7)	Operations, country, function, and information technology representatives (I1; I11).	Strategic and tactical demand (D8; W1).	Added development request to service portal (D7; I11).	Technical functionality that fulfils demand (D7).	Microsoft Teams (I11).	Strategic semi-annual prioritisation process, and Development request process. (D7; W1).
Strategic semi-annual prioritisation process (D1)	Leadership, country, and function management, and information technology governance (D8).	Strategic demand (D8).	New or continuing strategic investment request (W1).	Approved or denied investment request (D1).	Project portfolio management tool (I6).	Global review process (W1).

4.1.3 Roles and responsibilities

All interviewees have roles and responsibilities in the information technology demand management, but the roles differ from each other. One of the most common responsibilities in information technology demand management is to work at the boundary between information technology and business, as I1 defines the role as below:

> *"I have front-end discussions with the business, and the business contacts me straight. Also, we make feasibility studies with the business and have discussions which make it easier to understand business motivations behind the demand."*

However, these discussions are not always happening self-oriented, and thus centralised facilitator is needed to start discussions at the boundary. A facilitator leads reviews to facilitate communication between the information technology department and the business side and updates development status (I11).

Before demand is logged into processes, it is usually pre-handled by different business units and functions. Especially interviewees from the business side highlight that the collection and prioritisation are significant responsibilities within their areas. Furthermore, as every unit has its own goals, the business unit representatives tend to highlight the goals of their own units, meaning that they are driving demand that is beneficial for themselves forward in the processes. I3 lists the roles and the responsibilities of the business units' and functions' representatives as below:

> *"Collecting and prioritising information technology demand, participating in system requirement collection, and creating cases for different systems."*

Often, the same persons who collect the demand also input it into tools (I6). After the demand has been input to different processes, different people handle and receive it. Receiving demand signifies that the person responsible for receiving the demand item checks whether all required information is filled and sends the item back if something is missing (I5; I11). After the demand is checked, different workloads and cost estimates are often conducted. Thus, sending the demand forward to persons with the proper knowledge about the systems is essential during the demand management process (I11). The estimates are usually conducted by different people than those who participate in the collection and first demand handling. I12 describes the responsibility for the estimates as follows:

> *"I make cost estimates about how much a certain change costs, including operational costs. I know how demand is affecting support services. - -"*

Especially in the digital service operations model, certain dedicated roles are defined for the demand management. One of them is a product owner, who is accountable for the roadmap and backlog of the products. Also, the product owner owns the service and the development direction from the business point of view and is responsible for what is done and not done for the products (I8). I8 describes the role of a product owner as below:

> *"The product owner maintains and updates business backlog which includes all thigs that the business needs now and in the future. In the new operating model, backlog is located in the product management tool so product roadmap, backlog, and prioritisation regarding the product are handled there by a product owner. The product owner facilitates the prioritisation process meaning the owner receives input from business units and workload estimates from information technology department. The product owner executes prioritisation, builds roadmap and backlog, communicates, and maintains the roadmap and backlog based on the received information. Also, the product owner ensures that incoming demand and*

> *output are in balance, delivers demand to design continuously, and makes sure that the development teams have something to develop all the time. The product owner is the engine of the demand management process."*

Another dedicated role, especially in the digital service demand management process, is a portfolio owner. I8 describes the role of a portfolio owner as follows:

> *"The role of a portfolio owner is the same as that of the product owner with the exception that a portfolio owner is responsible for the whole portfolio instead of just one product in it. The portfolio owner makes sure that the whole portfolio is in line and that the product dependencies and prioritisations are in balance. When there are several products in the development, the portfolio owner takes care of the whole portfolio demand management maintenance and solves possible conflicts, e.g. prioritisation conflict between different products."*

For the development request process and especially for the joint venture, a single point of contact (SPOC) is a role created to enhance cooperation between both sides. Single point of contact is a broad role and can be argued to be involved in demand management during the whole process. I5 defines the responsibilities for the role as below:

> *"Receiving demand, managing the pre-analysis pipeline, contacting the customers from whom the request came, and handling resourcing and investments related to the demand. In addition, running weekly meetings with the customers."*

In addition to the dedicated roles presented above, many interviewees had no specifically indicated and named role in the demand management and worked more with supportive and coordinative tasks. For example, communication and experience sharing that help product owners and others in their work are general tasks in the demand management (I4). I10 describes a more supportive role as below:

> *"- - Currently, my role is at the portfolio level where the portfolio owner and the product owner handle the collection and prioritisation of the demand which is visible for the customer. I am more in a support role where I try to look over the portfolio and, on the other hand, bring my own experience to help the product and the portfolio owner."*

To summarise, as many different roles are identified as there are interviewees participating in this study. Also, only a few named roles and responsibility descriptions appeared during the data analysis. On the other hand, considering the complexity of information technology demand management and research sampling, the finding is not un-

expected. However, defining, clarifying, and centralising roles in certain areas could reduce unnecessary work and clarify demand management – something that needs to be considered in the construction creation.

4.1.4 Successes and challenges

The research has revealed that the current processes and models have both areas that are working well and areas that are not working properly. Information technology demand management needs to adapt to changes in the environment. Thus, demand management has been developed in the target company to enable scalable information technology solutions. However, it is noticeable that demand management currently has more challenges than success areas. Both of those are presented next.

An information technology department representative says that the cooperation with a business unit is working well if the unit has allocated resources to business development (I1). Allocation signifies that employees are working with topics and areas that focus on developing business processes. Thus, they have good knowledge about business processes and how the information systems are connected to them. When the business side has complete knowledge about what they are requesting, it is easier for the information technology department to analyse the need and estimate the work (I5).

One of the advantages that the current information technology demand management has is that there is a structured way of working and documented processes for internal systems, digital services, global reviews, and strategic and operational demand (I8). It means that descriptions exist for every process, and the company's information technology demand management is not a new or forgotten area (D8).

Another advantage area in information technology demand management is the operating model for digital services because it was updated and has been under investigation lately (I10). For example, it is mentioned that there are right persons in right places and that the co-operation is working well between the business and the information technology department (I9). In addition, it is considered that the roadmap transparency and visibility have increased after changes even though the roadmap can be forecasted only six months forward due to agile principles (I4). Between business and information technology, the communication channel is seen as one of the main advantages in the model (I10).

Especially the business side representatives highlight that the demand management is working well if a specific person is responsible for the system demand and has the proper skills to handle it (I3). For example, naming a specific person for the customer-facing

system has been seen working well as there is always somebody who can be contacted and with whom the brainstorming can be done (I2). However, only technical ownership is not enough, and the business needs a person who understands the systems linkage to business processes to fulfil the ownership requirements (I3).

The global review process is also a new way of working and is seen as an improvement from previous practicalities. I11 describes the process pros as follows:

> *"Now every demand management community is centralised, and crossover is added. A request form is created and in use, and it is centralised. Also, the global review is represented by all business units and functions, and an information technology representative is also participating in them."*

The global review has enabled more robust information technology demand management for the business because there was no process in place for that before. Also, all countries and functions are represented in the review, increasing the cross-checking validity. (I11) Thus, the global review is seen as a good improvement. On the other hand, it is also mentioned that the process has not been as active lately as it is needed to be. (I11; W1)

Nevertheless, despite the well working improvements and practicalities presented above, challenges appeared more than success factors. In summary, 50 different challenges or weaknesses were identified during the analysis. However, it must be noticed that many of the challenges are from one person's point of view and consider the process where the person is involved. Due to the number of challenges, it was possible to use a quantitative approach. Thus, different challenges are presented with the quantitative number, which signifies the number of mentions the same challenge has gotten in different interviews. Challenges are gone through topic by topic and collected in Figure 3 at the end of the section.

Missing customer value concept in demand management is mentioned four times during the interviews. It is explained that the customer value is not defined or asked during the processes, meaning that it cannot be used as a prioritisation method and the information technology department is not even aware of how valuable the developed item is for the customer (I4). I2 describes the customer value challenge as follows:

> *"Customer value concept is missing in the information technology demand management as the demand is collected in a technical list where the value is not defined. The approach is not customer-oriented."*

In addition, it is noticed in four different interviews that demand management is far away from customers, which is a commonly known problem in information technology development (I1). The problem is that customer service, business unit's business development, as well as an operational department are between the information technology department and the customers, making information technology feel they do not know the customers (I4). Also, it is noticed that the more the target company grow, the more the distance between customers and information technology increases (I8).

Priotisitation is also seen as one of the processes' current bottlenecks (I5). The challenge is that prioritisation is mostly missing in information technology demand management. Indeed, it got four mentions in different interviews. For example, there were problems with all demand in the queue being approved and the information technology department not being able to deliver all, thus making requestors dissatisfied (I4). Also, it is argued that the largest or the loudest requestor most often wins the prioritisation (I3). Sometimes, the requests from management bypass the whole backlog and wipe off all previous prioritisation (I12). Also, a prioritisation framework exists for digital services, but it is not used at the moment as strategically critical demand is bypassing the framework (I9). From the comment, it can be assumed that strategic alignment is used for prioritisation. Nevertheless, strategic alignment is still mentioned as one of the challenges in demand management (I5).

It was presented in previous sections that there are different processes in information technology demand management. However, these processes are not synced as smoothly as they should be (I9). Syncing different streams got three mentions in the interviews meaning that if, e.g., cross-checking is needed, the responsibilities and connection points between streams are unclear (I4). Syncing should mainly happen inside the information technology department, and thus it is mentioned that the co-operation is not working as it should (I10). I4 give an example of a syncing challenge as below:

> *"A grey area one is if somebody sends digital service demand, e.g., a new notification from the assets that are delivered to inventory. The demand itself is related to digital services, but it needs to be solved in the enterprise resource planning system. The requestor does not know that, and nobody wants to take responsibility for the demand or does not even know who is responsible for that. We put this kind of demand into internal system demand processes, but then customers' visibility to the demand disappears. So, the challenge is who is taking care of the syncing streams."*

Moreover, another challenge is that the streams are different in a fundamental way. The digital service operating model follows the agile principles while the other processes have more traditional or waterfall approaches. (I9) The problems appear, for example, when delivery dates are asked and locked, but the agile operating model can forecast only six months forward due to open backlog (I5). It can cause challenges when a schedule is promised in a stream that is not in sync with other streams' schedules (I4).

Syncing has connections also to other challenges that were mentioned in the interviews. For example, multi-system demand management is mentioned two times. Multi-system demand management denotes that demand that requires changes in different softwares is challenging to manage properly (I10). Also, combining requirements is mentioned two times. Challenges in combining requirements refer to a situation where similar requirements are difficult to combine as one, even though they should be combined (I6). Furthermore, it is also mentioned that demand management at the tactical level is a feature oriented even though it should be more product or value packet oriented. The risk is that the big picture might be forgotten if the approach is feature oriented (I10). It is also mentioned that sometimes demand is triggered in unwritten format, for example, from the meeting, increasing the risk of misunderstandings (I8).

Also misunderstanding of the demand, meaning that the requestor and receiver understand the demand differently, is mentioned as a challenge in demand management. In general, understanding all the characteristics of the information technology items is seen as challenging on the business side. If the business needs to prioritise items that they do not understand, the prioritisation might fail. Also, if the business does not understand demand, it can be challenging to categorise the demand. (I3) The categorisation is essential because different items are input to different channels. The challenge is that sometimes the business representatives suppose that a demand item is a bug and thus input it as a bug, but from the information technology’s point of view, the item is a software requirement. This item might drop from the processes if the information technology reports that the bug is fixed, but the change request is not added. (I3) Various input channels are seen as a challenge for demand management because the business side usually does not understand the functionalities behind the requests (I4).

Overall complexity can also be seen affecting all the previous challenges. The overall complexity of demand management is due to several stakeholders, legacy systems, different approaches, joint venture’s contractual position, and different business processes (I7; I9; I11). Complexity causes weaknesses such as slow demand management and inflexible process (I7). I9 describes slowness as follows:

> *"A challenge is that many stakeholders, especially from the business side, are involved in the process, making it slow. It means that we have to ask things from many people, and we have five to ten participants in meetings, which makes it difficult to combine needs and schedule the time. Thus, the front-end of the process is slow."*

In addition to previous, the information technology department representative mentioned that the department is controlled from many directions, and decisions are made outside of the department, further increasing the demand management complexity (I1). Sometimes, even the business units consider that it is more beneficial to implement information technology solutions by themselves, causing security and architecture related problems (I12).

Furthermore, communication is mentioned two times as a challenge in information technology demand management. However, communication was also seen as an advantage in some areas, meaning that the challenge is related only to certain areas or processes of the demand management. It is mentioned that interactivity is missing, the cooperation between information technology departments and the business is not working as it should, and the requestors do not have visibility over the demand (I2).

Also, missing product or solution ownership is mentioned three times during the interviews. On the other hand, ownership is also one of the successes when an accountable person is defined. Thus, the challenge appears to be related to systems and solutions that do not have ownership in place, as I2 clarifies as follows:

> *"Ownership is partly missing. Product and solution ownership are needed for successful demand management."*

One of the main reasons for the missing ownership might be the lack of resources mentioned three times during the interview. For example, it is mentioned that lack of resources appears in demand collection, handling and communication (I11).

Finally, a missing overview of demand management is mentioned two times (I2; I5). One interviewee highlights that the challenge of demand management is that the processes and ways of working are ambiguous. In more detail, it is also mentioned two times that there is a lack of transparency and visibility over different process phases. (I2) This causes challenges, for example, in backlog following and forecasting (I7). On the other hand, many processes have been added lately, and thus lack of maturity is one of the demand management's challenges (I1). All mentioned challenges with the number of mentions are collected in Figure 4 below.

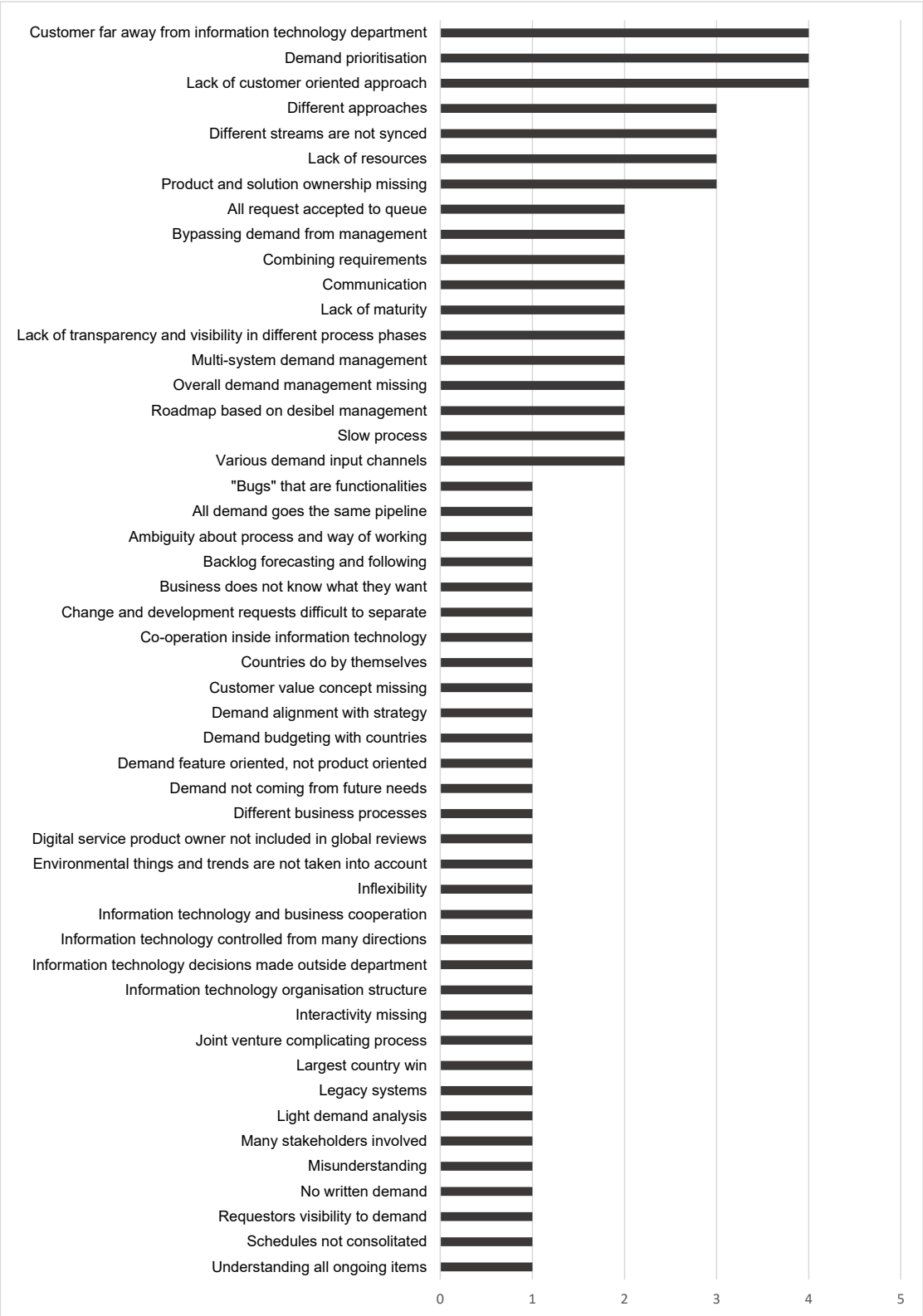

Figure 4. *Information technology demand management challenges.*

Identified successes and challenges increase the understanding of the topic and clarify how the processes can be improved in the target company and in general. The challenges are highlighted in construction creation as they are strived to be solved to improve the target company's current processes.

4.2 Improving information technology demand management in the target company

This section moves the focus from the target company's current status to future development needs and solution proposals. All necessary data from interviews are analysed to understand how information technology demand management can be improved and what is needed for the construction. The section consists of critical success factors, information demand management risks, and solution proposals.

4.2.1 Critical success factors

During the interviews, it was asked what the interviewees considered as the most important thing for successful demand management. The idea of the question was to determine which areas the construction would need to focus on. Communication is the aspect getting the most mentions, three in total, meaning that if the communication and communication channels are not working well, successful demand management is challenging to implement (I7; I10; I11). Another factor that got three mentions during the interviews is ownership. Ownership means that ownership for the demand and for the systems is defined, and it is straightforward throughout the processes (I3; I7; I9). I9 defines the ownership as follows:

> *"There is somebody accountable for input and outcome management for the demand. In this case, the product owner. If anybody is not accountable in the process, it does not work."*

Ownership was also mentioned both as a challenge as well as a current success factor, meaning that it has been considered working well in the current processes if it has been defined and communicated clearly. However, it is also considered that it is not defined in every process as comprehensively as it should be.

Also, Customer value is mentioned as a critical success factor for demand management and something that should be balanced with the development goals at all times (I2). All demand should be based on the customers' needs (I1). Also, the strategic fit and the implementation of all approved demands must follow the company's direction in information technology development (I1; I8). Furthermore, before this section, the complexity of demand management and the demand itself was noticed. It is emphasised that looking at the big picture of demand management is essential (I3). I6 explains the success factor as follows:

”Handling and understanding the big picture of demand management is the most important thing, and if it is not done, demand management becomes extinguishing fires.”

However, the importance of operational and developmental understanding cannot be underestimated even though the big picture is essential (I3). Rather, it signifies that the importance of seeing the big picture and relying on technical knowledge must be balanced during the whole process.

A few success factors are identified as important in achieving the big picture visibility. It is mentioned that the demand must be documented well and that there needs to be a predetermined or defined form for overall demand management in place (I1; I12). Furthermore, the overall clarity related to process, ownership, communication, and documentation is important (I7). Clarity related to demand management pipeline is also mentioned as a success factor, as I4 explains it below:

“The channel through which the demand comes must be clear for everyone. For as long as we have a problem with what is being asked, problems roll forward in the process.”

Demand prioritisation was mentioned most often as the main challenge, and it is also seen as one of the main success factors for demand management in the target company (I5). During the interviews, it is mentioned that high-level prioritisation can not be made without business case calculations because otherwise, the items are not comparable with each other (I5). Also, the roadmap where the items are scheduled is complicated if the items are not prioritised together (I8). All mentioned success factors and a count of the mentions in different interviews are collected in Table 14 below.

Table 14. *Success factors in information technology demand management.*

Success factor	#Count
Communication	3
Ownership	3
End-customer value	2
Prioritisation	2
Strategic fit/implementation	2
Understand the big picture	2
Clear input channel	1
Documentation	1
Having a defined or predetermined form	1
Process clarity	1
Roadmap	1

Based on the interviews, eleven different success factors are identified. Some of the success factors appeared already in the previous section that handled current successes

and challenges in the target company. If those success factors are also mentioned in this section as the most important factors for demand management, their weight increases in construction building. Identified success factors give direction for the demand management construction, especially if the success factors are also seen as current challenges. Thus, communication, ownership, end-customer value, strategic fit, prioritisation, big picture understanding, input channel, process clarity, and roadmap need to be highlighted in the construction.

4.2.2 Identified risks

During the interviews, it was asked if there are recognisable risks in the current demand management environment. Risks are identified because they should be mitigated by the construction, if possible. Mentioned risks with definition and reference are collected in Table 15 below. Also, the impact of the risks is estimated based on interviewees' estimates and common sense. The risks are compared to each other using a three-degree evaluation: high, medium and low.

Table 15. *Risks in information technology demand management.*

Risk	**Definition**	**Impact** (Low-High)
Budget, schedule, and scope	For example, if the scope is increased but the budget and schedule are not increased (I5).	Medium – Target scope, budget or/and schedule cannot be reached (I10).
Communication (I10)	Miscommunication or lack of communication means that the information is not shared as it should be during the process (I4; I6; I10).	Medium – Impact can be from small failures to more extensive investment failures. For example, promised schedule or something else that is impossible to reach (I6; I10).
Cross-checking (I2)	A demand which is not cross-checked enough is approved (I4). For example, the solution owner does something without asking from all stakeholders (I7).	Medium – One stakeholder's needs can be fulfilled, but others' needs cannot (I11). In the worst scenario, the demand conflicts in another environment and can break something else for other stakeholders, causing delays and costs for the company.
Customer value	Something is released that is not usable or valuable for the customer (I3).	High – Many resources are wasted if something that is not valuable is developed. Opportunity cost is high if something valuable could have been developed instead of invaluable demand (I1).
Delivery promising	For example, an unrealistic delivery time is promised in the contract, and it cannot be reached (I6; I10).	High – Realisation can cause contract fines, customer loss, or dissatisfaction (I10).

Risk	**Definition**	**Impact** (Low-High)
Demand understanding	Demand is not understood correctly on the information technology side. Usually, the reason is that the analysis is done too quickly (I4).	Medium – If demand is not understood correctly, it needs to be handled again, and the process lead time will increase. Also, it will increase resource usage in the process.
Demand's effect on other systems (I1)	Demand's effect on other systems is not considered during early phases or at all (I2).	High – If it is noticed late, the impact is that demand needs to be estimated again, and many resources are used. If the effect is not noticed during the demand management, it can break functionalities and be immediately visible to the customer (I2).
Lack of technological understanding (I1)	Lack of knowledge about how technology can enable business benefits (I1).	Low – The requestors expectations are higher than what the technology can fulfil in the best scenario, thus causing dissatisfaction.
Process following	The process is not followed correctly, which can lead to something being forgotten to consider and harmonised operations not being executed (I7).	Medium – If something is forgotten to consider, the impact can vary from critical to not critical. However, if processes are not followed, realisation causes inefficient and unharmonised solutions in the long term.
Resourcing (I4)	Responsibilities are centralised to specific people, or there are not enough resources to do some tasks (I9).	Medium – For example, long sickness leaves can cause delays to demand management processes (I9).
Vendor	Development is outsourced to external companies that do not understand operations or business, meaning that the development is not in line with customers or operations (I3).	Medium – Much money is wasted in development (I3). In addition, many resources are used in demand management.

Eleven different risks in demand management are identified during the interviews. One risk got the low impact estimate, two high impact estimates, and the rest the medium impact estimate. Many of the risks are identified as essential to mitigate during the process, meaning that the impact is medium or high. Thus, in the next section and in the construction building, it is vital to find solutions to mitigate the identified risks.

4.2.3 Solution proposals

Interviewees have a wide knowledge of information technology demand management and thus were asked how they would develop it. In this section, different proposals are approached topic by topic. Many presented solution proposals have a connection to presented challenges, risks, and success factors, so also the proposal's linkage is presented.

Lack of customer-oriented approach and customers' long distance from the information technology department was mentioned most often when challenges were discussed in

section 4.1.4. Customer is an important factor in demand management, and two interviewees identified end-customer value as the most important thing for successful demand management. However, only a few proposals to solve the situation are mentioned. One proposal is to move more to value-based demand item releases and follow up, meaning that the customer value is defined for every software release made (I10). On the other hand, I2 proposes a solution for the first tasks in the process as follows:

> *"We should have even more solutions to collect customer demand. For example, if one of the customers needs something, how can we make it visible whether other customers need the same demand as well. Also, if customers need something, we should know better what they really need and why. Thus, answering the question of "why" is important. - - Systematic ways to document and hear customers, as well as increased transparency, are needed, so not only solutions inside the business units. Then we also need metrics from this point of view. We cannot solve this without doing it together. For example, all participants do not team up and work together. So, no throwing ball to the next person but doing things together. We have good experiences and results when the information technology department and the business side have worked together."*

In addition to the customer orientation approach and improving practicalities related to it, the previous comment highlighted cooperation between units. Issues related to cooperation and breaking department boundaries cannot be solved only by improving demand management practicalities, but good demand management practicalities can further improve the cooperation. Cooperation is needed due to the cross-functional nature of demand management. I10 defines how cooperation should be improved as follows:

> *"Some kind of "tribe" system is needed. We need to think about demand in terms of cooperation, not only inside the information technology department, which is a typical practice in many things we are doing. Based on my experience in the product management side, I wonder if we define strategic information technology demand management to include only preliminary yearly planning and more accurate half-year planning because always something unplanned is coming. Digital services demand is handled together with the business. However, infrastructure and internal systems demands are handled inside the information technology department. So, I wonder why we handle these demands only inside the information technology department. We should involve the business side in the planning, and when the unplanned demand appears, a cross-functional team is needed to decide what is moved forward and how to prioritise the demand. Information technology department takes even too much burden to carry."*

Based on the above comment, it can be argued that cross-functional teams and business involvement solve problems related to cooperation. Also, communication was mentioned as a risk, challenge, and the most important success factor in demand management. Unfortunately, concrete solutions are not proposed to solve the communication challenges. It is mentioned that better dialogue is needed, reducing overhead in demand management and cooperation (I1; I8). On the other hand, training businesses about demand management would be one way to improve current processes' efficiency (I8). Also, processes can be improved if the demand can be reduced before it is handled. I11 proposes a solution for that as follows:

> *"Small changes could go through a quicker path in the process, and it could happen in a slightly different way. As much as possible should be done by business self-service. For example, suppose you want a new document. In that case, the process does not need the information technology department at all, meaning a superuser can make the document in the system or that reporting is open for everybody. This could make the process leaner for smaller demand items."*

Reducing demand in the first place would reduce the amount of work used to handle demand, meaning that it would help with the resource challenges and risks. Another challenge in demand management is that there are several input channels, and thus I4 proposes that input channels should be unified and that all demand is input using the same template. On the other hand, earlier, it was noticed that the different demand items require different handling practicalities. Thus, putting operational and strategic demand into mould would not be the best solution. However, unifying input channels and templates at the tactical level could make processes more efficient. After the demand is collected and directed to responsible persons, more investigations, analyses, and estimates are usually made. I3 proposes that investigation should be improved as below:

> *"We should spend more time in the initial phase to investigate the demand. E.g. if we want to replace an enterprise resource planning tool, we need to take time to understand the processes. For example, by interviewing people and making sure that all processes are covered, we would not be wasting a lot of time and money on development that is not required. - -"*

Demand prioritisation and the lack of it was also the major challenge in the current demand management. In addition, it was mentioned as a critical success factor. I5 argues that all demand should fall under the same prioritisation because the same human resources and money are used regardless of the demand. Also, making prioritisation visi-

ble would solve some challenges as people would be able to see why something is prioritised over something else. In addition, prioritisation would need a more quantitative approach to score specific criteria, e.g., revenue, customer value, and profit potential. (I1; I5) I9 proposes that new development would be prioritised using a framework consisting of some specific criteria. Also, I6 present that overall prioritisation and coordination is needed.

In the interviews, there were discussions also about where the demand management processes are ending. Demand monitoring and follow-up after processes were seen as challenges because they are not conducted, and therefore the managed demand success is not estimated. Thus, I4 proposes that the demand management should end three months after the release, so the success can be estimated, for example, by using return on investment metrics and updating business cases. On the other hand, if demand management continues until release, process lead time might be very long because some items can be over three years in the backlog before development.

Fixing the process end or other areas in demand management is challenging due to different processes and practicalities. I12 proposes that one company-wide way of operating would help. On the other hand, I5 presents that the processes should be synchronised together. However, putting processes in the same mould is challenging due to different approaches in demand management. Different approaches might be approached by adding certain syncing points to the processes. If they are wanted to be connected completely, a specific approach needs to be selected, for example, using agile methodologies in all processes (I9). On the other hand, taking the best practicalities, for example, from scaled agile methodologies, could solve some challenges (I9). Nevertheless, using agile methodologies in digital services has the challenge that backlog cannot be forecasted, and thus I7 proposes that the transparency for digital services backlog should be extended.

Syncing different processes and making them more connected is needed to solve some of the mentioned challenges. Organisational changes or additions can be one way to solve previous challenges and, on the other hand, improve communication and cooperation. I1 proposes that there should be a demand management function or team inside the information technology department responsible for overall coordination and demand management. I1 argues that without the demand management team, extra work is conducted, and substance skills are limited. On the other hand, I4 presents that a new forum would be a solution to the issue and describes it as below:

> *"We should have a demand forum that handles all the demand the information technology department receives. All relevant people would be involved in the forum, meaning hands-on people, technical specialists, and product owners who handle and solve demand, not only the leaders. The demand list would be gone through in the meeting, and the list would be same and visible for everybody."*

The demand forum would be easier to implement than the demand management team because no organisational changes would be needed even though some re-allocation and new responsibilities would emerge. During the interviews, also many new roles and responsibilities are proposed. Ownership was seen as the main challenge, success factor, and even the area that is working well if defined properly. I3 argues that product ownership should start in the project phase and continue to the system operation phase, making it much quicker to handle product related demand. Product ownership should cover both business and technical sides because business needs must be comprehensively considered. Also, somebody must know the system and the technical side to find innovative and most appropriate technical solutions. (I2) Also, if external companies are used for development, internal accountability is needed to transfer understanding about processes and functionalities. In addition to product owners from the business side, assigned persons from business units for the projects and systems would be needed. (I3)

I2 proposes that ownership should be defined for the demand from the beginning of the process to the end of it. If the demand is focused on a current system, it is logical that the system's product owner is accountable for the demand, but new projects and products need new owners. The demand management as a whole would also need someone to carry the overall responsibility (I5). I6 defines the overall demand management accountable as below:

> *"High-level accountable who is not function leader. The role is a full-time manager who owns the whole demand management and ensures that all meetings are done."*

The demand management owner would also solve issues related to overall prioritisation and coordination. I6 argues that people who do not have deep skills and time for demand management are currently running it. Resourcing and lack of resources were mentioned as challenges earlier. On the other hand, many interviewees argue that there are enough resources to do demand management successfully, but the allocations are not as efficient as they should (I5; I6; I10; I12). For example, I10 describes the situation and a solution to it as follows:

”Lack of resources is always present and will not change. Thus, roles need to be clarified, and open communication is needed.”

As mentioned, clarifying and defining roles and responsibilities would solve resourcing challenges (I12). During the interviews, it was asked if the target company had all relevant tools to implement demand management successfully. The general opinion is that all relevant tools are in place. What is more, I10 argues that there might be even too many tools. However, tools are good, but the challenge is that they should be used more efficiently (I6; I12). For example, implementing a prioritisation matrix in the backlog management tool would be needed (I4). The only missing tool mentioned is an organisation-wide resource management tool where, for example, cross-functional project work could be allocated (I5).

All mentioned solution proposals and which challenges, risks, or success factors they are addressing are collected in Table 16 below.

Table 16. *Proposed solutions combined with challenges, risks, and success factors.*

Challenge/ Risk/ Success Factor	**Solutions**
Communication	More dialogue, better dialogue and business trainings (I1;I8).
Cooperation	Tribe system where demand is handled in cooperation. Business should be involved in the planning, and when the unplanned demand appears, a cross-functional team is needed to decide what is moved forward and how to prioritise the demand. (I10)
Customer value/approach	1) Move more to value-based releases and follow up, meaning that the customer value is defined for every software release made (I10). 2) Solutions needed to collect and document customer demand, cross-check it transparently, find an argument why it is important, and measure it (I2).
Demand analysis (Investigation)	More time should be spent in an initial phase to investigate, e.g. processes to avoid failures (I3).
Demand monitoring	Demand management should end three months after the release, so success can be monitored, e.g., by using return on investment metrics and updating business cases. (I4)
Different approaches	1) One way to operate throughout the company (I12). 2) Syncroniced processes (I5). 3) Select a certain approach. 4) Using the best practices from different approaches. (I9)
Input channel	Unified input channel and one input template (I4).
Organisation	1) Demand management function or team inside information technology department that is responsible for overall coordination and demand management (I1). 2) Demand forum that handles all demand which information technology department receives and involves all relevant people (I4).
Ownership	1) Defined product ownership from the new system project’s start to operational phase (I3). 2) Ownership should cover both business and technical sides (I2). 3) Assigned persons for the projects and systems from business units (I3).

Challenge/ Risk/ Success Factor	Solutions
Prioritisation	1) All demand should go under the same prioritisation because the same human resources and money are used regardless of the demand type (I5). 2) Make prioritisation visible. 3) Quantitative approach used where specific criteria are scored, e.g., revenue, customer value, and profit potential. (I1; I5) 4) Use a prioritisation framework for new development demand (I9). 5) Have overall prioritisation and coordination (I6).
Resourcing	1) Efficient allocations (I5; I6; I10; I12). 2) Roles and responsibilities need to be clarified and defined needed (I10; I12).
Roles	1) Demand owner should be defined for the demand from the start of the process to its end (I2). 2) Demand management as whole needs someone that is responsible for it overall (I5).
Slow process/ Lack of resources	Small business changes could have a quicker path in the process, and business self-service should be used as much as possible (I11).
Tools	1) Tools should be used more efficiently (I6; I12). 2) Prioritisation matrix in the tool would be needed (I4). 3) Organisation-wide resource management tool is needed (I5).

4.3 Process framework – the construction creation

The preliminary construction, presented in Figure 2, worked as a foundation of the construction – information technology demand management process framework. Additions to the construction are made based on empirical findings. It is noticed that all findings from empirical or literature are not feasible to be implemented in the construction, and thus in this section, definitions behind selections are described. Finally, the construction and the weak market test results are presented at the end of the section.

Demand sources, items, processes, roles, main demand management phases, and a few highlighted tasks are included in the construction. The structure of the construction follows the structure of the preliminary construction. Only processes, which were excluded in the preliminary construction, are added. The construction consists of four demand sources, and they are opened in more detail by presenting sub-categories. Demand items are almost the same as in the preliminary construction, but the portfolio is excluded because it was not mentioned in the interviews. The main phases are otherwise the same as in the preliminary construction, but monitoring is a new phase because, during the empirical research, it was noticed as a needed improvement. Five processes were identified during the data collection, but only four processes were added to the framework. Two of the processes are proposed to be combined to improve demand management in the target company. Finally, roles and responsibilities in different phases are described based on literature findings, the target company's current roles, and improvement proposals.

The demand monitoring phase is added to the framework because it was noticed that nobody is following the demand success formally after the demand deployment. The importance of monitoring is that the value generation of the demand can be measured, and it enables learning from previously handled demands. For example, I4 proposes that monitoring will last formally three months after demand release and business case, and return on investment can be used as measurements. On the other hand, the strategic level monitoring period could last from the system lifecycle's beginning to the end of it to measure the system's actual value.

Four processes are described in the construction: 1) *Strategic semi-annual prioritisation process*, 2) *Digital service operating model*, 3) *Internal system process*, and 4) *Change request process (for incidents)*. The internal system process is proposed to be formed by combining the global review and the development request process. These processes are run by different departments: operation and information technology. Processes present how the demand is handled in different sides of the demand management, meaning that the development request process describes how the demand is handled on the information technology side, and the global review process describes how the demand is handled on the business side. The findings indicate that many of the processes' tasks are happening side by side, and even the same tasks are included in both of the processes. These overlapping tasks can be combined in the internal system process. Therefore, the combination of the processes would simplify the internal systems demand management.

The combination of the processes would increase cooperation between the departments because they would have a shared way of operating. Also, for example, operations and information technology departments are working closely together in digital services demand management. Many advantages of the digital services operating model were mentioned during the empirical research. Thus, learning from the digital services operating model is essential when the processes are combined. Furthermore, the combination itself would decrease the complexity of the demand management, make different streams sync better, and clarify the whole information technology demand management.

Syncing different streams must be considered because the challenges like cross-checking, unclearness, multisystem demand management, and prioritisation need to be solved. In the construction, syncing steams is approached by adding cross-process tasks in the demand management and clarifying the roles. The proposed cross-process tasks are: 1) *Centralised input demand*, 2) *Centralised demand collection, classification, and quickscanning*, 3) *Multisystem evaluation*, 4) *Centralised prioritisation*, 5) *Multisystem planning,* and 6) *Multisystem deployment*.

All input channels cannot be combined without significant changes. Every process has its own channel through which the demand is collected and different tools that are highly connected to the processes. Thus, the proposal is to combine input channels for the change request process and the internal system process. After the change, the requestor would use the same channel for the internal system's new functionalities, current functionality changes, and bug fixes. The change solves the challenge about the unclearness where the request is input, and items do not drop from the process anymore due to the wrong input channel.

Centralised collection, classification, and quickscanning were identified in the literature as a practice to improve and connect different streams, and by adding this cross-process task, visibility to different processes increases. All demand is collected into the same place to recognise multisystem demand, ensure the quality of the request, pre-classify demand between processes if needed, and do quickscanning during the task. For example, existing demand can be rejected, or more information about the filled request can be asked. A demand management team is responsible for the task, and it is proposed to be a new role. The demand management team is responsible for the information technology demand management, organising cross-process tasks, assigning demand to certain products and solution owners if needed, as well as ensuring the high-level coordination of the processes.

The above presented cross-process task's goal is to identify multisystem demand. Multisystem demand management is not defined at all, and therefore, three new tasks are proposed: *Multisystem evaluation*, *Multisystem planning*, and *Multisystem deployment.* The tasks are positioned between the internal system process and the digital service operating model. Multisystem demand requires the development of multiple systems. For the multisystem demand, it is important to synchronise different streams to avoid delays. Product owners and solution owners should cooperate during the tasks. In the evaluation phase, multisystem demand is evaluated as a whole to know and estimate the complete demand. In the planning phase, demand implementation and demand delivery dates are planned. Finally, in the deployment phase, demand is deployed based on the schedules. Multisystem demand is prioritised in centralised prioritisation.

Also, the construction proposes centralised demand prioritisation because the same human resources and money are used in the information technology department. However, the idea is not to put all demands into the same mould but to make prioritisation more transparent and visible. Still, the same criteria should be used when the demand is handled in the same process. Thus, a prioritisation framework is needed for each process

with quantitative criteria. Centralising prioritisation means that there is high-level coordination in place, and multisystem demand prioritisation can be coordinated by the demand management team.

Demand management team was already mentioned as a new proposed role proposed. In general, clarified roles and responsibilities solve challenges in ownership, resourcing, and roles. Thus, there are seven main roles described in the framework. The roles are Demand management team, Product owner, Solution owner, Portfolio owner, Investment committee, Information technology project manager, and Executive sponsor. Some of the roles are used partly or wholly in the target company's current demand management. On the other hand, further clarification is still needed, and roles and responsibilities are defined in more detail in Table 17 below. After the roles, the construction is presented in Figure 5. In Figure 5, additions to literature construction are presented with italicized text.

Table 17. *Construction roles and responsibilities.*

Role	Phases	Responsibilities
Demand management team	From elicitation to monitoring	Collect demand centrally from all sources, check demand content and quality, identify multisystem demand, reject demand based on quickscanning, and assign demand to a solution owner and product owner. Responsible for overall coordination and demand management. Facilitate communication between the information technology department and business and update development status.
Executive sponsor	From planning to monitoring	Owns approved and funded project, responsible for the realisation of the business case.
Investment committee	Prioritisation & monitoring	Prioritise demand based on business and information technology criteria, approve funding, and monitor strategic and tactical demand.
Project manager	From planning to monitoring	Perform a detailed project plan and manage the project.
Portfolio owner	From collection to monitoring	Responsible for keeping the whole portfolio demand, product dependencies, and prioritisations in balance. Take care of portfolio demand management maintenance and solve possible conflicts, e.g. prioritisation conflict between products.
Product owner	From collection to monitoring	Maintain, update, and communicate a certain product's business backlog and roadmap. Facilitate prioritisation process related to the product's software requirements, change requests, and bug fixes. Take care that incoming demand and output are in balance, deliver demand to design, and take care that development teams have something to develop all the time. Jointly review demand with a solution owner. Responsible for the business side.
Solution owner	From collection to monitoring	Analyse content and scope of demand and create specifications. Ask estimates and evaluation from specialists if needed. Communicate in a technical manner, contact customers for more information if needed, and estimate resourcing and investments related to the demand. Jointly review demand with a product owner. Responsible for the information technology side.

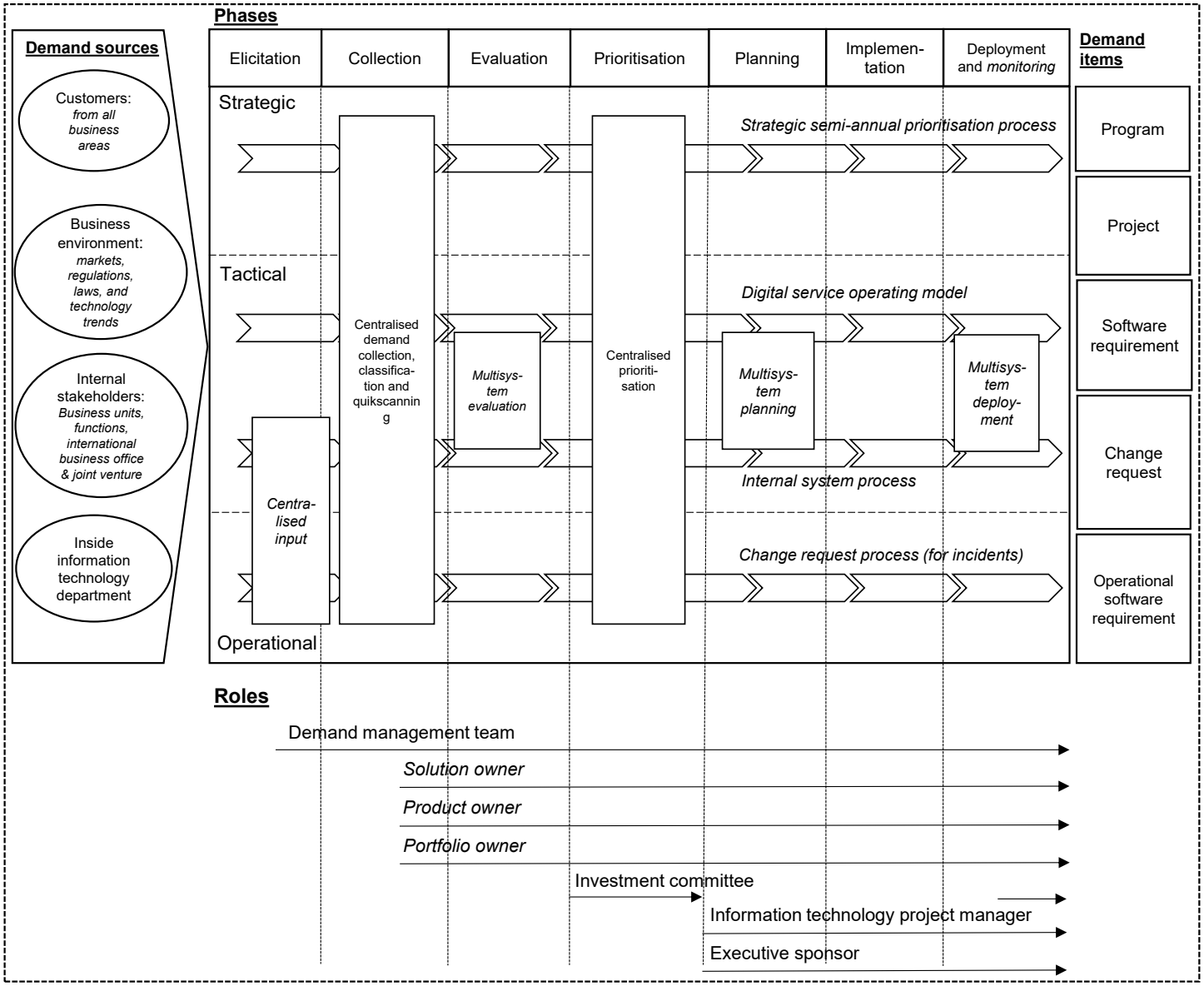

Figure 5. *Information technology demand management process framework for the target company.*

The construction was presented to the Information technology governance director in meeting four. The meeting implemented the fourth phase of the research process, where the aim is to demonstrate that the construction works for the task it is designed for. Also, it was defined earlier that the weak market test is conducted in this phase – meaning that the test is passed if the decision-maker accepts the construction and wants to take the construction in use. As a result of the meeting, the construction was approved by the Information technology governance director. The director described the framework as well-reasoned, realistic, and fitting with the target company's needs. The director said that the framework is executable in the target company and that the results will be communicated forward within the target company. On the other hand, the director noticed that process measurements are not defined and handled and proposed that measurements should be developed to enable continuous process improvement. (M4)

5. DISCUSSION

5.1 Information technology demand management for strategically important information technology

The first research question was to find out how strategically important information technology demand is managed. First, the question was approached by comprehensively defining the meaning of the information technology demand management for strategically important information technology. Second, different processes and roles were collected and compared in the literature review to get an overall understanding of demand management. Finally, empirical research was conducted to better answer the question. The findings related to this research question created the basis for the construction.

It was noticed that the information technology demand has different levels, as well as the demand items' size and scope vary considerably (Table 2). Demand was identified as having three levels: strategic, tactical, and operational (Alonso et al., 2008; Thomason, 2004). Based on both the literature review and the empirical study, these levels include different demand items. As a result, programs, projects, software requirements, change requests, and operational software requirements were identified as the construction's demand items. Another interesting notice was that the smaller the item is, the more frequently the demand item appears, meaning that software requirements, change requests, and operational software requirements appear more often than projects and programs. The finding means that operational and tactical demand appears more often than strategic demand.

Information technology demand management's connections to other more researched areas like requirement engineering, portfolio management (Table 3), and information technology governance (e.g. Alonso et al., 2017) were identified during the study. It was found that demand management covers a wider scope than requirement engineering and portfolio management and is one of the primary information technology governance processes. Information technology demand management covers management from a single software requirement to the entire information technology landscape. It includes tasks from demand collection to deployment to ensuring the efficient delivery of products and services. (Alonso et al., 2017; Legner & Löhe, 2012; Pombinho et al., 2013) Empirical findings of the nature of the information technology demand management supported the findings from the literature review. The demand management was seen to cover demand from small bug fixes to strategic multi-project programs. Also, all tasks as in the

literature were identified from demand collection to deployment in documented process descriptions in the empirical research.

Information technology demand management processes were approached at the beginning by going through processes in the previous literature (Table 4). As Gonzalez et al. (2012) argue, information technology demand management is not a single process. The same finding was discovered in also this research. Six different processes and models were discussed in the literature review. Three of them focused only on strategic demand management (Alonso et al., 2009; Alonso et al., 2017; Pombinho et al., 2013), while the other three included all the levels. Symons et al. (2006) presented different models to different levels, while Legner and Löhe (2012) and Gentle (2007, p. 42) proposed diverse paths to different demand items.

Empirical research extended the view of the demand management processes by identifying five different demand management processes in the target company. One of the processes was for the strategic level, three for the tactical level, and one for the operational level (Table 13). The uniqueness of the empirical findings compared to the literature findings was that different processes were found at the tactical level for different demands. The demand between the processes was divided based on the demand target, meaning that managing digital services demand and internal systems demand had their own processes. In the target company, it was noticed that different practicalities are needed if the system is part of the customer-facing service offering, and thus different processes were reasonable in the context. To summarise, not all information technology demand can be input in the same process due to different characteristics of the demand items, and thus different processes are needed.

Also, roles and responsibilities within information technology demand management were defined. However, when a standard process was not found for the demand management in the literature review, the definition of the demand management related roles was left unspecific. A few roles were identified based on the literature review findings (e.g. Gentle, 2007, p. 107-110; Legner & Löhe, 2012; Pombinho et al., 2013), and a few roles were found in the empirical research. Based on the findings, ownership of the system in the demand management was highlighted as necessary, meaning that somebody needs to be responsible for the product backlog maintenance, communication, demand collection, demand prioritisation, and coordination related to the product. Also, overall responsibility for the demand management, including collecting demand, checking request quality, assigning demand to correct people, and prioritising demand, was seen as beneficial (e.g. Legner & Löhe, 2012). In addition, when the roles were analysed in the empirical research and the literature review, the importance of both business and technological

knowledge was highlighted. The importance of technical knowledge increases when more detailed specifications, planning, and solution ideas are needed. The importance of business knowledge increases when knowledge about the processes, demand value for the customer, and strategic fit are needed.

5.2 Improving Information technology demand management for strategically important information technology

The second research question handled how information technology demand management can be improved for strategically important information technology. On the one hand, the aim was to collect a set of advice and specific improvement areas for information technology demand management. On the other hand, the aim was to find new theoretical insights to improve the complex process framework for information technology demand management. First, the question was approached by reviewing literature related to process improvement so that information technology demand management challenges, success factors, and solutions were handled. Then, findings were complemented with the empirical research that defined information technology demand management challenges (Figure 2), success factors (Table 14), risks (Table 15), and solution proposals (Table 16).

Different paths and different processes were identified as improvement areas for information technology demand management. The findings from the literature indicated that there should be different process paths (e.g. Legner & Löhe, 2012) or different processes (e.g. Symons et al., 2006) to different items. Also, it was found that the bigger and more strategically important the item is, the more processing is needed (e.g. Gentle, 2007, p.42). Despite the findings in the literature review, the empirical findings take for granted that there are different processes for different levels and even different processes for the same level. Thus, the viewpoint of improving information technology demand management shifted to finding practices for syncing these processes and forming an overall understanding of the information technology demand management at all levels.

Cross-process tasks turned out to be an appropriate solution for the above-mentioned challenge. Looking over the processes is beneficial when the demand is collected to check received demand quality, do the early demand rejection, and assign the demand (Legner & Löhe 2012). Empirical findings supported and expanded this viewpoint by identifying the importance of multisystem demand recognition in this phase. Prioritisation was identified as another beneficial phase to introduce a cross-process task (e.g. Quichiz & Bayona-Oré, 2016). In this phase, it is essential to prioritise items centrally because

the same resources and budget are used throughout the information technology department (Quichiz and Bayona-Oré 2016). Also empirical findings highlighted the need for improving the prioritisation practices to have equal and transparent prioritisation in the target company. In addition, it was found in the empirical research that simply centralising prioritisation is not enough, and thus specific prioritisation criteria are needed. Criteria to score demand were proposed to be quantitative, and for example, a prioritisation framework was proposed as a solution.

One challenge highlighted in the empirical research was customer value. Customer value -orientation in information technology demand management can be improved by adding a collection method, finding measurements to evaluate the value, adding criteria to prioritise demand based on the value, and following it up. The missing customer value can be emphasised as a critical challenge because all approved demand should somehow be connected to customer and value creation.

Also, taking advantage of different tools in the information technology demand management was highlighted as essential (e.g. Quichiz & Bayona-Oré, 2016). Using tools efficiently was seen as a way to improve transparency to demand progress and add requestors visibility over the demand (e.g. Symons et al., 2006). However, proper tool usage requires planning and managing because otherwise, the advantages cannot be reached. For example, in the empirical research, it was proposed that a prioritisation scoring should be added to the tools.

Resourcing was also found to be one of the improvement areas. Two practicalities to improve it was proposed: reducing information demand at the front-end of the process and allocating resources efficiently. The demand can be reduced by adding early checks to reject the demand where the, for example, bad-quality, existing, and non-valuable demand can be reduced (e.g. Legner & Löhe, 2012). Furthermore, both empirical and literature review findings highlighted that a small demand item should be solved in a self-oriented manner by the business side as much as possible, meaning that the demand can be answered via reporting tools or making changes to business processes (Cramm, 2008). Also, the early piloting and testing of the demand value with available tools would reduce the amount of the demand (Cramm, 2008).

Efficient resource allocations signify that the roles and the responsibilities are defined efficiently for the information technology demand management. The findings from different literature sources' that defined roles and responsibilities were combined to support solving the identified challenges (Table 8). Empirical research extended and clarified roles and responsibilities further (Table 17). For example, empirical research highlighted

the importance of knowledge and ownership from both the business and the technical sides for successful demand management. Moreover, centralised responsibilities over the processes, like having a specific demand management team responsible for the overall coordination of the information technology demand management, would be needed. By improving roles, it is possible to achieve better business alignment, which was mentioned most often as the most critical success factor for the information technology demand management (Quichiz & Bayona-Oré, 2016).

Finally, the presented construction in Figure 5 proposes many improvements for information technology demand management. The construction included the target company's process framework, where the recognised challenges, risks, and success factors are improved based on the study's results. The construction was designed for the context which has information technology demand management in strategic, tactical and operational levels.

Also, the target company's information technology department delivered services for internal and customer use, meaning that two different processes were defined at the tactical level to manage the demand. These two processes were synced by adding multi-system demand management tasks and cross-process tasks in the collection and prioritisation phases. In addition, cross-process tasks were added to sync the whole information technology demand management. Based on the research context and made selections, the construction would be most transferable for contexts that have information technology demand management at all different levels and where information technology is developed for both internal and customer use. In other contexts, the construction can be used for benchmarking information technology demand management and for finding further improvement areas.

5.3 Future development proposals for the target company

The results of the research have many practical implications for the target company. The construction building followed Rohleder and Silver's (1997) framework for process improvement with the exception that the last phase was excluded from the study. Therefore, the target company should conduct the last phase of the framework to implement proposed changes (Rohleder & Silver, 1997). Also, Popoff and Brache (1994) highlight that the focus is too often on redesigning processes in the process improvement – not implementing changes. To implement changes, I6 proposes that:

> *"It would be good if we had some kind of improvement team who collected all processes together. They should workshop together and synchronise processes and define roles and responsibilities. They could answer questions about how processes could be made more sensible and how the number of meetings could be reduced."*

In addition to previous, I1 proposes that:

> *"We need an external consultant to spar how we should improve the processes."*

Based on the previous comments and the importance of process change implementation, it is proposed that a process improvement project will be started, the cross-functional team is involved in the project team, and an external consultant is hired to lead the project. The project team must take into consideration process improvement areas that were not highlighted in this study: 1) process improvements are connected to business's strategic challenges, 2) right people, especially top management, is involved in the project, 3) changes effect on employees' work in the processes are considered, 4) process measurement system and other infrastructure that enables continuous process improvement is implemented (Popoff & Brache, 1994). It is proposed that the project team will implement the solutions and improvements that were found in the study. Based on the study's findings, the project is proposed to be started in the short term, and proposals for the project deliverables are:

- Combine global review and development request processes by learning from the digital services operating model.
- Merge internal system and change request input channels.
- Add cross-process tasks in the collection and prioritisation phases.
- Define multisystem tasks and responsibilities in more detail.

- Define roles by establishing the demand management team and investment committee and defining product and solution owners for every system.

After the project, information technology demand management should move to the “continuous improvement” -phase. As can be noticed, all proposed solutions that were suggested in the interviews were not included in the construction, and many excluded solutions are beneficial to consider in the target company. Solutions included or excluded in the construction are presented in Appendix B. Based on the findings, it is proposed that the target company should focus on the customer value approach, unplanned demand, and fundamental approaches in the continuous improvement phase.

Missing customer value and distance from the customer was mentioned as one of the main challenges in the target company. Unfortunately, neither literature nor empirical research did not propose any solutions for these challenges. Therefore, the area was left out from the construction. Still, solving these challenges is essential for successful demand management. Thus, the target company should focus on developing a customer value approach and decreasing the distance between the information technology and the customer.

Also, it was seen that the unplanned demand is sometimes causing confusion, and especially at the strategic level, the process does not cover unplanned items. The unplanned strategic items might have business potential and be more beneficial to implement than ongoing items. Therefore, unplanned strategic item flow needs to be described, for example, by taking advantage of new roles and cross-process tasks defined in the construction.

Currently, two different fundamental approaches are used in information technology demand management in the target company: traditional and agile. The challenges between these two methodologies will not disappear, especially for multisystem demand, until the same approach is used. Based on the research, the agile methodologies work better in the digital service’s demand management. Therefore, the target company’s information technology department should consider moving all demand management under the agile methodologies in the long term. Finally, all proposals for the target company with the timeline and the deliverables are summarised in Figure 6 below.

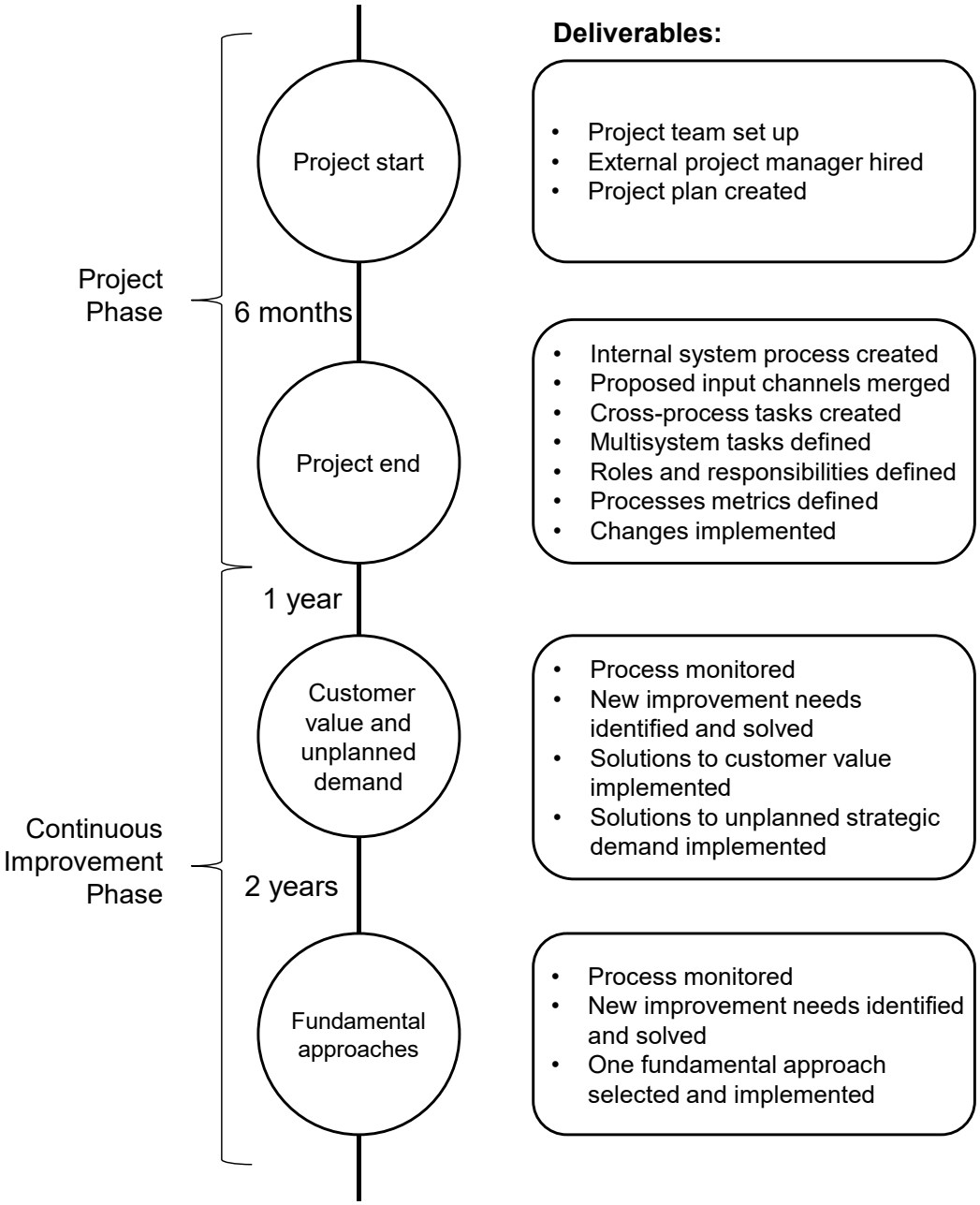

Figure 6. *Future development proposals roadmap for the target company.*

6. CONCLUSIONS

The conclusion chapter summarises the research by assessing it both from practical and theoretical perspectives and by presenting the main limitations as well as the future research proposals. From a practical perspective, the study is assessed based on how knowledge from academic literature was obtained and applied to practical context and how the findings from the research interact with the practical needs. The theoretical contribution is assessed based on findings for new theory building and extensions to previous literature. (Thunnissen & Gallardo-Gallardo, 2019)

6.1 Relevance – Practical success

At the beginning of the study, two main goals were set from a practical perspective. The first goal was to better understand the target company's current information technology demand management and the roles related to it and to create documented descriptions about the processes. The second goal was to recognise current challenges and improvement areas and propose solutions for them via construction.

The comprehensive literature review formed the ground for the understanding of information technology demand management. The literature review positioned the role of information technology in the target company and connected demand management to other researched areas like requirement engineering, portfolio management, and information technology governance. Basic concepts of information technology demand management were carried out throughout the study to form the basis for practical understanding. The findings of the empirical research responded to practical needs, and a comprehensive understanding of the target company's information technology demand management environment was created. Also, the study succeeded to clarify current processes and descriptions by collecting them into one place. In summary, it can be assumed that the study reached the first goal.

The current challenges were handled comprehensively based on the related literature, and they were connected to possible solutions. The preliminary construction was created by combining findings from information technology demand management and its improvement suggestions. Academic literature created a reasonable basis for the practical success of the study as the literature findings were highly visible in the construction. The empirical research complemented the findings to reach the second goal. Target company's challenges, risks, success factors, and improvement ideas were comprehensively

handled. The appropriate best practices for the target company were included in the construction. Thus, it can be assumed that the second goal was reached during the study as well.

Finally, the construction itself was designed for the environment where it should work. The environment was complex, making the requirements of the construction more complicated. However, the construction building was carried out throughout the study, and all findings supported its creation. Therefore, it can be assumed that the construction works in the complex environment it is designed for. Also, it was approved in the fourth meeting by the target company's representative.

6.2 Rigour – Theoretical contribution

This study collected the latest literature related to information technology demand management. However, it was noticed that literature could not define all needed areas comprehensively, which were complemented with the empirical findings of this study. Legner and Löhe (2012) argued that information technology demand management is an early-stage concept in many companies. Thus, new research related to the concept is needed (Legner & Löhe, 2012). This study contributes theoretically to information technology demand management roles, processes, and improvement areas.

Roles are an essential factor during information technology demand management processes. However, only a few sources (e.g. Gentle, 2007, p. 107-110; Legner & Löhe, 2012; Pombinho et al., 2013) defined roles for demand management. The study complemented the role descriptions by first defining the current roles in the target company and then presenting improvements to the roles based on the study's findings. The study created a description of critical roles and responsibilities in information technology demand management.

Information technology demand management processes described in the literature addressed only the flow of the tasks, aim, and roles. This signified that other general process description areas, input, output, dependencies, and tools, were left outside the previous literature's examination. This study defined the general process description areas by extending the view of the information technology demand management processes (Table 13).

Also, various challenges and possible solutions were identified during the literature review for improving the demand management (e.g. Pombinho et al., 2013; Quichiz & Oré, 2017). This study recognised new challenges which were not yet identified in the previous literature. The list of the challenges highlighted many new insights and essential

factors for improving information technology demand management. In addition, risks in information technology demand management and their effects were studied in the target company, which was a new point of view theoretically.

Previous literature also defined success factors for information technology demand management (e.g. Quichiz & Bayona-Oré, 2016). This study extended the previously identified success factor by finding eleven new success factors for demand management. Furthermore, the previous literature did not connect success factors and challenges to possible solutions. Therefore, specific practicalities were proposed to solve challenges and to utilize success factors (e.g. Cramm, 2008; Legner & Löhe, 2012). This study contributed to the previous literature by identifying proposed solutions to certain challenges, risks, and success factors to improve the target company's demand management (Table 16).

Alonso et al. (2017) highlighted the importance of creating frameworks for other information technology demand management contexts in future research. During this study, a unique process framework was built for the target company's purposes. Theoretical findings from previous literature highly supported the construction. The construction was complemented with a comprehensive study about the target company's current information technology demand management and its improvement needs. The construction collected the most applicable findings from both areas, making it a unique and valuable model also theoretically. In summary, the study extended the information technology demand management research at different levels and contributed to the current literature by many new findings from the case study.

6.3 Research limitations

First, the study is limited in terms of the implemented research process. The study followed the constructive research process presented by Kasanen et al. (1993), but only the first four process phases were implemented during the research. This means that phases *Showing theoretical connection and researching the contribution of the solution concept,* and *Examining the scope of applicability of the solution* were not implemented (Kasanen et al., 1993). Thus, the research is limited by the research process, which is designed to be implemented as a six-phase process, and all advantages of the research strategy could not be reached.

Data collection is limited to a qualitative case study inside the target company. The qualitative case study's controllability, deductibility, repeatability, and generalisability are low compared to, for example, the quantitative survey method (Gable, 1994). The argument

cannot be refuted because the case in this study is limited to one information technology demand management environment, making the sample size small. In addition, the environment is limited to a specific industry. Furthermore, the company has unique needs for information technology, decreasing the generalisability of the results.

Semi-structured interviews worked as the data collection method in the case study, setting limitations in data quality. Semi-structured interviews set reliability, generalisability, transferability, and validity limitations. (Saunders, 2016, p. 396) Also, only 12 interviews were held during the research, meaning that all participants in the demand management at the target company were not interviewed. The diverse interviewee group was selected to collect data from different sides of the processes and the organisation to overcome mentioned limitations. Results were validated during the process by the meetings and workshop. In addition, interviews were supported by the documented materials to decrease semi-structured interviews' disadvantages and increase data triangulation in the study.

Finally, the researcher's role in the target company sets its own limitations. The researcher had different personal relations to interviews, the research results affect the researcher's future possibilities in the company, and the target company ordered the research topic. These factors made it more challenging to be objective during the research. On the other hand, limitations were decreased by making the research transparent in all areas. Therefore, reasons behind methodological choices, research process, results, and construction building were presented to increase the study's confirmability (Shenton, 2004).

6.4 Proposals for future research

Proposals for future research are generated based on the meaningful findings as well as the limitations of the study. Four different areas are proposed to be researched further in the future. First, the fifth and the sixth phases of the constructive research process were excluded from this study, leaving space for further research. This means that the construction should be researched further by showing its theoretical connection to existing literature and researching its contribution in the research context. Also, the scope of the applicability of the construction should be examined as it was not implemented within this study.

Second, the information technology demand management process framework proved to be a unique concept. Thus, researching the concept further in the future would be needed. The framework should be researched in different contexts, for example, by using

multi-case study methods. Also, the focus should be on finding the generalisable framework for different purposes.

Third, one of the main challenges, success factors, and risks highlighted in the empirical part was customer value. Customer value as a concept is interesting because all demands should somehow add customer value and be beneficial for the business. However, the related literature did not handle the customer value of the demand, and solutions were not comprehensively found during empirical research. For example, customer value should be evaluated, used as prioritisation criteria, and monitored during information technology demand management. Therefore, it is proposed to research further the customer value concept and its involvement in the demand management processes.

Fourth, during the empirical part, it was observed that different fundamental approaches cause challenges in information technology demand management. For example, it was noticed that waterfall, and agile methodologies did not work well together and caused daily challenges. Therefore, it would be interesting to research further how different fundamental approaches can be synchronised in demand management and how best practices can be implemented at the connection points. On the other hand, the approaches should be researched further to understand the advantages and disadvantages of each approach in different information technology demand management contexts.

REFERENCES

Ajjan, H., Kumar, R., & Subramaniam, C. (2016). Information technology portfolio management implementation: a case study. Journal of Enterprise Information Management, Vol. 29(6), pp. 841–859.

Al-Karaghouli, W., Alshawi, S., & Fitzgerald, G. (2005). Promoting requirement identification quality. Journal of Enterprise Information Management, Vol. 18(2), pp. 256–267.

Alonso, I., Verdun, J., & Caro, E. (2008). The Importance of IT Strategic Demand Management in Achieving the Objectives of the Strategic Business Planning. 2008 International Conference on Computer Science and Software Engineering, Vol. 2, pp. 235–238.

Alonso, I., Verdún, J., & Caro, E. (2009). Project Prioritisation as a Key Element in IT Strategic Demand Management. In Innovations and Advances in Computer Sciences and Engineering (pp. 417–422). Springer Netherlands.

Alonso, I., Verdún, J., & Caro, E. (2013). Case Study of Strategic IT Demand Management in Organizations – Exploratory Results. Procedia Technology, Vol. 9, pp. 900–909.

Alonso, I., Verdún, J., & Caro, E. (2017). Description of the structure of the IT demand management process framework. International Journal of Information Management, Vol. 37(1), pp. 1461–1473.

Artto, K., Ahola, T., & Vartiainen, V. (2016). From the front end of projects to the back end of operations: Managing projects for value creation throughout the system lifecycle. International Journal of Project Management, Vol. 34(2), pp. 258–270.

Baxter, P., & Jack, S. (2008). Qualitative Case Study Methodology: Study Design and Implementation for Novice Researchers. The Qualitative Report, Vol.13(4), pp. 544-559.

Buer, S., Fragapane, G., & Strandhagen, J. (2018). The Data-Driven Process Improvement Cycle: Using Digitalization for Continuous Improvement. IFAC PapersOnLine, Vol. 51(11), pp. 1035–1040.

Campbell, G. (2014). Project management (1st edition). Alpha a member of Penguin Group USA Inc.

Chau, D., Ngai, E., Gerow, J., & Thatcher, J. (2020). The effects of business-IT strategic alignment and IT governance on firm performance: A moderated polynomial regression analysis. MIS Quarterly, Vol. 44(4), pp. 1679–1703.

Chen, D., Mocker, M., Preston, D., & Teubner, A. (2010). Information Systems Strategy: Reconceptualisation, Measurement, and Implications. MIS Quarterly, Vol. 34(2), pp. 233–259.

Cramm, S. (2008). How to Reduce IT Demand by 50%. Harvard Business Review. Available at: https://hbr.org/2008/05/how-to-reduce-it-demand-by-50 (Referenced at 07.12.2021).

Croxton, K., Lambert, D., García-Dastugue, S., & Rogers, D. (2002). The Demand Management Process. The International Journal of Logistics Management, Vol. 13(2), pp. 51–66.

Davis, G. (2000). Information systems conceptual foundations: looking backward and forward. In Organisational and social perspectives on information technology (pp. 61–82). Springer, Boston, MA.

Davenport, T. (1993). Process innovation : reengineering work through information technology. Harvard Business School Press.

Davenport, T. (2005). The coming commoditisation of processes. Harvard Business Review, Vol. 83(6), pp. 100–108.

Denner, M., Püschel, L., & Röglinger, M. (2017). How to Exploit the Digitalization Potential of Business Processes. Business & Information Systems Engineering, Vol. 60(4), pp. 331–349.

Dömges, R., Jacobs, S., Jarke, M., Nissen, H., Pohl, K., Maiden, N., Sutcliffe, A., Taylor, C., Till, D., Constantopoulos, P., Spanoudakis, G., Vassiliou, Y., Grosz, G., Plihon, V., Rolland, C., Schmitt, J., Schwer, S., Si-Said, S., Souveyet, C., Bubenko, J., Gustas, R., Holm, P., Johannesson, P., Ljungberg, J., & Wangler, B. (1996). Defining visions in context: Models, processes and tools for requirements engineering. Information Systems (Oxford), Vol. 21(6), pp. 515–547.

Ebert, C., Vizcaino, A., & Manjavacas, A. (2020). IT Governance. IEEE Software, Vol. 37(6), pp. 13–20.

Eisenhardt, K., & Graebner, M. (2007). Theory building from cases: Opportunities and challenges. Academy of Management Journal, Vol. 50(1), pp. 25–32.

Ernst, N., Borgida, A., Jureta, I., & Mylopoulos, J. (2014). Agile requirements engineering via paraconsistent reasoning. Information Systems (Oxford), Vol. 43, pp. 100–116.

Gable, G. (1994). Integrating case study and survey research methods: an example in information systems. European Journal of Information Systems, Vol. 3(2), pp. 112–126.

Gentle, M. (2007). IT success! towards a new model for information technology (1st edition). John Wiley & Sons.

Gonzalez, P., Mckeen, J., & Smith, H. (2012). Managing IT Demand. Information Technology and Management, Vol. 23(2), pp. 17–28.

Gregory, R., Kaganer, E., Henfridsson, O., & Ruch, T. (2018). It consumerisation and the transformation of it governance. MIS Quarterly, Vol. 42(4), pp. 1225–1253.

Grover, V., & Malhotra, M. (1997). Business process reengineering: A tutorial on the concept, evolution, method, technology and application. Journal of Operations Management, Vol. 15(3), pp. 193–213.

Guillemette, M., & Paré, G. (2012). Toward a New Theory of the Contribution of the IT Function in Organizations. MIS Quarterly, Vol. 36(2), pp. 529–551.

Heising, W. (2012). The integration of ideation and project portfolio management — A key factor for sustainable success. International Journal of Project Management, Vol. 30(5), pp. 582–595.

IEEE. (1998). IEEE Recommended Practice for Software Requirements Specifications. IEEE.

Kasanen, E., Lukka, K., & Siitonen, A. (1993). The constructive approach in management accounting research. Journal of Management Accounting Research, Vol. 5(5), pp. 243–264.

Laamanen, K., & Tinnilä, M. (2009). Terms and concepts in business process management (4th rev. ed.). Federation of Finnish Technology Industries = Teknologiainfo Teknova.

Laybats, C., & Davies, J. (2018). GDPR: Implementing the regulations. Business Information Review, Vol. 35(2), pp. 81–83.

Legner, C., & Löhe, J. (2012). Improving the realisation of IT demands: A design theory for end-to-end demand management. International Conference on Information Systems, ICIS 2012, Vol. 4, pp. 2760–2776.

Lock, D., & Wagner, R. (2019). The handbook of project portfolio management. Routledge.

Lu, H., Lin, P., Huang, P., & Yuan, A. (2017). Deployment and Evaluation of a Continues Integration Process in Agile Development. Journal of Advances in Information Technology, Vol 8(4), pp. 203–209.

Martinsuo, M. (2020). The Management of Values in Project Business: Adjusting Beliefs to Transform Project Practices and Outcomes. Project Management Journal, Vol. 51(4), pp. 389–399.

Meskendahl, S. (2010). The influence of business strategy on project portfolio management and its success — A conceptual framework. International Journal of Project Management, Vol. 28(8), pp. 807–817.

Mithas, S., & Rust, R. (2016). How information technology strategy and investments influence firm performance: Conjecture and empirical evidence. MIS Quarterly, Vol. 40(1), pp. 223–245.

Oyegoke, A. (2011). The constructive research approach in project management research. International Journal of Managing Projects in Business, Vol. 4(4), pp. 573–595.

PMI (Project Management institute). (2014). The standard for portfolio management (3rd ed.). Project Management Institute.

Pombinho, J., Aveiro, D., & Tribolet, J. (2013). The Role of Value-Oriented IT Demand Management on Business/IT Alignment: The Case of ZON Multimedia. In Practice-Driven Research on Enterprise Transformation, Vol. 151, pp. 46–60.

Popoff, F., & Brache, A. (1994). The seven deadly sins of process improvement. Chief Executive, Vol. 95, pp. 22–26.

Reddivari, S., Asaithambi, A., Niu, N., Wang, W., Xu, L., & Cheng, J. (2017). Ethnographic field work in requirements engineering. Enterprise Information Systems, Vol. 11(1), pp. 137–159.

Quichiz, L., & Bayona-Ore, S. (2016). IT demand management models in organizations. 2016 6th International Conference on Information Communication and Management (ICICM), pp. 40–46.

Quichiz, L., & Oré, S. (2017). IT Demand Management in Organisations: A Review. Proceedings of the 8th International Conference on Computer Modeling and Simulation, pp. 95–99.

Roberts, N., & Gerow, J. (2020). Connecting the Role of the Information Technology Function to its Contribution to the Organization. Journal of Organizational Computing and Electronic Commerce, Vol. 30(2), pp. 150–168.

Rohleder, T., & Silver, E. (1997). A tutorial on business process improvement. Journal of Operations Management, Vol. 15(2), pp. 139–154.

Romano, L., Grimaldi, R., & Colasuonno, F. (2016). Demand management as a critical success factor in portfolio management. Paper presented at PMI® Global Congress 2016—EMEA, Barcelona, Spain. Newtown Square, PA: Project Management Institute.

Rouvali, J. (2019). Agile and waterfall project management methodology effect on IT-projects success. Bachelor thesis, Tampere university.

Saunders, M., Lewis, P., & Thornhill, A. (2016). Research methods for business students: 7. ed. Pearson.

Seethamraju, R., & Marjanovic, O. (2009). Role of process knowledge in business process improvement methodology: A case study. Business Process Management Journal, Vol. 15(6), pp. 920–936.

Serrador, P., & Turner, R. (2015). The Relationship Between Project Success and Project Efficiency. Project Management Journal, Vol 46(1), pp. 30–39.

Shenton, A. (2004). Strategies for ensuring trustworthiness in qualitative research projects. Education for Information, Vol. 22(2), pp. 63–75.

Siha, S., & Saad, G. (2008). Business process improvement: empirical assessment and extensions. Business Process Management Journal, Vol. 14(6), pp. 778–802.

Symons, C., Cameron, B., Orlov, L., & Sessions, L. (2006). How IT must shape and manage demand. Best Practices. June, Vol. 15.

Tallon, P., Kraemer, K., & Gurbaxani, V. (2000). Executives' Perceptions of the Business Value of Information Technology: A Process-Oriented Approach. Journal of Management Information Systems, Vol. 16(4), pp. 145–173.

Thakurta, R. (2017). Understanding requirement prioritisation artifacts: a systematic mapping study. Requirements Engineering, Vol. 22(4), pp. 491–526.

Thejendra, B. (2014). Practical IT service management : a concise guide for busy executives (Second edition.). IT Governance Publishing.

Thomason, D. (2004). Strategic, tactical, operational(Demand management). Manufacturing Engineer, Vol. 83(3), pp. 34–37.

Thunnissen, M., & Gallardo-Gallardo, E. (2019). Rigor and Relevance in Empirical TM Research: Key Issues and Challenges. Business Research Quarterly, Vol. 22(3), pp. 171–180.

Toyama, K. (2018). From needs to aspirations in information technology for development. Information Technology for Development, Vol. 24(1), pp. 15–36.

Turkulainen, V., Ruuska, I., Brady, T., & Artto, K. (2015). Managing project-to-project and project-to-organisation interfaces in programs: Organisational integration in a global operations expansion program. International Journal of Project Management, Vol. 33(4), pp. 816–827.

Xiang, Y., Wu, X., & Hu, B. (2008). Strategic Alignment b Methods Based on Demands Classification of Information Technology. 2008 IEEE Symposium on Advanced Management of Information for Globalised Enterprises (AMIGE), pp. 1–5.

Vanwersch, R., Shahzad, K., Vanderfeesten, I., Vanhaecht, K., Grefen, P., Pintelon, L., Mendling, J., Merode, G., & Reijers, H. (2016). A critical evaluation and framework of business process improvement methods. Business & Information Systems Engineering, Vol. 58(1), pp. 43–53.

Voss, C., Tsikriktsis, N., & Frohlich, M. (2002). Case research in operations management. International Journal of Operations and Production Management, Vol. 22(2), pp. 195–219.

Vuorinen, L., & Martinsuo, M. (2018). Program integration in multi-project change programs: agency in integration practice. International Journal of Project Management, Vol. 36(4), pp. 583–599.

White, G. (2009). Strategic, Tactical, & Operational Management Security Model. The Journal of Computer Information Systems, Vol. 49(3), pp. 71–75.

APPENDIX A: INTERVIEW QUESTION OUTLINE

Theme	Question
Defining and understanding the process (phase 2-4)	1. What kind of personal experiences have you had about information technology demand management? a) Can you give concrete examples of the situations you have faced? b) What worked well in these situations? c) What did not work so well in these situations? 2. Which are a majority cases that you have faced in information technology demand management? a) Which are a minority cases that you have faced in information technology demand management? 3. Which tasks have you participated in information technology demand management? a) Can you describe or draw the flow of the mentioned tasks? 4. Do you know any other tasks that are related to information technology demand management? b) Can you describe or draw the flow of these tasks? 5. What roles have you had in information technology demand management? a) What other roles can you recognise in information technology demand management? 6. What sources of information technology demand have you faced in the company? 7. What differences have you noticed in managing different information technology demands, e.g. projects and software requirements? 8. What do you see as starting and ending points in information technology demand management? 9. What do you see as input and output of the information technology demand management process? 10. Who are the customers of information technology demand management? 11. Who owns the information technology demand management process? a) If you cannot name one owner, can you identify different owners for different areas of the process? 12. Which tools and templates have you used in information technology demand management? b) Do you know other tools that are being used?
Identification of obvious wastes and challenges (phase 5, 7)	13. What kind of challenges have you faced in information technology demand management? 14. Have you recognised any other challenges? 15. What duplicated or overlapping tasks or roles have you recognised during the processes? 16. What risks have you recognised in information technology demand management in the company?
Identification of documented materials and	17. Do you have or do you know any documented materials related to information technology demand management? 18. Can they be used as a part of this research? 19. Can you recognise any challenges in the materials?

their challenges (phase 6)	20. Can you think of any additional materials that would help you in information technology demand management?
Defining solution proposals (phase 8)	21. What do you consider as the most important thing in information technology demand management? 22. How would you develop the current processes? 23. What tools are required to manage information technology demand successfully? 24. What roles and resources are needed to manage information technology demand successfully?
Ending	25. Is there anything you have not said but would want to add?

APPENDIX B: PROPOSED SOLUTIONS INCLUDED AND EXCLUDED IN THE CONSTRUCTION

Included

Excluded

Challenge/Risk/Success Factor	Solutions
Communication	*More dialogue, better dialogue and business trainings (I1;I8).*
Cooperation	*Tribe system where demand is handled in cooperation. Business should be involve in the planning and when the unplanned demand appear, a cross-functional team is needed to decide what is moved forward and how to prioritise them. (I10)*
Customer value/approach	*1) Move more to value-based releases and follow up, meaning that the customer value is defined for every software release made (I10). 2) Solutions needed to collect and document customer demand, cross-check it transparently, find an argument why it is important and measure it (I2).*
Demand investigation	More time should be spent in an initial phase to investigate in e.g., processes to avoid failures (I3).
Demand monitoring	Demand management should end three months after release, so success can be monitored by using return on investment metrics and updating business cases. (I4)
Different approaches	*1) One way to operate through the company (I12). 2) Syncroniced processes (I5). 3) Select a certain approach. 4) Taking best practices in the use from approaches. (I9)*
Input channel	The unified input channel and all demand are input using the same template (I4).
Organisation	1) demand management function or team inside information technology department which responsible for overall coordination and demand management (I1). 2) Demand forum that handles all demand which information technology department receives and all relevant people are involved (I4).
Ownership	1) Defined product ownership that covers from project start to operational phase (I3). 2) Ownership should cover both business and technical sides (I2). 3) Assigned persons for the projects and systems from the business side (I3).
Prioritisation	1) All demand should go under the same prioritisation because the same human resources and money is used regardless of the demand (I5). 2) Making prioritisation visible. 3) Quantitative approach used where specific criteria are scored, e.g., revenue, customer value and profit potential. (I1; I5) 4) Creating a prioritisation framework for new development demand (I9). 5) Having overall prioritisation and coordination (I6).
Resourcing	1) Efficient allocations (I5; I6; I10; I12). 2) Roles and responsibilities need to be clarified and defined, and open communication is needed (I10; I12).
Roles	1) Demand owner should be defined for the demand from process start to end (I2). 2) The demand management as wholeness needs the overall responsible (I5).
Slow process/Lack of resources	*Small business changes could have a quicker path in the process, and business self-service should be done as much as possible. For example, if a new document is needed, information technology department participation is not needed (I11).*
Tools	*1) Tools should be used more efficiently (I6; I12). 2) Prioritisation matrix in the backlog management tool would be needed (I4). 3) Organisation wide resource management tool missing (I5).*