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RISTO KURPPA
STRATEGIC MANAGEMENT AND CHOICES OF BUSINESS MOD-
ELS IN SME PROJECT PORTFOLIO MANAGEMENT

Master's thesis

Examiner: Professor Saku Mäkinen
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ABSTRACT

RISTO KURPPA: Strategic management and choices of business models in SME project portfolio management

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This Master's thesis investigates the phenomena of business models, competitive strategy and competitive advantage in the context of project business. The objectives of the study were to investigate the linkages between business models, competitive strategy and project business, how these influence the performance of a business, and how dynamic capabilities can help in the creation of sustainable competitive advantage in project business. The findings are based on a five-case study in a single Finnish small-to-medium enterprise. The data was gathered via participant-observation.

Significant differences existed in between the cases, such as the scope of the projects themselves, the activity systems employed in the projects, the influence of competitive forces and marketplace dynamics and the profitability of the cases. The projects were delivered for five distinct customers in three different industries, containing components from four distinct business units of the case company.

The concept of business model is directly linked to the competitive strategy of a business. Strategic decisions define what capabilities to build, execute and remove, while business models govern the execution of activities in creation of value. In project business, business models are often solution-specific activity configurations, driven by changes in customer needs, often combining both project and service components. Project portfolio of a business should maintain a balance in activities.

Choices in business models and competitive strategy influence the performance of project business. The decisions to build capabilities are strategic in nature, and the profitability of project business is driven through the evolution of capabilities to respond to different customer needs. Choices in the execution of activities are choices in business models and have an impact on the performance of the business, and the performance in a given project results from the fit between the solution-specific activity system and the customers' needs. A value system of a business evolves and can be influenced by the dynamic capabilities of the business. Business models can create sustainable competitive advantage if they result in new activities, cost advantage or improved activity configurations.

Dynamic capabilities can help create sustained competitive advantage in project business. This happens as dynamic capabilities create new capabilities, resources and activities, enabling a business to perform better than its rivals. To realize these benefits, dynamic capabilities, including organizational learning, should be integrated into the management and measurement system of the project business.

TIIVISTELMÄ

RISTO KURPPA: Strateginen johtaminen ja valinnat liiketoimintamalleissa osana PK -yrityksen projektiportfolion hallintaa
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Tämä diplomityö tutkii liiketoimintamalleja, strategiaa ja kilpailuetua projektiliiketoimintakontekstissa. Tämän tutkimuksen tavoitteina olivat liiketoimintamallien, strategian ja projektiliiketoiminnan välisten linkkien tutkiminen, kuin myös sen, miten nämä vaikuttavat liiketoiminnan suorituskykyyn, ja miten dynaamiset kyvykkyydet vaikuttavat pysyvän kilpailuedun luomiseen projektiliiketoimintakontekstissa. Tutkimuksen tulokset perustuvat viiteen tapaustutkimukseen suomalaisessa keskisuudessa yrityksessä. Data kerättiin osallistuvan havainnointitutkimuksen keinoin.

Tapausten välillä oli huomattavia eroja, kuten projektien mittakaava, projekteissa hyödynnetyt aktiviteettisysteemit, ulkoisten voimien vaikutus kilpailukykyyn, markkinapaikan dynamiikka ja projektien kannattavuus. Projektit toimitettiin viidelle eri asiakkaalle kolmella eri toimialalla, sisältäen komponentteja neljästä kohdeyrityksen eri liiketoimintayksiköstä.

Liiketoimintamallin konsepti liittyy suoraan liiketoiminnan kilpailustrategiaan. Strategiset valinnat määrittelevät mitä kyvykkyyksiä rakentaa, toteuttaa ja poistaa, kun taas liiketoimintamallit ohjaavat aktiviteettien toteutusta arvonluonnissa. Projektiliiketoiminnassa liiketoimintamallit ovat usein ratkaisukohtaisia aktiviteettikonfiguraatioita, joita ajavat muutokset asiakastarpeissa, usein projekti- ja palvelukomponentteja yhdistäen. Liiketoiminnan projektiportfolion tulisi olla aktiviteettien suhteen tasapainossa.

Valinnoilla liiketoimintamalleista ja kilpailustrategiasta on suora vaikutus projektiliiketoiminnan suorituskykyyn. Valinnat kyvykkyyksien rakentamisesta ovat strategisia, ja projektiliiketoiminnan kannattavuus kehittyy kyvykkyyksien vastata erilaisiin asiakastarpeisiin kehittyessä. Valinnat aktiviteeteissa ovat valintoja liiketoimintamalleissa, ja niillä on vaikutusta liiketoiminnan suorituskykyyn. Yksittäisten projektien suorituskyky on seurausta yhteensopivuudesta ratkaisukohtaisen aktiviteettisysteemin ja asiakastarpeiden välillä. Yrityksen arvosysteemin kehittymiseen voi vaikuttaa liiketoiminnan dynaamisten kyvykkyyksien kautta. Liiketoimintamallit voivat olla pysyvän kilpailuedun lähde, jos ne mahdollistavat uusia aktiviteetteja, kustannusetua tai erilaisia aktiviteettikonfiguraatioita.

Dynaamiset kyvykkyydet voivat auttaa luomaan pysyvää kilpailuetua projektiliiketoiminnassa. Näin tapahtuu dynaamisten luodessa uusia kyvykkyyksiä, resursseja ja aktiviteetteja, jotka mahdollistavat liiketoiminnan kilpailijoita paremman suorituskyvyn. Näiden hyötyjen saavuttamiseksi dynaamisten kyvykkyyksien, sisältäen organisaation oppimisen, integrointi projektiliiketoiminnan johtamis- ja mittausjärjestelmiin on suotavaa.

PREFACE

This journey began three and a half years ago, when I began my employment at the case company, and almost a year since I began to gather materials for my Masters' thesis. Along the way we have been through a rollercoaster ride of new challenges, triumphs and defeats. We have done some great things along the way. It has been the best of times, it has been the worst of times. But we pulled through. Thank you all for your comments, encouragement and contributions for this study.

I would like to thank the examiner of my thesis, Saku. I have no idea how this would have been possible without you. I would also like to thank my family and friends for being there when the journey seemed impossible, and the urging you gave me to keep going. I cannot put into words how much it helped.

My time to graduate has finally come, and with it, many things will undoubtedly change. But still,

Show must go on.

Tampere, 20.11.2018

Risto Kurppa

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1. INTRODUCTION

“At its heart, engineering is about using science to find creative, practical solutions. It is a noble profession.”

Queen Elizabeth II

1.1 Background of the study

The field of strategy is concerned with the fundamental question of “Why firms succeed or fail” (Porter, 1991). It is not surprising that in such a wide subject several schools of thought exist, especially regarding the sub-question “What is the source of competitive advantage?” Several alternatives, such as competitive positioning (Porter, 1980, p. 34–46), controlled resources (Wernerfelt, 1984) and dynamic capabilities (Winter, 2003) are posited as the sources of competitive advantage, each with their own, unique viewpoint. The main problem for the business practitioner is that no universally accepted consensus exists regarding *e.g.* the source(s) of competitive advantage, leading to confusion and uncertainty when trying to apply the lessons into practice. Thus, a model combining several viewpoints could be of high utility and provide a foundation for future research with both explanatory power regarding businesses’ current performance, and predictive power regarding the future performance of a business.

Business models are one of the more recent fields of study in academic literature. Appearing first in the context of e-business, (*e.g.* Amit and Zott, 2001; Petrovic *et al.*, 2001; Pitt *et al.*, 2001) business models have attempted to explain how a company conducts its activities and derives value from them. However, like with strategy, the research into business models is extremely fragmented, with several interpretations of the contents of the concept and its role in the performance of a business, also drawing significant critique (*e.g.* Porter, 2001). In addition, most of the research seems to be focused in the organization of either business-to-consumer or electronically conducted business. Significantly less attention has been given to business models in the context of project business, despite some forays into integrated solutions (*e.g.* Davies *et al.*, 2001, Davies *et al.*, 2006a) and solution-specific business models (*e.g.* Kujala *et al.*, 2011), creating an impetus for further study.

Projects are some of the oldest activities of humankind, with history ranging from year 10 000 BC to the current date. The academic study of project business, defined as “the part of business that relates directly or indirectly to projects, with a purpose to achieve objectives of a firm or several firms” (Artto and Wikström, 2005), is significantly younger

but still a firmly established field. However, much of the research into projects and project business happens in its own silo of academic literature and in its own journals, such as the *International Journal of Project Management*. Thus, while the field of project business *per se* is rather mature, much research could still be conducted into the linkages between management of project business and other fields, such as business models. This becomes exceedingly important as project networks (e.g. Hellgren and Stjernberg, 1995) have emerged, leading to the need to manage business activities on the level of several interconnected companies – one of the main foci in the study of business models (e.g. Tikkanen *et al.*, 2005; Al-Debei and Avison, 2010).

In addition to their own deficiencies, strategy and sources of competitive advantage, business models and project business are very much separate fields of study, and the linkages between them are poorly understood and expressed. Some research attention has been paid to questions such as “How strategy influences the selections of a project portfolio?” (Archer and Ghasemzadeh, 1999), but several others, such as “How do project portfolio selections reinforce the strategic position of a company?” or “Can business models be used to build new capabilities?” are so far unanswered.

This study was conducted at the request of a medium-sized enterprise in Finland, wrestling with many of the issues described here. The study was executed during the year 2018, during which the researcher was employed by the case company and involved intimately in the daily operations of the company, including some of the cases described here. Despite this background, the results of the study should be generally applicable in the context of project business.

1.2 The research problem

The focus of this study is the interaction between the focal concepts of business model, strategy and project business. On one hand, this study attempts to understand how these concepts relate to each other, what are the key differences in the concepts and how they interact with each other. On the other hand, this study attempts to improve the state of business practice in the strategic management of project business and business models. Thus, the study is directly connected to questions of corporate performance, organization and management practices of project business in addition to the theoretical frameworks of strategy and business models. Based on this duality, the research questions are defined:

1. How are the concepts of business model, strategy and project business related?
2. How do business models and strategy influence the performance of project business?
3. Can dynamic capabilities help create sustained competitive advantage in project business, and how?

The first research question aims to find out how the three academically rather distinct concepts of business models, strategy and project business interact with each other. The goal behind this question is to illustrate how, for example, strategic choices impact project business and available business models of a given company, or what kind of limitations and constraints the context of project business causes for choices regarding business models.

The concept of strategy is strongly linked to business performance (*e.g.* Porter, 2008). Similarly, the concept of project business has direct connection to business performance (*e.g.* Artto and Kujala, 2008), as well as the concept of business model (*e.g.* Zott and Amit, 2002; Fiskén and Rutherford, 2002; Pohle and Chapman, 2006). However, these linkages are not always well-understood, as apparent from *e.g.* Neely (2007; 2008), who presents the finding that companies listed as both manufacturing and service companies are more likely to go bankrupt; in contrast to *e.g.* Cohen *et al.* (2006), who suggest that services are, in fact, often the most profitable part of the company, complemented by several authors (*e.g.* Oliva and Kallenberg, 2003; Ulaga and Reinartz, 2011) who argue for expansion of services in the offering of a project company. The second research question aims to explain the dynamic between these linkages and company performance.

Third research question considers some of the more abstract attributes under scrutiny. The concept of business model is rather vague, of which the concept has received critique (*e.g.* Porter, 2001). Similarly, the concept of dynamic capabilities (*e.g.* Winter, 2003) is mostly concerned with abstract capabilities such as the capability to learn as an organization. These factors make the concepts rather difficult to employ in business practice due to their intangibility. The third research question aims to answer what tangible benefits could be derived from including the concepts of business models and dynamic capabilities into management of project business. As dynamic capabilities are directly connected to the cognitive abilities of the management of the company (Winter, 2003), and as the study attempts to create constructs of practical utility in addition to theoretical contributions, a satisfactory answer to the third research question should be able to both explain how dynamic capabilities create competitive advantage for project business, and to integrate dynamic capabilities and business model attributes into a management system.

1.3 The contents of the study

The first chapter of this study is the introduction. This introduction consists of a reasoning for the execution of this study and the research questions and a reasoning for them. The chapter is concluded by a description of the contents of this study.

The second chapter of this study contains the theoretical background. The chapter contains an introduction to the domain of competitive strategy and a synthesis combining different schools of thought regarding the source of competitive advantage. Upon this, a concept of business models is built and evaluated. The chapter also contains a discussion

regarding project business and integrated project-service systems and conducts a more thorough look into dynamics of learning in project business.

In the third chapter the research methodology is described and evaluated. The research strategy and the goals of the study are expanded upon and the data collection methodology is described. The explanation of the logic and structure of the analysis process is also included here, and potential pitfalls in the conduct of this study are discussed in greater detail.

The fourth chapter contains the results of the study. This includes descriptions of the case company and the cases themselves, an evaluation of the strategic context in which the cases are built and developed, a comparative analysis of the financial performance of each case and a discussion regarding the project and project portfolio management system present in each case. The description of results also contains a look into the learning systems in place in the case company.

The fifth chapter consists of a critical discussion of results and answers to the research questions. These include a *description of the linkage between business strategy, business models and the management practices of project business*, a description how the preceding influence the performance of a business and a discussion of how dynamic capabilities can be utilized to create sustainable competitive advantage in project business.

The final chapter of this study concludes the study, collates the key findings in relation to the research questions and the goals of this study, evaluates its scientific and practical contributions. The study concludes with a look into the limitations of the study and potential new, fertile research subjects.

2. THEORETICAL BACKGROUND

This chapter builds the theoretical background of the study. The first subchapter considers business models. The focus of the second subchapter is project business, related services and dynamic capabilities. Third subchapter summarizes the theoretical background of the study.

2.1 Business models

In this subchapter the concept of strategy and competitive advantage is analysed. This is followed by an analysis of how the concept of business model came into being, how the concept is defined by different authors and finally how the concept of business model is related to the concept of competitive strategy. This is followed by a look into how business models can be categorized, what are the structure and components present in business model descriptions and how business models could be built, developed and innovated upon. The subchapter concludes with an analysis of existing research investigating the linkage between business models and corporate performance.

2.1.1 Strategic context of business models

In this study, the domain of strategy is defined following Michael Porter (e.g. 1980; 1985; 1991; 1996; 2008). According to his view, theory of strategy should be able to explain “why firms succeed or fail” (Porter, 1991). Porter presents a causality chain for the cross-sectional determinants of success in distinct businesses, where the success of a business is based on the structure of its industry and the relative position seized by the business (*ibid.*). The structure of the industry is determined by the Five Forces: bargaining power of buyers, bargaining power of suppliers, rivalry among existing competitors, threat of new entrants and threat of substitute products or services (Porter, 2008).

The relative position, on the other hand, can be categorized into several alternatives. These can be classified as ‘generic competitive strategies’ comprised of overall cost leadership, differentiation and focus. Cost leadership means that lower relative costs protect the profitability of the business from the five forces, as cost structure limits the power other actors can enact on the business vis-à-vis its competitors. In differentiation the company provides unique relative value in its offering, increasing its ability to deflect the impact five forces can have on its profitability, for example, through increased value leading to increased brand loyalty, preventing new entrants. In focus the business targets a segment within the larger market, aiming to either provide higher relative value or lower relative cost *especially* to that exact target. (Porter, 1980, p. 34–46.) Different choices regarding generic strategies mean the movement of a business along a productivity

frontier, formed from the relative cost position at a given value delivered to the customer at the state of best practice in the industry (Porter, 1996) – in other terms, the total trade-off made by the business between relative cost and provided value.

How the generic strategies translate to business profitability is determined by what constitutes a sustainable competitive position in the industry, resulting from the chain of different value-creating activities performed by businesses (Porter, 1985; 1991). The differences are in necessary trade-offs in what activities to perform, not to perform, and how, as well as the fit between different activities and trade-offs (Porter, 1996). These are driven by the economic logic underlying buyer value and the costs to perform activities (Porter, 1991). This *cross-sectional* ‘picture’ of the business then evolves and is influenced by *longitudinal* interaction of managerial choices made over given initial conditions (*ibid.*). These interactions are illustrated in figure 1, where the cross-sectional image of the business in initial conditions evolves through managerial choices over time.

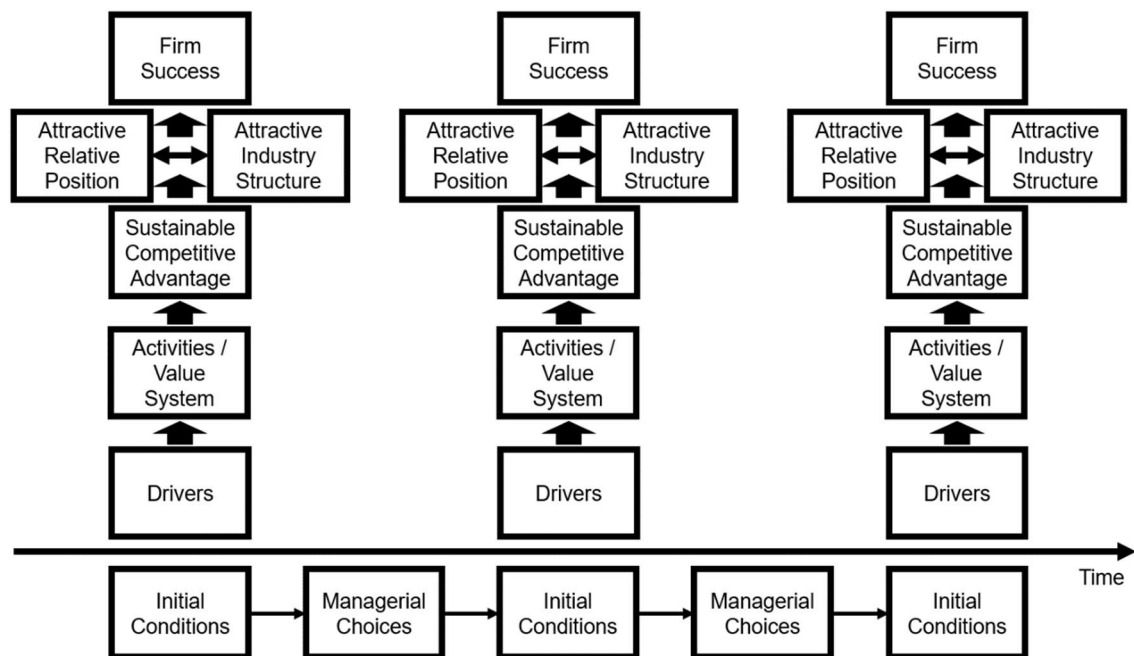


Figure 1. Determinants of success in distinct businesses, adapted from Porter, 1991.

The domain of strategy, as presented before, has several foci and schools of thought, especially regarding the origins of competitive advantage, defined here as the ability to generate sustained superior relative profitability (*e.g.* Porter, 1991; Teece, 2010). In porterian thought, the competitive advantage is the result of choices made regarding the activities to perform, choices leading to a different positioning in the market *vis-à-vis* competitors, resulting in the ability to either gain higher relative prices, to incur lower relative costs, or a combination thereof (Porter, 1996). The necessary trade-offs and fit among activities make the choices and positioning more difficult to copy by competitors, enabling superior returns from an advantageous position (*ibid.*).

An alternative view to the source of competitive advantage is presented by Wernerfelt (1984) in the article “A Resource-Based View of the Firm”. In this interpretation the firm’s resources are the basis for competitive advantage and strategic analysis, control over resources translating to the ability to derive sustained superior profitability (Wernerfelt, 1984).

Other authors, such as Winter (2003) and Teece (2007; 2010) expand the resource-based view from resources controlled by the firm to capabilities the firm has, especially dynamic capabilities, defined as capabilities that “operate to extend, modify or create” ordinary capabilities. The argument is that competitive advantage is the result of dynamic capabilities (*e.g.* Winter, 2003; Teece, 2007). Winter (2003) argues that a company has several different levels of capabilities, with zero-level capabilities being the capabilities the company already possesses, new product development being an example of first-order capability, higher-order capabilities being more abstract and costly to obtain, requiring things such as investments in organizational learning. Teece (2007) expands on this and defines distinct dynamic capabilities, such as the ability to sense markets and seize business opportunities, enabling the company to derive competitive advantage through adaptation to changes.

Presented viewpoints of the sources of competitive advantage are not intended to represent an exhaustive list of literary interpretations regarding the ability of businesses to gain sustainable competitive advantage. They do, however, provide a sufficient background regarding the role of strategy and competitive advantage for the purposes of this study. The presented viewpoints are summarized in table 1.

Table 1. *Summarization of different schools of thought regarding the source of competitive advantage*

School	Representative author(s)	Summary
Positioning	Porter, M.E.	“The selection and fit of activities in a value chain enables a business to position itself favourably, gaining competitive advantage.”
Resource-based view	Wernerfelt, B.	“The competitive advantage enjoyed by a business is the result of the resources controlled and leveraged by the business.”
Dynamic capabilities	Winter, S.G. Teece, D.J.	“The competitive advantage enjoyed by a business is the result of managerial choices over time, limited by the dynamic capabilities possessed by the managers and the business.”

Despite the differences apparent from table 1, the different schools of thought are not irreconcilable. Using the earlier framework for determinants of success in distinct businesses by Porter (Figure 1; Porter, 1991) as a basis, different schools can be consolidated

into a combined perspective of determinants of business success, with key difference in perspective being the time horizon of the study. Here, a distinction is made between *cross-sectional* and *longitudinal* views of the determinants of competitive advantage. For the purposes of *cross-sectional* analysis, the following argument is posited utilizing the theories of positioning and resource-based view:

Competitive advantage in any given moment is the result of the selection and fit of activities in a value chain, enabling a business to position itself favourably within its industry. This is defined as the ability of a business to protect itself from the fundamental forces present in the industry, thus allowing it to charge higher relative price, to incur a lower relative cost, or a combination thereof. The choices in the configuration of activities are limited by the resources controlled and leveraged by the company.

Similarly, for the purposes of longitudinal analysis, the following argument is posited combining the theories of positioning, resource-based view and dynamic capabilities:

Competitive advantage over a sustained period of time is the result of managerial choices limited by the dynamic capability of managers to both understand and react to the environment, as well as by the initial resources and activities. The result of managerial choices is the configuration and fit of resources and the value chain in a given market, leading to a favourable market position.

Using Porter (1991) and figure 1 as a basis, the preceding arguments for the sources of competitive advantage can be illustrated in figure 2. In the figure, the competitive success of a business is the result of the structure of the industry as well as the position occupied by the company. The position is determined by the sustainable competitive advantage of the business, itself determined by the configuration of the activities within the company. The configuration of activities is driven by the fundamental logic of the business system and the resources the company possesses. The position of the company evolves over time as a result of managerial choices limited by the initial conditions, definable by the ‘resources the company has at a given moment’ and the dynamic (cognitive) capabilities of the managers of the company. The influence of each school of thought in this framework is highlighted in the figure.

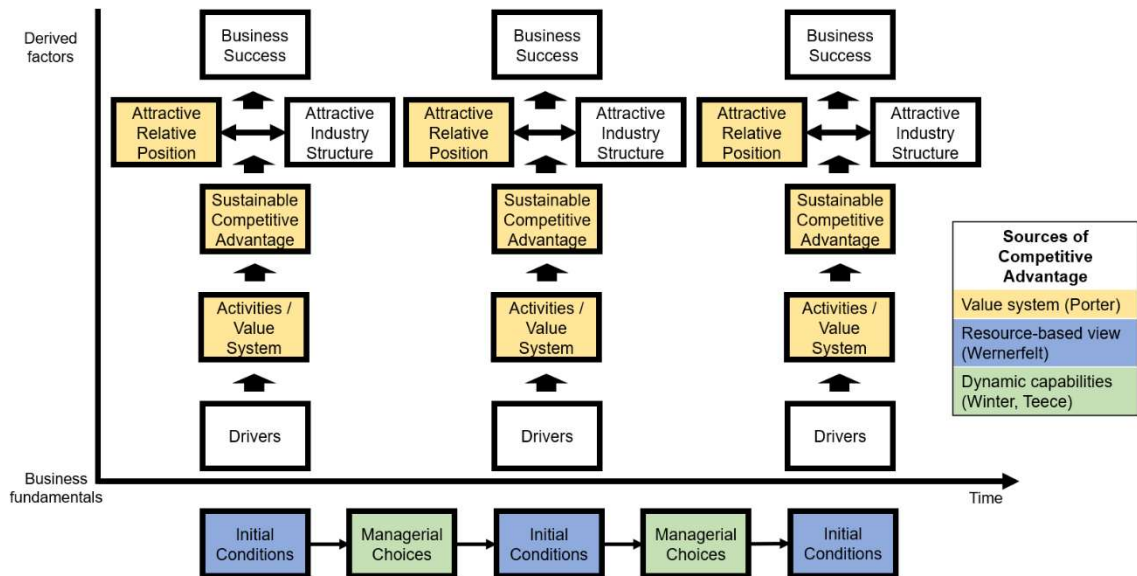


Figure 2. Sources of competitive advantage according to different authors, figure adapted from Porter, 1991.

2.1.2 Conceptualization of business models

The origins of the term ‘business model’ can be found at the IT-boom at the turn of the millennium, but the contextual foundation lies much deeper. For example, as early as in the year 1984 Ives and Learmonth describe how information systems can have strategic importance for a company based on the aforementioned Five Forces framework (e.g. Porter, 2008) and the generic strategic alternatives (Porter, 1980, p. 34–46). Ives and Learmonth establish that information systems can be used to cause structural changes in the marketplace, and that the changes can provide firms with competitive advantage (Ives and Learmonth, 1984), a view in accordance with Porter (1991). In hindsight, this can be interpreted as an early interpretation of business model changes caused by information systems – influencing the way actors in the marketplace interact with each other.

One of the earliest authors to use the term ‘business model’ *per se* was by Timmers (1998) in his study “Business Models for Electronic Markets”. In Timmers’ language business models are seen describing value chains “An architecture for the product, service and information flows, including a description of the various business actors and their roles”, value propositions “A description of the potential benefits for the various business actors” and revenue streams “A description of the sources of revenues” (Timmers, 1998). Interestingly, Timmers specifically excludes strategic considerations from the concept, leaving “questions like: how is competitive advantage being built, what is the positioning, what is the marketing mix” to the domain of business strategy (*ibid.*). The foundation of business model concept is therefore

- Based on value generation and value streams, as described by Porter (1985) and
- Conceptually distinct from pre-existing strategic research.

The proper emergence of the term ‘business model’ in academic literature begins at the turn of the millennium, with publications especially during and immediately after the dot-com boom & bust. The early research around the subject seems rather fragmented, with several scholars focusing on the creation and capturing of value in the emerging, electronic markets (*e.g.* Amit and Zott, 2001; Petrovic *et al.*, 2001; Pitt *et al.*, 2001), with others attempting to investigate business models and their impact on corporate performance (*e.g.* Chesbrough and Rosenbloom, 2002; Fisker and Rutherford, 2002).

Simultaneously with emergence of the term ‘business model’, the validity of the concept was called into question. Especially notable was the article by Michael Porter in the Harvard Business Review article “Strategy and the Internet” decrying the term as “murky at best” and “an invitation for faulty thinking and self-delusion”, with Porter calling for a “return to fundamentals” (Porter, 2001). In the same magazine a year later, Joan Magretta in her article “Why Business Models Matter” (2002) quotes Michael Lewis in the invocation of the term “to glorify all manner of half-baked plans”. Conversely, Magretta herself sees the term as useful, but distorted, misused and poorly defined, with an attempt to define business model as separate, but interlinked construct from strategy (Magretta, 2002).

Since its origin, the concept of business model has been adopted into mainstream business literature and has been revisited by several authors with differing perspectives. However, clarity regarding its usage or purpose has yet to be achieved, with current practice heavily dependent on differing conceptualizations.

The conceptualization of business models

The definitions and goals assigned to business models vary significantly between authors. For example, aforementioned Timmers (1998) defines business model in terms of the architecture of organizing the flows of products, services and information between actors, the potential benefits and revenue sources. Gordijn *et al.* (2000) define the business model as being about the value exchanges between actors, including involved actors, offerings and elements thereof, as well as activities performed. Amit and Zott (2001) focus on transactions, with the definition of business model as “A business model depicts the content, structure, and governance of transactions designed so as to create value through the exploitation of business opportunities.” Teece (2010) presents business models as “nothing less than the organizational and financial ‘architecture’ of a business”. A non-exhaustive list of conceptualizations of business model by different studies is presented in Table 2, including authors, years of publication and definitions or rationale for business models.

Table 2. *Conceptualization of business models according to different authors*

Author(s)	Year	Concept of business model
Timmers	1998	Architecture for product, service and information flows, including different actors, description of potential benefits, description of revenue sources
Amit & Zott	2001	Content, structure and governance of transactions enabling value creation
Porter	2001	“Loose conception of how a company does business and generates revenue”
Petrovic <i>et al.</i>	2001	“Logic of a business system” for creating value behind the actual processes
Gordijin	2002	Creation, exchange and consumption of economically valuable objects in a multi-actor network
Magretta	2002	Tying the narrative of how the business / marketplace operates to financial numbers, “how the pieces of a business fit together”
Currie	2004	Value capture driven by positioning, product-service portfolio and value propositions
Osterwalder	2004	The abstract conceptual model representing the business and money earning logic of a company
Rappa	2004	Specification of how a company creates value, its position in the value chain and the arrangement it has in order to generate revenue
Osterwalder <i>et al.</i>	2005	Translation of strategic issues into a conceptual model stating how business functions
Morris <i>et al.</i>	2005	Multi-level model from the basic elements (foundations) of business to combinations of basic components to the rules driving operations
Shafer <i>et al.</i>	2005	Reflection of strategic choices and their operating implications
Tikkanen <i>et al.</i>	2005	Cognitive mechanism; “sense-making” of a company
Chesbrough	2007	The value creation & value capture process of the company
Al-Debei & Avison	2010	Intermediate layer between business strategy and business processes
Casadesus-Masanell & Ricart	2010	Reflection of the firm’s realized strategy
Sabatier <i>et al.</i>	2010	Link between core competencies and strategy
Cavalcante <i>et al.</i>	2011	Abstraction of the principles supporting the development of core standard processes
George & Bock	2011	“Design of organizational structures to enact a commercial opportunity”
DaSilva & Trkman	2014	“What company really is at a given time” as opposed to strategy describing what a company wants to become

As can be seen from table 2, there is no absolute unifying concept, overarching theme or consolidation regarding the contextualization of business models. However, several repeating factors exist:

- Strategy and strategic considerations are omnipresent in discussions of business models, but there are major differences in the interpretation of the role of strategy vis-à-vis business models
- A network perspective to business models is adopted by several authors, with activities by several actors included in the concept

- Business model is defined using terms such as ‘abstract’ or ‘conceptual’ rather than *e.g.* ‘concrete’ or ‘tangible’
- Concepts of value creation and value capture play a significant role in the definitions of business models
- Business models have a strong linkage to operating practice
- Business models are defined using concepts like revenue streams, cost structures, value propositions and business logic
- The elements of different interpretations of business models are defined in absolute terms (*i.e.* revenue stream **is**, rather than revenue stream **relative to competitor is**), rather than relative ones.

Business models and strategy

There have been several interpretations of the linkage between the concept of ‘business model’ and strategic issues. The view of business models as separate, although strongly linked, entities from strategy, is, in addition to the Timmers (1998) and Magretta (2002), shared by *e.g.* Osterwalder (2004), Al-Debei and Avison (2010) and Teece (2010). Another perspective sees strategy as part of a business model, such as Hedman (2003) who attempts to integrate different perspectives of strategy research with the term “‘business model’ acting as an umbrella. This is similar to Morris *et al.* (2006), who splits business model perspectives to domains, one of which being the ‘strategic domain’, in addition to market factors, strategic capability factors, competitive strategy factors and economic factors included in the MSA, or Morris – Schindehutte – Allen -framework for business models (Morris *et al.*, 2006). Thus, in the context of business models, strategy is seen both as a part of the wider business model, and as a conceptually separate entity.

In addition to matters of strategy, business models are also conceptually separated from business process models, as evidenced in the aptly named “Business modelling is not process modelling” by Gordijn *et al.* (2000), presented on the International Conference on Conceptual Modelling. The same view is expressed by, for example, Osterwalder (2004, 2005) and Al-Debei & Avison (2010).

One of the overarching themes in early business model literature is the focus on value creation and value capture (*e.g.* Timmers, 1998; Gordijn *et al.*, 2000; Petrovic *et al.*, 2001; Hedman, 2003; Al-Debei and Avison, 2010; Teece, 2010), often based on the work of Michael Porter regarding value chains (1985). Earlier, but similar sentiment, despite lack of the actual term ‘business model’, is expressed by Kambil *et al.* (1996). The strategic context of the business models is thus deeply ingrained in the research on value chains. Simultaneously, several authors include themes familiar from literature regarding resource-based view, such as key resources (*e.g.* Osterwalder, 2004; Petrovic *et al.*, 2001).

Another theme apparent in business model literature is more strongly related to dynamic capabilities (*e.g.* Winter, 2003; Teece, 2007; Teece, 2010). Dynamic capabilities are

defined as capabilities that extend, modify or create ordinary capabilities (Winter, 2003), or in other words, capabilities that enable business to evolve over time. The importance of dynamic capabilities is apparent especially when considering business model change and innovation. Naturally, the closest equivalent to the aforementioned concept of dynamic capabilities is visible in studies focusing on business model innovation, such as Linder and Cantrell (2000), Chesbrough (2007), Giesen *et al.* (2007) and Teece (2010).

The concept of business model is thereby strongly based on strategic literature. Interesting question then becomes ‘how the concept of business model is distinct from strategy, and what is the unique value provided by the concept?’ Magretta (2002) defines the distinction such that the role of strategy is to “take care of competition”, and the role of the business model is to describe “how the pieces of a business fit together”. This description, however, is not too far off from the view where part of strategy is achieving “fit” between activities necessary for an effective strategy providing competitive advantage (Porter, 1996).

Several authors besides Magretta include similar thoughts. For example, Osterwalder (2004) defines business model as follows:

“A business model is a conceptual tool that contains a set of elements and their relationships and allows expressing a company’s logic of earning money. It is a description of the value a company offers to one or several segments of customers and the architecture of the firm and its network of partners for creating, marketing and delivering this value and relationship capital, in order to generate profitable and sustainable revenue streams.” (Osterwalder, 2004.)

From the activity perspective, this definition can be interpreted as business model being directly concerned with the fit between activities undertaken by the business. This sentiment is expressed by, *e.g.* Gordijin *et al.* (2000) and Chesbrough (2007). In addition, whereas the concept of fit, as described by *e.g.* Porter (1996) is mostly focused on *internal* activities as executed in the operating environment of the company, the scope of business model often includes that of activities within the *entire value network* (*e.g.* Holmström *et al.*, 1999; Andriani, 2001; Davies *et al.*, 2001).

Two key differences can be drawn between the concepts of business model and strategy. First, the concept of business model is most often related to the *absolute* operating logic of the business, including absolute revenue streams, costs and value propositions, whereas strategy is defined as more focused on the businesses’ *relative* operating logic, including revenue (price), costs and value propositions relative to its industry. This is not to say that strategy is not concerned with absolute operating logic, but rather that the viewpoint is different – the purpose of the strategy pertains to the operating environment and the configuration of the business activities therein, whereas the purpose of business models is more concerned with the overall viability and execution of activity configurations.

Secondly, when it comes to the configuration of activities, the viewpoint of business models is more concerned with activities and linkages in the entire *value network*, rather than *internal* configuration of activities. It is worth noting that while in porterian strategy, one of the key choices of a business is “what activities to do”; in the context of business model as presented here, the focus is more on “who does what activities”. The view presented here is thus reminiscent of that proposed by Magretta (2002), with perhaps slight expansion & differences in emphasis.

Thus, despite the basis of the business model concept in e-business literature, and significant differences of opinion regarding the contents and even validity of the business model concept, business models have a foundation in strategic literature, and the concept seems to be of value for the practitioner. In accordance with preceding discussion, this study adopts a distinction between competitive strategy and business models where the question of strategy pertains to issues discussed in the earlier subchapter, *i.e.* competitive positioning, resources and dynamic capabilities, whereas the business model focuses mostly on the choices of activities and fit among them across the entire value network.

2.1.3 Categorization & building of business models

This subchapter considers several themes of business models present in academic literature. More specifically, the themes are categorizations and categorization methods of business models, proposed components of business models; different approaches to building business models and the evolution and innovation of business models.

Business model categorizations

Osterwalder *et al.* (2005) present a hierarchy for the concept of business models. Highest level of this hierarchy is the overall definition of business model, accompanied by different meta-models defining what elements belong into a business model. The second level of this hierarchy is taxonomy of different business model types, and what are the common characteristics within each type. Below taxonomies are instances or views of a company, below which are real-world instances (companies). (Osterwalder *et al.*, 2005.) However, Osterwalder *et al.* do not specify a taxonomy for business models, presenting the view that taxonomy is or should be a definite part of the overarching concept of business models.

Chesbrough (2007) categorizes business models based on the degree of differentiation, involvement of external actors and degree of innovation present in the business model; ranging from undifferentiated business model through “some differentiation”, “segmented business model”, “externally aware business model” and “innovation process integrated with business model” to “business model is an adaptive platform”. A key factor in this typology is that movement by a company through the different business model types is seen as “advancement” of a business model towards more “valuable” business

models (Chesbrough, 2007). In this typology it is implicit that higher degree of innovation and differentiation are seen as increasing value; an assumption that is not investigated further.

One of the more specific categorizations is by Morris *et al.* (2006), who categorize business models into clusters in a study of high-growth, entrepreneurial firms. Using cluster analysis, the study finds four business model types being “Focused technical service model”, “Standardized producer model”, “Product franchiser model” and “Customized service model” (*ibid.*). The problem of this categorization is the clustering based on high-growth entrepreneurial firms, leaving open the possibility of different typologies being useful in different contexts.

Sánchez and Ricart (2010) in their study of business models in low-income markets find two different types of business models in pattern of entry to low-income markets: isolated and interactive. Isolated business models are in this context business models that leverage firm’s internal resources and capabilities, while interactive business models aim to leverage external resources and dynamic capabilities (Sánchez and Ricart, 2010). There are interesting parallels between interactive & isolated business models according to Sánchez and Ricart (2010) and generic strategies according to Porter (1980, p. 34–46). According to the former, integrated business models aim to increase willingness to pay; corresponding to differentiation strategy of porterian thought, while isolated business models are concerned with efficiency and costs; corresponding to cost leadership strategy. As such, the study by Sánchez and Ricart (2010) can be seen as an example of business model categorization according to strategic themes expressed by the business.

Zott and Amit (2010) present yet another categorization of business models based on what they call “Design themes”. These include the novelty of business models, meaning the novelty in undertaken activities or their linkages; lock-in or the ability to keep 3rd parties involved in the business model; complementarities or the bundling of activities within a system increasing value compared to separation of activities; and efficiency or reduction of transaction costs by a business model (Zott and Amit, 2010). This approach is based on configuration of activity systems and transactions being the sources of value, with the actual categorization of business models based on methods to derive value from these beginnings.

Despite the preceding list not being exhaustive in different ways to categorize business models, it is evident that there is no single consensus on how to categorize different business models. Instead, there are several differing approaches that are hugely context-specific and purpose-built. However, there are some important takeaways:

- Business model categorization can be done along several axis, such as value creation method, level of differentiation or functionality, depending on purpose of the study

- Typologies can be both generic (*e.g.* isolated / interactive) and specific (*e.g.* “Product franchiser model”) in relation to the underlying business
- A given typology does not necessarily need to have general utility
- It is possible to create a high-specificity empirical categorization of business models and use the typology as a basis for evaluation.

Business model components

The components included in the concept of business model varies significantly from author to author, both from the point of view and from the contents included. For example, Amit and Zott (2001) define the contents of business model as “the content, structure and governance of transactions” – a view based on transaction cost economics and firmly centered on the modelling of business as execution of transactions. On the other hand, Petrovic *et al.* (2001) describe business model as being comprised of several sub-models, including *e.g.* value model, resource model, customer relations model and capital model. Like with business model categorizations, no consensus regarding the contents of business models has been reached despite efforts by several authors. Still, some components are significantly more prevalent in literature than others. A list of some of the more pronounced ones is included below.

External actors are present in a significant amount of business model descriptions. For example, Gordijin *et al.* (2000) include “value adding business actors”, and later Gordijin (2002) includes actors and composite actors (partnership of several unitary actors) in the E³ value framework. Petrovic *et al.* (2001) includes “Customer relations model” as one of business model sub-models. Hedman’s (2003) generic business model includes both customers and competitors, while Rappa (2004) mentions upstream and downstream partners as well as arrangement with customers. Osterwalder *et al.* (2005) include actors in two perspectives; in customer interface (customers) and in infrastructure management (key partners). Tikkanen *et al.* (2005) consider network as one of business model material components, like Al-Debei and Avison (2010) where value network is one of value dimensions of business models. In RCOV or “Resources and Competences, Organization of the business and Value propositions” framework as presented by Demil & Lecocq (2010), the perspective of external actors is included in the ‘organization’ within their framework of the business model concept.

Despite the differences in perspective and terminology regarding the presence of actors in listed business model components, it is apparent that external actors are most often considered an integral part of the business model. This holds even in cases where actors are not explicitly mentioned, such as by Morris *et al.* (2006) where despite lack of explicit mention, market factors are included in the Morris – Schindehutte – Allen -framework. For the purposes of this study, external actors are understood as *any and all external entities that have an impact on the operation of the business model*. This includes, for

example, competitors, customers, suppliers, and financiers, as well as the network and markets consisting of the interactions between actors.

Value proposition or value offering is a second repeating component nearly omnipresent in lists of business model components by different authors (*e.g.* Gordijin *et al.*, 2000; Petrovic, 2001; Hedman, 2003; Currie, 2004; Rappa, 2004; Osterwalder *et al.*, 2005; Morris *et al.*, 2005; Al-Debei and Avison, 2010; Demil and Lecocq, 2010; Parviainen, 2018). There are some minor differences in perspective between authors, however. For example, Currie (2004) sees business model as mostly market-related concept with division between strategic positioning, product / service portfolio and value proposition as the components of business model. On the other hand, Al-Debei and Avison (2010) take a more expansive position on the contents of the business model with value proposition seen in conjunction with value network, value architecture and value finance. Similar position is adopted by, for example, Osterwalder *et al.* (2005). It is, however, apparent that the value proposition is one of the most emphasized components in business models.

Finance is another perspective that is often raised as one of the key components of business model. This includes concepts such as revenue streams (*e.g.* Petrovic *et al.*, 2001; Rappa, 2004; Osterwalder *et al.*, 2005), cost structure (*e.g.* Osterwalder *et al.*, 2005) and, for example, available capital (*e.g.* Petrovic *et al.*, 2001). Some authors, such as Al-Debei and Avison (2010) do not separate between revenues, costs and capital, simply listing “finance” as one of the key components of business models. As an interesting observation, revenue is included as a consideration significantly more often than costs; especially in research focusing on internet companies and the market side of business model concept, whereas business model definitions that emphasize operations in their interpretation of business models tend to include more expansive view of finance than simply revenues.

Operations and activities are present in several listings of business model building blocks, albeit under different names. For example, Gordijin *et al.* (2000) include value-creating or adding activities in the list of key design decisions in business models, Petrovic *et al.* (2001) list production model as one of the sub-models in business models and Hedman (2003) defines activities and organization as one part of the ‘generic business model’. Rappa (2004) considers “what a company does to create value” to be a part of the business model, while Tikkanen *et al.* (2005) lists simply “Operations”. Other authors focus especially on the core competency of the company as the part of the business model. These include Osterwalder *et al.* (2005) and Morris *et al.* (2005).

Resources are another common component in business model descriptions, included, for example, by Petrovic *et al.* (2001), Hedman (2003), and Demil and Lecocq (2010), as well as George and Bock (2011). The prevalence of resources in lists of business model components, as well as that of aforementioned core competence, can probably be at least partly attributed to the application of resource-based view to business model research.

Other components included in the definitions of business models are more case-specific. For example, Hedman (2003) in the proposed generic business model includes the longitudinal dimension, defined as the (*e.g.* social and cognitive) constraints on actors influencing the development of the business model over time; a perspective familiar from strategic research to dynamic capabilities. Currie (2004) includes strategic positioning as part of the business model, as well as Morris *et al.* (2005, 2006) in a view at least partly shared by Tikkanen *et al.* (2005) who include ‘strategy and structure’ as one of the material components of business model. Especially Morris *et al.* (2006) include several strategic considerations in their framework, consisting of offering-related, market-related, strategic capability-related, competitive strategy-related and economic factors.

Some interpretations of business models take an **entirely different view** on the subject. Of these, worth mentioning is the transaction-based view of Amit and Zott (2001), where business model is defined as

“A business model depicts the content, structure, and governance of transactions designed so as to create value through the exploitation of business opportunities.”
(Amit and Zott, 2001.)

The same split is present in other studies by the same authors, including Zott & Amit (2010). Other views are presented by, for example, Al-Debei and Avison (2010) who see the business model having four value dimensions: value proposition, value architecture, value network and value finance; and Casadesus-Masanell and Ricart (2010a, 2010b) where the concept of business model is defined as choices, including those of policies, assets and governance, and consequences of the choices, leading to flexible or rigid business models.

In this study, the basis for the comparisons of business models employed in the cases are the perspectives of external actors, value propositions, finances including revenues, costs and capital, operations and resources. It is recognized that the list is non-exhaustive, but the goal of the analysis is not a perfect description of the employed business models but rather to enable the comparisons between business models in their strategic context.

Business model structure

Existing literature contains several different methods for building business models, extending far beyond the variance in the components *de facto* composing the frameworks. For example, one of the more concrete frameworks is the one proposed by Osterwalder *et al.* (2005) which includes four “pillars” of products, customer interfaces, infrastructure management and financial aspects, with very specific building blocks, such as distribution channel, relationship with the customer segments and the cost structure of the business. This view is expanded in the practitioner-targeted popular book “Business model generation: A handbook for visionaries, game changers, and challengers” (Osterwalder *et al.*, 2010). As another multi-level framework, Morris *et al.* (2005) define the business model

in three levels: foundation level as the basic components, proprietary level dealing with the unique combinations and approaches to the basic components and the rules level as the actual operating rules governing actions undertaken by the company. Later evolution of this is the framework from Morris *et al.* (2006), where there are five main model components of offering, market, strategic capability, competitive strategy and economic factors; with highly specific subcomponents such as information management, operating leverage and level of customization present in the offering.

The structure and contents of the business model concept in the frameworks of the preceding chapter are all rather operative by nature, an example being that by de Reuver *et al.* (2009a, 2009b) who split the business model components to service, technological, organizational and financial components. Further, de Reuver (2009c) finds that concepts within organizational and financial domain lead to divisions in roles and risk, indirectly leading to acceptable levels of profitability. This operative approach is in stark contrast to the extremely abstract definition of the structure of business models as “Choices and consequences” by Casadesus-Masanell and Ricart (2010a, 2010b).

In addition to the scope and level of abstraction of the concept, the background of different business model frameworks varies significantly. One background is in transaction cost economics (Amit and Zott, 2001; Zott and Amit, 2010), which is clearly visible in their concept of business model consisting of the content, structure and governance of transactions. On the other hand, apparently following the resource-based view, Demil and Lecocq (2010) abstract the core components of business models to a framework consisting of resources and competences, organizational structure (including the value chain of activities and the value network), and value propositions. The internal logic of the model consists of core components leading to profits in that resources and competences influence value propositions and the organization, that revenues flow from value propositions, and internal & external organization create the costs; revenues and costs leading to margins then again influencing the resources and competences the company can acquire (*ibid.*). This is illustrated in figure 3. Combining some of the previous, George and Bock (2011) adopt an opportunity-centric framing of the business model, with resource structure, transactive structure and value structure as the main components.

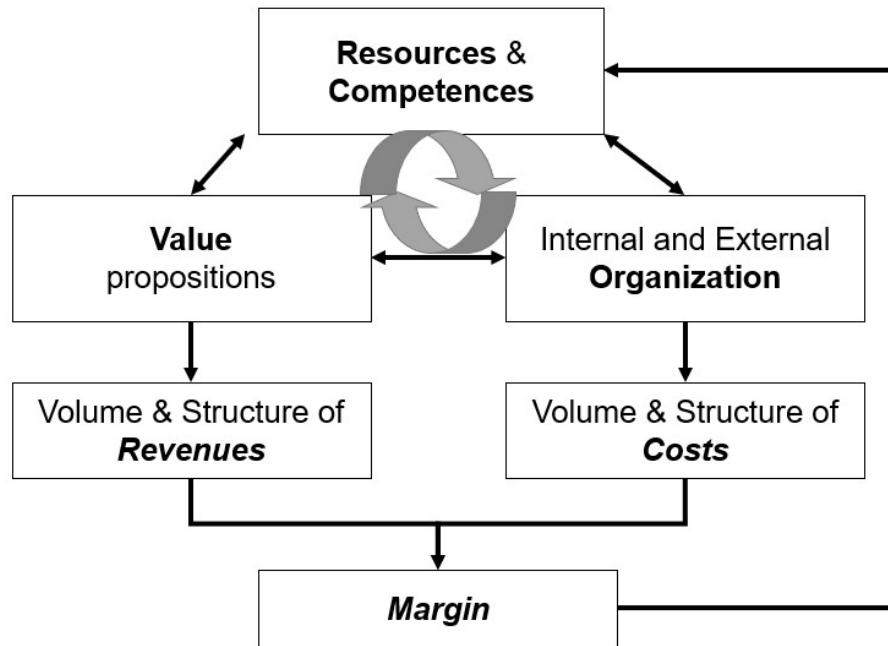


Figure 3. Resources, competences, value and organization -framework, adapted from Demil and Lecocq, 2010.

In conclusion, there is no widespread consensus on the contents of the business model concept. Several persistent themes exist in the interpretations, such as actors other than the focal company, value proposition, financial connections and the organization of activities, but even these are not universally accepted. Perhaps the fundamental problem in defining the components of business models is the lack of consensus regarding the scope and intended utility of the entire concept, and even from several shared components, the methods used to build business models vary significantly from author to author.

Business model building, development and innovation

There are several different approaches into how business models are developed and built. The following paragraphs present some of these with an evaluation of the utility of the models for the purposes of this study.

One of the earliest suggestions for building business models appeared before the proper emergence of the concept of business models by Holmström *et al.* (1999). The study suggested the creation of customer-specific solutions through movement of value offering point (point, where the customer allocates demand to a specific supplier) and order penetration point (point, where the product is allocated to a specific customer), leading to changes in customer & supplier economics through changes in the trade-off between value creation and transaction costs. The proposed process for this decision making was to segment the customers and map the demand chain, followed by identification of potential value offering points and re-segmentation, then creating a solution for new value offering point and scaling the solution up in the segment. (Holmström *et al.*, 1999.) This early proposal has several key attributes:

- The benefits of business model development arise from changes in the transaction between the companies
- The change is justified based on the economics of the companies
- The process contains changes to the activities formulating the value proposition between actors, leading to financial impacts.

One of the main issues in proposed methods for business model development is the level of abstraction present. For example, Casadesus-Masanell and Ricart (2010a) present business model development in two stages: strategy stage where the actual business model is chosen, and tactics stage, where tactical choices are made depending on the choices in business model. However, from this are absent the actual ways, means and tools for practitioners in how to create new business models. Rather, Casadesus-Masanell and Ricart (2010a) give several recommendations including being alert to changes in the environment and to look for virtuous cycles or self-reinforcing activity systems.

In the context of delivery of *integrated solutions*, Davies *et al.* (2001) proposed a methodology for building new business models, including the need to build new capabilities, namely systems integration-, operational service-, business consulting- and financing capabilities, used to redefine the role of the company in the value chain. This approach provides definite capabilities to develop, but unfortunately is lacking in the methodology to employ these capabilities. In addition, the focus on integrated solutions means that in situations where the focal firm is unable to assume the role of systems integrator or otherwise unable to derive additional revenues from these capabilities, the capabilities may only serve as additional fixed costs rather than as vessels for higher profits.

Instead of proposing a process *per se*, Petrovic *et al.* (2001) list characteristics for business model creation methodology in that the methodology should be able to handle complex systems, support the structuring and sharing of knowledge, risk-free experiments, iteration and changes as well as to be grounded on theory while being practically available and to create a learning environment for managers. Demil and Lecocq, on the other hand, provide a list of management tasks for consideration of business model dynamics, including monitoring of risks, anticipation of potential consequences of changes and taking deliberate action to promote consistency of business model components (Demil and Lecocq, 2010). The main problem with these suggestions is the lack of tools for how a manager could measure them in practice, or how to employ in business contexts.

Wallin (2005) sees business modelling as one of the higher-order capabilities a company can possess, including attributes such as absorptive capacity, or the ability to recognize & utilize the value of new information, the ability to transfer knowledge into actionable activities, and timing. The focus on these higher levels of abstraction is also present on a study by Morris *et al.* (2005) who share a similar view in that business model evolution should begin on highest levels of abstraction, and then move towards clearer articulation of more specific attributes and rules concerning the execution in business models. This is

doubtlessly to avoid “blind spots” that may be present when simply tailoring current business models and to enable more holistic view.

In the context of technological innovations influencing the creation of new business models, Pateli (2003) splits business model development into three phases: Understanding the current business model through *e.g.* documentation, identifying the influence of new technology, and changing through first defining new scenarios, then describing the new business model from several viewpoints (*e.g.* actors, market scope, relationship model, critical success factors) and finally to evaluating the impact of changes on the markets. While more concrete than several other proposals, the clear limitation of this study is the sole focus on business model evolution enabled by technologic change, somewhat limiting its utility.

One framework for business model innovation is provided by Giesen *et al.* (2007), who first categorize business model innovation types into innovations in industry models, including value chain innovations and the creation of new industries; innovations in revenue models including *e.g.* pricing models and innovations in enterprise models, such as redefinition of roles in the value chain. In the framework the first step is the understanding of the industry context followed by the definition of current position and finally building capabilities to manage business model innovation; the capabilities themselves being dependent on the type of business model innovation (*ibid.*). This framework connects to strategic considerations through evaluation of industry (strategic) context. In addition, the tie-in between the business model innovation types and capability building gives guidelines into how business model building could begin.

Cavalcante *et al.* (2011) provide their own categorization for business model innovations. In that categorization business model change types are the creation of a business model, extension or adding new activities, revision or removing something that exists or changing current working practices and termination or abandoning or removing processes or parts of business (Cavalcante *et al.*, 2011). Another categorization is provided by Demil and Lecocq (2010), where the viewpoint is more on the side of how the change is enacted; through deliberate decisions, independent development paths in elements of the business model, through interactions of elements within the core components or interactions between the core components. As evident, there is little shared ground in between these typologies of business model innovation.

Amit and Zott (2012), suggest the division of business model innovations into adding new activities, linking activities in novel ways or changing who performs the activities; in a model tightly related to the business model as presented by Amit and Zott (2001). In this model adding of new activities links to the content of the business transactions, linkages between activities relate to the structure of the transactions and decisions about who performs what is related to the governance of the transactions (Amit and Zott, 2012). This is expanded upon with a set of concrete questions for the practitioner’s benefit, namely

“What customer needs will the new business model address?”, “What novel new activities could help satisfy those needs?”, “How could the activities be linked in novel ways?”, “Who should perform the activities? What novel governance arrangements can be found?”, “How will value be created for each stakeholder?” and “What revenue models can be adopted to complement the business model?” (Amit and Zott, 2012).

Several problems exist in the implementation of new business models. For example, Chesbrough (2010) presents the conflict between existing and future business models and necessary assets as one major concern in the implementation of new ones. This is expanded by Chesbrough (2007) with two key insights: one being that current management probably reached their position through execution within the bounds of the current business model, resulting in “business model innovation leadership gap” where no person has both the authority and capability to innovate & employ new business models. In addition, lack of information about the performance of new business models may present a barrier to business model innovations, and Chesbrough (2007, 2010) goes on to highlight the necessity of experimentation as the only way to determine the business model of the future, as the highest-fidelity experimentation is only achievable with real customers paying with real money.

Experimentation regarding new business models has also been a focus in research. Chesbrough (2010) suggests some parameters including the cost of conducting the test, time to receive feedback, amount of information learned and the difference between failures and mistakes (failure as the result of unviability, mistake as the result of poorly planned experiment). Doz and Kosonen (2010), on the other hand, recommend accelerated business model renewal founded on three “meta-capabilities” including strategic sensitivity, leadership unity and resource fluidity, experimentation included as a subcomponent of strategic sensitivity.

2.1.4 Business models and corporate performance

The focus of this subchapter is in the relationship between business models and corporate performance. In practice the subchapter reviews several studies and their findings regarding the connection of business models to different measurements of corporate performance.

Within the several existing studies investigating the impact of business model choices on corporate performance, there are major differences in the study method, measures to evaluate corporate performance and the interpretation of the term ‘business model’. A non-exhaustive listing of different studies, performance measures and key findings can be found in table 3.

Table 3. *Authors, performance measures, business model aspects & key findings*

Author(s) and year	Measure of performance	Aspects of business model researched	Key finding(s)
Zott & Amit, 2002	Stock price	Efficiency, complementarities, lock-in, novelty	Efficiency & novelty lead to increased value appropriation
Fisken & Rutherford 2002	Invested capital	Value creation logic; product – platform	Hybrid business models preferred by capital markets
Fetscherin & Knolmayer 2004	Profits	Product, consumer, revenue, price, delivery	Business model aspects chosen by ability to drive profits
Ordanini <i>et al.</i> 2004	Revenue	System type; open vs. closed system	Business models tailored for existing relationships achieve higher performance
DeYoung 2005	Return on investment	Delivery model, bricks-and-mortar vs. online banking	Higher profitability might not translate to greater ROI if more equity is needed
Pohle & Chapman 2006	Survey of CEO's, operating margin growth	Business model innovations	BM innovations can lead to cost reductions, strategic flexibility, ability to exploit opportunities and influence cost structure
Flouris & Walker 2007	Profits	Low-cost vs. legacy carrier airlines	Low-cost business models have a lower overall cost structure with larger share in variable costs
Mair & Schoen 2007	Organizations considered successful	Value network	Successful organizations create their own value network with shared social vision
Zott & Amit 2007	Stock price	Efficiency & novelty	Novelty-centered business models lead to higher performance
Glick 2008	Revenue	Value chain integration	Performance is dependent on the connections and synergies in the value chain
<i>Kauffman & Wang 2008</i>	<i>Firm survival</i>	<i>Operating logic of internet companies</i>	<i>Companies that facilitate interactions, broke transactions & rely on advertising are less likely to go bankrupt</i>
Patzelt <i>et al.</i> 2008	Profits	Operating logic of biotechnology companies	Top management team has a composite effect with business model on profitability
Zott & Amit 2008	Stock price	Efficiency & novelty	Novelty interacts positively with differentiation, cost leadership and early market entry strategies
De Reuver <i>et al.</i> 2009c	Profits	Organizational design & financial design	Profitability is indirectly achieved from decisions regarding organizational & financial design
Rédis 2009	Time-to-profit, level of turnover, amount of venture capital raised	Position in the value chain, targeted customer base, income model	Especially positioning on the value chain & choice of targeted customer base have an impact on turnover & time to become profitable

Aspara <i>et al.</i> 2010	Profitable growth	Business model innovation	Firms that have high strategic emphasis on business model innovation & replication have higher average profitable growth
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One of the earliest studies systematically evaluating the impact of business models on corporate performance was that performed by Zott and Amit (2002). This study was based on a database of stock market valuations over a period from 1996 to 2001, including the dot-com crash of 2000. The dimensions of the study were based on the business model categorization focusing on efficiency, complementarities, lock-in and novelty, with the finding that efficiency and novelty of the business model lead to increased value appropriation by the focal company. (Zott and Amit, 2002.) Similar study was performed by Zott and Amit (2007), again using stock market valuation as the basis for performance evaluation, with the finding that novelty-centered business models lead to higher performance of the firm. However, the other research questions regarding the impact of resource munificence, efficiency-centeredness of the business model and the efforts of combining novelty- and efficiency-centered design themes produced mostly mixed, weak or negative support (Zott and Amit, 2007).

Yet another study based on stock price development by Zott and Amit (2008) evaluated the connection of novelty-centered and efficiency-centered business models to the generic product-market strategies, with the reveal that novelty-centered business models interact positively with differentiation and cost leadership strategies, as well as early market entry strategies. Another perspective on the performance implication of business models is given by Fisker and Rutherford (2002), who present that hybrid business models, or business models combining the attributes of product and platform value creation logics, are preferred by the capital markets. However, there is the problem of using stock market performance as the proxy for the economic performance of a company which is especially apparent when the study period experiences strong fluctuations in the stock market. Similarly, issues might arise when applying the results to non-listed companies.

One of the most used proxies for corporate performance in studies of business models is the turnover of the company. These include, for example, Ordanini *et al.* (2004) who concur that business models tailored for existing business relationships achieve higher performance in terms of revenue. Glick (2008) applies the same performance measurement for US biotechnology companies with the finding that the success of a biotechnology company is dependent on the connections and synergies with its partners in the value chain. The importance of partnerships is highlighted even more by Mair and Schoen (2007) who present that in developing economies, successful social entrepreneurial organizations are those that create their own value networks with companies sharing their social vision and integrate their target groups into the social value network. These three

studies can then be viewed as a combined testament to the necessity of the fit between the internal business model of a company and its external value system.

In a study of the newspaper and magazine industry by Fetscherin and Knolmayer (2004) business models were found to consist of five components: product, consumer, revenue, price and delivery based on their ability to drive profits. Regarding banking business, on the other hand, DeYoung (2005) establishes that there exists a strong linkage between business model choices and the performance, with the crucial distinction that relatively higher profitability might not be translated to improved rates of return for investors, if the profitability gains require relatively more equity capital. This finding implies that evaluation of business model performance shouldn't be limited to direct profitability but extend to assets employed.

In a survey of global CEO's, Pohle and Chapman (2006) find that according to CEO's, business model innovations can lead to cost reductions, strategic flexibility and greater ability to exploit market opportunities, as well as reduce risks and influence the cost structure of the company. In addition, the largest operating margin growth rates could be found in companies focusing on business model innovations, especially those with an expressed focus on strategic partnerships (Pohle and Chapman, 2006). The cost structure -argument is reflected in a study by Flouris and Walker (2007) of the Canadian airline industry, with the finding that airlines employing low-cost business models have a cost structure that is more weighted towards variable costs and lower overall, with lower breakeven loads than legacy carriers with generally higher overheads and lower operational flexibility.

Patzelt *et al.* (2008) discovered in a study of German biotechnology industry that business model and the composition of top management team have a composite effect in the context that different business models have different implications regarding the qualities necessary for the top management team *i.e.* the optimum composition and qualities of the management team are related to the choices regarding business models and vice versa. Another finding was that business model is better suited for describing the differences between companies than *e.g.* generic strategies (*ibid.*). However, the study focused on companies using a single business model for all of their business, potentially limiting the utility in the case of a corporate conglomerate consisting of several businesses with shared top management team, although the application might still apply to the management team of a given business.

Studying Internet firm survival rates, Kauffman and Wang (2008) found that companies that facilitate customer-provided interactions, act as transaction brokers and rely on advertising have a lower likelihood of bankruptcy or failure. Even though the utility of these findings *per se* in the context of this study is rather limited, it bears mentioning due to the overall conclusion that business model choices may have an impact on corporate survival.

Combining several performance measures, namely time to make a profit, level of turnover and amount of venture capital raised, Rédis (2009) found that business model (evaluated in terms of position in the value chain, targeted customer base and income model) does have an impact on the performance, in that especially positioning in the value chain and choice of targeted customer base have an impact on turnover and time to become profitable, with companies situated further downstream having a tendency to become profitable faster. The significance of this study is in the usage of compounded performance metrics to evaluate aspects of business model.

Based on a survey of the effects of business model innovation and replication in both large and small companies, Aspara *et al.* (2010) found profitable growth is at least partially influenced by the combined effect of emphasis on business model innovation and replication. As another result, the study found that the effect behaves differently for small and large companies; the significance of replication being notably more prevalent in large companies than small ones (*ibid.*). In addition, Dunford *et al.* (2010) find that the ability to replicate business models is crucial in the internationalization of new ventures. The findings of these studies indicate that there might be differences in the connections between profitability and business models in large companies and small-to-medium enterprises, and that the repeatability of business models might have an impact on company performance.

As one additional observation, business models may play a role in the circular economy, potentially forming one part of the competitive advantage for the future, according to Bocken *et al.* (2016). This study is included in order to illustrate that choices in business model may have impacts on corporate performance even in axis that transcend financial measurements.

As a conclusion it can be said that choices in business model have an impact on corporate performance in several different measures. This is the same conclusion as the one arrived to by Lambert and Davidson (2013) in a literature study. Overall, several measures have been recognized as being at least partially related to the choices in business models, including stock price, revenue, profitability, raised capital and even firm survival, thus, the question of business model choices is highly relevant for corporate performance. For the purposes of this study, the measurements focus on operative measures, such as revenue, gross margin and operating margin. These are due to the fact that the focal company is a non-listed conglomerate with several business areas, of which this study only pertains to a few. This means that *e.g.* stock price – even if one were available, would not accurately reflect the performance of the business itself. Moreover, for a comparative case study, the relevant comparisons only become available when comparing the cases ‘in a vacuum’, meaning that financial analysis should be based on figures directly attributable to the business under scrutiny. This is also influenced by the limitations of the management accounting system of the company, that does not allow for an analysis of, for example, capital employed by a given project.

2.2 Project-service business

Project business is defined as “the part of business that relates directly or indirectly to projects, with a purpose to achieve objectives of a firm or several firms” (Artto and Wikström, 2005), and its goal is to ensure that projects support the firm’s strategy and business objectives, and efficiently allocate the firm’s scarce resources to projects (Artto and Kujala, 2008). This means that

- Not all the business a company does is necessarily project business – a company may conduct only part of its business as project business
- Project business is distinct from singular projects; *i.e.* project business pertains to several projects, with potentially differing objectives in the context of firm- / network-level objectives
- Successful project business is tied to the business objectives and strategy of the firm, not necessarily to the success of singular projects
- The definition includes several firms and their objectives, indirectly containing the view of project execution in project networks.

Services, on the other hand, are activities “performed rather than produced” that are “essentially intangible” (Vandermerwe and Rada, 1988). The definition can be interpreted as performing activities, rather than delivering products, on behalf of the customer. The focus of this study is in services delivered in an industrial context, especially as part of or directly related to project deliveries.

In this subchapter, the first subject is the management and organization of project business including the organization of project business, management practices and project networks. This is followed by an analysis of industrial services in support of project business with background on the servitization phenomenon and the role of services in strategy. This is expanded with literature concerning management of industrial and project services, including management of generic service operations, services in the context of capital goods and integrated solutions and service operations in project business, concluded by an analysis of profits and business models in industrial services. After these considerations, the role of learning and dynamic capabilities in project-service business is considered. The subchapter concludes with an analysis of the particularities of business models in the context of project-service business.

2.2.1 Management and organization of project business

One of the key issues to be investigated in this study is the management of project business, the success factors of which are defined by Artto *et al.* (2011, p. 286–287) as the management system for the organization, anticipative financial management, balanced, strategy-aligned project portfolio and evolving customer and supplier network. These are derived from the strategy of the organization and guide project management on the level

of unitary projects (*ibid.*, p. 286–287). This subchapter expands the preceding from the viewpoints of project business organization, management practices including financial management and project portfolio creation, and the management of project and business networks.

Organization of project business

For the organization of project business, several organizational structures have been proposed, with projects seen as one of the foundations of business activities (Van Der Merwe, 2002). The key issue in designing a project organization is managing the trade-off between functional excellence and flexibility to changing customer needs (Hobday, 2000). One of the earliest authors on the subject was Galbraith (1971), who proposed matrix organizations for the purpose, combining functional and product line organizations to achieve benefits of both models.

Functional structure has its own set of benefits. These include the improved capability to develop technologies and economies of scale (Galbraith, 1971), in addition to performance in routine tasks and promotion of organization-wide learning (Hobday, 2000). Some benefits of project structure, on the other hand, are better performance with regards to cost and schedule (Galbraith, 1971), innovativeness, flexibility and integrating knowledge (Hobday, 2000). In addition, especially in complex project deliveries requiring cross-firm coordination, project networks have their own demands for the management of project business, and the relevant unit of analysis might be the executing network instead of a single company (Hobday, 1998).

Focal issue in the management of project-based organizations is the unavoidable tension between functional requirements and the requirements of projects caused by the sometimes-conflicting goals of the project and the functions (Sydow *et al.*, 2004). In addition, purely project-based organization might even act counter to company strategy in pursuit of single-project goals (Hobday, 2000), as project goals might contradict firm-level goals (Mutka and Aaltonen, 2013). Generally, tighter schedule and greater diversity between projects tends to create pressure towards more project-based organizations, while higher technological or functional requirements and the need for economies of scale and cost efficiencies favour more functional organization (Galbraith, 1971).

Instead of projects versus functions, Arenius *et al.* (2002) focus their attention on activities executed by project companies, with separation of business development which includes things such as product and process development; business management including assigning policies, standard operating procedures and promoting learning; and project management responsible for the execution of singular projects (Arenius *et al.* 2002). This organization type separates executive project organization and supportive administrative organization, with some of administrative organization's functions similar to the

functional elements present in Galbraith's (1971) matrix structure, but overall closer to the project-based organization as presented by Hobday (2000).

As different forms of organization have their own positive and negative sides for the management of project business, different authors have proposed different solutions. Galbraith's (1971) proposal was a matrix organization combining the best qualities of functional and project organization. Hobday (2000) analyses purely project-based organizations in the context of complex product and system deliveries. Turner and Keegan (2001) propose several different models for project management, especially regarding customer interface, depending on the amount and size of projects and the size of the customers (Turner and Keegan, 2001). Galbraith (2002) proposes the organization of project business into customer-centric solution units, while Whitley (2006) discusses the positive and negative aspects of project-based firms in terms of separation and stability of work roles and singularity of goals and outputs.

Galbraith (2002) presents the sliding scale between functional and project-based organizations. As the distinct organizational types have their different strengths and weaknesses, they flourish in different contexts. Thus, the most beneficial organizational form should be derived from the characteristics of potential projects encountered by the organization (Turner and Keegan, 2001).

One of the main criteria that can be used in evaluating the applicability of different organizational types is the complexity of the project delivery (Hobday, 1998). Some of the technical components of project complexity are the quantity of tailored components and subsystems, as well as the hierarchy of subsystems (*ibid.*), degree of component integration (Galbraith, 2002) and technological novelty (Hobday, 1998). Significant causes of complexity are also the required number of organizational units involved and coordination required (Hobday, 1998; 2000). Production scale and scope are also potential sources of complexity and should be included as analysis dimensions (Galbraith, 2002). Generally increasing complexity increases the need for effective coordination of activities and increases uncertainty (Hobday, 1998), and it should be counteracted with organizational structures that enhance communication within a project and have more effective capabilities to respond to changes (Hobday, 2000). This means *i.e.* organizations closer to pure project-based organizations on the scale from pure project-based organizations to pure functional organizations.

Customer behaviour also influences the optimal organizational structure when designing organization for project business. Especially Turner and Keegan (2001) propose, based on transaction cost economics, that the number and size of customers, as well as the number and size of projects should influence the structuring of the executing organization. They propose that in large projects for large clients, the project director should stay directly in touch with the customer organization, while in other types of systems some kind of broker-steward -model between project execution teams and customer contact may be

formed, with some differences in the purpose of the broker. Figure 4 represents these changes. The role of the broker is to enable project execution teams to focus on the daily management of projects, such as optimizing resource usage, while in large projects for few customers, due to the need for constant communication between specific project teams and customers, the contact should be direct, with the implicit insight that the distinction between broker and steward gradually fades as the length of contact with the customer increases (Turner and Keegan, 2001).

Project size	Large	Broker-steward: broker collates the inputs from customers, relates information to execution-focused project team	Project director in direct contact with customer
	Small	Broker-steward: unified contact for client, coordinates the actions of all projects related to the client	Broker-steward: unified contact for client, communicates with project teams internally
		Small	Large
Customer size			

Figure 4. Influence of project and customer size on the project-customer interface, based on Turner and Keegan, 2001.

Also the offering has an effect on the optimal organizational structure for conducting project business, as suggested by Galbraith (2002), with the observation that organization to customer-centric structures, characterized by, for example, organization around customer segments, customer teams and customer-level profit & loss -statements, is driven by factors such as degree of solution verticality, scale and scope of the solution provided, degree of integration between solution components and the percentage of revenues coming from solutions. Conversely, should a company move its offering toward vertical or integrated solutions, it can reasonably be expected to move towards more customer-oriented organizational structures.

Whitley (2006) argues that industry structure influences preferable organizational structures. The argument is that project business organizations can be classified along two axes: singularity of goals and outputs, and separation and stability of work roles, and that their prevalence differs between industries especially due to the risks involved in projects and the commitment of capital and labour (Whitley, 2006). In particular, the uncertainty-argument is relatable to that placed by Hobday (1998), and at the very least, the influence of goal and output singularity. Work role separation and stability on actual organizational structures merits further investigation.

For the purposes of this study, the composition and organization of the executing project team is considered as a variable. From the preceding discussions, the dimensions of project organizations under scrutiny include the position on the sliding scale between matrix- and functional organization and the organization of the customer interface. Especially the analysis of the organization of customer interface is supplemented by an evaluation of the novelty and perceived complexity of the project. This is augmented by an analysis of the organizational context within which the project is executed, including the wider organizational structure.

Management practices for project business

As project business pertains to several projects, potentially running concurrently, it is necessary for the management of project business to be able to consolidate the requirements and objectives of several projects under a common management umbrella. This is because the relevant unit of analysis in project business is the firm, rather than single projects. (Artto and Wikström, 2005.)

From a purely financial standpoint, at least on gross income level, firm financial results should follow directly from projects (Artto, 1998). This means that in making choices between several, concurrent projects, the starting point can be the analysis of individual projects, potentially preceded by project screening to disqualify clearly incompatible projects (Archer and Ghasemzadeh, 1999). Several tools exist for this analysis. Artto (1998) presents several principles for financial calculations of singular projects, including

- Costs involved should be burdened
- Internal transactions should be carried out when lending and borrowing internal resources
- Income should be realized as the work is done to due to even distribution of fixed costs in comparison to uneven distribution of project handovers. (Artto, 1998.)

Expanding financial analysis from pure cost and revenue tracking, several tools for financial comparison and evaluation of projects have been put forth by different authors. These include the expected economic value (Cooper and Edgett, 1997; Archer and Ghasemzadeh, 1999), net present value (NPV) and internal rate of return (IRR) of the project (Cooper and Edgett, 1997) and project business forecasting on income statement level (Artto, 1998).

Due to the recognized potential for conflicts between single-project goals and goals of the functions or strategy of the company (e.g. Hobday, 2000; Sydow *et al.*, 2004; Mutka and Aaltonen, 2013), it is evident that focusing on purely financial tools and measures does not capture everything essential in the management of several projects. One well-known approach to balancing different types of metrics is that by Kaplan and Norton (1992): Balanced Scorecard, supplementing financial perspective with the perspectives

of customers, internal business and innovation and learning that could be utilized in the context of project business.

In especially project context, Cooper and Edgett (1997) present project portfolio management as a solution to the agency problem of conflicting project- and company-level goals. Albeit the study focuses on managing new product development projects, the insights can be applied to the management of delivery projects. This study utilizes both Balanced Scorecard and the project portfolio management approach by Cooper and Edgett (1997).

Cooper and Edgett propose three goals for project portfolio management: maximization of portfolio value, maintaining portfolio balance and upholding the strategic direction of the project portfolio. (Cooper and Edgett, 1997.) Project portfolio perspective is expanded by Archer and Ghasemzadeh (1999), who focus especially on project portfolio selection process, ending in a process that includes strategic considerations, evaluation of individual projects from several perspectives, and a description of different tools and approaches for portfolio selection (Archer and Ghasemzadeh, 1999).

The portfolio selection process proposed by Archer and Ghasemzadeh consists of project proposals submitted to pre-screening, followed by the analysis of individual projects, followed by more careful project screening. The screened projects are then evaluated from portfolio perspective, resulting in portfolio selections, and if necessary, adjustments. The projects in the portfolio are developed and executed, subject to constant analysis. This entire process is governed by strategy in the form of guidelines to project analysis and screening, as well as resource allocations to projects in the portfolio. (Archer and Ghasemzadeh, 1999.) Figure 5 represents this process.

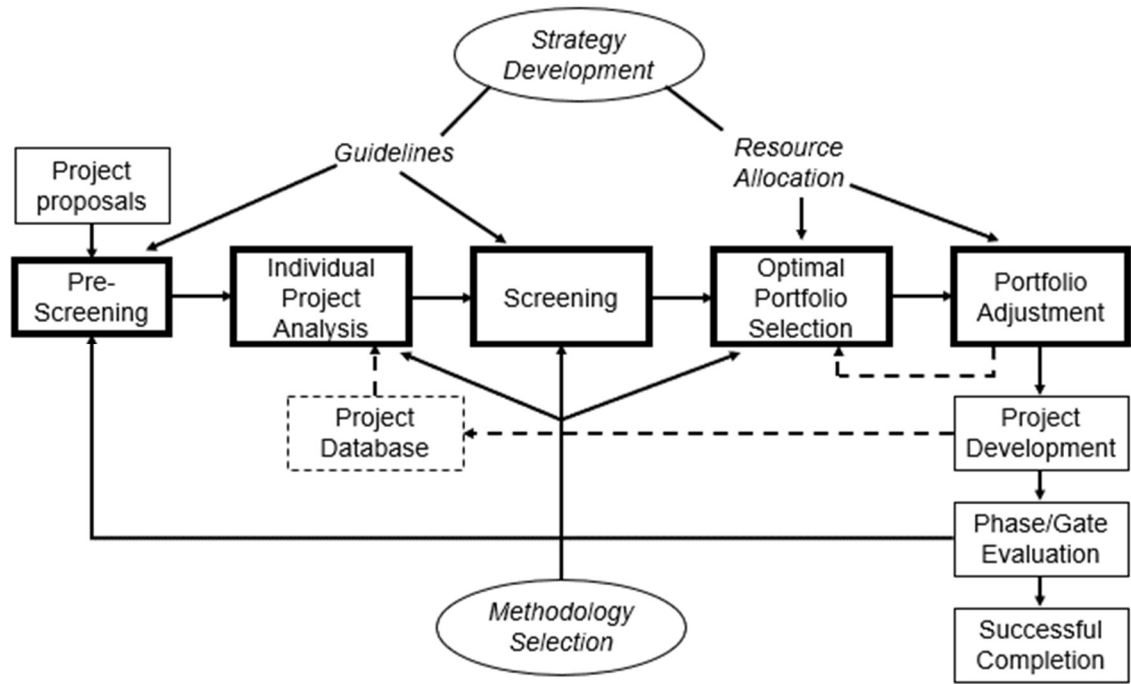


Figure 5. Project portfolio management process, adapted from Archer and Ghasemzadeh, 1999.

Building on project portfolio selection process by Archer and Ghasemzadeh (1999) and the goals of project portfolio management by Cooper and Edgett (1997), a toolkit could be constructed to enable the analysis of projects in a portfolio and guide the strategic management of project portfolios. This is presented in Figure 5 in the circle “Methodology Selection”, pertaining to decisions considering the tools and applications used in the process, especially in the stages of individual project analysis, screening and optimal portfolio selection (Archer and Ghasemzadeh, 1999). Naturally, the goals should be weighed differently in different stages of the process, with, for example, portfolio balancing being paid the most attention in the stages of optimal portfolio selection and portfolio adjustment but should still be present throughout.

In the pre-screening stage of project portfolio management, the key issues are feasibility of the project, recognition, analysis and estimations of evaluation parameters, fit to the strategic focus of the portfolio according to strategic guidelines, and finding a champion for the project (Archer and Ghasemzadeh, 1999). This is done to expunge projects clearly outside the scope of the portfolio. In relation to Cooper and Edgett’s portfolio management goals, the pre-existing strategic guidelines fulfil the goal of upholding strategic direction (Cooper and Edgett, 1997). Regarding the other goals of value maximization and maintaining balance (*ibid.*), it should be noted that the project might not yet be fully formed in this stage, necessarily limiting the capability for rigorous analysis. In addition, the number of projects entering pre-screening might place constraints on possible analyses due to limitations of managerial cognition, especially in small and medium-size enterprises. Thus, tools and measures used should be fast and easy to use and understand.

Such evaluations pertaining to portfolio value might be the expected gross profit of the project (Artto, 1998) or even expected revenue in circumstances of extremely high uncertainty. Regarding portfolio balance, in the pre-screening phase consideration should be made at least regarding the project's temporal placement (Cooper and Edgett, 1997; Archer and Ghasemzadeh, 1999), levels of originality, uncertainty and complexity (Cooper and Edgett, 1997; Hobday, 1998) present, the market targeted and type of project in question (Cooper and Edgett, 1997). Mandatory projects are also identified in this stage (Archer and Ghasemzadeh, 1999).

In the stage of individual project analysis, the project is subjected to a rigorous analysis. The goal of this analysis is to obtain the ability to compare the project with others, taking necessary interdependencies and potential mandatory projects into account (Archer and Ghasemzadeh, 1999). This usually includes financial analysis in terms of key performance indicators, such as the aforementioned net present value, as well as detailed analysis of risks and uncertainty (*e.g.* technical, commercial, financial, competitive) related to the project, financial aspects generally focusing more on the value maximization goal of project portfolio management, uncertainty-aspects on portfolio balancing (Cooper and Edgett, 1997). The potential strategic impacts of the project are also analysed in this stage. The actual choice of metrics to include can be expected to vary significantly from company to company, as strategies, chosen methodologies and project types are not identical between companies but the end goal of obtaining comparable measures from different projects remains.

During project screening phase the projects are eliminated or allowed to proceed to the final stage of portfolio selection. The screening happens based on pre-existing criteria determined by strategic choices, such as estimated NPV. (Archer and Ghasemzadeh, 1999.) The screening may be based on several independent criteria, all of which need to be fulfilled, or, for example, on achieving a minimum weighted mean from several criterion (Cooper and Edgett, 1997). The key consideration here is the comparison against a measured *baseline*, rather than other available projects.

In the stages of portfolio selection and adjustment a combination of projects is selected, and resources are allocated so the final decision best fulfils the stated goals of value maximization, portfolio balancing and maintaining strategic direction (Cooper and Edgett, 1997; Archer and Ghasemzadeh, 1999). Portfolio balance has a key role here in, for example, including low-risk projects with low potential benefits to hedge against the failure of high-risk, high-reward projects (Archer and Ghasemzadeh, 1999). Dimensions to balance include time horizon, risk levels and market segment (Cooper and Edgett, 1997). Different visualization aids and models can ease the decision-making process, such as scoring models, portfolio matrixes, optimization models and ranked lists based on weighted criteria (Cooper and Edgett, 1997; Archer and Ghasemzadeh, 1999). The actual tools used are dependent on the company-specific, or even business unit-specific chosen methodology (*ibid.*), key being their consistent application over projects. As the portfolio

is formulated, it should also constantly be forecasted on income statement level, including administrative costs as well as bid-stage projects based on the likelihood of winning (Artto, 1998).

Assuming that alignment of project portfolio goals and project goals is achieved, and that allocation of scarce resources to projects is successful (Artto and Kujala, 2008; Artto *et al.*, 2011, p, 304–306), the success of project portfolio management should come from the successes in the management of singular projects. This view is reinforced by Martinsuo and Lehtonen (2007), who conclude that efficiency in project management is correlated with the efficiency of project portfolio management. This is evident to the degree that single-project factors explain over half of the variance in project portfolio management efficiency, with the additional finding that the importance of portfolio-level management increases as the size of the company grows (Martinsuo and Lehtonen, 2007). Conversely, project management competency is influenced by the strengths and weaknesses on corporate level, such as the capabilities and resources present in the corporation, strategic decisions made and relationships with external actors (Isik, 2009); factors usually seen to belong under the territory of strategy. This means that strategic choices have a two-fold impact on successful management of project business: both through the guidance given to portfolio selection and resource allocation, as well as to the competence in and execution of single-project management.

This study utilizes the portfolio approach to the management and evaluation of collections of projects. The management practices utilized in cases are evaluated, and based on the findings and theory, a methodology for systematic portfolio management will be proposed, including strategic considerations, time horizon, financial analysis and measurements, technical balance and assumed risk position. The proposed methodology will, inasmuch as possible, be supported by visualization tools and illustrations.

Project business in project networks

Management of project business in networks can be viewed through two distinct lenses: management of a project network and management of a business network. The first pertains to the execution of a singular project in a temporary network, including goal alignment and coordination of several companies. The second pertains to maintaining efficiency and innovativeness over a semi-fluid value network and positioning within. (Artto and Kujala, 2008.) Key term here is that of project network, defined by Hellgren and Stjernberg (1995):

“A project network consists of several actors and their relations, where no actor may act as an authority for the whole network, the network is open in the sense that its boundaries are indefinable unambiguously, and the network is limited temporally and changing over projects” (Hellgren and Stjernberg, 1995).

Key aspects of project and business networks can be thus identified as *fluidity over time* and *sovereignty of actors*. *Fluidity over time* means that these networks are dynamic, and that actors may enter or leave the networks (Hellgren and Stjernberg, 1995; Artto and Kujala, 2008). It also carries the implication that partnerships are often temporary and subject to change from project to project, causing uncertainty (Hellgren and Stjernberg, 1995). *Sovereignty of actors* means that the companies participating in the networks may, and most often do, have differing goals that sometimes conflict with those of other actors, exposing the entire network to opportunism (*ibid.*). Thus, management of these networks includes the alignment of goals between actors (Artto and Kujala, 2008).

The fluidity and sovereignty of actors in the project and business networks cause significant challenges to network optimization. For example, a company participating in a project network only for the delivery of a single project might only be interested in the optimization of gains over a short period of time, potentially conflicting with goals of companies in the network with established positions and long-term time horizons (Hellgren and Stjernberg, 1995). In a long-term participation to the business network, the interplay between project networks in the larger business network also becomes significant (Artto and Kujala, 2008).

If the management of a company is inherently a solution to an agency problem, can the management of project networks and business networks be seen as the same problem, only compounded by the involvement of numerous parties and their greater independence from each other. Thus, different tools of alignment are needed. Some of the proposed tools are strategic partnerships, contractual arrangements, especially as it pertains to singular project deliveries (Artto and Kujala, 2008) and controlling information flows within the network (Hellgren and Stjernberg, 1995; Suomi, 2018). However, in the context of business network management, these tools may be insufficient for maintaining efficiency and innovativeness, one of the most important goals in business network management (Artto and Kujala, 2008). In this study, external actors are analysed in the context of cases, and their influence on the structure of the project is evaluated. Especial interest is paid to any partnership arrangements, either explicit or those of mutual shared understanding.

2.2.2 Industrial services in support of project business

As a groundwork to the discussion of services in the context of strategic management, business models and project portfolio management, it is first necessary to consider the nature of services. Services as an academic discipline as well as in business practice have grown significantly in importance since the 1950s (Heineke and Davis, 2007), driven by pressures to diversify and respond to customer needs (Vandermerwe and Rada, 1988). Baines *et al.* (2009) find that main challenges in adopting services relate to service design, organization strategy and organizational transformation, with the primary research need in engineering tools and techniques for practitioner working with these challenges. The focus of this study, following the categorization by Homburg and Garbe (1999) is

industrial services, defined as “services provided by a manufacturing company to organizational customers”, including pre-purchase, at-purchase and after-sales delivered services, *e.g.* engineering, staff training and technical maintenance. In this study, focus is mostly on project-related services. In this subchapter, first, the phenomenon of servitization and the driving financial logic is presented, followed by a discussion of strategic considerations behind servitization.

Services & servitization

Some of the earliest academic discussions regarding services took place in Harvard Business Review in the year 1976, with articles “The industrialization of service” by Levitt and “Match supply and demand in service industries” by Sasser Jr. These early articles established the foundations of services, such as perishability or the inability to control demand through inventories, inseparability of the consumer-producer interaction, immediacy or the demand and intangibility of outputs (Sasser Jr, 1976), as well as the connection to operating management practices, such as the observation that efficiency requires volume just as in manufacturing (Levitt, 1976). In addition, some approaches for the operational management of services were proposed, such as attempting to match capacity with demand by altering supply of capacity and altering demand for capacity (Sasser Jr, 1976).

The lure of higher profits is one of the key drivers in the emergence of industrial services. Wise and Baumgartner (1999) present the case that installed base is significantly larger than that of annual installations, leading to large revenues potentially attainable from downstream activities. The key benefits listed include increased revenue, higher margins and improved customer allegiance (*ibid.*). Similar sentiment is expressed by Cohen *et al.* (2006) with the suggestion that the services produce significantly larger share of the profits than the gained turnover would suggest; that 24 % of revenues brought from after-sales services generate 45 % of total gross profits. This is supplemented by suggesting several ways how to improve the performance of services, including a mention of selecting business models to support service products (Cohen *et al.*, 2006). Should this claim be true, it should be apparent from the cases within this study. Services are also suggested to enhance product sales (Kastalli and Van Looy, 2013).

A contrasting view to servitization is given by Neely (2007), who finds that companies which classify themselves as manufacturing and services -companies are more likely to go bankrupt than purely manufacturing companies. This seems to indicate that ineffective implementation of services may cause issues for the well-being of the company. This is expanded upon by Neely (2008) who finds that servitized companies have larger revenues and lower relative profits, caused by higher employment costs, operating revenue, working capital and total assets per employee. As a curious finding the results are moderated by firm size, in that for smaller companies, defined as below 3 000 employees, servitization actually improves net profits, but that the effect is inverse for larger companies

(Neely, 2008). This indicates that service provision probably requires more highly trained staff, thus increasing employment costs, and that the cost of additional assets necessary for service provision may outweigh the increased revenues.

As a potential solution for the conflict regarding the true profitability of services, Kastalli and Van Looy (2013) find that the relationship between service activities and profitability is positive, but not linear. An illustrative figure of the relationship is given in figure 6. The explanation of this phenomenon follows from the logic that first service activities can be performed with only minor additional costs in comparison to the revenues gained, while increasing the scope of service activities incurs additional costs due to investments into scaling of services; creating a profitability hurdle. However, as the scope of activities grows, economies of scale come into effect, again leading into higher profitability. (Kastalli and Van Looy, 2013.) The up-front investments necessary as the services are scaled might be the reason behind the findings of Neely (2007; 2008) regarding likeliness of bankruptcy and decreasing net profits in major companies.

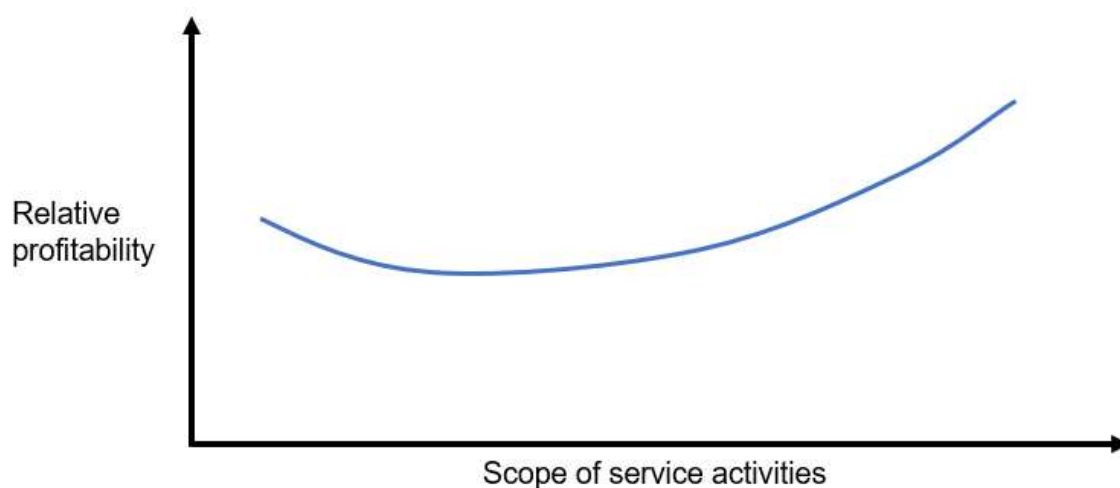


Figure 6. Relative profitability of services as the function of the scope of service activities, based on Kastalli and Van Looy, 2013.

Service strategy

Vandermerwe and Rada (1988) classify services as something that is “performed rather than produced”. The reason for servitization prevalent in manufacturing companies is given as a customer-driven attempt to gain competitive edge through, for example, creating barriers to competitors and new entrants, differentiation of offering and increasing switching costs (Vandermerwe and Rada, 1988). This is directly related to the porterian school of strategic thought, and especially the Five Forces (Porter, 2008). Thus, it can be claimed that servitization is fundamentally the result of similar strategic conclusions by several companies in a similarly evolving marketplace, with the implication that investments into services should be driven by carefully considering the future evolutionary path of the industry, and that potential benefits of services may be unattainable in some industries. Wise and Baumgartner (1999) suggest evaluating, in addition to the attractiveness

of the downstream business, the importance of customer relationships and the power of distribution channel.

Coyne (1989) makes several observations regarding the viability of new service initiatives, including that all service elements are not important, that investments should focus on the factors that improve service promise, and that new services should be difficult to copy. Key argument is the evaluation: if the market has a service gap and the focal company decides to exploit it, will the company be better off than if the effort was never initiated, or will the competitive position return to parity, only with higher costs (*ibid.*)? Thus, both financial and strategic analysis are necessary before the introduction of new service elements.

Expanding upon the view of Vandermerwe and Rada (1988), Quinn *et al.* (1990) take a value chain approach, with the suggestion of focusing on areas where the focal company can add the most value to the customer, and to focus on strategic activities regardless of their status in the value delivery pipeline. The idea is to create a strategic position in the value chain combining products and services, based on own abilities and competences (*ibid.*). This is an interpretation that combines perspectives of positioning, value chain analysis and resource-based views. Regarding positioning itself, Davies *et al.* (2004) suggest first classifying the industry based on the spread of industrial activities (horizontal – vertical) and scope of systems integration (assembly from externally developed components – assembly from single-vendor or internal components).

Strongly connected the concept of business models as well as the resource-based view, den Hertog (2010) focuses on service innovation. The study conceptualizes service innovation into 6 dimensions, including new service concepts, revenue models and business partners, familiar from the preceding discussion of common components in business models (*ibid.*). This is then expanded with a list of dynamic capabilities necessary for managing service innovation, such as conceptualizing, scaling and learning & adapting (den Hertog, 2010). Following the categorization by Winter (2003), these are higher-order dynamic capabilities, and their acquisition can be rather challenging.

In summary, then, services have the recognized potential to increase revenue and profitability, leading to increased adoption of services by industrial actors. However, the implementation of services is not risk-free, and increased revenue might not lead to higher profits due to the necessary up-front investments required for service network, assuming that economies of scope are not obtained. Services also have a strategic role, and research of their relevance is grounded on strategic theory including considerations of positioning, value chain configuration, differentiation and dynamic capabilities, with significant interfaces to the research in business models.

2.2.3 Management of industrial and project services

In this subchapter, industrial services are analysed firstly from the perspective of service operations management, followed by introduction to services in capital goods and integrated solutions and then from the perspective of purely management of project-service operations. The goal of this subchapter is to illustrate existing research on industrial services in order to form a basis for the comparative analysis of the cases.

Management of service operations

Early literature on the management of service operations was mostly based on services supporting manufacturing activities or vice versa. For example, focusing on how industrial services can be supported by existing production facilities, Chase and Garvin (1989) present four distinct models in how to better respond to different customer needs arising in services, each corresponding to a well-defined set of customer needs. This research still emphasizes the connection between manufacturing and service operations in its investigation how factories could be utilized to better support emerging service business.

In the context of industrial services *per se*, Cooper and Jackson (1988) found that in addition to intangibility, inseparability and perishability, defining qualities of services include concepts of heterogeneity of outputs and the requirement of specialization to the customers' have implications for management. They suggest that in industrial services, corporate resources should be invested in customer contact skills, where necessary, customer contact should be somewhat standardized to limit heterogeneity and variance in service quality (Cooper and Jackson, 1988). In addition, Cooper and Jackson (1988) find that the marketing of industrial services has several constraints not present in consumer buying, such as larger amounts of money, larger technical complexity and uniqueness of the products.

Auramo and Ala-Risku (2005) investigated manufacturing companies moving downstream in the context of industrial services. As a key challenge for the manufacturing company, the study notes the unpredictability of demand. This is managed by splitting the demand into predictable (*e.g.* contract-based, scheduled) demand and unpredictable demand (*e.g.* alert work), with the goal of increasing the share of predictable demand of the total demand, with several suggestions given for the management of service operations, such as response-time based pricing, modularity and preventative maintenance plans. (Auramo and Ala-Risku, 2005.) Turunen and Toivonen (2011) also note that using outsourced service operations led to lower effectiveness and usefulness of services. This indicates that cost-effective responsiveness to changing demand might not be possible, increasing the impetus for demand management.

A study by Frei (2006) investigates different methods in how to achieve high service levels efficiently; a common trade-off. The key takeaway of this study is the

categorization of customer variability into arrival, request, capability, effort and subjective preference variability, as well as the strategies to match each kind of variability and suggestions of how to tackle each kind of variability (Frei, 2006). This categorization of customer variability could be used to identify the strategy used to match capabilities across all cases and evaluate the success of the chosen methods, aiding in more effective capacity matching.

Regarding the quality of services, some of the suggestions include things such as considering people skills in addition to technical competence in hiring process, that resources are invested in development of customer contact skills and that customer contact should be standardized and if at all possible, services should be modularized to ease selection and further standardization (Cooper and Jackson, 1988). Homburg and Garbe (1999) divide the quality of industrial services into structural (technical competence), process-related (friendliness) and outcome-related (proper working of the previously defective machine) quality. Homburg and Garbe find that all types of quality influence customer trust and satisfaction, and especially that process-related quality correlates with customer commitment. Even more interesting is that, according to the study, outcome-related quality is not necessarily correlated with customer commitment. (Homburg and Garbe, 1999.) This would seem to suggest that especially the measurement and improvements of process-related quality are important in the management of industrial services.

Service operations in project business

Artto *et al.* (2011, pp. 267–284) list several types of project-related services. These cover a huge range from deliveries where the project deliverable itself is sold as a service to simply selling training and support for the end user, with service offerings such as commissioning, preventative and corrective maintenance, and guarantees for the function of the product (*ibid.*). The services utilize several different earning logics, such as direct earnings from the service provided, keeping the service free and charging for the raw materials and spare parts and earnings based on the output received by the customer (Artto *et al.*, 2011, p. 280). Naturally, the cost structure and risk involved vary significantly between projects as well as between service components within a given project delivery, necessitating strong understanding about the expected performance of the product as well as the underlying business dynamics.

Focusing on the performance of project companies, Gann and Salter (2000) present the argument that a single project might not by itself be a capable explanation of the firm's performance. Instead, the authors argue that competitiveness results from the interactions of project and business processes, and list generic tests with which to evaluate project-service interactions, some of which include the extent of business-project process integration, the extent of value-added services developed on the back of core project-based activities, extent of mechanisms to capture learning and extent of mechanisms to capture value from outside the firm (Gann and Salter, 2000).

Kujala *et al.* (2013) split services in the context of project deliveries into three categories: core project delivery, facilitating service products and supporting service products. Services pertaining to core project delivery include activities such as design, *i.e.* activities that are necessary for the *function* of the project delivery. Facilitating service products, on the other hand, are services that enable tailoring of the system delivery according to customer needs. Supporting service products are those that create additional value for the customer, such as optimizing system availability. (Kujala *et al.* 2013.) As the service products differ greatly in their goals and operating logic, it seems likely that differences exist also in their profit potential. Kujala *et al.* (2013) identify five perspectives how services support business, including strategic, marketing & sales, project implementation, learning & innovation, and financial perspectives. Naturally, different service delivery types provide distinct benefits and challenges for project business.

Capital goods and integrated solutions

In a study of services on capital goods manufacturing industry, Oliva and Kallenberg (2003) find that the role of services in capital goods offering exists in a continuum of importance, ranging from services acting as an “add-on” of tangible goods, to the point where tangible goods act as “add-on” for services. The study sees the service adoption occurring in stages from first consolidating the product-service offering, followed by entering the installed base service market, followed by expansion to relationship-based and / or process-centered services, yet followed by taking over the end-user’s operations (Oliva and Kallenberg, 2003). However, the study does not suggest that all companies should go all the way to conducting operating on the behalf of the customer, but instead urges companies to think in terms of “Why do you want to expand your service offering?” and “What position should you occupy on the change line?” (*ibid.*).

Interestingly, Oliva and Kallenberg (2003) suggest that one key step is to separate service organization from the manufacturing organization, enabling service management to focus its attention entirely on the service business. This is contrasted in a case study by Turunen and Toivonen (2011), who find that separate service unit does not guarantee success in service business, with the finding that while separating service unit from manufacturing business eases the measurement and controlling processes of services, it also requires major investments. On the other hand, Gann and Salter (2000) present the argument that the separation of management to services and manufacturing creates unnecessary additional rigidities.

Integrated solutions combining products and services are suggested by Hax and Wilde (1999) as one way to create additional value for the customer, supported by Kastalli and Van Looy (2013) who emphasize the importance of integrated product-delivery business model. In this context, Davies *et al.* (2004) present the case that services related to capital goods provide high margins and recurring revenue streams before, during and after the lifetime of capital goods delivery. Ulaga and Reinartz (2011) expand on this with the

argument that the ability to offer “hybrid offerings”, or offerings consisting of both goods and services, may provide strategic benefits. Ulaga and Reinartz suggest several critical resources and capabilities for hybrid offerings, including field service organization, product development and manufacturing assets, ability to gain data from installed base, capability to process and interpret data and the capability to sell and deploy hybrid offerings (Ulaga and Reinartz, 2011). Hybrid offerings can be seen as positions on the sliding scale between services as “add-on” to products and products as “add-on” to services as illustrated by Oliva and Kallenberg (2003). The research by Ulaga and Reinartz (2011) is used here to expand the research of Oliva and Kallenberg (2003) to strategic considerations of the offering.

Typical method for service delivery in industrial context is as a component in product-service system business, where both services and products form part of the total value delivered to the customer. For example, Tukker (2004) presents a categorization for services delivered as parts of the product-service system, depending on the primary creator of value. In the categorization, services where most of the value comes from the product content are categorized as “product-oriented”; services where the service component of product-service system is the primary creator of value, the services are “result-oriented”; with “use-oriented” in between (Tukker, 2004). The same categorization is adopted by Baines *et al.* (2007), with the observation that moving towards result-oriented product-service systems can be used to create higher-value, more easily differentiable offerings, customers are released from the responsibilities of asset ownership and the society may gain sustainability benefits as the producer is incentivized to *e.g.* decrease material consumption. This categorization can be used to establish a position for a company in the sliding scale of value creation in product-service systems.

One additional consideration regarding value creation is the finding by Barquet *et al.* (2013), who suggest that value and competitive advantage in product-service systems is, in fact, created by co-creation among players, deeply tied to the concept of value network. This is expanded by Maglio and Spohrer (2013) who suggest the evaluation of value propositions (defined as a systematic search process to improve and create new offerings and reconfigure ecosystems) from the perspectives of primary stakeholders, including customers, service providers, authorities and competitors.

Profits and business models in the context of industrial services

For the purpose of creating profitable services, Davies *et al.* (2006) suggest several important attributes, such as creating organizational structure that supports service business and to build capabilities for repeatable solutions. Heskett *et al.* (2008) expand the linkage between services and profits by introducing the concept of service-profit chain, where internal service quality leads to employee satisfaction, leading to both employee retention & productivity, both of which lead to increased value of services to external actors, thus increasing customer satisfaction and loyalty, leading to higher revenues and profits. This

process is visualized in figure 7. As another perspective, Anderson *et al.* (1997) present the case that there may exist trade-offs in between customer satisfaction and profitability. In this study, attention is paid especially to the measurement of external service value and customer satisfaction, and whether customer loyalty translates to profitability.

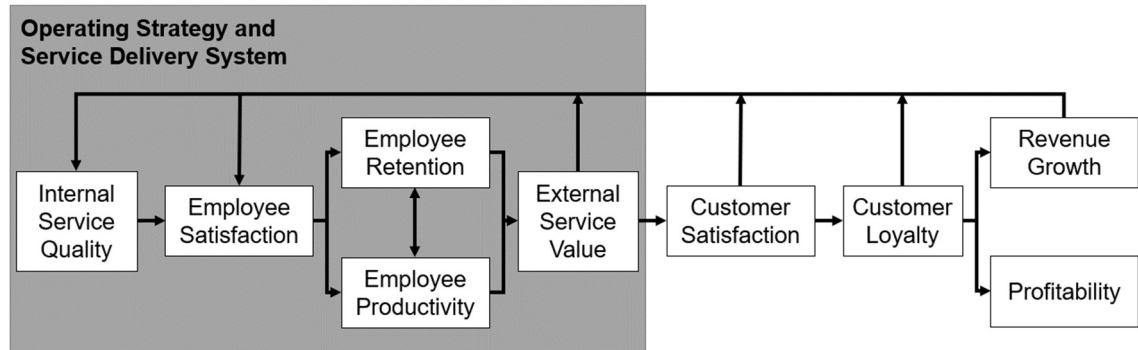


Figure 7. Service-profit chain, adapted from Heskett et al., 2008.

Regarding the role of the supplier in a complex systems delivery, Davies *et al.* (2006b) categorize the role assumed by the responsible party for the delivery into systems sellers and systems integrators. Their research suggests that systems sellers have more revenues and lower cost, thus leading to higher profits, with the added benefits of brand loyalty and the ability to ensure ‘fit’ between components, while systems integrators may specialize in the production of each component, are able to handle more complex tasks and choose the most effective solutions (Davies *et al.*, 2006). This naturally has implications for the necessary capabilities. However, systems integrators need to have more capabilities in business outside their normal scope of operations and need to be able to respond to a higher variance of customer needs. Frei (2008) presents a warning regarding the organization of service offering by connecting business model and service model. The issue is that in trying to meet all kinds of customer needs, a company may dilute both available resources and excellence in responding to any given need, simultaneously leaving the company vulnerable to more focused competitors. The solution is to focus on multiple unique niches, supported by economies of scope gained in shared services. (Frei, 2008.)

Kindström and Kowalkowski (2014) find that the concept of business models is valuable and can be used in developing new services, and that any changes in service strategy must be reflected in business models. Especially on a case study of service-based business models in manufacturing companies, Kindström (2010) categorizes service innovations into innovations in service offering (value proposition), process and position, based on the concept of business model as articulated by Chesbrough (2007). Kindström lists several issues relating to different parts of the business model, such as the issue of getting customers to appreciate new value generated by services when changing the value proposition (Kindström, 2010). This study utilizes the framework combining business model components and service innovation types to aid in recognizing possible actions in potentially problematic business model components identifiable from the cases.

Ulaga and Reinartz (2011) suggest a classification for service types on the basis and type of the value being delivered, with the dimensions of goods-oriented – process-oriented services; and to promise a deed – guarantee performance. This categorization is visualized in figure 8 as a foursquare matrix. Services that are oriented towards goods delivered and promise to perform a deed are categorized as product life-cycle services, those that are oriented towards goods but instead promise to achieve a performance are categorized as asset efficiency services, process-oriented and deed-performing services as process support services, and process-oriented, performance-achieving services as process delegation services (*ibid.*) Naturally, the differences in capabilities necessary for the performance of each type of service vary significantly, and require different investments. This categorization could potentially be used to identify potential market opportunities in other service categories as well as develop the relation with existing customers.

Goods-oriented services	Product life-cycle services: Facilitate the customer's access to the good and ensure its functioning	Asset efficiency services: Assist the customer in improving their own business processes
Process-oriented services	Process support services: Aid customer in achieving productivity gains from their assets	Process delegation services: Perform processes on behalf of the customers
	Promise to perform a deed	Promise to achieve a performance

Figure 8. Categorization of services according to Ulaga and Reinartz, 2011.

2.2.4 Learning and dynamic capabilities in project-service business

One of the defining features of projects is their uniqueness. Generally, the project organization is temporary and after the conclusion of the project dissolves, and the staff and resources are distributed to other projects, meaning that the immediate demands of the project complicate the dissemination of learnings to future projects (Sydow *et al.*, 2004; Gann and Salter, 2000). One of the main issues is the tension between the necessary autonomy of the project organization and attempts of interorganizational coordination (Sydow *et al.*, 2004). This subchapter attempts to provide an overview into learning and dynamic capabilities in projects and form a basis for the evaluation of cases from the perspective of dynamic capabilities.

In a case study focusing on complex product systems, Davies and Brady (2000) find that learning is crucial in the delivery of complex systems. The authors list several necessary

capabilities, such as bid preparation capabilities, project execution capabilities and project capabilities (Davies and Brady, 2000), all of which can be classified as first-order dynamic capabilities (Winter, 2003), but also emphasize organizational learning (Davies and Brady, 2000), an expressly higher-order dynamic capability (Winter, 2003). Key findings from Davies and Brady (2003) are the importance of organizational learning and that opportunities for learning arise from repeating similar projects.

The list of capabilities necessary for hybrid offerings by Ulaga and Reinartz (2011) can also be seen as dynamic capabilities, such as data interpretation and execution risk assessment & mitigation capabilities. Ulaga and Reinartz present these capabilities as potential source of competitive advantage (*ibid.*), and as such, dynamic capabilities can be interpreted as a potential source of competitive advantage in project-service business.

Some of the main issues in learning in projects are time pressures, centralization of learning resources to senior members of hierarchy and deferral of learning to the end phase of the projects (Keegan and Turner, 2001). Keegan and Turner (2001) note that especially learning by trying things is discouraged and that organizational learning is not prioritized in project selection. The authors suggest several tools to aid retention of learning, such as lessons learned-databases and corporate training programs (*ibid.*), but the main issue of the natural unsupportiveness of project business regarding learning initiatives remains unsolved. Of significant note is the finding that in the case companies from Brady and Davies (2004), learning was supported by accepting the risk of cost overruns and delays, thus overcoming one of the key issues apparent in the aforementioned study by Keegan and Turner (2001).

The issue of empowering learning initiatives in project business is partially remedied by Brady and Davies (2004) in a longitudinal case study of capital goods suppliers with a Project Capability-Building model. Brady and Davies (2004) split learning into project-led learning and business-led learning, where the creation of new project capabilities begins with project-led learning from exploratory vanguard projects, then between projects with the attempt to select successful routines from vanguard projects, then new project capabilities are spread across the organization via business-led learning with more exploitative perspective, facilitated by top management. The process is illustrated in figure 9. In addition, Davies and Brady (2016) note that the recognition of valuable lesson falls under the umbrella of dynamic capabilities, and that the relationship between project and dynamic capabilities is reciprocal, calling for the ability to both explorative and exploitative learning.

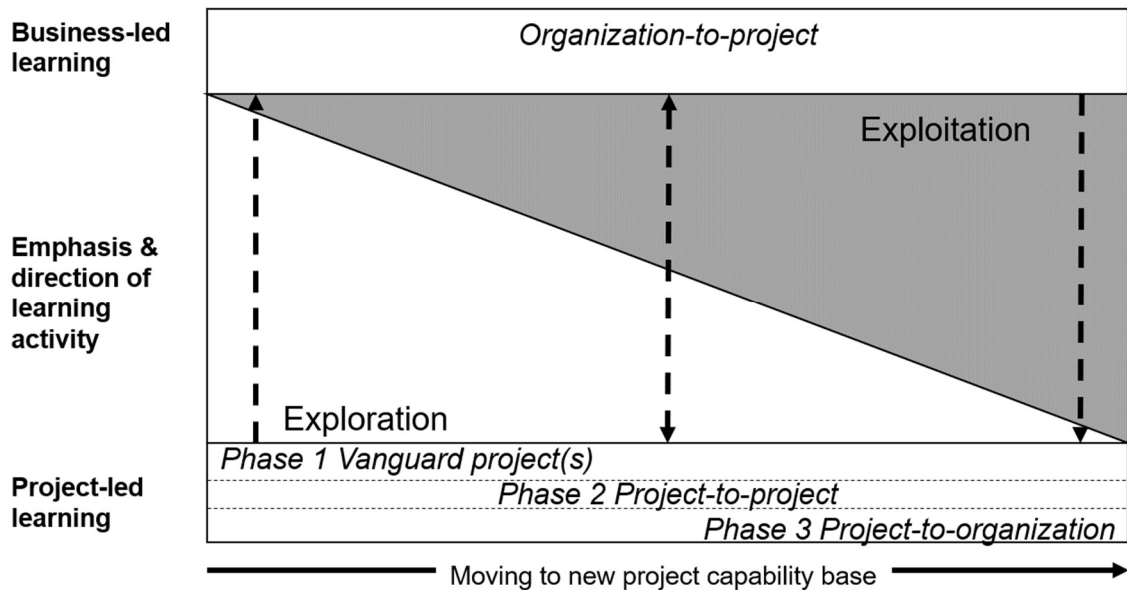


Figure 9. Process of building new project capabilities, adapted from Davies and Brady, 2004.

In summary, learning and relevant dynamic capabilities in project business are a potential key success factor, and they have received significant research attention. Albeit the amount of attention paid to services *per se* in this context is significantly less, most of the research seems to be applicable to both pure-product deliveries and project-service system deliveries.

The main issue with dynamic capabilities regarding this study is the difficulty in their measurement; the absolute quantification of issues such as “organizational learning” and “ability to repeat solutions” might rightfully be considered an exercise in futility. However, the merit of these factors is such that they cannot be disregarded in project business. Thus, this study focuses on the evaluation of processes to enable and capture learning, including the mandate to take risks in the name of learning (technological, financial, etc.) and the existence and extent of processes to evaluate success of projects and to disseminate results among the company.

2.2.5 Business models in project-service context

When integrating service components into project business, the question about business models to be employed becomes immediately apparent. Questions including “What services should be included in the project bid and what charged separately?”, “What is the earning logic for the service?” and “How to ensure availability of resources for rush work?” are distinctly in the domain of business models as described earlier, and are some of the more common asked by managers considering the necessary trade-offs in risk, capacity and value propositions.

There are several views regarding the logic of business models in project-service context. For example, Wikström *et al.* (2009) present the perspective of four business logics regarding how to include services in business models. These include product-driven logic, where drivers for service inclusion are mostly technological (technological novelty and customization of the final system); innovation & technology-driven logic, where the drivers are again technological, but more related to the high complexity of the final project; service-driven logic applicable in cases where the degree of maturity in delivering services is high, but the complexity rather low; and business-driven logic, mostly present in cases where the variety of necessary knowledge bases and stakeholders is high and the share of the project delivery is large in relation to the customers' overall investment (*ibid.*).

As another categorization of business models, albeit on a higher level of abstraction, is presented by Wikström *et al.* (2010) who classify business models in project business into project business models, project network business models and business network business models. The key differentiating factor is the scope of the model. For example, in project business model the company is mostly focused on the efficient delivery of a singular project, while in business network business model the focus spans a network of actors over several projects (Wikström *et al.*, 2010). This is directly relatable to earlier discussion about project networks (*e.g.* Artto and Kujala, 2008).

In a study focusing on the implementation of service business models in the context of project-based firms, Wikström *et al.* (2009) adopt two main dimensions: the complexity of the core project delivery and degree of maturity in delivering services. Each dimension is evaluated using several variables, some of which are listed in table 4. The variables listed are a non-exhaustive list adopted from Wikström *et al.* (2009), including concepts such as 'organizational concept', meaning whether the business is organized around product profit centres, customer segments or natural workflows and 'variety of skill & engineering outputs'. The ones listed here are based on their aptitude for analysis of the case studies at hand and are included to illustrate factors that might influence the choices regarding business models in project-service business.

Table 4. *Some variables of complexity of the core project and maturity of services in the business model, adapted from Wikström et al., 2009.*

Complexity of the core project delivery	Degree of maturity in delivering services
- Financial scale of the project	- Organizational concept
- Variety of distinct knowledge bases	- Value creation route
- Degree of technological novelty	- Measures
- Variety of skill & engineering outputs	- Most important process
- Degree of customization	- Company culture
- Intensity of user involvement	- Main offering

In another view, Kujala *et al.* (2010) suggest the use of solution-specific business models, with a typology of five, including basic installed base -services, customer support services, operations and maintenance outsourcing, and life-cycle-solutions, further split to delivery and development of life-cycle solutions. As the basis for this categorization, Kujala *et al.* (2010) use two dimensions: the orientation of the value proposition towards the project product or customer's process (relevant measure being the degree of integration versus separation of the components in the offering), and the revenue generation logic as transaction-based or relationship-based. For example, customer support services including consulting are categorized as customer's process oriented and transaction-based services. As a significant finding, Kujala *et al.* (2010) find that the movement of a solution from one category to another by adjusting the value proposition had significant impact on the profitability of the solution as well as perceived solution quality. The categorization is presented on figure 10.

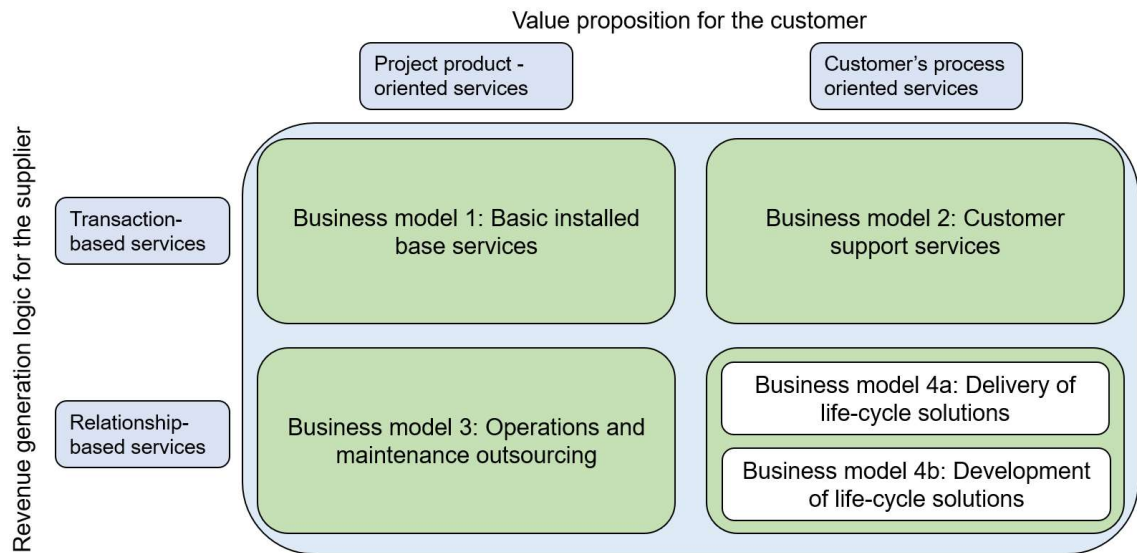


Figure 10. Categorization of solution-specific business models, adopted from Kujala *et al.*, 2009.

For the purposes of this study, the viewpoint of solution-specific business models is adopted. Thus, the assumption is that different cases under scrutiny may utilize different business models. After the cases have been evaluated, the assumption of “business models utilized by the case companies are solution-specific” is tested against the findings. Naturally, the argument may have different degrees of validity. Such happens, if, for example, some details, such as the earning logic vary between cases, but, for example, the cost structure, involvement of external actors and the value proposition remain the same. The relevant information then is in the *degree* of variance between cases.

Supporting the concept of solution-specific business models, Kujala *et al.* (2011) list several factors influencing the choice of business model. These include the product orientation of both the customer and the supplier, the existence and skill level of the customer's maintenance organization, the level of complexity in the delivered technology as

perceived by the customer, the customer's core business and financial resources, the supplier's marketing approach and the accustomed business practices as well as the organizational structure of the supplier and the customer (Kujala *et al.*, 2011). It would, however seem that these factors are more implicit drivers than pronounced ones due to their intangibility.

Besides typologies for the business models in project-service business, significant amount of research attention has been paid to the specific elements of business models present in project-service business. For example, Wikström *et al.* (2010) identify five business model elements including value and flexibility, organization, innovation and growth, competence and assets, and relationships and collaboration. These elements differ significantly from generic elements of business models in literature focusing specifically on the concept of business models, especially due to higher level of abstraction present here.

In another study business models in project-based firms, Kujala *et al.* (2010), on the other find, find six highly specific business model elements including customers, value proposition for the customer, competitive strategy, position in the value network, supplier's internal organization and key capabilities, and logic of revenue creation. Thus, there are again differences in definition and level of abstraction, as noted earlier in the context of business model elements *per se*. In the context of this study, especially those by Kujala *et al.* (2010) have been earlier recognized as components of the business model concept (customer, value proposition), or at the very least, directly related (competitive strategy). On the other hand, the elements in Wikström *et al.*, while highly derivable from the existing ones, are highly immeasurable concepts due to their level of abstraction.

2.3 Summary of theoretical background

The concept of business model is strongly grounded on strategic theory, but there are significant differences between authors in the scope and construction of the concept, mostly based on the schools of thought behind different theories. Despite differences in perspective regarding especially the source of competitive advantage, these schools of thought, such as positioning theory, resource-based view and dynamic capabilities, are not irreconcilable, and neither are the resultant differences in the concept of business models. This study adopts a dual perspective regarding competitive advantage as both cross-sectional and longitudinal or evolving.

The origin of the concept of business model itself comes mostly from research considering e-business but is strongly founded on pre-existing strategic theory. There are significant differences between different theories regarding *e.g.* the extent, relation to business strategy and even validity of business models, mostly due to different theories' foundations in different aspects of strategic literature. Based on the aforementioned differences of perspective in the concepts of competitive strategy and business models, this study adopts the view where business models and strategy are discrete, but interrelated

concepts, where the business models express the execution and fit of activities across the value network.

Several methods for classification of business models have been recognized in academic literature, but so far none has received universal acceptance, most being purpose-built or rather generic for practical utilization. On the other hand, this means that should the need arise, a company-specific typology of business models could be built. Regarding the components of business models, some of the more common ones include external actors, value propositions, finance, operations and activities, and resources, but significant differences exist between different interpretations. The same, fundamental issue of lacking universally accepted definitions becomes apparent when considering the structure of the framework and methods of building and innovating business models: most are tied to some pre-existing, but not shared conceptualization, thus leaving their global utility questionable.

The linkage between business models and company performance seems to be rather less abstract. Several studies have found links between different aspects of corporate performance (including financial measures), and choices in business models. This creates a solid foundation for the study to use quantitative financial measures in tandem with (mostly) qualitative measurements used to evaluate the characteristics of business models.

Significant amount of research considers project business in some shape or form, and there exist several aspects in which there are strong literary best practices or otherwise significant research, including the organization of project business, project management processes and management of project networks. For the purposes of this study, the identified claims are compared across the findings from the cases, and their utility is evaluated. Also, best practices recognizable from the literature are tied to the strategic context of the cases and used as a foundation for recommendations.

Industrial services are an emergent theme in both academic literature and business practice. The higher involvement of manufacturing companies in services, called servitization, is driven by both competitive demands as well as the lure of higher profitability potentially available through services. However, the implementation of services is not risk-free, and investments in service capabilities might lead to a situation where the additional investments lead to decrease in profitability. Like the research into the management of project business, research onto management of service operations is well-established and several identified best practices exist. Similarly, this study investigates the actual practices performed in the cases, compares them to literary best practices and makes recommendations accordingly.

Learning in the context of project-service business models has been investigated by several authors. Learning is directly tied to the concept of dynamic capabilities and to strategic research. This strategic connection is compounded by investigation of practices and

processes involving dynamic capabilities in the cases under scrutiny and utilized to create recommendations grounded on strategy.

The concept of business models has a key role in the integration of project and service operations. Existent research includes themes such as what drives the inclusion of services into project business, as well as how project-business business models are built and classified. The concept of solution-specific business models is a highly promising phenomenon for future research, seeming to be the realization of the uniqueness of projects applied to the context of business models.

Similar to the concept of business models *per se*, elements present in project business models have been studied in the special case of project business models and solution-specific business models, but the existing classifications are less applicable to practical considerations than the business model elements studied outside the bracket of project business. Final theme present in the literature of business models in project-service business is the research concerning factors influencing the choices of (solution-specific) business models. This study adopts the solution-specific perspective to the concept of business model in the meaning that business models may be constructed on a case-by case basis.

3. RESEARCH METHODOLOGY

In this chapter an overview is given about the research methodology of the study. This includes a description of the nature of the study and research strategy employed, as well as the description and selection of research methods. This is compounded with a description of data collection and analysis methods and their foundations in existing research.

3.1 Nature of the study and research strategy

Following design science methodology, the main goal of this study is to create constructs to serve human purposes, rather than an attempt of creation or testing of scientific claims (March and Smith, 1995). Thus, the main significance and validity of the products of this research is measurable by their utility in practice (*ibid.*). The study aims to increase understanding of the relation between the concepts of competitive strategy, business models and project portfolio management, how they influence the performance of a company, how the concept of business models should be included in the management of project business and could dynamic capabilities produce benefits or even competitive advantage in the context of business models in project business. This is done via verifying factors in pre-existing academic literature and attempting to recognize new factors and relations from the cases under scrutiny, thus constituting a value-adding contribution to the understanding of the phenomena (Whetten, 1989).

In support of these goals, this study adopts a pragmatic research philosophy (Saunders *et al.*, 2009, p. 109). The main drivers for this are

- The multidimensionality of the phenomenon necessitates both qualitative and quantitative analysis (multi-method)
- Pragmatic research philosophy offers the greatest likelihood to generate practically useful research products (design science)
- The researcher cannot adopt a purely objectivist view of the company in question, due to the researcher's personal involvement with the business.

The research is conducted using inductive approach. Inductive approach is chosen due to the lesser constraints it places on the available explanations of the phenomenon and greater flexibility in methodology (Saunders *et al.*, 2009, pp. 125–127). This is in accordance with the pragmatic research philosophy, as the available sample sizes do not support relying simply on statistical quantitative data, the researcher is by necessity part of the research process and the number of alternative explanations is higher than possible to test using deductive research approach (*ibid.*).

The study is an explanatory multi-method study combining action research and case study research. Explanatory research (Saunders *et al.*, 2009, 140) is chosen due to the research

goals of providing concrete, high-utility tools, as well as increased understanding about the interaction of the research objects. It is understood that the sample size will, due to the limitations in available resources, not be enough for drawing statistical conclusions about the variables in question, thus necessitating mostly qualitative approach. This is supported by quantitative financial data wherever possible.

Case study research was chosen because the number of variables influencing strategic project portfolio management & business model choices greatly exceeds the number of available data points, thus necessitating the combination of multiple sources of evidence for reliable conclusions, in accordance with Yin (2014, pp. 16–17). The study was conducted as an action research out of necessity, as the researcher is currently employed by the focal company, with partial responsibility for the issues presented herein. This is not in contrast with design science principles, where the main goal of the research is the utility of research products to human purposes (March and Smith, 1995), and it can be argued that daily involvement with the issues under study makes the researcher uniquely qualified for the creation and evaluation of the practical tools. Action research is also particularly apt because it is uniquely suitable for promoting change within the organization under study (Saunders *et al.*, 2009, p. 147), thus increasing the likelihood of adoption of the research products.

3.2 Data collection

The empirical data collected consists of 5 cases. The selection of only a single case was seen as insufficient due to the concerns of generalizability and unique characteristics of any singular case (Saunders *et al.*, 2009, pp. 146–147; Yin, 2014, pp. 63–64). The selection of cases was done by selecting extreme cases (judgmental sampling, Saunders *et al.*, 2009, p. 213; pp. 237–240), in accordance with Eisenhardt (1989). This was done to enable the cross-case comparison of key variables. The number of cases was limited due to the limited resources available for the conduct of this study, in the bounds of which the execution of similar in-depth analysis across the entire population would have been highly impracticable.

The cases were all delivery projects or project-related services and were chosen based on several criteria:

- The significance of the case for the focal company in (value in EUR)
- The type of customer relationship with the project customer
- The business model employed in the case.

Main sources of data were company internal documentation and records, as well as participant-observation. Documentation and archival records were chosen due to their subjectivity to quantitative analysis (Yin, 2014, pp. 105–110). Especially in this case the availability of internal archival records can be considered extraordinary in comparison to most business research, as the researcher had near-unlimited data access. Participant-

observation (Yin, 2014, pp. 115–117) was mostly conducted informally during the normal course of business over the year and has mostly been recorded in the form of meeting notes and e-mail. Only a few *bona fide* interviews were conducted exclusively for the purposes of this study, mostly as informal in-depth interviews to expand on a pre-selected topic. The data collection process itself was adaptive (Yin, 2014, p. 65), with new data included as became necessary over the course of the study.

3.3 Data analysis and sources

The cases were all submitted to thorough analysis. The analysis included basic quantitative financial analysis of the projects, theory-based analysis of the employed business model, and qualitative analyses on the market context & dynamics as well as the strategic importance of the customer and the market segment. Data collection involved some controlled opportunism in accordance with Eisenhardt (1989). In practice, all the cases were subjected to identical analysis on the dimensions in which they were compared with each other, and some cases were supplemented with additional analyses where necessary to explain some particularities of a given case, as well as to provide additional insights. The combined analyses were triangulated to increase the reliability of the study (Yin, 2014, pp. 120–121).

As the study didn't have a hypothesis, analysis was conducted inductively and iteratively, in accordance with Saunders *et al.* (2009, pp. 124–126). The analysis began with generic features of strategic context, business model choices and project-service components, and as the research progressed, was expanded with more detailed analysis of the value chain and performed activities. As another key issue, the customer relationship, both as a resource and as the result of activities, was analysed in more detail, as the significance became apparent.

The sources used for the literary analysis were mostly magazine articles, supported by some textbooks, other literature and conference articles. The criteria for the selection of sources was as such:

- Theory-building books or textbooks by authors with significant footprint were accepted as sources (*e.g.* Porter's 'Competitive Strategy', 1980; Artto, Martinsuo & Kujala's 'Project business' -textbook, 2011)
- Popularized literature by authors with significant footprint, building on theoretical background was accepted as supportive information and as potential sources of insight for recommendations, but not into the theoretical discussion (*e.g.* Osterwalder, Pigneur & Clark's 'Business Model Generation', 2010)
- Central pieces within the literature analysis were required to have a Publication Forum rating of at least one; for example, articles in Harvard Business Review were accepted as central pieces of theory, articles in the Journal of Air Transportation were not

- Articles, conference articles, workshops and corporate-sponsored works with no Publication Forum rating were only included if
 - They provided substantial context outside the extent of peer-reviewed journals *and* were significantly referenced in peer-reviewed journals (*i.e.* Linder and Cantrell's 'Changing Business Models: Surveying the Landscape', 2000)
 - The article connected some attribute of corporate performance to the concept of business model in a way otherwise untouched by academic literature to express the viewpoint that such a connection could exist
- Articles with no Publication Forum rating, or one of 0, with no significant contribution to the existing literature, were disqualified from the study
- Articles consisting solely of a literature review were only included in the context of illuminating the expanse of the research fields, while within the theoretical concepts based therein, original sources were used wherever possible.

The main analysis tools were written descriptions of the cases. These were submitted for review by the key personnel involved in the cases, and subsequently reiterated until a consensus was received that the description contained a materially accurate description of the case. This creates a potential issue in that written descriptions by involved personnel might be subject to self-censorship or unduly aggrandizement. In addition, as the researcher was intimately involved in both some of the conduct of the cases, the researcher might be unable to recognize bias, especially one that is endemic to the organization.

Written descriptions were supported by financial analysis. The analysis was conducted based on company internal documents and management accounting systems. It is recognized that even financial analysis is potentially subject to systematic bias, especially if such a bias is 'baked in' into the management accounting system, arising from factors such as allocations of indirect costs, accounting mistakes and irregularities, as well as from the initial purpose of the documents to serve the organizational structure for which reporting is intended. In addition, assumptions, either implicit or explicit might act as sources of hidden systematic bias. To combat these, the analysis was mostly based on costs, revenues and capital needs *directly* attributable to or arising from the cases. It is recognized that differences in how cases consume indirect resources, such as top management attention, may exist, and that cases might have indirect benefits, such as brand recognition, but as the monetary evaluation of these factors is both difficult and likewise subjective to bias, these are excluded from the quantitative analysis, and included in the qualitative evaluation wherever necessary.

After the creation of written and financial analyses, these were combined in the discussion segment to obtain a holistic view of the cases, including strategic, business model, financial, business organization and project organization viewpoints. These were then used to create constructs for improved management of future projects, as well as to evaluate the concepts identified from the literature analysis.

4. RESULTS

This chapter summarizes the findings of the study. The chapter is divided into 5 parts. The first part gives an overview of the case company and the cases undertaken. In the second part, the strategic context and activity chains are evaluated for each of the cases. This analysis is conducted cross-sectionally. In the third part, the cases are subjected to financial analysis. Following this analysis, management practices and the organization on the level of project-organization and project business organization present in the cases is evaluated, including an analysis of the management of service components in the cases. In the fifth subchapter, the cases and the executing organization are analysed from the perspective of organizational learning.

4.1 Overview of the cases

This subchapter gives a general overview of the cases under investigation. First, the case company is introduced. This is followed by an overview of each of the cases under scrutiny, including a look into each customer, the customer's significance to the case company, scale of the case in terms of revenue, production methodology and the existence of services as part of the project delivery, and a short history of each case. The subchapter is concluded with a comparison of the most pronounced characteristics of the cases.

4.1.1 Case company

The case company is a conglomerate manufacturer of polymer products. The corporation operates from several nations in Europe and Asia, with total expected turnover of approximately 70 M€ for the year 2018. The corporation mainly manufactures customer-tailored goods for B2B markets, has significant technical know-how regarding its products and specializes in rubber goods for high-wear environments.

The focus of this study are the Finnish operations of the corporation, which include manufacturing of rubber hoses, moulded goods of rubber, liquid silicone, plastics and polyurethane using several manufacturing techniques such as compression moulding, injection moulding and casting, as well as manually applied rubber linings. A large share of the corporation's business comes from project business, with a non-insignificant service component.

4.1.2 Case A: Multi-product line project for established customer in the mining industry

The customer of Case A (hence: Customer A) is a corporation in the minerals processing business, with a revenue of over 1 Bn EUR. Customer A has global presence and it competes with other multinationals. The typical customers of Customer A include mines and mineral processing plants, and its product offering ranges from spare parts to turnkey mineral processing plant deliveries, with supporting localized service infrastructure. Its supply chain and customer base are global. Customer A and the case company have a long-standing relationship, and the case company is a trusted supplier by the Customer A. Customer A is the largest customer of the case company, with 13,5 % of the global revenue of the case company coming from Customer A.

Case A consisted of a delivery of several components for minerals processing cells. The components are steel components in corrosive, high-wear conditions, protected from both chemical and mechanical wear by a layer of elastomer (polyurethane and rubber) lining. The delivery is a part of a construction project undertaken by the Customer A related to the opening of a new mine. The total amount of elastomer components delivered by the case company is 1,25 M€ from two functional business units within the company.

Despite the long-standing relationship between Customer A and the case company, the order-delivery process rather complicated. From the beginning, it was known that the case would by necessity happen in two phases. At the beginning of the first phase, the customer placed a request for quotation regarding some components of the mechanisms, which was followed by an attempt by the case company to increase its' share of the complete delivery with other components. After price negotiations the case company received the order for all the components within its portfolio included in the first portion of the project. Only three days after the order was received, Customer A froze the order due to complications regarding necessary permits at the construction site. At this point, Customer A agreed to cover the costs of the cessation of the order and to move some of the components into other upcoming projects in this portfolio.

At approximately one month later the order was unfrozen, and the work was continued with the case company waiving the invoice for the cessation of the order. First delivery of the project was completed by the end of May 2018, with the value of approximately 0,5 M€. Before the completion of the first delivery, the case company received an order for Phase 2 of the project, being delivered by the end of November 2018, with the remaining value of 0,7 M€.

The complete project delivery consisted of components manufactured using several techniques. Of the total value delivered, 56 % had a coating consisting of casted polyurethane, 31 % with manually applied rubber lining and 13 % with rubber lining applied in a compression mould. This is illustrated in figure 11. Within these manufacturing technologies,

deliveries of manual rubber lining and polyurethane casting are managed in the same business unit and rubber compression moulding is managed within a different business unit of the case company.

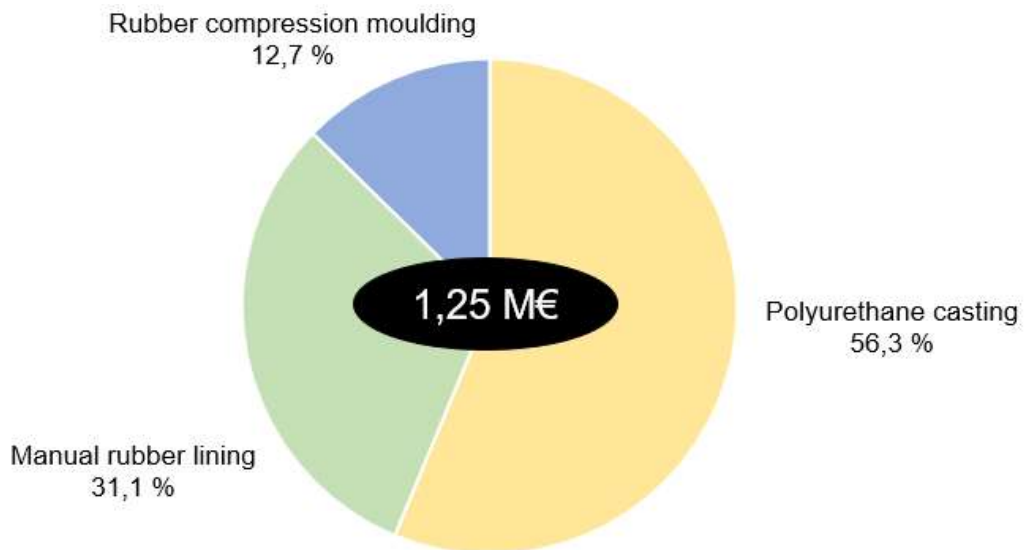


Figure 11. Split between manufacturing technologies of total order value in Case A.

Besides manufacturing technologies, there are significant differences in the type of components within the project. Components manufactured using rubber compression moulding were, by and large, engineered-to-order, designed according to specifics of the end-user's installation site. On the other hand, the components manufactured using polyurethane casting or manual rubber lining are standard components and follow a manufacture-to-order delivery logic.

Polyurethane- and manual rubber lining components of Case A can be considered as an example of 'pure' project-type delivery. All components were manufactured on premises, and there were few or no service components included in the delivery, notwithstanding the inclusion of pre-packaged installation components in accordance with standard delivery protocol with the customer. In rubber compression mouldings, only apparent service component were the engineering activities in designing the custom components.

Thus, the overview of case A can be summarized as a

- 1,25 M€ project delivery as part of a major capital expenditure combining
- Several types of elastomer components for high-wear environments
- With little service components
- Using both engineer-to-order and manufacture-to-order business logics on standard and specifically-engineered components
- To a strategically significant customer in the minerals processing industry.

4.1.3 Case B: Multi-product line project for new, transactional customer in the mining industry

The end customer of case B (hence: Customer B) is a major Nordic mining operation, with a total revenue of over 2 Bn EUR. The core business of Customer B is mining and processing iron ore for later refinement. Customer B's operations are capital-intensive, and major maintenance or expansion projects typically include significant capital investments. The projects are usually put to tender, with several actors offering turnkey deliveries, themselves focusing on a part of the delivery and subcontracting the rest. The value chains are generally long and involve several sub-sub-contractors. The case company does significant amount of business with Customer B, much of which through intermediaries. Bids are competed for by several companies from Europe.

Case B was part of a total delivery with the approximate size of 10 million EUR, with the target of rebuilding and extending an iron ore processing line. General planning was done by the Customer B, with bidders responsible for the detailed planning and execution. The tender was bid on by several turnkey project suppliers, themselves soliciting bids for the subcontracted components. The case company received requests for quotation from both turnkey suppliers and their subcontractors, with differing approaches and solutions based on the Customer B's general plan.

The winning subcontractor for a part of the bid (hence: Contractor B) placed the order for the case company. Total order was for 0,58 M€, consisting of material transfer hoses, rubber seals and rubber-lined steel piping. Of the value, the share of rubber-lined steel piping was the largest, with a share of 57 %, material transfer hoses' share at 40 % and rubber seals with the smallest share of 3 % of the total delivery, illustrated in figure 12.

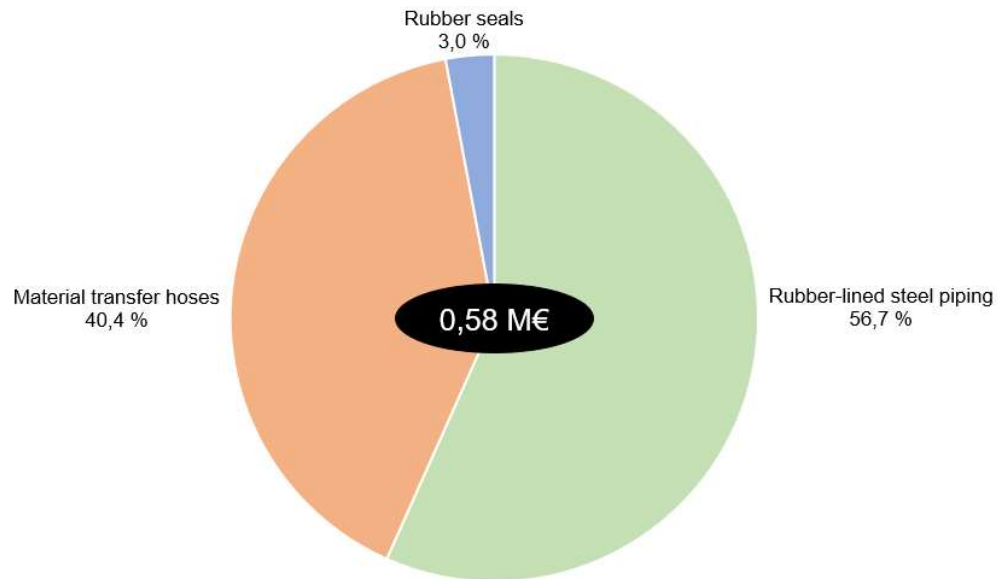


Figure 12. Split of delivered components in Case B.

The environment of the Customer B is, like with Case A, naturally high-wear from the processing of iron ore, and the case company has a pre-designed line of products and lining types for these kinds of high-wear environments. All the hoses and rubber seals delivered were standard components produced using make-to-stock or make-to-order logic, and the rubber lining of steel piping is a standard activity for the case company despite differences in the measures of steel pipes used. The only ‘new’ feature was the employment of a new, internally developed rubber lining type, but the difference in manufacturing process itself was rather minor.

Case B can be considered a pure project delivery. Like with Case A, the amount of service activities included in the delivery was mostly limited to the design necessary for answering the bid, such as the selection of rubber lining type and hoses to offer and soliciting bids for the steel piping. The manufacturing was done on premises of the case company and assembled by Contractor B or another subcontractor as part of the turnkey delivery.

Thus, the overview of Case B can be summarized as a

- 0,58 M€ project delivery as part of a ~10 M€ turnkey project combining
- Several types of elastomer knowhow in product design including hoses, rubber linings and seals
- With little or no service components
- Built on standard processes and products
- To a major end customer through a long supply chain involving competition on multiple levels
- Via a new contractor.

4.1.4 Case C: Project-service delivery to a partner customer in the chemicals industry

The customer of Case C (hence: Customer C) is a Nordics- based chemical company supplying industrial and agricultural chemicals, with activities ranging from mining to operating chemical plants. Customer C is one of the world's largest producers of several agricultural chemicals, with a revenue of approximately 10 Bn EUR and manufacturing operations all over the world. Customer C and the case company have a long-standing partnership agreement and the case company is "the number 1 supplier of rubber components" for the customer. Several functional business units within the case company do business with Customer C, over 80 % of the business being in rubber linings. For rubber lining business Customer C is especially significant, as 8,5 % of rubber linings' revenue comes from Customer C.

Case C consisted of a new installation of a rubber lining. The installation was due to a premature failure of previous rubber lining installation by the case company in a device part of an acid concentration apparatus. The total value of the new installation was 0,17 M€, representing approximately one third of the total spend by Customer C in the 12 months preceding the delivery. Customer C did not solicit bids from alternative suppliers for the lining installation in Case C, but several for the steel frame.

The delivery consisted of rubber lining of the steel-body device, prepared in the premises of another supplier to the Customer C. The rubber lining was installed in these premises by the case company. In addition to the installation, the delivery included assembly support by the case company in the Customer C's premises.

Thus, the overview of Case C can be summarized as a

- 0,17 M€ replacement project delivery targeted at existing installed base
- Combining product and service elements including lining manufacture, off-site installation and assembly support
- For use in environments under significant exposure to corrosive chemicals
- Involving resources and activities by a single business unit
- To a significant customer in the chemicals industry with a strong existing relationship.

4.1.5 Case D: Project delivery to a new, transactional customer in the chemicals industry

The customer of Case D (hence: Customer D) is a global chemicals manufacturer with over 2 Bn EUR of revenue and manufacturing sites all around the world. Customer D and the case company have a long-standing arms-length relationship consisting of a few larger

project deliveries to installations near the case company's operating region, with minor repair-type revenue streams from ongoing maintenance efforts.

Case D occurred due to an incident in one of Customer D's facilities, resulting in significant damage to the facilities and equipment. Case D is an umbrella for the effort consisting of repairs and rebuilding of the damaged apparatus, new installations and standard maintenance projects pertaining to the undamaged installed base. For all these efforts, Customer D had separate purchasing and project management organizations. Most of the revenue to the case company was generated from rubber lining of different apparatus, with minor revenue streams from polyurethane coating and rubber hoses. The total value of the project for the case company by Customer D was 1,90 MEUR, of which rubber lining represents a 95 % share (37 % of the total revenue of rubber lining business during the lifecycle of the project). The total size of the project was estimated to raise to several hundreds of millions of euros until Customer D ceased the repair efforts.

Typically, for each major component to be repaired or rebuilt in Case D there was a separate bidding, with price and delivery time as the most common defining criteria. The site was highly interesting for several competing suppliers, and due to the reconstruction happening mostly on-site, several competitors as well as the case company had constant presence at the site. The repair efforts lasted approximately one year before the cessation of the project.

Several smaller entities with separate bidding, manufacturing and delivery are included under the umbrella of Case D, and the case can be considered as both a unitary project as well as a program of projects, but the case as was executed under one manager and resource base, it is in this context is considered a single project. Case D was, in both scale and scope, significantly larger than any project at the customer's facilities previously undertaken by the case company. This includes the monetary scale, amount of resources required and the time horizon of the project.

Thus, the overview of Case D can be summarized as a

- 1,90 M€ of a reconstruction project totalling 100's millions of EUR over a year-long period
- Consisting of a multiple minor bids and deliveries of rubber linings, executed under unitary management
- Leveraging pre-existing status and installed base with the customer
- Under conditions outside the influence of the case company
- Ceased before completion by Customer D.

4.1.6 Case E: Pure service delivery to a partner customer in the energy industry

The customer of Case E (hence: Customer E) is a Finnish energy company operating nuclear power plants with several 100's of millions of euros in revenue. Customer E and the case company have a long-standing relationship in rubber linings, and the case company is a preferred supplier by the customer. Customer E represents a share of 2,6 % of total rubber lining business within the case company.

Case E consists of the annual maintenance conducted on behalf of the customer, with total value of 0,11 M€. This includes annual inspection and repair of rubber linings on the premises of the customer. The inspection was conducted as part of a larger annual maintenance scheme with several competing main contractors. However, Customer E does not solicit bids for rubber linings from suppliers other than the case company. Inspection and repair of rubber linings form only a small portion of the total annual maintenance spend by Customer E, but the time window during which the inspections can be undertaken is rather short, and delays can be extremely costly. The total amount of business with the customer is highly dependent on the repair needs detected according to the investigation.

Thus, the overview of Case E can be summarized as a

- 0,11 M€ annual maintenance service
- Consisting solely of inspections and maintenance of existing rubber linings
- Under the constraints of the customer's general maintenance schedule
- To a customer with whom strong mutual rapport exists.

4.1.7 Summary of the case overview

The cases were selected by choosing extreme ones, as suggested by Saunders *et al.* (2009, p. 213; pp. 237–240). This was done to bring forth the complexities in the strategic management of the projects under differing conditions, and to better highlight the resulting differences as well as their influence on employed business models.

The customer segments selected for the cases have significantly different behaviours. Chemicals segment typically has a stable demand driven by maintenance schedule, fixed long before the actual need for the project-service delivery. Demand in chemicals segment usually only fluctuates in case of major one-time investments, energy segment behaving much alike. Mining segment, on the other hand, has highly cyclical demand driven by major global investments into mines and mineral processing equipment. Mining segment also has a constant need for spare parts that is not as clearly forecasted as the annual maintenance schedule present in chemicals and energy.

In addition to the customer segments, customer themselves have wildly varying behaviours. For example, the deep relationship with Customer A and the case company is

strongly contrasted with the highly transactional behaviour exhibited by Customer B and Contractor B, despite sharing the mining segment. Another notable contrast can be drawn from the interaction of the Customer C and the case company in case where the pre-existing installation by the case company had failed in process, and Customer C did not even solicit competitive bids. In addition, of customers C and E, both have a strong, existing relationship with the case company with no other bidders, but Customer C has a constant maintenance contract, while Customer E maintains a transactional relationship.

The monetary scale of the cases is also divergent. The monetary scale of the cases ranges from almost 2 M€ to 0,1 M€, with Case E turning 1/17th of the revenue compared to Case D. The difference in revenues is due to the different justifications behind the projects. For example, in the smaller cases C and E the delivery scope consisted of services and repairs of installed base, while cases A and B are capital expenditures with the goal of expanding mineral output of the end customers, and Case D is a major reconstruction following an incident, thus, in effect similar in scope to a capacity-extending capital investment.

As an interesting finding, deliveries to chemicals and energy -segments seem to consist mostly of manually applied rubber linings, while large projects to the mining segment seem to include business from several business lines, as illustrated by figure 13. One of the main reasons for this split is that the case company has a significant presence in the mining industry in all its business lines, with more than 1/4th of its global revenue coming from the mining segment. A secondary explanation for this is an intentional selection bias towards rubber lining business in the selection of cases, due to the significant share of project business within rubber lining business line.

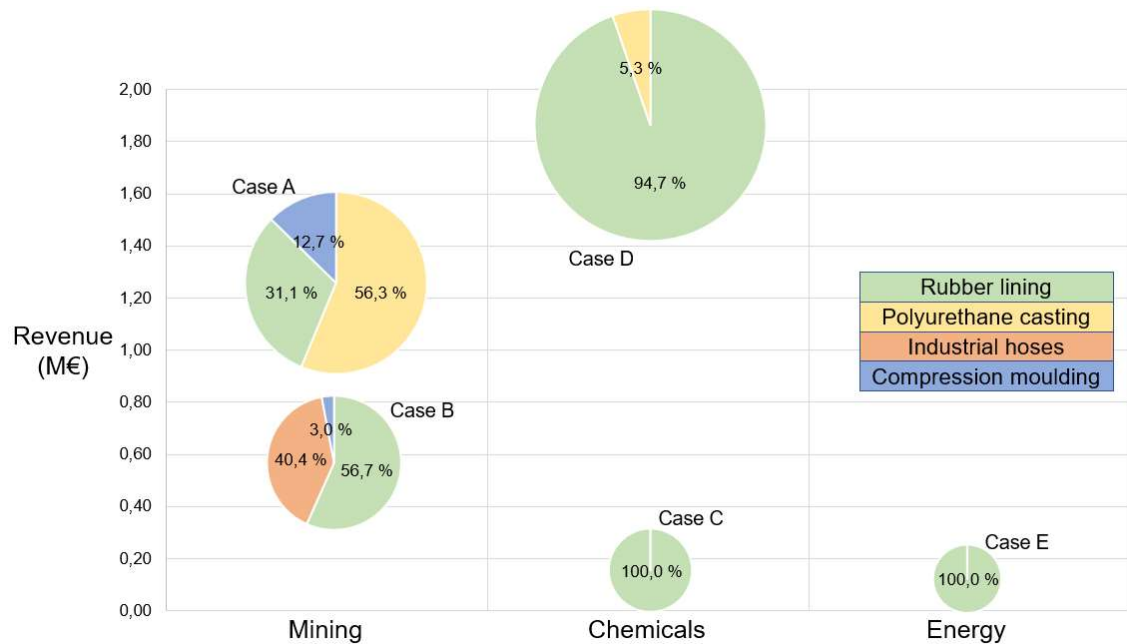


Figure 13. *Distribution of revenue in the cases by segment and business line.*

The contents of the cases also had significant differences. For example, Case E can be viewed as a pure service delivery project, with scale from the scope of agreed-upon repair activities, while Case B is almost a pure component-delivery project. Some of the cases were executed on-premises, while some, especially service activities were executed on customers' premises. Contrary to this, however, Case D was almost completely executed at the customers' premises. The execution methodology of services is more related to the logistics of the service targets, with components that are easily shipped (steel pipes, rubber hoses, polyurethane-coated steel parts) manufactured on premises, while with objects where transport is highly difficult or impossible (large process containers, seawater tanks of a nuclear power plant) are mostly done at the customer's premises.

4.2 Strategic context and the activity system in the cases

Based on the literature review, the study of strategy and competitive advantage has two distinct viewpoints: cross-sectional view and a longitudinal view. Of these, cross-sectional view is concerned with matters such as dynamics of the industry, fit among activities and the resource base of the company, while the longitudinal view is mostly concerned with dynamic capabilities, such as learning, of the business. Regarding business models, in the literature review it was found that business models are directly related to the choices and execution of activities and activity systems in a wider value network of internal and external actors. To illuminate the relation between the concepts of strategy and business models in the level of activity systems, the cases are evaluated from three perspectives:

- Five Forces (Porter, 2008)
 - Bargaining power of suppliers

- Bargaining power of buyers
- Intensity of rivalry
- Threat of new entrants
- Threat of substitutes
- Performed activities (Porter, 1985)
 - What activities are performed at all
 - What is the fit between activities
 - Resulting potential differences in relative cost structure
- Resources controlled by the business and utilized in a case (Wernerfelt, 1984).

This analysis attempts to answer the first research question:

1. How are the concepts of business model, strategy and project business related?

This research question can be answered by understanding the separate relationships between business models and strategy, between strategy and project business and business models and project business, after which conclusions can be drawn regarding their collective interaction.

The perspectives of this subchapter aim to illustrate the concept of fit between activities in a value network, the external environment and choices regarding activities. Especially interesting are the interaction between industry-specific factors, such as intensity of rivalry, strategic choices in activities, such as “developed capacity for product design”, resources employed such as “existing customer relationship” and the potential for self-reinforcing fit between activities. This illustrates the linkage between strategy and business models.

The second factor in the linkage between business models, strategy and management of project business studied here is how strategy and project business are linked to each other. Based on the literature review, strategy should drive choices of what projects to include in the project portfolio, and strategy should play an integral role in project portfolio management process. Thus, two things can be investigated: The existence of a project portfolio management process (either explicit or implicit) and what, if any, strategic considerations are made when managing the portfolio of projects.

In the linkage between business models, strategy and management of project business the third linkage is between business models and project business. Based on the literature review, especially the concept of solution-specific business models is tested. Should it be that business models and project business are not interconnected, the organization of activities within a given business would remain rather constant over the cases. On the other hand, should project particularities influence the business models as to cause solution-specificity, it would become apparent in the form of distinct business models dependent on the particularities of the projects. Thus, in similar cases a given business could employ different activity configurations. Were the claim to be invalid, the activity configuration would remain stable over the project portfolio.

4.2.1 Influence of the Five Forces

This subchapter begins the analysis from the influence of Five Forces (Porter, 2008) which are investigated for each case. For each case the forces are illustrated in a figure reminiscent of figure 14, with the relative impact of each force highlighted by the changing the relative size of the forces in the figure.

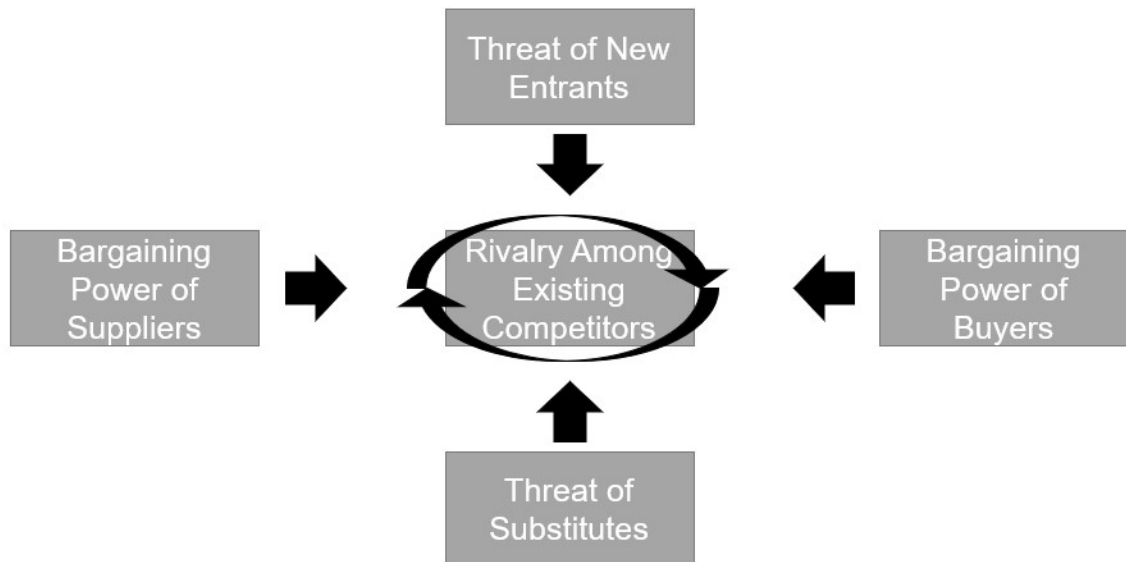


Figure 14. *The Five Competitive Forces, adapted from Porter, 2008.*

Case A

In Case A the *bargaining power of suppliers* can be considered rather low. Despite the rather high share of direct material expenses in the delivery, ranging from 40 – 50 % for the polyurethane parts, approximately 35 % for rubber lined components and highly variant from 35 – 65 % for compression moulded components, the actual influence obtained by the supplier remains rather low due to several factors:

- Significant share of the materials are commodities, (*i.e.* polymers for polyurethane), and the polyurethane compound has been conformity tested for all major suppliers, thus, the suppliers don't have pricing power
- For the unique steel components, several competing suppliers exist, with little or no differentiating potential between them. Also, Customer A has the capability to manufacture necessary steel parts, increasing the price pressure for the suppliers
- Rubber compounds are a material with proprietary know-how and few suppliers. However, the compounds used are designed by the case company and manufactured in its own rubber compound mixing plant. Thus, the relevant suppliers are the suppliers of raw materials for rubber compound mixing, most of which are commodities traded on the global markets.

The *bargaining power of buyers* in Case A is intermediate-to-high. This is because there are globally only a few potential bidders for the capital expenditure project, and only one

customer for some of the components supplied by the case company. In addition, the spend of Customer A in relation to the case company is significant (13,5% of net sales). The entire turnkey delivery is also rather price sensitive, because Customer A is not the only bidder for the end customer. On the other hand, the delivery capability and quality of the case company have a significant impact on the performance of Customer A, decreasing the buyer power somewhat. Generally, Customer A uses price, quality and delivery capability as criteria for supplier selection, and the case company has a strong position as a trusted partner. In some cases, the customer can also use the supply by case company as a differentiating factor. This in combination with pre-existing know-how in materials technology also protects the case company from backwards integration.

Intensity of rivalry in Case A is extreme in items manufactured using rubber compression moulding, while in polyurethane products and rubber linings the intensity is significantly less. There are several companies capable of producing compression moulded products globally, and the suppliers are generally rather undifferentiated. In addition, the assets required are typically expensive and highly specialized, creating high exit barriers. On the other hand, there are only a few suppliers of polyurethane components accepted by Customer A, among whom the case company has the status of premium-quality supplier with some pricing power. The same applies to rubber lining, with the caveat that Customer A is less interested in the quality of rubber lined components, and the number of potential suppliers is more extensive, rubber lining requiring less sophisticated equipment. The place of premium supplier does not, however mean that Customer A would purchase all its components from the case company; in some cases, Customer A does intentionally offer a low bid, and as a result, often utilizes lower-cost producers.

Threat of substitutes in Case A pertains mostly to alternative types of coating or lining. At this moment, some alternative lining methods for rubber and polyurethane exist, but these often have drawbacks, such as poor shock resistance, difficulty of repair or need to shutdown process for maintenance, all of which have significant negative impact on the utility of the solution. As a side note, the competition in technical quality is still very much focused on wear resistance and longevity, and has not yet moved to, for example, industry 4.0 factors such as embedded sensors. Overall threat of substitutes remains low.

The *threat of new entrants* can be classified as low-medium. One of the key factors in the market space is “who gets to write the specifications”, as it places the limitations and expectations for the new entrants as well as incumbents. In Case A, the case company has been heavily involved in the creation of standard specifications for rubber linings and polyurethane coatings by Customer A, protecting its favourable position from rivals, new entrants and substitutes. Despite the rather low investments necessary for competing, the industry is not necessarily attractive for new entrants. This is due to the rather high fixed costs involved in activities such as sourcing, conformity testing and reputation building. In addition, the market is highly uncertain, and the compounded annual growth rate is low enough to be unattractive for new entrants, as growth and economies of scale would

by necessity come from incumbents ready and willing to defend their position. Figure 15 illustrates the relative significance of the Five Forces in Case A.

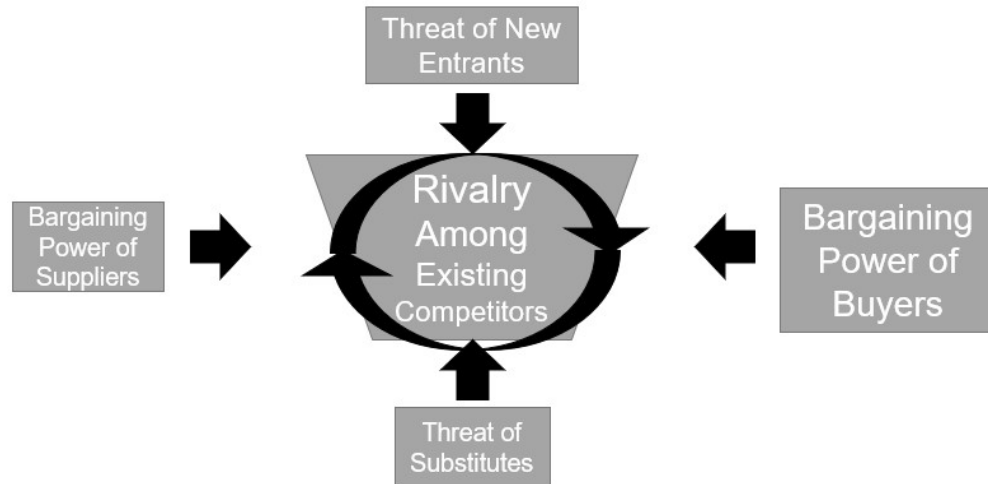


Figure 15. *Relative intensity of the Five Forces in Case A, following Porter, 2008.*

Case B

Case B follows much the same logic regarding the low *bargaining power of suppliers* as Case A, with the distinction that polyurethane components were not included in the delivery, but material transfer hoses. The key raw materials for the case in rubber lining, namely, rubber compounds, are proprietary for the case company, and can be produced at a cost advantage in relation to comparable materials available in the open markets. It was later quoted that the price advantage in internally produced rubber compounds and the resulting competitive pricing was one of the key factors in closing the deal, another being the low bid received for the steel piping. Regarding industrial hoses, despite the high share of materials in relation to the sales price (over 40 %) the effect is diminished because, again, significant share of materials is internally produced, and rest of the raw material is available on the open market as more or less commodities. In addition, the total spend of the case company in some of the rarer necessary materials is enough to grant the case company a favourable bargaining position.

The *bargaining power of the buyer* in Case B was rather low. The driver behind here is the competitive dynamic of the bidding process, where several actors bid and solicited bids on several levels of the value chain, with the cheapest option being chosen at the end and practically no option to differentiate. Thus, the potential for value capture by the chosen contractor, in this case Contractor B, had to, by necessity remain low. On the other hand, this dynamic also led to extreme conditions of *industry rivalry*, where the marketplace had significant number of potential contractors bidding for Customer B, again with rather undifferentiated offerings, each of which was soliciting undifferentiated bids from their potential suppliers. It should be kept in mind that the bargaining power of the end

customer, or Customer B was extremely high, but the bargaining power of intermediaries, such as Contractor B, was low.

The *threat of new entrants* in the context of Case B is two-faceted. The threat was low in industrial hoses, as the necessary know-how to manufacture hoses capable of transporting mining slurry is extensive and not easily acquired. In addition, the size of necessary investments is notable. On the other hand, manual rubber lining has low capital requirements, and acceptable materials are available on the open market, with installation instructions and training provided by the supplier, thus making it rather easy market to enter. This is apparent from several service-focused machine shops who have recently expanded into rubber lining space. The size of the total project and lure of capturing higher share of the complete delivery has been instrumental in driving this trend. However, new entrants are most often limited to a position of the low-cost provider, and remain essentially dependent on the rubber compound suppliers, due to design activities being rather expensive. Attempting to acquire design capabilities, on the other hand, needs notable upfront investments and economies of scale. The compression moulding component in this case was mostly to provide seals for hose assemblies, with generic, workable alternatives in the market.

Threat of substitutes in Case B was also rather high. This was due to the original request for quotation by Customer B, where only the general guidelines were provided. This gave the players offering turnkey solutions the option to include several alternative materials in the design, as well as the option to design, for example, steel pipeline in place of a material transfer hose, or to choose Teflon as a coating type for a steel pipe instead of rubber. These are most often dependent on the preferences of the designing team and have a profound impact on the possibilities available to the suppliers. Again, “who gets to write the specifications” has the advantage in the value chain. Figure 16 illustrates the relative significance of the Five Forces in Case B.

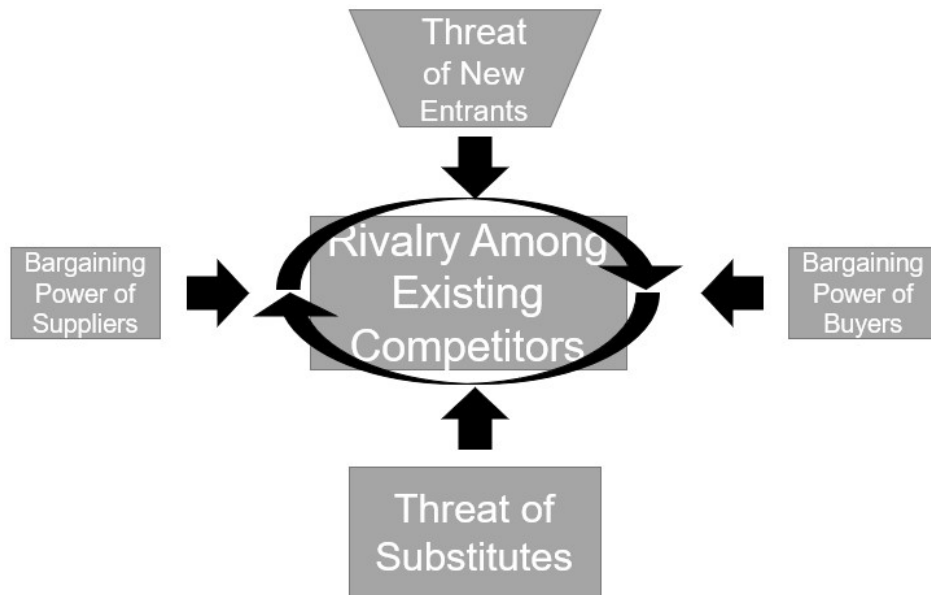


Figure 16. *Relative intensity of the Five Forces in Case B, following Porter, 2008.*

Case C

As Case C only related to rubber lining components, the preceding discussion about the *bargaining power of suppliers* again applies: the main raw material was internally-manufactured rubber compound, raw materials of which are traded in the open markets. With other necessary components being of mostly trivial value in relation to the total delivery, it can be said that the bargaining power of suppliers in Case C was extremely low.

Bargaining power of the buyer in Case C was low. On the other hand, due to the long-standing partnership between the case company and Customer C, extent of installed base and demonstrated know-how, the switching costs of Customer C are rather high. In addition, the cost of the rubber lining is insignificant in comparison to the other operating expenses of the customer (project size less than 0,25 % of the turnover from the Customer Cs Finnish operations), and the customer is fairly price insensitive. Even more advantageous is the fact that Customer C has the habit of asking the case company for recommendations of the specifications before even requesting a bid. On the other hand, the customer is not interested in the technical solution *per se*, rather than the operation of its own facility, downtime of which is extremely expensive, and in which critical failure might even lead to bodily injuries. This disinterest in the technical aspects of the know-how of the case company outside its capability to deliver functional solutions somewhat increases the bargaining power of the buyer.

Rivalry between existing competitors has so far not been an issue with the business of Customer C. This is mostly a result of the close ties between the case company and Customer C, the customer going as far as to specify the case company as the supplier of rubber linings in its request for quotations for maintenance. The same applies to *new*

entrants, who face a significant challenge in unseating the case company from the position of the incumbent, requiring significant up-front investments into a relationship. New entrants are unlikely to unseat the case company unless preceded by a significant failure to deliver from the case company's part, driving Customer C to look for new suppliers.

Threat of substitutes remains the most relevant external threat for the Case C. As the customer's interest is focused on the operation of its plant, the customer might be open to technical solutions with greater certainty of operation at a competitive price. This is expounded by the fact that Customer C has openly discussed the possibility of replacing rubber linings with *e.g.* Teflon in some applications. So far from a technical perspective, competitive solutions tend to have significantly higher up-front investment costs, with repair often meaning the replacement of the entire vessel, but innovations in materials science might change the balance in the future. The threat of substitutes remains moderate. Figure 17 illustrates the relative significance of the Five Forces in Case C.

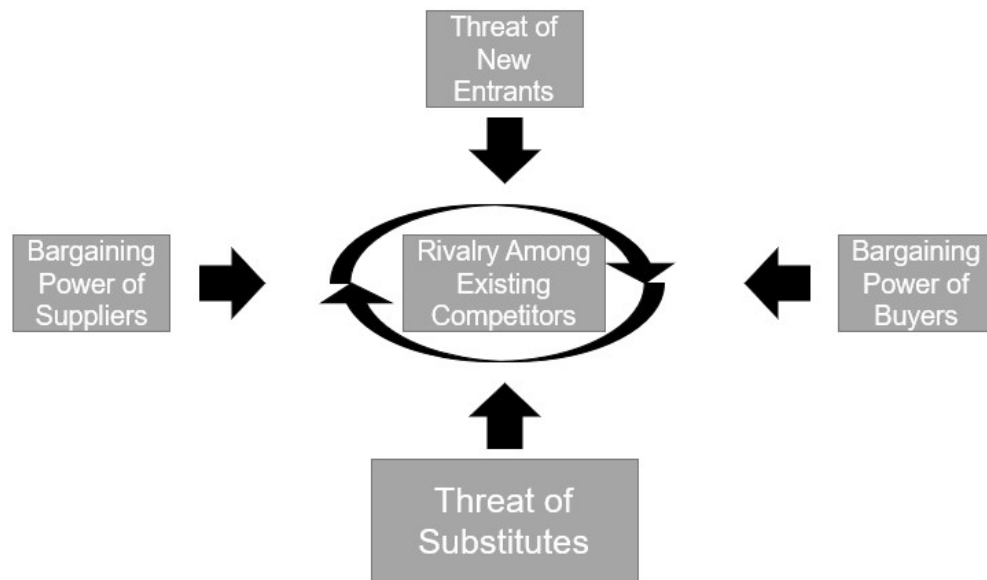


Figure 17. *Relative intensity of the Five Forces in Case C, following Porter, 2008.*

Case D

Despite including some polyurethane components, the relevant discussion regarding Case D focuses only on rubber lining as part of the delivery. Again, the discussion regarding the *bargaining power of suppliers* in rubber lining contains most of the factors noted above, with the key caveat that in the delivery of Case D, significant share of the rubber used was bought from a single, large external supplier. This was due to the suppliers' extensive line of rubber compounds certified, effectively acting as the golden standard of rubber specifications. In this case, the case company had little to no negotiation power in relation to this supplier, but the effect was moderated by a significant part of the spend on internally manufactured rubber compounds, leading to an overall moderate bargaining

power of suppliers. In addition to the rubber compound suppliers, in the Case D a significant role was played by a company delivering rented workforce from abroad, at a cost smaller than or comparative to Finnish labour costs, with moderate bargaining power especially due to significantly lower costs of overtime than with Finnish workforce.

The *bargaining power of Customer D* was extremely high. This was because the reconstruction effort was the primary activity of the customer organization, forcing the customer organization to take great interest in the progress of the project. In addition, the customer was under constant cost pressure and severe time constraints, leading to high price sensitivity. This was compounded by the customer-provided specifications with little room to differentiate and low switching costs.

Throughout entire Case D, the *intensity of rivalry* was extremely high. The size of the total project was well-known, and it attracted rivals from all over Europe. The intensity was increased due to the customers' decision to split the case into several small partial deliveries, and to spread these around, generally to the lowest bidder. This led to an intense price war for each sub-delivery. In addition, the environment had extremely low entry- and exit barriers, attracting even more competition, with the low profit margins acting as the main barrier to entry. In whole, the situation led to a severely heightened *threat of new entrants*. As an additional complication, several of the suppliers had special competences in several substitutable solution types and pushed for the adoption of these solutions wherever possible, heightening the *threat of substitutes* somewhat. Figure 18 illustrates the relative significance of the Five Forces in Case D.

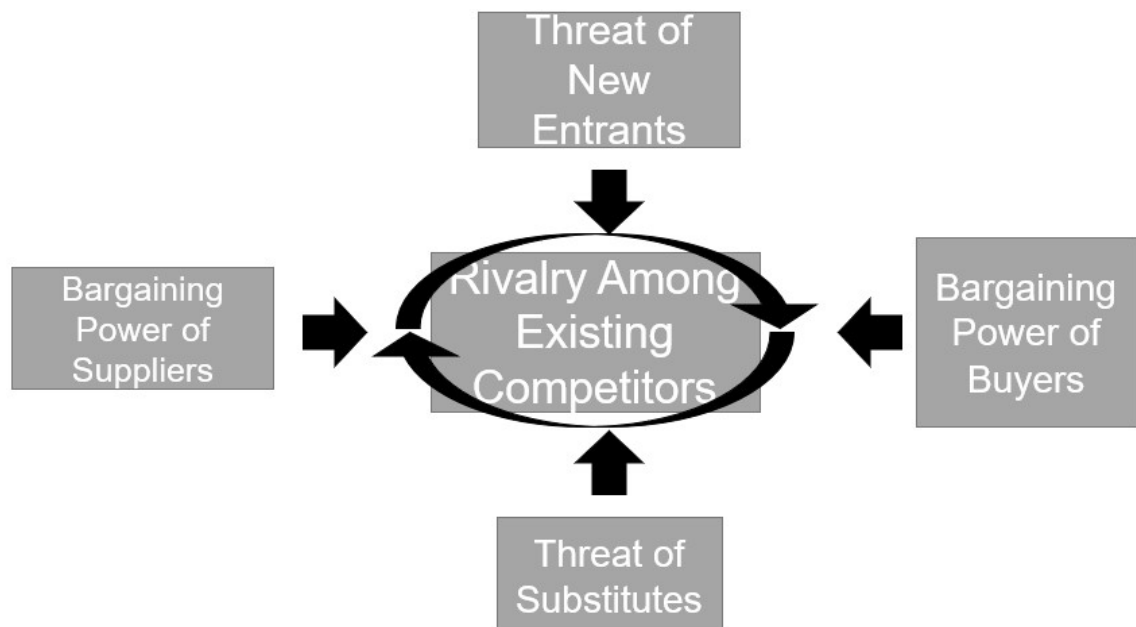


Figure 18. *Relative intensity of the Five Forces in Case D, following Porter, 2008.*

Case E

Case E followed mostly similar logic than Case C, with little to add. The *bargaining power of suppliers* was low like with Case C, with some of the spend going to external suppliers as in Case D. Most significant factor limiting supplier power was the close relationship with customer, enabling the case company to somewhat influence specifications beforehand.

The *bargaining power of Customer E* is much like that of Customer C, with the exception that for the Customer E, the annual maintenance is bid separately every year. However, the Customer E “does not shop around” for other suppliers, and the cost of the service provided by the case company is extremely minor in comparison to the total maintenance spend of Customer E.

Intensity of rivalry is in the Case E demonstrably low. In fact, the main contractor for the annual maintenance wanted to install its own rubber lining as part of the larger maintenance operation, a suggestion which was immediately discarded by Customer E in favour of the case company. In other words, Customer E does not only refrain from soliciting bids, it actively discourages them. This behaviour also diminishes the *threat of new entrants* by placing additional barriers to entry – namely, the need to first unseat the incumbent (case company) and then to convince the customer that doing business with it is worthwhile.

As the operations of Customer E focus in the operation of a nuclear power plant, the regulatory constraints placed on companies and personnel allowed to operate on site are very significant. This further complicates issues for potential new entrants, necessitating *e.g.* the application for working permits on the site with background checks. The same regulatory concerns apply to potential usable *substitutes*, where changes in some of the components demand authorizations from Finnish nuclear authorities, thus creating an effective regulatory constraint for substitution. The intensity of rivalry, threat of new entrants and threat of substitutes can thus all be found to be extremely low. Figure 19 illustrates the relative significance of the Five Forces in Case E.

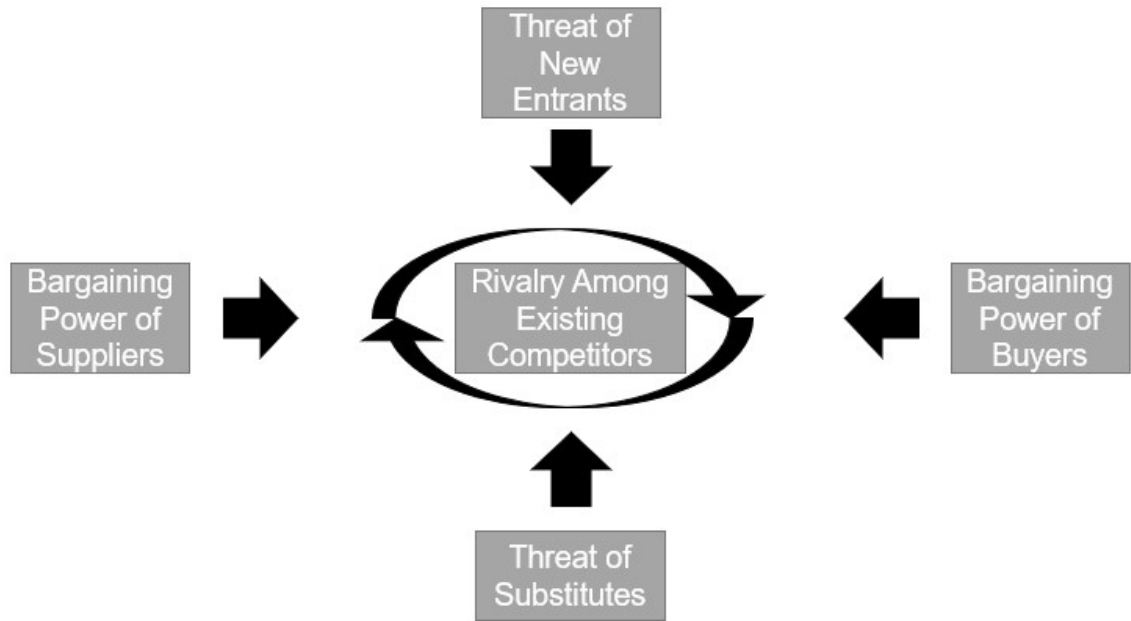


Figure 19. *Relative intensity of the Five Forces in Case E, following Porter, 2008.*

In summary, the most significant of the Five Forces in all of the cases seems to be the intensity of rivalry driven by the end-customer approach to purchasing components, but significant variations in importance of each force exist between cases. The intensity of rivalry seems to be somewhat moderated by the resources and capabilities controlled by the case company in each case, most important of which seems to be the extent of existing customer relationships. A summarization of the results is collected in Table 5 where light red represents combination of cases and forces where the intensity of a given force can be interpreted as strong, and light blue represents a combination where the intensity of a given force is particularly insignificant.

Table 5. *A summary of the relative importance of the Five Forces over the cases.*

Case	Bargaining Power of Suppliers	Bargaining Power of Buyers	Rivalry Among Existing Competitors	Threat of New Entrants	Threat of Substitutes
Case A	Light Blue	Light Red	Light Red	Light Blue	Light Blue
Case B	Light Blue	Light Blue	Light Red	Light Red	Light Red
Case C	Light Blue	Light Blue	Light Red	Light Red	Light Blue
Case D	Light Blue	Light Red	Light Red	Light Red	Light Red
Case E	Light Blue	Light Blue	Light Red	Light Red	Light Red

4.2.2 Performed activities and fit

The **generic value chain** of rubber industry begins with the manufacturers of raw rubber suppliers. Their products include items such as natural rubber, synthetic rubber compounds, carbon black and different chemical additives. The suppliers include global chemical giants selling their products at market rates.

The next step in the value chain are the compound manufacturers. In the more technical applications of rubber, the necessary properties require mixing rubber types with additives to gain, for example, wear resistance or resistance to elements. The market for rubber compound suppliers is somewhat fragmented. In the market several companies have a large market share, mostly in the tyre industry and the manufacturing of generic rubber goods. This is compounded by hundreds of minor companies with more limited production capabilities producing smaller batches of more special compounds. This is driven by the fact that the availability of special compounds is essential in several businesses, but the small amounts in relation to economic batch sizes of major operators, in tandem with the short shelf-life of rubber mixtures create natural diseconomies of scale for the more specific rubber compounds. In addition, as the properties of the rubber compound very much determine the properties of the final products, as well as its malleability during manufacturing, rubber compound know-how is essential for the entire value creation process, giving the compound designer an ability to capture significant share of value.

Next step of the generic rubber industry value chain is the proper manufacturing of rubber goods. Naturally, the manufacturing itself has multiple stages and necessary supporting elements depending on the type of rubber good. Several potential manufacturing methods exist. These include manufacturing of rubber hoses using mandrels or by hand, manufacturing of moulded rubber goods in compression moulding, injection moulding and extrusion moulding, calanderization of rubber sheets or manual applying of rubber lining to surfaces. Depending on the type of manufacturing, several supporting activities are needed, such as the ability to design and manufacture rubber moulds for production of moulded rubber goods.

Typically, in the rubber goods value chain, goods are sold through different industrial players manufacturing capital goods -class machinery and equipment, such as Customer A and Contractor B. Other channel especially for generic rubber goods is through merchants and technical retailers, acting as transaction cost -decreasing intermediaries between manufacturers and the high number of low-spend customers for generic rubber goods, or integrating goods into components of their larger offerings. Especially in project deliveries, this step on the generic value chain is often bypassed, such as with cases C, D and E, but on the other hand, the was extremely significant in cases A and B.

The value chain is terminated by the end customer, such as customers B, C, D and E. These are often industrial actors, where rubber goods are included in the machinery they

operate or manufacture, and in some cases, such as mining and minerals processing, in fact play a key role in the function of the customer's process. These customers typically have little understanding or interest in the properties of rubber and tend to take the view of "rubber is a tool" and are often open for the idea of substitute materials as long as price-performance criteria are satisfied. Figure 20 illustrates the generic value chain of the rubber industry.



Figure 20. *The generic value chain of rubber goods industry.*

Despite using the term 'rubber' in the earlier discussion, the same value chain applies to polyurethane, with one notable exception: mixing of polyurethane chemicals to gain the wanted properties from the casted polyurethane is integral to the manufacturing process, meaning that the steps of compound manufacturer and goods manufacturer are in practice the same step. Still, the same insight about the necessity to understand the properties of the compounds holds true for polyurethane.

The generic value chain can often be expanded by different value-adding activities. Some of the more common ones include technical design activities, such as designing the actual form and function of the product. Financial activities, such as supplier financing and participating in capital investments are often more typical from the capital equipment manufacturers and end customers than (generally smaller) manufacturer of rubber goods. In addition, purely consultative activities can be embedded in the value chain, such as helping the customer with creating a specification for a bid. Furthermore, especially in the sector of project-type deliveries of rubber goods the value chain is often expanded with different service activities such as inspections, maintenance and training. As a curiosity, there is very little conscious effort to include activities regarding the reverse flow of materials, mostly due to the poor recyclability of once-calanderized rubber.

Regarding the activities performed in each case, some notable differences exist. For example, in **Case A** and the polyurethane- and rubber lining components of the total case, the amount of necessary activities in support of the project *during the project delivery* was rather minor. The production equipment already existed and the products themselves were standard products manufactured using standard methods, with the production of additional quality documents and supplier financing by Customer A being the most significant differences to a standard delivery. However, even these followed a standard protocol agreed upon with Customer A. Interestingly, for the compression moulded components, it was necessary to design the components separately for this case, but even then, manufacturing happens according to standard practice for compression moulding, thus adding only design to the list of activities performed.

The particularities of the case contained some examples of particularly good fit among the activities. For example, because of the market situation with both Customer A and the case company facing competition, it was necessary to create a bid that was competitive in price. However, while maintenance of delivery schedule was crucial, the schedule was not tight. This created significant buffer time for the case company to solicit bids from competing suppliers of steel parts, leading to more competitive pricing. In addition, as the maintenance of the schedule was paramount, it necessitated the reservation of buffers in the manufacturing process, that would normally increase capital requirements and costs of capital for the case company. However, this was remedied by the pre-existing supplier financing agreement, lowering the case company's cost of capital.

Both Customer A and the case company shared a willingness to deliver generally higher-margin spare parts to the end customer, creating a shared interest for the generation of a competitive bid. This shared interest and trust between the case company and Customer A was also clearly visible when the order was frozen, with Customer A offering to reimburse the case company without prompting, making a conscious effort to allocate the products of the order to its other cases and case company duly waiving its reimbursement invoice when the project was continued. In addition, the success of the project delivery has already led to orders for spare parts for both Customer A and the case company.

The list of activities acting in support of the delivery Case A is not particularly extensive in comparison to other similar deliveries. However, to obtain the case at all, performing several different supporting activities have been necessary. These include compound development, vetting competitive steel frame suppliers, investments into product design and relationship building with Customer A. Naturally, the costs of these supporting activities are spread across a long period of time, and cannot be directly attributed to Case A. However, the resources gained from these supporting activities over time played a key role in the delivery. For example, the cultivation of steel frame suppliers (an activity) led to the ability to offer a low bid (a resource), and internal compound development (activity) gave the opportunity to offer rubber linings with in-house manufactured compounds (resource). The decision to commit to these supporting activities is, by nature, strategic, and these strategic choices did in fact directly create value in Case A.

In Case A the self-reinforcing nature of these activity sets resulted in a virtuous cycle of activities, as described by, for example, Porter (1996); Linder and Cantrell (2000) and Casadesus-Masanell and Ricart (2010). Expanding the concept of virtuous cycle in activities to the resources that form the basis of the activity systems, figure 21 contains key activities necessary to build resources on a green background, resources needed for the execution of the case in a blue background, competitive drivers of the case on grey background and the resulting characteristics of the case in white background. This illustrates how the strategic choices regarding activities and thus acquired resources fit to the activities and characteristics necessary in the case.

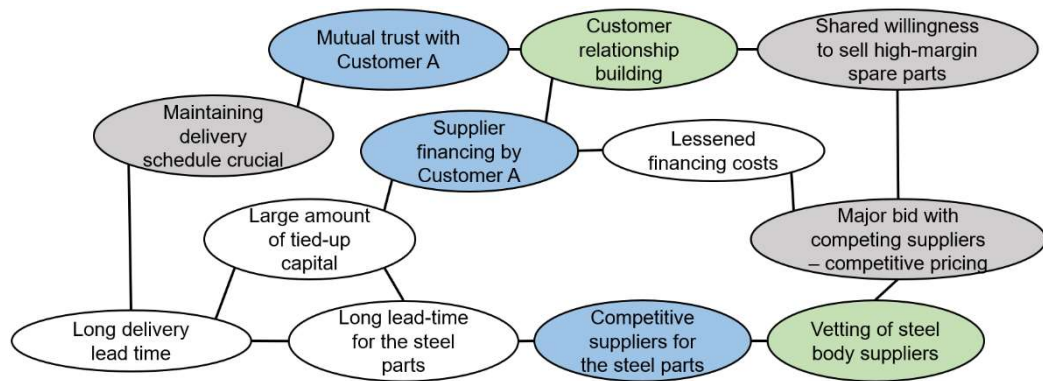


Figure 21. Part of the virtuous cycle in Case A.

In **Case B** the activities performed were somewhat different from Case A. As some of the differences, the products manufactured by manual rubber lining are decidedly non-standard, but the type of product, in this case, steel pipes, are rather common. In addition, as Contractor B designed and delivered the necessary drawings, the need for design activities by the case company remained rather low. In addition, the hose-part of the delivery was completed with standard material transfer hoses. This enabled Contractor B to capture a significantly larger share of the value than in a situation where the case company would have been responsible for the design. In addition, absent the potential for value-added services in the delivery, and due to the intense rivalry between Contractor B and other potential contractors, the customer relationship was transactional by necessity. In this context, the ability of the case company to extract a price premium was severely diminished.

In Case B, the cost structure of the case didn't have as many necessary support activities, leading to lower relative cost. However, what the lack of need for support activities in fact means that the case company was *unable to derive value from its pre-existing capabilities*, or in other words, the business model of the case did not align with the activity system of the company. Some supporting activities present in Case A, such as the cultivation of potential steel suppliers, also provided value for Case B, but for example, the capability to design compression moulded products did not.

Comparing cases A and B in the mining segment, it becomes apparent that the fit between activities and virtual cycles can be achieved in several ways. In Case A, the virtuous cycle is achieved through a deep, long-term customer relationship aiming for the mutual benefit of selling higher-margin spare parts by generating a competitive bid in a project delivery, utilizing a tightly-interlinked activity network. On the other hand, the potential virtuous cycle of Case B is based on a transactional relationship where each player only conducts a few core functions, with the benefits resulting from the ability to focus on efficiency in these. However, the execution of these two positions within the same company and even business unit seems to be, if not unworkable, at the very least, difficult. For example, Case A clearly requires the existence of several support functions and supporting

activities to achieve the necessary fit, while the optimization for Case B requires the cutting of these activities from around the core project offering.

The reasoning behind the execution of Case B was to create an initial contact with the customer. Thus, the case was adopted by the case company knowing that the case demanded capabilities outside its normal scope of operations. The reasoning was to conduct a successful case with the customer and use it as a source of leverage for future bids and to begin building a rapport with the customer. In other words, the goal of the case company was to move Contractor B towards the behaviour of Customer A, enabling the company to capture additional value from its supporting activities in future projects.

In contrast to cases A and B, the activities in **Case C** are even more divergent. Case C is the first of the cases analysed here to include a significant service component. The activities in support of the actual project include regular development discussions with Customer C, training of customer staff and regular inspections and repair of the installed base at the customer's premises, as well as guarantees and consulting in, for example, writing specifications. This naturally has a significant cost-increasing element due to the need for service infrastructure and more wide-ranging expertise such as rubber know-how. On the other hand, as a result, Customer C is less price sensitive, due to the lower transaction costs resulting from the lack of need to solicit bids separately for each repair operation or larger project. In addition, the risk position is moved towards the case company and away from Customer C, increasing willingness to pay. This is well supported by the extreme costs occurred each time Customer C needs to shut down its process, as well as significant risk of damage to property and injury to personnel in case of acute failure.

Figure 22 illustrates the fit and virtuous cycle between the activities of Case C, again key activities in green background, resources in blue and the driver of the value system in dark grey. The virtuous cycle is driven by the Customer C's extremely high costs of shut-down and potential consequences of failure. This drives the value system where the supplier assumes part of the responsibilities and lowers the exposure through maintenance activities, which helps build customer relationship through constant interaction. This trust lowers the transaction costs for the customer, while the guarantees given by the suppliers increase switching costs. The conduct of these activities incurs additional costs for the supplier, but they can be passed on to the customer, as the price of the service provided is insignificant in comparison to a process shutdown or acute failure.

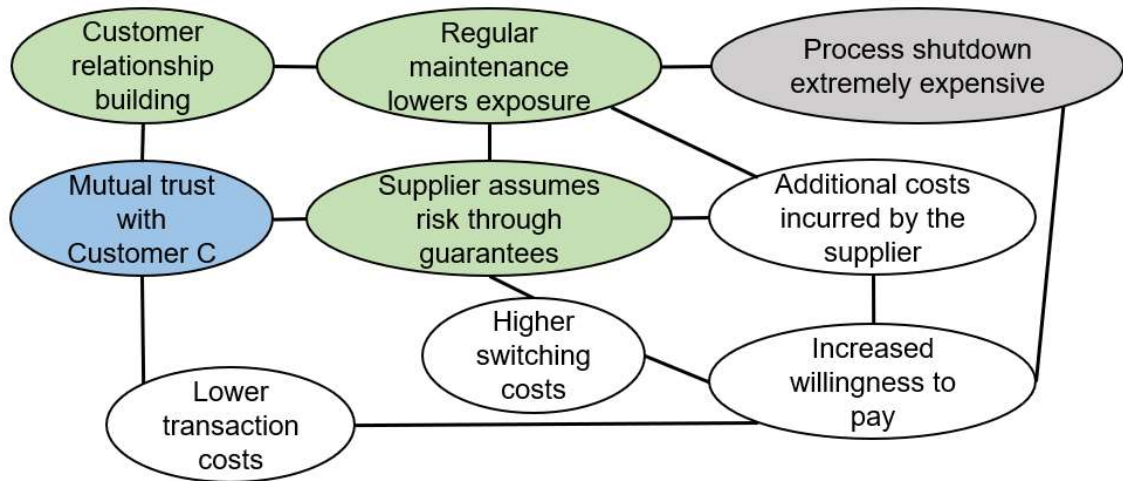


Figure 22. Part of the virtuous cycle in Case C.

Despite sharing an industry, the activities performed in **Case D** have only little shared ground with the activities of Case C. The activities necessary in Case D included significantly higher amount of deskwork, such as preparation of bids, compared to all other cases under scrutiny. This was due to Customer D soliciting bids for almost all separate parts of the entire repair effort. This was complicated because the bidding process, requirements and change order management, especially at the beginning of the project, were not clear. This caused significant confusion in all involved parties. The case also necessitated the development of new activities for the case company, including management accounting procedures, operations management procedures and project management procedures. Driven by Case D, the case company has conducted not-insignificant investments into its capability to execute large projects on the customer's premises, such as acquisition of new tools and cultivation of supplier relationships with, e.g. companies providing rental labour. Even the commissioning of this very study is largely driven by Case D.

Despite Case D driving the acquisition of new capabilities, the actual manufacturing operations in Case D were very much standard and reminiscent of Case B, with the caveat that the execution of Case B was done on-premises, while Case D was mostly conducted on the customer's premises, and the difference in scale and scope of the cases. One major difference between cases pertains to the necessary supporting functions. The low-cost virtuous cycle of Case B was mostly driven by the minimization of the role of supporting functions, while in Case D, significant effort was spent on bidding, preparing and submitting paperwork, often separately for each subcomponent of the case, to be even able to invoice work completed. This resulted in a vicious cycle of high transaction costs with low margins to cover them, expounded by the scale of the project. This was compounded by extremely competitive environment and razor-thin margins, illustrated in figure 23.

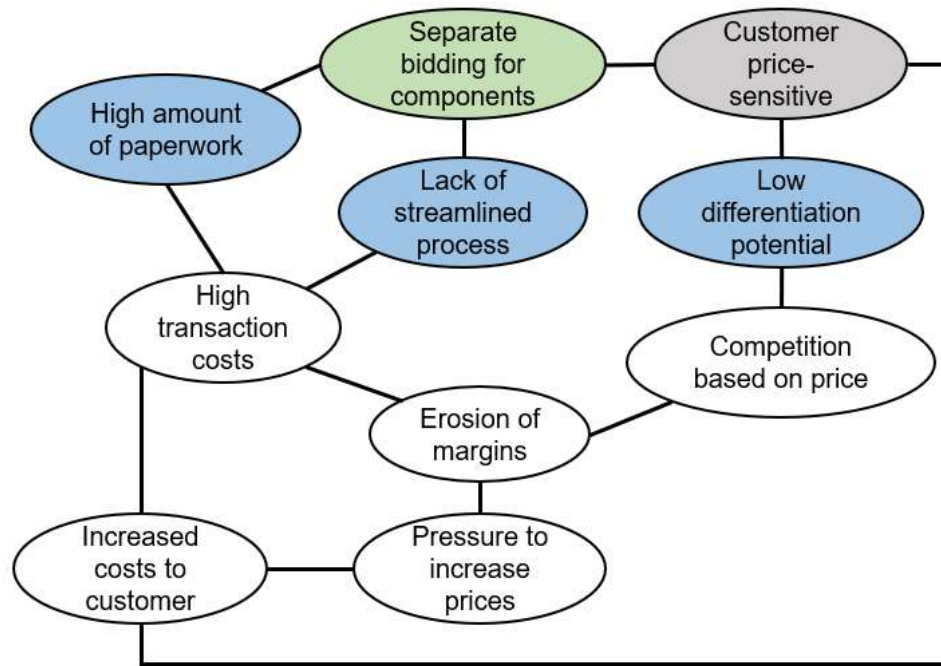


Figure 23. Part of the vicious cycle in Case D.

It bears mentioning that the vicious cycle presented before hurts both the customer and the supplier. The issue on the customer's side is that as transaction costs keep growing, the suppliers come under heavier pressure to increase their prices, an effect that is passed to the customer in full due to components being bid separately. This is exacerbated by transaction costs cutting both ways, as Customer D also spent significant time and effort in the management of paperwork over the case, amplified by the separation of the site project management into functionally separate organizations with poor internal lines of communication. In hindsight, it may be claimed that this combination was one of the factors that eventually led to slipping schedule, cost overruns and the eventual termination of the project.

In a contrast to other cases, the most significant difference in the activity system from **Case E** to Case C is maintaining the customer relationship mostly transactional. Customer E prefers to receive bids for each time, bidding in the definition "go through the cost level together". In addition, there are, for example, no guarantees of a service level. This is due to the operating environment of installed base in the Customer E's premises being mostly exposed to seawater, while in Case C the installed base is constantly exposed to concentrated acids. Thus, the costs of failure in Customer E's environment are significantly less, and the importance of the case company's products in relation to the Customer E's full operations is extremely minor.

Despite lacking product-based incentives for loyalty, Customer E has, as mentioned earlier, actively discouraged competing offers for rubber linings. This is due to the "trust gained by presence" with the customer, the effect of which lowers the transaction costs for each party and increases switching costs for Customer E. On the other hand, the

service activities offered to Customer E cannot be supported by the Customer E's volume alone, but instead are dependent on a given level of economies of scale. It should be noted that despite differences in the customer relationship, Customer E and Customer C tap into the same resource base and provide economies of scale in conjunction with other customers using the same resource base. Similarly, most of the activity system necessary to serve customers C and E is shared. The business model, however, differs again. In Case C, the earning logic was a fixed-price contract, while in Case E the earning logic was expressly cost-plus, again reinforcing the concept of solution-specificity of business models.

4.2.3 Resources and capabilities

Seemingly one of the most crucial resources, apparent from several cases, is the reputation of the case company and the trust following from long-term partnerships. The foundation of Case A was the pre-existing customer relationship and related agreements with Customer A, leading to a situation where it was even possible for the virtuous cycle to emerge. In addition, under the umbrella term of "customer relationship", several arrangements exist, such as the supplier financing agreement, vetted suppliers for steel components and procedures to ensure quality documentation meeting the customer's requirements. Furthermore, the creation of the customer relationship in Case A is the result of activities executed over a long period of time, themselves requiring both capabilities to deliver as well as technical know-how and the capability to support the customer in, for example, new product development. Thus, the resource of "customer relationship" is, by itself gained through executing activities based on some other resources, such as "technical know-how". Similarly, with the "existing product base" and "number of competing suppliers for the steel parts", both key resources in the execution of the virtuous cycle in Case A, are the result of activities such as cultivating new suppliers and long, concurrent product development with the customer.

In Case B, the same resources could not be utilized to the same extent. First, the lack of existing customer relationship with Contractor B and the bid-based approach of Customer B make it expressly difficult to cultivate the same resources, and even if such an attempt were successful, Case B is mostly not supported by the resource base of the business. In Case B, factors such as low-cost labour and low level of business overhead would have been resources enhancing the competitiveness of the case company. On the other hand, the ability to use internally-sourced, specification-fulfilling rubber compound at a lower cost than market standard was a significant resource and was quoted as "the reason the bid was won", even against players with significantly lower cost levels (*i.e.* one competitor from a country with salaries $\frac{1}{4}$ th compared to Finland).

One problem in replicating the resource base of Case A is that to cultivate high-value customer relationships, it is necessary to create an opening to do business in the first place. Otherwise the contact with the customer does not develop and the case company remains exposed to competitors and price wars. The reasoning behind Case B was

explicitly an attempt to prove competence and competitiveness of the case company to the Contractor B. The main complication in Case B is caused by the difference between Customer B and Contractor B, where positive relationship with Contractor B might not aid in a situation where Customer B decides to place the following projects to a similar tender, again leading to a situation where the market is practically open to everyone and decisions are made based on price. On the other hand, should Contractor B gain the trust of Customer B, and the case company with Contractor B, a positive dynamic like with Customer A might emerge.

Regarding Case C, customer relationship and trust return as the most crucial resources possessed by the case company, compounded by technical know-how, likewise with Case E. The separation with Customer C and Customer E lies in the service contract, one of which exists between the case company and Customer C, but not with Customer E, due to the reasons discussed earlier. Knowledge of the customers' environments can be added as one additional resource again creating switching costs for the customer, but within this resource exists a threat, as the knowledge is rather tacit, and internal documentation regarding customer's environments can only be classified as 'lacking'. What combines all these resources is again the fact that these resources cannot be acquired on-demand, but rather are resources that emerge over time via the execution of activities, facilitated by dynamic capabilities. In other words, the resources act as a basis upon which activities can be executed, and the resources themselves evolve over time as the result of dynamic capabilities.

In Case D, at the beginning of the project, only few resources supporting the project existed, such as own rubber compound fulfilling the customer specifications. In fact, it seems that most of the won bids within Case D were bids where the case company was able to offer its own rubber compound, and conversely, when forced by specification to use another suppliers' compound, the case company generally lost the bids. Admittedly, internal development of rubber compounds does create additional overhead costs, and thus might decrease profitability while competing with price against low-cost actors in deliveries where the specificities of the compound are not relevant. However, in cases where higher technical competence is required, internal know-how of rubber compounds is crucial, and in these cases, the competition tends to be less intense and customers less price-sensitive. Thus, the conclusion drawn regarding the resource of internal rubber compound development is that the utility of the resource changes between cases, but was of extremely high utility in several cases, like Case B, Case C and Case D. It is important to note that even highly useful resources and capabilities have a cost associated with them, and the decision to develop a resource is, by necessity, always a trade-off between the immediate costs of developing the resource and the potential for future value extraction from the resource.

As an example of project-facilitated capability building, during Case D, the case company did cultivate several new resources and capabilities. Some of the most notable include a

relationship with a low-cost supplier of rented labour, new financial management practices and the adoption of new processes and tools to track the status of large projects. In effect, this is an example of dynamic capabilities creating new resources as the result of distinct cases. This also provides a new viewpoint to Case D, which was not just a large project, but a facilitator for the development of new resources. This viewpoint can be expanded further, and in this light, Case B can be interpreted as an attempt to develop knowledge regarding the cost performance of the case company, the takeaway being that *projects can potentially be used as vessels for learning and developing new capabilities and resources*.

4.3 Financial performance in the cases

To illustrate the relationship between business performance, business models and strategy, a financial analysis of the cases will be conducted. The crucial research question in this context is the second one:

2. How do business models and strategy influence the performance of project business?

This research question cannot be answered by this subchapter alone. Instead, combining the results of this subchapter with the preceding analysis should be enough to answer the second research question. Based on the literature (*e.g.* Porter, 1991; Artto, 1998; Artto and Wikström, 2005; Artto and Kujala, 2008; Porter, 2008), four claims are made:

- External factors under the domain of strategy, such as Five Forces influence the performance of a project
- Operational effectiveness in performing activities influences the performance of a given project
- The fit between the activity system of a project and the activity system of the business influences the performance of a project
- The fit between the combined activity systems in the project portfolio and the activity system of the business influence the performance of a business.

Despite the extensive access to financial information by the researcher, the inclusion of all relevant financial measures in absolute numbers in this study is impossible due to concerns of confidentiality. Thus, instead of absolute profits and costs, the analysis as presented here focuses mostly on relative costs, profits and differences, as well as relative differences in *e.g.* cost components between cases. For the same reason, some of the numbers and ratios given are obfuscated. The purpose of these measures is to protect the case company's confidential information, while still providing enough information to be of theoretical utility.

The differences in relative profitability between the cases were extremely significant, and hugely influenced by the product mix relative to the cases. In terms of direct profits, the largest relative profitability was in the polyurethane-component of Case A, while the

lowest relative profitability was present in the rubber lining component of Case B, and the cases with lowest relative profitability in total were Case C and Case D. The relative profitability of the cases as a whole is illustrated in figure 24.

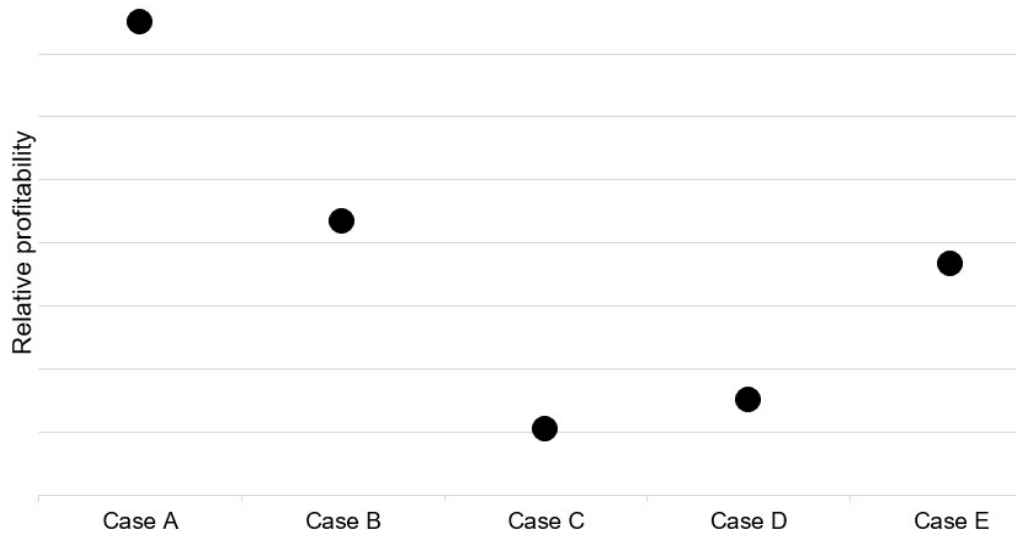


Figure 24. *The relative profitability of the cases.*

This description of relative profitability is not, however, especially relevant without accounting for differences in product mix. The differences are illustrated in figure 25.

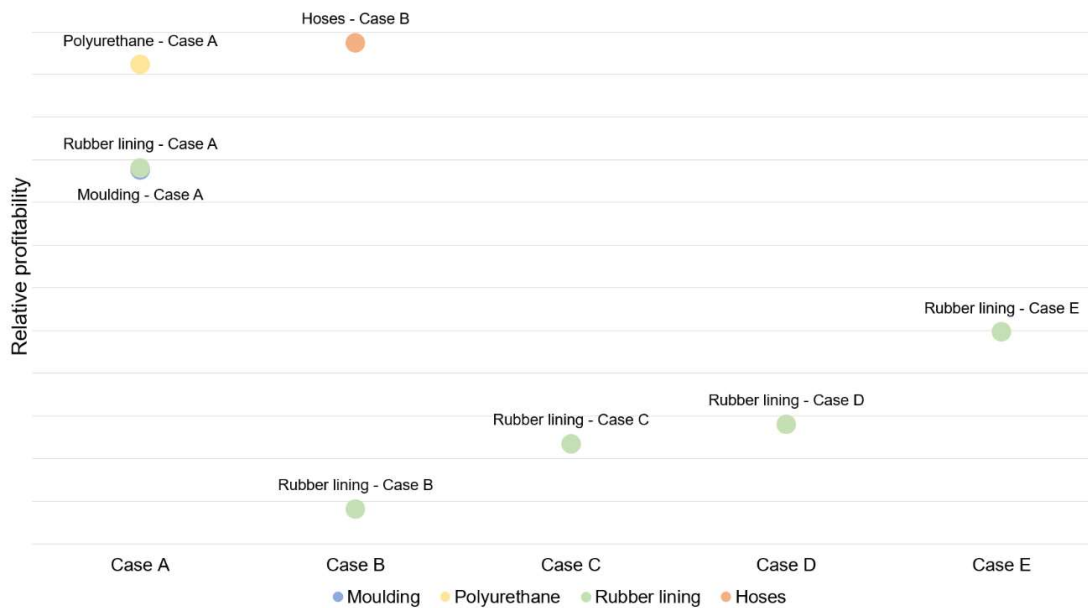


Figure 25. *Relative profitability of the components within cases.*

From figure 25 it is apparent that differences in the profitability are more profound between components of the cases than the differences between cases. For example, total profitability of Case B is rather average in the comparison group, but of its two components, other has the largest relative profitability of this sample set, while the other has the poorest. In addition, excluding Case A, rubber lining projects seem to have a significantly

lower profitability than other project types. This would seem to indicate that external (industry-specific) forces significantly influence profitability in accordance with the first claim. In other words, cases and business components that are less exposed to external forces, such as Case E, seem to have better relative profitability than cases where the external forces have a stronger impact, with the notable exception of Case C.

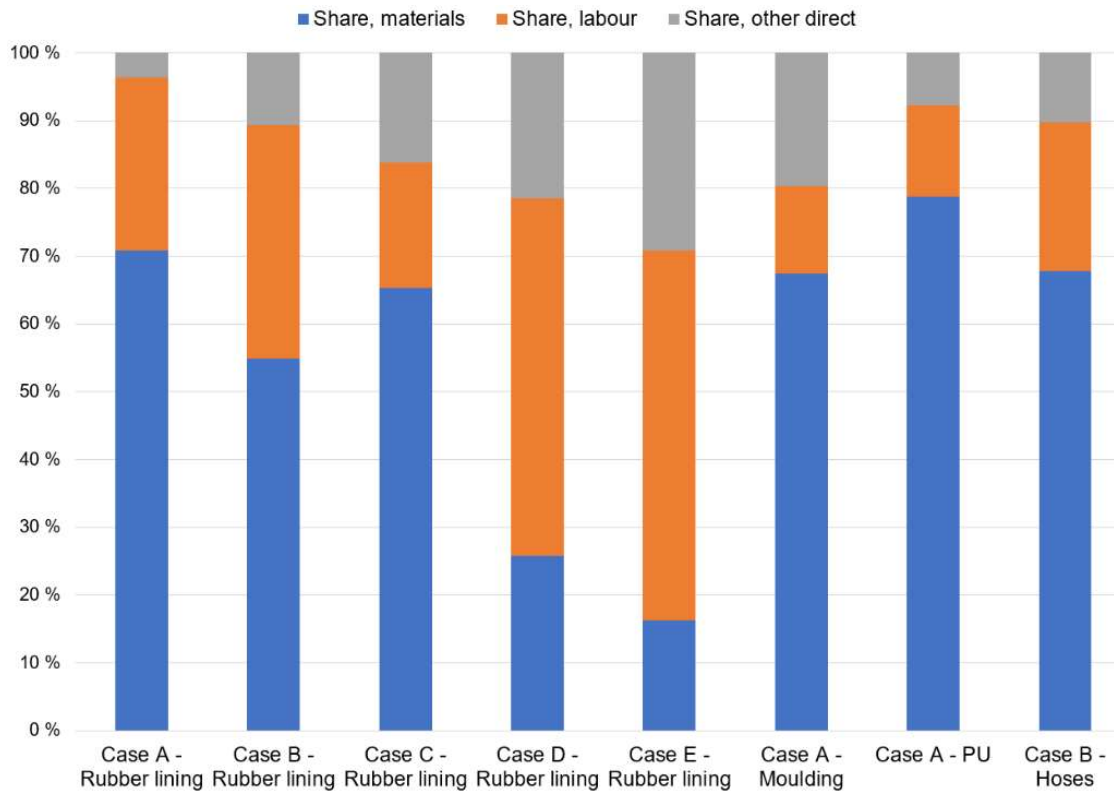


Figure 26. *The distribution of costs in the cases.*

Figure 26 illustrates the differences between the distribution of costs in each of the cases under scrutiny. Several variables were investigated for the correlation to relative profitability. These results are presented in table 6.

Table 6. *Correlation coefficients of some financial variables.*

Factor	Correlation coefficient	Comment
Material expenses (total)	0,053	Insignificant
External material expenses	-0,100	Insignificant
Internal material expenses	-0,257	Insignificant
Labour expenses (total)	-0,696	A moderate negative relationship
External labour expenses	-0,598	A moderate negative relationship
Internal labour expenses	-0,773	A strong negative relationship
Other direct expenses (total)	-0,568	A moderate negative relationship

From table 6 it becomes apparent that the relative share of labour expenses, especially internal labour expenses and that of other direct expenses correlates most strongly with relative profitability. However, similar analysis based on only rubber lining does not reveal similar results, making it likely that should such a correlation exist, it is most likely due to rubber lining cases in general having larger share of labour expenses combined with lower profitability due to external factors. It should also be kept in mind that a sample size of 8 is not enough to draw conclusions about statistical correlation.

Unfortunately for the purposes of financial analysis, the tracking of direct expenses in the case company is limited to the level of gross margin. Based on the preceding discussion regarding the differences in activities and resources employed in the cases, it seems apparent that on the level of operating margin, even more pronounced differences exist in between cases, but these are currently out of reach of the research.

The non-manufacturing direct costs are not directly related to the revenue of the cases or any other generic measurement. For example, in Case A, the compression moulding portion of the delivery was less than a fourth of the size of the polyurethane portion. Regardless, the costs incurred from supporting activities in the compression moulding portion based on the supporting staff employed on the design activities were estimated to be more than 3 times as large than those required in the polyurethane portion, or 12 times per EUR of revenue. Similarly, despite the proximity in the relative profitability of cases C and D, the amount of management attention consumed by Case D was estimated to be on a similar level in relation to revenue as those consumed by Case C – a significant amount considering that Case C was less than 10 % of the size of Case D.

Based on this discussion, it seems evident that external forces do impact the profitability of a project, as the projects with least impact from external forces seem to be the most profitable ones. However, there are still significant differences between projects in a similar environment, such as between Case C and Case E. Thus, external factors cannot explain all the performance differences in between cases. Especially between cases C and E the crucial difference was in the earning logic present, as Case C was delivered with a fixed-price contract, while Case E was invoiced directly based on consumption. Based on internal documentation it seems that the relatively poor profitability of Case C is, in fact, a mistake in pricing (mistake in evaluating the total labour and material necessary) or manufacturing efficiency (the execution of the project was somehow wasteful). Regardless, Case C illustrates the claim that operational efficiency in activities does, in fact, influence the performance of singular cases. It should also be noted that Customer C has a service agreement in effect acting as a source of recurring revenue, that was not included in these financial calculations, and on an aggregate level Customer C is profitable beyond the levels present in Case C.

The third claim of the relation between the activity system of a project and the performance of the project seems to hold true. This is apparent especially in the relative

performance difference between the rubber lining component of Case B and the rubber lining component of Case A. In Case A the case company was able to leverage its supporting activities nearly to its fullest extent, while in Case B it was almost completely unable to derive value from them. Similarly, Case E has a significantly higher relative profitability than cases B and D, Case C being excluded due to concerns of operational efficiency and supporting revenue streams from support activities not being included in this analysis.

Combining some of the previous, it seems that all external forces, operational efficiency and the fit between activity systems of a business and the activity system of the project influence the performance of the project. The final claim regarding the fit between the activity system of a business and the activity system of a project portfolio will be discussed separately.

Unfortunately, the drawing of solid financial conclusions is complicated especially due to the deficiencies in the company's management accounting system, especially regarding non-manufacturing costs and capital employed.

4.4 Management practices and dynamic capabilities utilized

The third research question concerns the relationship between dynamic capabilities, business models and project business as

3. Can dynamic capabilities help create sustained competitive advantage in project business, and how?

To answer this research question, this study begins by evaluating the current management system of the case company including *e.g.* the organization of project business, general management practices of project business, such as financial management and project portfolio management and the management of services as a part of a project-service system. In effect, this is a look into the first-order dynamic capabilities of the company according to Winter (2003). In addition to these and recognizing the role of organizational learning as a dynamic capability, learning initiatives at the case company are evaluated. The result of this subchapter should be a comprehensive look into the management system of the case company, an analysis of the dynamic capabilities possessed by the company and an evaluation of how the dynamic capabilities present contributed to the cases under scrutiny.

4.4.1 Organization behind the cases

From the perspective of the case company, the cases often included inputs from several functional business units. The Finnish manufacturing operations of the case company are organized into four business units:

- Hoses, responsible for manufacturing and sales of rubber hoses

- Moulding, responsible for manufacturing and sales of moulded products of rubber and plastics using different methodologies
- Lining, responsible for manufacturing and sales of items made by polyurethane casting and manually applied rubber linings.
- Compounds, responsible for manufacturing and development of rubber compounds for both internal and external customers.

This functional distribution is in a stark contrast with the nature of the cases often crossing organizational boundaries. For example, in Case B products from all business units were included within the project, while cases C and E were executed only with input from manual rubber lining within the “Lining” business unit and raw materials supplied by “Compounds” business unit. Figure 27 illustrates the organizational structure of the case company in relation to the cases.

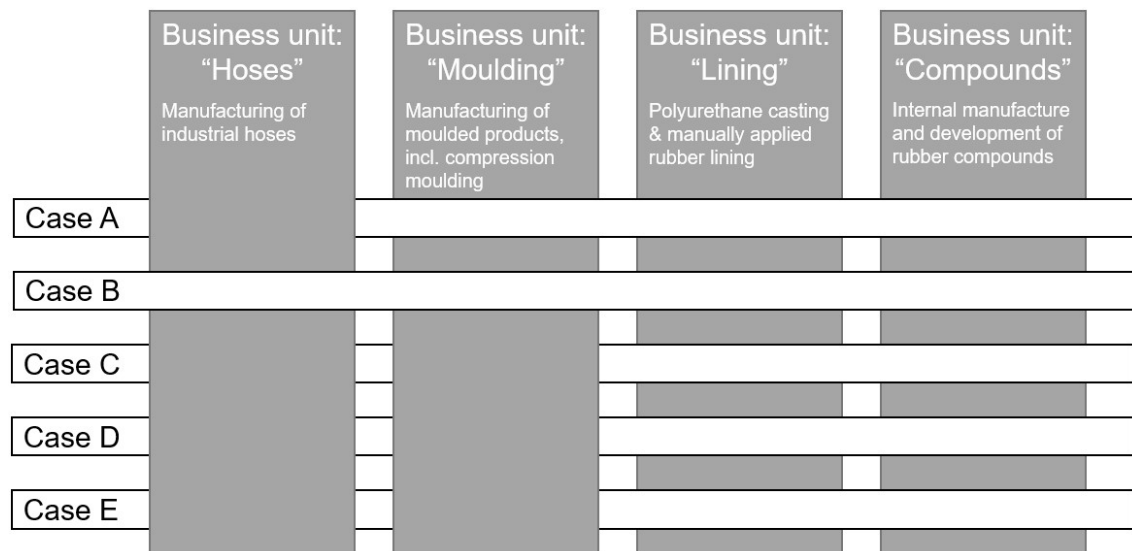


Figure 27. Organizational structure of the case company in relation to the cases.

In cases crossing organizational boundaries, it could be assumed that in such cases, a cross-functional project manager would be appointed. However, such a measure was not taken for any of these cases. Each of these cases was handled using standard operating procedure, where each business unit’s part of the delivery was handled by and only that business unit. This includes even activities such as order processing and invoicing. That is not to say that the cases were not communicated across business units at all – they were, but the communication was on a personal basis and more *ad-hoc* than anything, some efforts to create a consolidated offer for the Case B notwithstanding.

The explicit exclusion of Compounds can be explained by the fact that the leader of Lining business unit is, simultaneously, the leader of Compounds -business unit, and furthermore, the business between Compounds and the other functional business units is rather transactional, in that other BU:s know the rubber compounds they can deliver to the

customer, and can trust the delivery capability of Compounds to meet up with the demand, so arrangement of resources is, by itself, a rather trivial affair. This is complicated somewhat in cases where rubber needs to be specifically developed for the solution, but these usually involve significant amounts of group-level supporting activities, such as R&D. Such a case is not, however among the ones chosen for this study.

In addition to the explanation for excluding Compounds from the main deliberations of project deliveries, there are other reasons why some cases might not be led under a single management. For example, the series of customer purchase orders comprising Case A arrived over a long period of time, from different contact persons in the customer's organization, and is the result of the internal separation of activities by Customer A. Furthermore, the actual components included under the umbrella of Case A follow, as mentioned, separate logic, as polyurethane and manually applied rubber lined components are, for the most part, standard, while the products for rubber compression moulding needed to be designed separately.

The key attribute of the case company's organizational structure is the rather strict organization around business lines and the following decentralization of project management to different business units, as apparent from cases A and B. This means that, in effect, the company operates much like four separate businesses regarding even major deliveries, with only some shared supporting functions such as research & development, finance and general management.

4.4.2 General management practices

As a rule, the project management practices employed by the case company do not diverge from the management practises employed during normal manufacturing procedures. The functional sales teams prepare the offers and receive orders, which are then handed to the operations "just as any other order". The assumption is then that operations will take care of the acquisition of materials, resourcing, manufacturing and completing the delivery on time. In cases such as A and B, where significant sourcing effort needs to be spent, bids are often solicited already on the offering creation phase, upon which the purchasing is simply given the mandate to order the goods. Generally, no singular person is responsible for the entire project from offering to delivery, and measurement of project progress is mostly done by the sales teams on an *ad-hoc* basis.

The cases under scrutiny did not deviate significantly from the general system described above. For example, Case A followed the general practice to the letter, while Case B saw an *ad-hoc* team in the design phase, but in the manufacturing stage the progress was not coordinated between the functional business units. On the other hand, in cases C, D and E, and more generally, off-site work conducted by Lining business unit is coordinated separately in concert with sales and operations. Particularly in Case D, a separate site manager was appointed for the customer's premises due to the scale of the operation and

the load it placed on the staff. This was, in practice, unprecedented by the company, and the decision was taken only after it became apparent that the scale of the case couldn't be handled using regular processes. The closest approximation of the company's project management system in the literature is the classification as a broker-steward -model for large projects with multiple, small clients, as described by Turner and Keegan (2001). The model gains additional validity due to the Case D, an example of a large project to a large customer, where the case company eventually appointed a single person to the customer's site, into direct contact with the customer.

The financial management of the cases mostly revolves around sales margin. For example, in the offering phase the general considerations are "how much material is needed?", "how much labour is needed?" and "what other direct costs, such as hotels, daily allowances and travel expenses will we acquire?" when constructing a fixed-cost offer, while in cases of cost-plus offerings the considerations rely mostly on the axis of "how much indirect costs will we incur and how to include them in the pricing?". Post-fact calculations are generally not done, except on a case-by-case basis and even then, only for larger projects. In the context of this study such an analysis was made, but otherwise it is likely that only Case D would have received a formal post-fact analysis. This naturally harms the ability of the case company to learn from previous cases. Especially apparent this becomes when projects are undertaken for the explicit purpose of learning or future business development, such as Case B.

Regarding forecasting, project results, including expenses and incomes are generally not forecasted besides the original offering, and offers given are not included in a systematic forecasting process. Sometimes, known projects are included into *ad-hoc* forecasts, but this process is not continuous or explicitly defined. For example, Case D was included in the turnover forecast for 2018, as was Case B, but in neither of these cases, the price point that was known well beforehand, was included in the income statement forecasts.

Regarding the management of project portfolios, the only systematic activities undertaken by the company are the regular resourcing discussion in the Lining business unit, and a recently adopted project planning / tracking overview with a rough overview about likely projects coming and won projects ongoing in compression moulding business. However, these only pertain to the management of resources -part of project portfolio management. Attributes such as risk, technological aspects and opportunities for learning in projects are not evaluated in a level higher than singular projects. Formal project portfolio management process, such as the one proposed by Archer and Ghasemzadeh (1999) is not on place. For example, despite cases B and D being under execution during the same time, both containing significant uncertainty factors (in Case B the low price point and new type of rubber involved, in Case D the unprecedented scope of the project, in addition to both demanding significant amount of resources), the combined risk was not considered, and it nearly realized in the delivery schedule of Case B.

4.4.3 Services as part of the project delivery

Of the cases, only Case C and Case E can be said to contain purely service-related elements, and even they cannot be considered as pure-service deliveries. Of course, this depends on the adopted definition for services, and elements such as designing components for rubber compression moulding in Case A could be classified as services. In figure 28, the cases are situated on a sliding scale between pure product delivery (pure project delivery) and pure service delivery, following the idea of a product-service continuum as expressed by Tukker (2004).

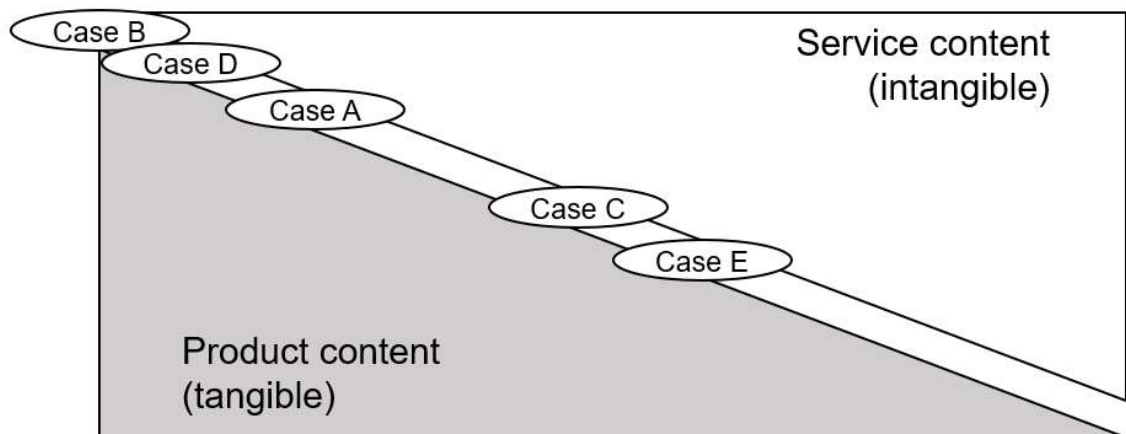


Figure 28. *The place of the cases on the product-service continuum, following Tukker, 2004.*

Regarding the most common problems in effective management of service operations, the variability in demand was interestingly not an issue either in case C or E. For both of these cases, the need was known significantly beforehand, mostly due to the continuous communication with the customer, and in the case of Case E, the annual maintenance schedule is well-known. The most prevalent type of demand variability according to the categorization by Frei (2006) was that of effort variability, present especially in the exceptionally major scale of Case C, but the variability in these cases was not significant enough to cause major issues. More pressing question would be the measurement of demand variability across a time period, and expanded to include both services and products, as the resource pools utilized tend to be the same. For example, the simultaneous execution of cases D and E, while simultaneously preparing for the second part of the delivery in Case A and conducting caused significant scheduling and resourcing issues.

One significant measure missing from these cases is the evaluation of customer satisfaction beyond anecdotes or overt actions, such as Customer D shutting down the reconstruction efforts of Case D. Similarly, service quality (including structural, process-related and outcome-related quality, Homburg and Garbe, 1999) has not consistently been measured by the case company. Evaluating based on the financial performance of the cases, it seems that a link exists between the strength of the customer relationship and the

profitability of the case, in accordance with the service-profit chain proposed by Heskett *et al.* (2008). Especially cases A and E were executed with high relative profitability, and both customers expressed satisfaction regarding the delivery performance based on anecdotal evidence. However, it should be noted that Customer C has expressed similar high levels of satisfaction, which did not translate to high relative profitability as discussed earlier.

The services delivered were mostly goods-oriented, “to perform a deed” -type product life-cycle services, as categorized by Ulaga and Reinartz (2011). As the industry value chain most often involves intermediaries, such as Contractor B, it is extremely difficult to successfully introduce performance-centric services. However, some of the services delivered, namely, the training included in the service contracts of Case C can be counted as process-oriented services “to perform a deed”. The share of these of the total service offering within the cases was, however, rather low, with most of the services being delivered as maintenance-type services, using existing facilities, following Chase and Garvin (1989), in the role of a dispatcher, the base for service personnel, and a supply point for raw materials and tools.

Using the categorization of Kujala *et al.* (2010) as a basis, the view of the services offered is somewhat extended. This is because despite both Case C and Case E being admittedly project-oriented services, the revenue generation logic differs significantly. In the categorization of Kujala *et al.* (2010) Case E falls under basic installed base services, while Case C is more in the segment of operations and maintenance outsourcing or relationship-based services. This is despite Case E also being directly relationship-based, as the revenue generation logic is transaction-based. These are presented in figure 29.

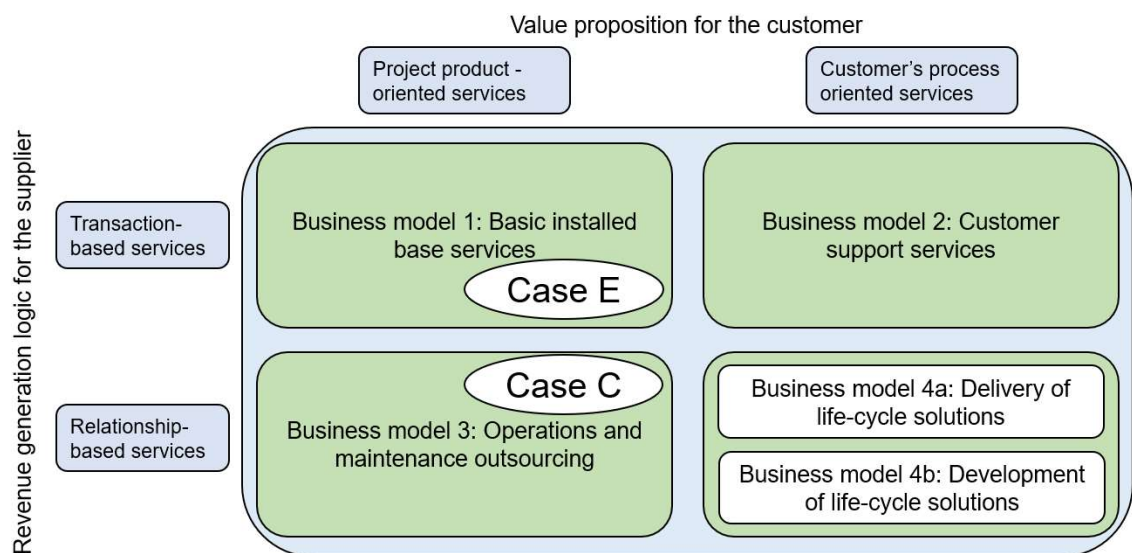


Figure 29. The position of cases C and E in the service categorization adopted from Kujala *et al.*, 2010.

Regarding especially cases A, C and D, it seems that the linkage between projects and services is less clear than usually articulated. Several authors (*e.g.* Artto *et al.*, 2011, p. 280; Gann and Salter, 2000, Kujala *et al.*, 2013) create a clear distinction between projects and supporting services, however, in the context of the cases evaluated here, similar distinction cannot be easily made, for example, the delivery of Case D contained both pure project -elements and pure services -elements. Here is that projects and project-related-services are considered under a single umbrella of “satisfying a one-time customer need”. Pre-existing literature considering services in project context does still apply, but in this study the uniqueness of projects seems to be the dominant factor even in service-esque deliveries, making it unnecessary to separate services and projects to distinct constructs.

From the preceding discussion it is apparent that the capability to execute services was a criterion in executing several cases, such as Case A (design capabilities) and Case E (on-premise installations), both of which were relatively profitable cases. However, it also seems that the case company has not yet developed its capabilities to manage and coordinate service activities effectively, as apparent from the issues in the simultaneous execution of cases D and E, and the relatively poor performance in Case C despite sharing much of the activity system with Case E. The conclusion then is that the capability to execute service-type activities (*i.e.* ability to offer product design to a customer such as in Case A) *in conjunction* with the capability to manage service activities effectively (*i.e.* to avoid the mistakes conducted with Case C) seems to be a potential source of competitive advantage. Noting that management capabilities are dynamic capabilities, and that the service operations described here were conducted as parts of project business, it seems clear that dynamic capabilities in service operations management may act as a source of competitive advantage in project business. In addition, from cases C and E it seems apparent that the capability to offer services is, in fact, boosting product sales, as suggested by Kastalli and Van Looy (2013).

4.4.4 Learning initiatives and their application

Organizational learning is a dynamic capability, and dynamic capabilities may act as a source of sustainable competitive advantage, according to a rather wide consensus in academic literature as discussed before (*e.g.* Teece, 2003; Porter, 1991; Brady and Davies, 2004). The goal of this subchapter is to expand on this claim by identifying what kind of learning initiatives were utilized in the cases or present in the company at the time of this study, and whether they had material impact on the conduct of the cases.

When considering the cases themselves, it seems apparent that some of them were motivated at least partially by learning opportunities in addition to commercial potential, as discussed before in the context of Case B and Case D. However, no system for enabling or capturing learning from the cases was found to be in place. The case company has a system for the management of standard operating procedures, but these tend to be out of date, and are generally not updated or evaluated in the view of new experiences from

cases. Based on interviews, it appears that often some learning happens in the design phase of the projects, but these are mostly limited to individuals or project teams responsible for execution of the projects, and even then, the learnings seem to accumulate in random, rather than via a conscious effort. There is, as mentioned earlier, no financial post-fact calculation process, no procedure to walk through lessons learned or to disseminate them across the organization.

In addition to the poor dissemination of learnings, there is a significant risk that lessons learned reflect more the hidden bias of individuals, rather than the objective execution of the cases. For example, both Case B and Case D were lambasted within the company, while Case C was lauded as a great success, before the presentation of post-fact calculations presented here demonstrated that the levels of relative profitability in these cases were not divergent. The inescapable conclusion is that these false lessons learned might lead to distorted view of company strengths and weaknesses, themselves leading to erroneous decisions, acting as a potential source of competitive *disadvantage*.

Projects conducted by the case company are generally not sought with a learning perspective. As mentioned, the rubber lining component of Case B forms a notable exception here, with intentional pricing strategy and extremely low bid partially motivated by the purpose of learning whether the case company could compete on the market. In contrast, Case D provided significant learning opportunities for the case company, but the motivation behind the execution was mostly commercial. With regards to the only explicitly-learning-driven project, Case B, even though the project was eventually finished on schedule and it turned a reasonable, albeit low profit, it happened “with a little luck”, as the process was not under control throughout the project. In addition, no evidence exists that the lessons of the project were put into practice.

One of the main issues inhibiting learning from project to project is the lack of any kind of record of the extent of installed base. Some supplementary files exist, such as condition maps of the facilities of Customer E, and the drawings and other technical documents generated in the design phase, but even these are distributed to the functional silos within the company, only poorly searchable and mostly dependent on individuals remembering that such documentation exists.

In conclusion then, the status of learning initiatives in the case company is rather worrying. The procedures to support organizational learning are currently lacking or non-existent, which exposes the company to significant risks. As evident from the misinterpretation of the comparative success of cases B, C and D, the lack of procedures to gather, interpret and exploit organizational learnings might lead to erroneous decisions. It also seems likely that the relatively poor performance in Case C was at least partially driven by lack of learning from preceding similar deliveries. In addition, during the concurrent execution of cases B and D, the inability to estimate resource needs beforehand almost led to a failure to maintain the schedule in the rubber lining business.

5. DISCUSSION

This chapter discusses the findings of the study, and its goal is to answer to the research questions of the thesis. Each main research question is handled in its own separate subchapter.

5.1 Business models, strategy and project business

The first research question of this study is

1. How are the concepts of business model, strategy and project business related?

This can be interpreted as three distinct linkages: the relationship between business models and strategy, the relationship between strategy and project business and the relationship between business models and project business.

From Case A the conclusion can be drawn that the organization of activities in the value chain – the business model of Case A – was heavily influenced by the strategic choices made by the case company long before the actual execution of the case and illustrates a direct linkage between strategy and the business model of a project. In addition, as the time horizon involved in these choices is longitudinal, it follows that the fit between activities is, in fact, the result of dynamic capabilities executed over time, with the result of a new resource base – such as known steel suppliers – that was utilized for the benefit of the entire activity system.

Based on the combined analysis of cases A and B, it is first evident that the business models are very different, especially in the rubber lining business line where the two deliveries utilize the same resources for effectively to the same customer segment, but with very different business models. The business models are solution-specific, and it seems clear that the particularities of projects in project business do in fact have an impact on the business model choices. However, the difference in business models means that the value systems needed to conduct cases A and B are very different.

Based on the activities, Case C seems to be more reminiscent of Case A in that the successful execution of the case requires several supporting activities, which on their behalf need capabilities obtained over a long period of time. However, the set of supporting activities in Case C is noticeably different from Case A. This means that to include both cases A and C in its portfolio, the case company needs to have invested time and resources to obtain the capabilities necessary for two distinct sets of supporting activities. It is apparent that these capabilities are necessary for the case company to execute the activities of – again distinct – business models of both Case A and Case C, but this comes with a high supporting cost. Of course, some of the supporting activities, such as customer relationship building, are shared between Case A and Case C, but *no such overlap exists*

between Case B and Case C. This means that the combination of three cases A, B and C, as well as their solution-specific business models demanded the capability for three distinct activity sets.

The tragedy of Case D is that it combined high price pressure, high transaction costs and need for significant supporting activities, many of which were new for the case company. This basically translated into a need to build a resource base and an entire supporting activity system from scratch to support the demands of the case. Thus, we can again conclude that

- The activity system required by Case D was not supported by the existing activity system of the company
- The business model employed in Case D was clearly solution-specific and distinct from other cases.

Especially from Case A it seems that the strategic choices over time may translate to resources and capabilities to execute different business models. However, as the activity systems differ significantly between projects due to the solution-specificity of business models, it seems that focusing only on a single set of supporting capabilities is insufficient. On the other hand, if no project in the portfolio on a given moment utilizes the supporting activities, the resources spent on the activity are wasted. This naturally is most pronounced when a company attempts to serve all customers and partake in all projects, necessitating the build-up of capability to execute increasing number of supporting activities. Furthermore, the necessary level of investments into supporting activities needed is not determined by the average load of the activity, but rather the *peak* load. This leads to several conclusions:

- In building strategic capabilities to execute activities, trade-offs need to be made regarding what activities to invest in and what not to invest in
- In constructing solution-specific offers, the necessary activities for the offer should be considered in relation to the company's capability to execute the activities
- The inclusion of new activities into offerings is a strategic action and should be driven by strategic considerations
- Project portfolio should be in balance regarding activities.

5.2 Business models, strategy and performance of a project company

The second research question of this study is

2. How do business models and strategy influence the performance of project business?

The concept of industry as the foundation of profitability, where the industry boundaries are defined by the changes in the Five Forces, and sustainable profitability results from positioning within the industry (Porter, 1991; Porter, 2008), is reinforced by the results of this study. Based on the findings of the financial analysis, it seems apparent that external, industry-specific factors influence the performance of a company. The influence of industry is evident from the significant differences in gross margin between cases and especially business lines. Regarding the influence of positioning, the differences between *i.e.* the relative profitability of the rubber lining component in cases A and B are illustrative. Based on the write-ups, the project profiles in were similar, but in Case A the case company was significantly better able to protect itself from the influence of the Five Forces. This is supported by academic research, such as Porter (2008).

Evaluating the write-ups of the cases, the main difference between the cases would seem to be the structure of the marketplace, especially in customer behaviour regarding competition. It is clearly visible that some of the customers pursued aggressively transactional relationships, placing most value for the final price of the product, resulting in generally lower overall profitability on gross margin level. However, the extent supporting activities necessary for e.g. Case B in contrast to Case A, are significant. Thus, the claim can be made that for both cases, a high relative profitability can be achievable, but that the choices in what support activities the company should commit itself in can make the achievement of high performance in both cases simultaneously impracticable, or even impossible. This is because the support activities in Case A might not add value for Case B -type projects, only adding to the project overhead, while cutting these activities would make the cultivation of customer relationship like with Customer A next-to-impossible. This is the result of different virtuous cycles present in different value chains, themselves driven by customer-specific underlying economies.

The claim that activity systems are the driver of sustainable profitability is supported by Porter (1996). However, this does not explain why the differences in activity systems came into being, or why, for example, the activities supporting the existing customer relationships in Case E were not present in Case D.

As an alternative explanation to activity systems, a resource-based view can be considered, as the relationship between the case company and Customer E is categorizable in the domain of 'resources' as defined by Wernerfelt (1984). The problem in resource-based view is that though in both cases D and E the case company did have an existing customer relationship, with Customer D the relationship never developed to similar extent as with Customer E. In addition, the case company has had a long-standing customer relationship between Customer B (as opposed to Contractor B), that has, despite best efforts, not led to a sustained relationship like with Customer A. It seems that resources employed in the cases are not as effective at explaining the nuances of the particularities. Rather, the conclusion seems to be that the foundation created by the resources does explain how it is even possible to partake in some of the activities, and that the activities

themselves have an evolutionary effect on the resource base upon which projects are executed.

Expanding the discussion of activities into their underlying economies, it should be kept in mind that the performance measures here only pertain to the direct costs included in the cases. Significant share of the costs of the case company are not directly attributable to projects, rather than expended in supporting activities. In addition, as apparent from the preceding discussion, projects are not equal in how they employ these supporting activities, such as logistics, product design or R&D. However, the costs from creating these supporting activities are of fixed nature, and for profitable project business, need to be covered by direct profits from the projects. In addition, activities that do not bring value to the project portfolio, or are underutilized, only add to the overhead to be covered by projects. On the other hand, performing these supporting activities might be crucial for the competitive advantage enjoyed by the business, as apparent from the critical role of support activities in Case A, and the lack of value-adding supporting activities in Case D. Figure 30 presents an illustrative income statement of a project company, where there are two categories of costs: those directly attributable to projects and included in the project margin, while the company margin results from these costs less the cost of supporting activities.

	Project A	Project B	Project C	Company
Revenue	X	X	X	
Material expenses	-X	-X	-X	
Labour expenses	-X	-X	-X	
Other direct expenses	-X	-X	-X	
Project margin	X	X	X	Σ
Activity 1				-X
Activity 2				-X
Company margin				Σ

Figure 30. An exemplary income statement of a project company.

The conclusion is not that a company should attempt to cut its costs of supporting activities. Rather, the cost borne from supporting activities should be understood and in relation to the additional value activity brings to the overall value system. Even still, while maintaining project portfolio balance, the load projects place upon the supporting activities should remain in balance, otherwise bottlenecks might form in the supporting activities influencing project deliveries themselves. In cases it might even be worth it to bid with a lower-than-normal relative margin to gain more absolute margin from projects that

contribute to covering costs of supporting activities. As mentioned, investments into supporting activities are, in fact, investments into strategic capabilities and should be viewed as such, rather than simply as costs to be managed. For the purposes of managing company performance, the costs of supporting activities tend to be rather stable and can be predicted over long time horizon. This enables a company to account for the costs of its supporting activities when *e.g.* pricing new bids.

The management of support activities by necessity consumes resources that could otherwise have been used to improve the activities that *do* add value to the customer or left unperformed. This could result in either higher value delivered, and thus potential for additional value extraction, or left unperformed, leading to lower costs; both cases improving profitability. This means that understanding own activity systems and their underlying economics and drivers is one of the keys for making effective activity choices. On the other hand, the value system of a company is clearly not stable but evolves over time. Some examples are the development of the resource of customer relationship in Case A and the resource of own rubber compound in Case B; both of which are examples of enabling resources being acquired by executing supporting activities (such as customer relationship building and rubber compound development) over time. Some conclusions can thus be drawn:

- Activity choices are an important determinant of variance in profitability between different cases in the same industry
- Activity choices have far-reaching effects in potential value propositions and finances
- Activities may evolve over time, resulting in evolving resource base
- Value-adding activities are dependent on external actors and the structure of the marketplace
- The choices in activity sets leads to differences in capability to respond to different customer needs.

It is important to note that discussion of activity sets to perform is, in fact, discussion about business model choices, expanding the linkage between strategy, business models and corporate performance. As the choices in activities to perform fall under the domain of strategy, the link between strategy and corporate performance is established. Furthermore, as the marketplace can be interpreted as the actions of external actors in a value chain to satisfy a customer need, and external actors are included in the concept of business model, the linkage between business models, strategy and corporate performance can then be defined:

Corporate performance is directly affected by the strategic choices company makes regarding its activities. Performance results from the fit of activities and the needs of the customer being served, and a choice regarding an activity can have an either positive or negative effect on performance. Differences in customer economies influence the optimal value system for satisfying a given need. A business

model is the expression of this value system including external actors and the structure of the marketplace. The value system evolves over time as the result of conscious and unconscious changes in the activities performed, customer needs, other external actors and the dynamic capabilities of the actors.

From the preceding discussion, the important takeaways are that

1. Strategic choices might lead to suboptimal fit between customer needs and own activities, thus **not all customers are necessarily worth serving**
2. The activities might have a positive or negative impact on the performance depending on how the activities fit customer needs, thus **activity choices should be driven by a strategic analysis of which customers the company wants to serve and its capabilities regarding these activities**
3. As external actors are important constituents of the business model, **the choices in activities should account for the activity choices of external actors**
4. Any given system of strategies and resulting activities, external actors and customer needs is not stable, but evolves over time, and **conscious effort can be taken to influence the evolution of the value system.**

In the perspective of the case company, the main choices in its activities separating it from its competitors are the heavy inclusion of support activities, such as rubber compound development, resulting in both the potential for higher value delivered, but simultaneously larger overhead cost structure. This creates difficulties for responding to customer needs revolving mostly around low costs. Thus, the recommendation is that the company should re-evaluate how it approaches future projects where the most value for the customer is generated from the manufacturing of the rubber compound and competitors exist with naturally lower cost base in *e.g.* installation labour, as these value systems are naturally unfavourable to the resource base of the case company. The company should also aim to look for additional business among especially quality-conscious customers, such as the customer A, and to attempt to cultivate other customers, such as Contractor B towards similar behaviours. This is due to the self-reinforcing activity system (virtuous cycle) favourable for the existing activities and resources of the case company. Similar sentiment is expressed by, for example, Quinn *et al.* (1990) who express that the company should focus on areas where it can add the most value to the customer.

Based on the earlier discussion about virtuous cycles, it is evident that several different virtuous cycles can be tapped simultaneously, as long as the necessary trade-offs to execute any given case is supported by the trade-offs made on a company level. This lends support to the view of solution-specific business models, as presented by Kujala *et al.* (2011). From the beginning of the analysis, it was clear that the solution-specific business models were utilized in practice, but these results seem to indicate that adopting solution-specific business models do have a positive influence on the profit potential, as long as the underlying economics are understood and taken into account. In addition, the claim by Davies *et al.* (2006) that systems integrator is more profitable than systems seller is

somewhat reinforced here, especially in that Case A and Case E, where the case company was able to ‘write the specifications’, the overall performance of the case company was improved. However, this comes at a cost of more support activities necessary and the positive relationship with performance and might not hold true in all cases.

Regarding different factors influencing the adoption of solution-specific business models suggested by Kujala *et al.* (2011), such as the product orientation of the customer and the supplier, level of complexity in the delivered technology and the accustomed business practices, ‘accustomed business practices’ arise as the only significant factor in this study, and even then as the result of value chain and activity configurations in combination with customer needs, rather than as independent variables. The position assumed here is that the factors presented by Kujala *et al.* (2011) are *descriptive* variables dependent on strategic activity choices, rather than *prescriptive* variables such as the activities undertaken by the company. *I.e.* a company servicing customers that have significant variance to the extent where the customers’ own organizations perform activities outside its core products, might have to adapt its own activity sets to be able to serve several different kinds of customers adequately, thus leading the company to utilize solution-specific business models for each customer.

On this basis, solution-specific business models can thus be defined as **case-specific expressions of the value system organized to satisfy given needs**. These value systems can cross organizational boundaries and involve external actors. The choices in business models are then strategic choices of what activities to perform, by whom and to which actors. Combining this with the fundamentals of competitive advantage as defined by Porter (1991), a project company may derive sustainable competitive advantage and thus superior performance from its business model, should it

- Possess a capability to execute different activities from rivals
- Possess a capability to execute same activities at a lower cost than rivals
- Possess a capability to organize project-specific activity configurations to respond to customer needs better than rivals
- Possess a capability to evolve its activity system vis-à-vis its rivals and changes in the marketplace.

5.3 Dynamic capabilities and business models in project business

The third research question of this study is

3. Can dynamic capabilities help create sustained competitive advantage in project business, and how?

From the preceding discussion it is immediately apparent that in project business *projects can potentially be used as vessels for learning and developing new capabilities and*

resources. Perhaps the clearest example presented here is Case D, during which several new capabilities were developed. From another perspective, the success in Case A can be attributed to capabilities and resources cultivated in earlier project deliveries. These two cases combined illustrate that

- Dynamic capabilities may help in developing new capabilities, resources and activities in project business
- Capabilities, resources and activities thus developed may act as a source of competitive advantage.

Perhaps the most significant finding of this study regarding dynamic capabilities is the suggestion that particularly deficient systems for collecting learnings from cases might act as a source of competitive disadvantage, as apparent from the internal misconceptions regarding the relative profitability between the rubber lining component in cases B, C and D. As the true relative profitability of the cases was not understood, it created a significant risk for decisions on erroneous basis. Even more worrisome is the fact that these cases only represent a small portion of the total project business conducted by the company.

From other cases under scrutiny, especially Case B illustrates that projects may be undertaken to further learning. However, it seems that the lessons learned from the case were not employed by the company. This suggests that a system for collecting and disseminating learnings from projects would support the development of new capabilities; a sentiment shared in the academic literature (*e.g.* Davies and Brady, 2000; Brady and Davies, 2004). Several deficiencies in the dynamic capabilities supporting the projects can be identified, such as the apparent failure in the bid preparation or project execution phase of Case C and the difficulties in the concurrent resourcing of cases A, B and D.

The project portfolio management system of the case company is clearly deficient. The cases under scrutiny have significant differences in scale, ranging from 0,11 M € of Case E to the 1,90 M€ of Case D, technological components such as hoses, rubber linings and polyurethane goods, risk involved and time horizon from weeks to over a year. This distribution of scale and scope is currently not being managed as a systematic process, but rather as a series of individual projects, exposing the company to a significant risk. Several authors suggest methodologies and dynamic capabilities to acquire, such as Davies and Brady (2000; 2004) and Ulaga and Reinartz (2011).

To support the dynamic capability development of the case company, it is recommended that the company integrates dynamic capabilities into a management system, meaning that

- The company should develop a process to manage its project portfolio
- Dynamic capabilities and their development should be measured in the project portfolio management process.

The process for the management of project portfolio by the company is recommended to follow the process as proposed by Archer and Ghasemzadeh (1999), only streamlined and adopted for the context of customer-initiated projects. For the purposes of small-to-medium enterprise, the process as suggested by Archer and Ghasemzadeh is rather heavy and formal, as the number of decision makers included in each stage is significantly less in a SME than in a large enterprise. Thus, the main stages of project portfolio management are consolidated into four: pre-screening, individual project analysis, optimal portfolio selection and portfolio adjustment, using the criteria as presented above. As other notable differences, the phase / gate evaluation phase of the process is removed, as the process in question here is focused on customer-targeted projects; the abortion of which during execution is often untenable. In addition, the evaluation of the project after completion is explicitly added to address the current weaknesses. This adaptation of the process is illustrated in figure 31.

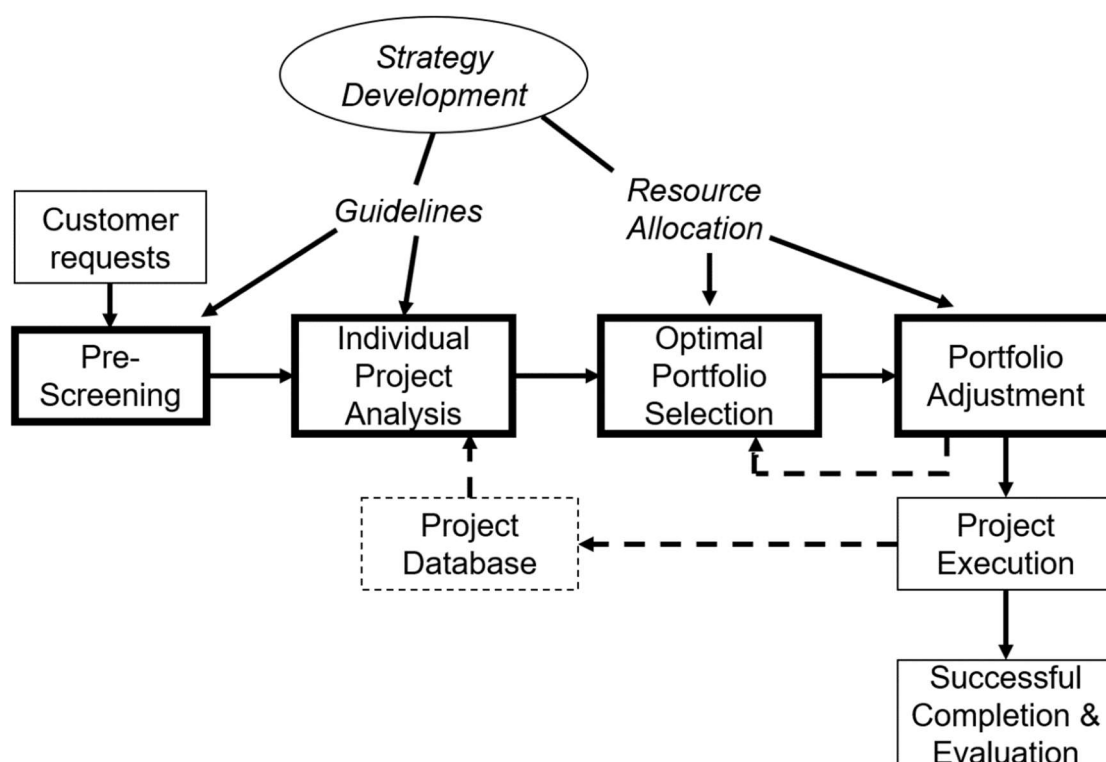


Figure 31. Suggested project portfolio management process, adopted from Archer and Ghasemzadeh, 1999.

Regarding the question of how to integrate dynamic capabilities into a discrete measurement system, an approach combining two approaches to measurement systems: Balanced Scorecard by Kaplan and Norton (1992) and the proposed goals for project portfolio management as presented by Cooper and Edgett (1997). The goal of this study is not necessarily to find the best possible recommendation for a measurement system. Rather, the purpose of this study is to find a measurement system that accounts for dynamic capabilities and helps the company to monitor its development of dynamic capabilities and avoid the loss of learning as apparent from e.g. Case B. As the perspectives of the Balanced

Scorecard include those of innovation and learning, as well as of customer, internal business and financial performance (Kaplan and Norton, 1992), it seems to suffice for this purpose. Furthermore, the expansion of Balanced Scorecard with the perspectives of to project portfolio management goals by Cooper and Edgett (1997) tie the measurements directly to the concept of project portfolio management. This framework for the creation of a measurement system is included in figure 32. An illustrative system of measures for the case company, as well as the reasoning behind them is listed in Attachment A.

	Value maximization	Balance	Strategic direction
Customer perspective	Measure A	Measure B	Measure C
Internal Business perspective	Measure D	Measure E	Measure F
Innovation and Learning perspective
Financial perspective

Figure 32. *A proposed framework for the measurement of project portfolio, adopted from Kaplan and Norton, 1992 and Cooper and Edgett, 1997.*

The measures to be adopted in the framework should be based on both the particularities of the adopting company as well as factors and measures proposed in business model-, project management-, project portfolio management- and project-service literature. As dynamic capabilities help to extend existing capabilities and develop new activities (Winter, 2003), and that these capabilities may act as a source of future competitive advantage, especially development of dynamic capabilities should be included in the measurement system.

In addition to the proposed measurement system, to support the adoption of dynamic capabilities, the creation of a system to monitor, codify and disseminate learnings from projects is highly recommended. Such a system should be built based on the activity systems and strategic goals of the company, and the learnings from the system should reinforce strategic capabilities. For example, as partnership with the customer was found to be a significant factor in the exceptional performance of Case A, the learning system should be able to support the company in the development of customer partnerships. Likewise, as the concurrent resourcing of simultaneous cases A, B and D proved challenging for the company, it should be possible to provide feedback from resourcing and actual resource usage of projects. Attachment B proposes some attributes the learning system of the company should have. It should be noted that the attributes listed in Attachment B are not intended to represent a universally applicable blueprint. Instead, the listed attributes are company-specific and derived from the particularities of the cases considered here. The

key to creating such a measurement system is to focus on the value systems at work, their underlying economies and what are the lessons a company needs from the value system, enabling a company to derive competitive advantage from the dynamic capabilities of learning.

6. CONCLUSIONS

This chapter contains the key findings of the study. First, the chapter includes the practical findings and the significance of the study to business practitioners. Second, the chapter contains a discussion regarding the scientific contribution of the study. Finally, the chapter describes the limitations of the study and suggests potential avenues for future research.

6.1 The goals of the study and the significance of results

The study had three main research questions:

1. How are the concepts of business model, strategy and project business related?
2. How do business models and strategy influence the performance of project business?
3. Can dynamic capabilities help create sustained competitive advantage in project business, and how?

The linkages between the concepts of business models, strategy and project business were found to be significant. In the literature review it was found that while the concept of business model is based on existing strategic research, no consensus exists on the actual contents and reach of the term, and the literature regarding competitive strategy and the source of competitive advantage is split into distinct schools of thought. This study adopts a dual view of competitive strategy. In the cross-sectional perspective competitive advantage of a business is the result of the fit of activities in a value chain and the resulting positioning in its industry, limited by the resources controlled by the business. In the longitudinal perspective competitive advantage is seen as the result of managerial choices made on given initial conditions, limited by the dynamic capabilities of the managers.

Business models are defined as the execution of these activities in a value system containing external actors. In this definition the role of strategy is in the decisions of what capabilities to build, execute and remove, while the role of business model is in governing the execution of these activities in the creation of value. In project business the business models tend to be solution-specific configurations of activities driven by unique customer needs, often combining both project and service components. Choices of projects to conduct should be driven by strategic considerations and the project portfolio of a business should maintain a balance of activities.

The profitability of project business is heavily dependent on the choices of activities to conduct. The decisions to build capabilities to execute activities are strategic in nature, and thus strategic considerations drive the profitability of project business through the

evolution of capabilities to respond to different customer needs. Furthermore, choices in the execution of the activities are choices in business models, and they have a direct impact on the performance of the business. Within project business, the performance of a given project is the result of the solution-specific fit of activities performed and needs of the customer being served. A project business should expect to face a large variety of different customer needs, and it should be able to tailor its activity systems to the needs of its chosen customers. Especially poor fit between the customers' needs and the possible activities of a company might lead to a situation where a customer might not be worth serving and choices in activities to perform should be driven by strategic considerations, understanding of underlying economics and knowledge of the choices of external actors. A value system of a business evolves over time and a conscious effort can be made to influence this evolution, influenced by the dynamic capabilities of the business. Business models can create sustainable competitive advantage if the business possesses capabilities to execute different activities, same activities at a lower cost, improved capability to set up activity configurations or an improved capability to evolve its activity system vis-à-vis its rivals.

Dynamic capabilities can help a project business to create sustained competitive advantage. Dynamic capabilities such as organizational learning and are identifiable both in the literature (*e.g.* Winter, 2003; Davies and Brady, 2000; Ulaga and Reinartz, 2011) and in cases, such a Case A, to enable a business to compete via developing new capabilities, resources and activities that can be leveraged to improve the performance of a business vis-à-vis its rivals. In support of a businesses' ability to develop its dynamic capabilities a business should explicitly include dynamic capabilities into its project portfolio management processes and measurements. An approach combining Balance Scorecard (Kaplan and Norton, 1992) and the project portfolio management goals of value maximization, balance and strategic direction (Cooper and Edgett, 1997) is recommended for this purpose. A business should also design and implement a learning system enabling it to systematically learn from its execution of projects, and the learning system should be tailored to the key activities and underlying economic and competitive drivers of the business.

Based on the discussion and this conclusion, the research can be said to have answered its research questions while fulfilling the research objectives. This study explains the linkage between the concepts of business model, strategy and project business, how strategic choices and choices in business models influence the performance of a project business and how dynamic capabilities help a business to create sustained competitive advantage. Especially the discussion regarding the evolution of value systems driven by strategic considerations, dynamic capabilities and projects as vessels of learning both expands the current understanding of the phenomena of business models and competitive strategy. In addition, the discussion of ways how to integrate dynamic capabilities into the

management and measurement systems of a business has potential to be of tremendous practical utility.

6.2 Scientific contribution

This study constitutes a marked expansion to the current research considering the interaction of business models, competitive strategy, project business and dynamic capabilities. It significantly expands the scope of current understanding about the connections between the discrete concepts of business model, competitive strategy and project business, explains the relationship between the preceding and the performance of a business and strongly illuminates how dynamic capabilities operate to change the activity systems of a business.

In this study, the concept of competitive advantage is expanded into a two-dimensional construct with both explanatory power regarding cross-sectional competitive advantage and predictive power regarding the evolution of competitive advantage via dynamic capabilities, supporting existing literature, such as Porter (1991). Particularly the integration of dynamic capabilities as an explanatory factor of the evolution of activity systems is a novel contribution to academic literature.

The previously murky concept of business models is significantly expanded in this study, and the concept is connected into the concepts of competitive strategy, dynamic capabilities and project business. This study especially expands the concept of solution-specific business models as the project-specific configuration of activity systems based on customer needs.

Potentially the most notable scientific contribution of this study considers the concept of dynamic capabilities, which have often only been defined in vague and abstract terms. This study connects dynamic capabilities to business models and expands significantly how dynamic capabilities can be developed and used to transform value systems, acting as a source of sustainable competitive advantage. In addition, this study links dynamic capabilities directly linked to the management and measurement systems of project business, constituting a notable step towards direct integration of abstract dynamic capabilities into daily management of businesses. The study also integrates the concepts of Balanced Scorecard and the goals of project portfolio management into a generic system that can be employed in support of a business management system and discusses the requirements for a strategically relevant platform for organizational learning.

In summary, this study contributes significantly to the understanding of competitive advantage and business performance, and their evolution over time as the result of execution of projects, conscious choices by managers and competitive dynamics.

6.3 Limitations, reliability and validity of the study

The main issues of this study are the questions of reliability, validity and generalizability. Defining validity and reliability in the context of qualitative research following Golafshani (2003), it can be argued that reliability is a consequence of validity, and so a demonstration of validity is sufficient to establish reliability. Similarly, the concept of validity is defined as the trustworthiness of the results, with the crucial question “How to test or maximize the validity and as a result the reliability of a qualitative study?” (Golafshani, 2003). In this study, three key attributes for the measurement of validity are adopted following Joppe (2000, as cited by Golafshani, 2003): *consistency over time* (repeatability), *accurateness* and *representativeness regarding the total population*.

The accuracy of the study was ensured by triangulation, as suggested by Saunders *et al.* (2009, pp. 120–121). This included triangulation of sources and methods (fiscal / qualitative data, interviews, direct observation, write-ups) as well as evaluators (iteration of write-ups based on comments received). In addition, the study was supported by multiple strands of literature, providing support for the conclusions from several distinct perspectives. The different perspectives seem to be convergent, thus increasing the trust in the accuracy of the study.

One significant issue effecting the reliability of the study might be the representativeness of the cases regarding the total population. In the context of the case company, the cases were, in accordance with Yin (2014, pp. 16–17) selected as extreme examples. This means that regarding the several dozen project deliveries executed by the company in the time frame of the research, the variability between cases should mostly fall within the bounds as presented here. Although all the projects contained a component of manually applied rubber lining, itself constituting only a minor part of the company’s project business, other business lines within the case company were also included. Based on these results, the cases seem to somewhat follow the same dynamics across business lines, with differences in factors such as cost structure and necessary supporting activities, but similar underlying interactions.

Despite the seemingly similar dynamics of other business lines, the lack of comparison cases from within the other business units of the case company does somewhat decrease the representativeness of the cases. This is exacerbated by the focus of the analysis sector in the rubber lining components due to their high mutual comparability. In addition, the number of cases evaluated – five – is less than could be hoped for, and especially when compounded with judgmental sampling, might leave out cases that would have crucial dynamics contrasting the dynamic present here. Especially considering the analysis of business performance in relation to the business models, operative failures in the execution of projects, such as seems to have happened with Case C, might guide towards wrong conclusions regarding the influence of competitive strategy and business model factors.

Another dimension of total population is the applicability of the findings as they pertain to organizations outside the case company, where the variance might – and is likely to – be significantly higher than within the case company. Some dynamics present in the case company, such as the significance of supporting activities to the overall value system might very well be contrary in other companies, such as in cases where a business focuses solely on one given set of activities, relying on other actors in the value system to take care of the rest of the customers' needs.

As the third attribute of reliability, repeatability of the studies is the one where least amount of data is available. All the cases took place during 2018, a year that enjoyed favourable overall economic conditions, and for the case company itself, a rather tumultuous year with significant changes in its internal organization. Thus, a similar research executed in a competing company during the same period or in the same company two years later might yield different results. For example, in a rapidly shrinking economy a company might be forced to 'battle for every project' in a cycle of intensifying competition fighting for scraps. In these conditions the conclusion could be that focusing solely on core activities and to cut the rest would be the dominant strategy (in other words, top adjust internal cost structure to match market conditions where price dominates), especially if such a belief is dominant among the managers of the company.

The highest concern regarding the validity of the study is the employment of the researcher in the case company. Thus, the researcher might be subject to bias regarding the internal matters of the company. In addition, the personnel involved in the study in the form of informal interviews and discussions, providing feedback or reviewing case write-ups were nearly all employed by the case company, increasing the risk of bias significantly, and the effect of especially endemic bias in the results of this study is possible.

From the results it seems that the effect of intentional bias would be limited. Generally, it could be expected that bias would lead to self-aggrandizement and overly positive results. The results are, however, rather candid and contain significant criticism regarding the current operations of the company. Similar sentiment is expressed from all levels of the organization, including self-critique from persons responsible for the execution of these projects. On the other hand, this study might be subject to another kind of bias, over-criticism of the current operations of the company. This kind of bias could influence, for example, the evaluation of the current learning and project portfolio management systems, be overly harsh in these attributes and even lead to some underlying factors being overlooked in the conduct of this study. However, the circulation of the write-ups within the company should somewhat remedy the issue. It could still be that the write-ups are not given the attention necessary by the personnel from whom commentaries were requested, due to, for example, constraints in the schedule, thus limiting the true amount of triangulation of evaluators present in this study.

The generalizability of this study is limited due to the selected approach of case studies with participant-observation. The approach provided the researcher with highly intimate knowledge of the research target and provided invaluable insight into the business context of the cases, but it might also blind for external points of view, and in case of highly context-specific insights, even limit the applicability in other contexts. Especially the subjectivity of interpretation remains a potential issue for this study.

One factor limiting especially the validity of results regarding the choices in business models is survivor bias. All these cases were executed to completion (with the exclusion of Case D, but as Case D was not terminated by the case company, so its validity still stands). However, noticeably absent are the potential cases that were not actually executed, due to *e.g.* case company losing a bid or deciding not to bid in given value systems at all. The dynamic of these cases would probably provide insights especially into how the choices of value systems in the bidding phase influence the likelihood of winning the bid as well as deriving value.

6.4 Future research

This study provides several fertile avenues for future research. First, the validity of the results would improve by replicating this study in other small-to-medium enterprises in different industries, as well as in large enterprises. Especially interesting would be how the current set of choices in activities influences the options a business has available when developing new value systems and solution-specific business models, and in what kind of environments would such a company thrive. If at all possible, such a study should, include similar performance measurements, but include the amount of capital employed in the projects to arrive into more holistic conclusions regarding profitability.

Second significant avenue of research provided here would be the analysis of activity system – project bidding interaction in greater detail and in an environment with larger set of variables. For example, interesting conclusions could be found by selecting a sample set of companies competing in the same industry, but with different activity sets, and investigating how the activity sets and activity choices in solution-specific business models included in project bids influence the win rate of projects, resulting profitability and customer satisfaction. This could shed new light on how the activity choices result in increased value across the entire value chain, and how the choices influence the share of value capture. Another view into this issue would be to conduct a comparative study of the evolution of activity systems in both a single-business-line company and a corporate conglomerate, with an evaluation of how the operating logic of the entire company, in contrast to an individual business, influences the activity systems.

Third issue potentially warranting future research is the interaction between dynamic capabilities and activity systems in project business context. Dynamic capabilities, such as organizational learning, are of recognized importance regarding their influence in the

creation of sustainable competitive advantage, but more research should be conducted into the decision making considering future activities, how they impact project business, and what is the logic behind the choices. This could provide valuable insight into the cognitive processes of managers responsible.

Finally, one significant aspect of future research is related to project networks. Supplementing the preceding study, it is recognized here that project networks have a significant impact on the final configuration of value systems, and especially the share of value capture available by each actor. However, the concept is yet to be integrated in the research of solution-specific business models. This is especially relevant in the context of project networks and the configuration of activities in circular economy consisting of solution-specific unique project networks (e.g. Suomi, 2018). It could be possible to draw conclusions that enable companies to create activity systems that both tap into the future revenue and profit streams of circular economy, while simultaneously providing the benefits of circular economy to the society at large.

One of the more interesting findings of this study comes from the analysis of external actors in the project network (e.g. Artto and Kujala, 2008; Hellgren and Stjernberg, 1995). In this study only the customers and intermediaries (such as Contractor B) were relevant for the perspective the case company. This might be related to the fact that the bargaining power of suppliers was found to be rather low in all the cases under scrutiny. This seems to suggest that the linkages between project network management and industry analysis are potentially interesting target of study, especially in how the industry analysis could be utilized to improve the management of project networks.

BIBLIOGRAPHY

- Al-Debei, M.M. & Avison, D. (2010). Developing a unified framework of the business model concept. *European Journal of Information Systems*, Vol. 19(3), pp. 359-376.
- Amit, R. & Zott, C. (2001). Value creation in e-business. *Strategic Management Journal*, Vol. 22(6-7), pp. 493-520.
- Amit, R. & Zott, C. (2012). Creating value through business model innovation. *MIT Sloan Management Review*, Vol. 53(3), pp. 41-49.
- Anderson E.W., Fornell, C. & Rust, R.T. (1997). Customer satisfaction, productivity, and profitability: differences between goods and services. *Marketing Science*, Vol. 16(129), pp. 129-145.
- Andriani, P. (2001). Diversity, knowledge and complexity theory: some introductory issues. *International Journal of Innovation Management*, Vol. 5(2), pp. 257-274.
- Arampatzis, A. (2004). Online business models in Greece and the United Kingdom: A case of specialist versus generic and public versus privately owned online news media. *International Journal on Media Management*, Vol. 6(1-2), pp. 88-101.
- Archer, N. & Ghasemzadeh, F. (1999). An integrated framework for project portfolio selection. *International Journal of Project Management*, Vol. 17(4), pp. 207-216.
- Arenius, M., Artto, K.A., Lahti, M. & Meklin, J. (2000). Project companies and the multiproject paradigm: a new management approach. Paper presented at PMI® Research Conference 2000: Project Management at the Turn of the Millenium, Paris, France. Newtown Square, PA: Project Management Institute.
- Artto, K., Martinsuo, M. & Kujala, J. (2011). Project business. Helsinki, Finland.
- Artto, K. & Kujala, J. (2008). Project business as a research field. *International Journal of Managing Projects in Business*, Vol. 1(4), pp. 469-497.
- Artto, K., Wikström, K., Hellström, M. & Kujala, J. (2008). Impact of services on project business. *International Journal of Project Management*, Vol. 26(5), pp. 497-508.
- Artto, K.A. (1998). Management of finances and profitability in project companies. *Project Management*, Vol. 4(1), pp. 62-69.
- Artto, K.A. & Wikström, K. (2005). What is project business? *International Journal of Project Management*, Vol. 23(5), pp. 343-353.

- Aspara, J., Hietanen, J. & Tikkanen, H. (2010). Business model innovation vs replication: financial performance implications of strategic emphases. *Journal of Strategic Marketing*, Vol. 18(1), pp. 39-56.
- Auramo, J. & Ala-Risku, T. (2005). Challenges for going downstream. *International Journal of Logistics: Research and Applications*, Vol. 8(4), p.333.
- Baines, T.S., Lightfoot, H.W., Benedettini, O. & Kay, J.M. (2009). The servitization of manufacturing: A review of literature and reflection on future challenges. *Journal of Manufacturing Technology Management*, Vol. 20(5), pp. 547-567.
- Baines, T.S., Lightfoot, H.W., Evans, S., Neely, A., Greenough, R., Peppard, J., Roy, R., Shehab, E., Braganza, A., Tiwari, A. & Alcock, J.R. (2007). State-of-the-art in product-service systems. *Proceedings of the Institution of Mechanical Engineers, Part B: Journal of Engineering Manufacture*, Vol. 221(10), pp. 1543-1552.
- Barquet, A.P.B., de Oliveira, M.G., Amigo, C.R., Cunha, V.P. & Rozenfeld, H. (2013). Employing the business model concept to support the adoption of product-service systems (PSS). *Industrial Marketing Management*, Vol. 42(5), pp. 693-704.
- Bocken, N.M.P., de Pauw, I., Bakker, C. & van der Grinten, B. (2016). Product design and business model strategies for a circular economy. *Journal of Industrial and Production Engineering*, Vol. 33(5), pp. 308-320.
- Brady, T. & Davies, A. (2004). Building project capabilities: From exploratory to exploitative learning. *Organization studies*, Vol. 25(9), pp. 1601-1621.
- Casadesus-Masanell, R. & Ricart, J.E. (2010a). From strategy to business models and onto tactics. *Long Range Planning*, Vol. 43(2-3), pp. 195-215.
- Casadesus-Masanell, R. & Ricart, J.E. (2010b). Competitiveness: business model reconfiguration for innovation and internationalization. *Management Research: Journal of the Iberoamerican Academy of Management*, Vol. 8(2), pp. 123-149.
- Casadesus-Masanell, R. & Ricart, J.E. (2011). How to design a winning business model. *Harvard Business Review*, Vol. 89(1/2), pp. 100-107.
- Cavalcante, S., Kesting, P. & Ulhøi, J. (2011). Business model dynamics and innovation:(re) establishing the missing linkages. *Management Decision*, Vol. 49(8), pp. 1327-1342.
- Chase, R.B. & Garvin, D.A. (1989). The service factory. *Harvard Business Review*, Vol. 67(4), pp. 61-69.

- Chesbrough, H. (2007). Business model innovation: it's not just about technology anymore. *Strategy & Leadership*, Vol. 35(6), pp. 12-17.
- Chesbrough, H. (2010). Business model innovation: opportunities and barriers. *Long Range Planning*, Vol. 43(2-3), pp. 354-363.
- Chesbrough, H. & Rosenbloom, R.S. (2002). The role of the business model in capturing value from innovation: evidence from Xerox Corporation's technology spin-off companies. *Industrial and Corporate Change*, Vol. 11(3), pp. 529-555.
- Cohen, Agrawal, & Agrawal (2006). Winning in the Aftermarket. *Harvard Business Review*, Vol. 84(5), p. 129.
- Cooper, P.D. & Jackson, R.W. (1988). Applying a services marketing orientation to the industrial services sector. *Journal of Business and Industrial Marketing*, Vol. 3(2), pp. 51-54.
- Cooper, R.G., Edgett, S.J. (1997). Portfolio management in new product development: lessons from the leaders. *Research-Technology Management*, Vol. 40(5), pp. 16-28.
- Coyne, K. (1989). Beyond service fads - meaningful strategies for the real world. *MIT Sloan Management Review*, Vol. 30(4), p. 69.
- Currie, W.L. (2004). Value creation from the application service provider e-business model: the experience of four firms. *Journal of Enterprise Information Management*, Vol. 17(2), pp. 117-130.
- DaSilva, C.M. & Trkman, P. (2014). Business model: What it is and what it is not. *Long Range Planning*, Vol. 47(6), pp. 379-389.
- Davies, A. (2004). Moving base into high-value integrated solutions: a value stream approach. *Industrial and Corporate Change*, Vol. 13(5), pp. 727-756.
- Davies, A. & Brady, T. (2000). Organisational capabilities and learning in complex product systems: towards repeatable solutions. *Research Policy*, Vol. 29(7-8), pp. 931-953.
- Davies, A. & Brady, T. (2016). Explicating the dynamics of project capabilities. *International Journal of Project Management*, Vol. 34(2), pp. 314-327.
- Davies, A., Brady, T. & Hobday, M. (2006a). Charting a path toward integrated solutions. *MIT Sloan Management Review*, Vol. 47(3), p. 39.
- Davies, A., Brady, T. & Hobday, M. (2006b). Organizing for solutions: Systems seller vs. systems integrator. *Industrial Marketing Management*, Vol. 36(2), pp. 183-193.

- Davies, A., Tang, P., Brady, T., Hobday, M., Rush, H. & Gann, D.M. (2001). Integrated solutions: The new economy between manufacturing and services. Available (accessed 30.9.2018): <https://www.researchgate.net/publication/215915579>.
- De Reuver, M. & Haaker, T. (2009). Designing viable business models for context-aware mobile services. *Telematics and Informatics*, Vol. 26(3), pp. 240-248.
- De Reuver, M., Bouwman, H. & MacInnes, I. (2009a). Business model dynamics for start-ups and innovating e-businesses. *International Journal of Electronic Business*, Vol. 7(3), pp. 269-286.
- De Reuver, M., Bouwman, H. & MacInnes, I. (2009b). Business model dynamics: a case survey. *Journal of Theoretical and Applied Electronic Commerce Research*, Vol. 4(1), pp. 1-11.
- De Reuver, M., Bouwman, H. & Haaker, T. (2009c). Mobile business models: organizational and financial design issues that matter. *Electronic markets*, Vol. 19(1), pp. 3-13.
- Demil, B. & Lecocq, X. (2010). Business model evolution: in search of dynamic consistency. *Long Range Planning*, Vol. 43(2-3), pp. 227-246.
- Den Hertog, P., Van der Aa, W. & De Jong, M.W. (2010). Capabilities for managing service innovation: towards a conceptual framework. *Journal of Service Management*, Vol. 21(4), pp. 490-514.
- DeYoung, R. (2005). The performance of internet-based business models: Evidence from the banking industry. *The Journal of Business*, Vol. 78(3), pp. 893-948.
- Doz, Y.L. & Kosonen, M., 2010 (2010). Embedding strategic agility: A leadership agenda for accelerating business model renewal. *Long Range Planning*, Vol. 43(2-3), pp. 370-382.
- Dunford, R., Palmer, I. & Benveniste, J. (2010). Business model replication for early and rapid internationalisation: The ING direct experience. *Long Range Planning*, Vol. 43(5-6), pp. 655-674.
- Eisenhardt, K.M. (1989). Building theories from a case study research. *Academy of Management Review*, Vol. 14(4), pp. 532-550.
- Fetscherin, M. & Knolmayer, G. (2004). Business models for content delivery: An empirical analysis of the newspaper and magazine industry. *International Journal on Media Management*, Vol. 6(1-2), pp. 4-11.

- Fisken, J. & Rutherford, J. (2002). Business models and investment trends in the biotechnology industry in Europe. *Journal of Commercial Biotechnology*, Vol. 8(3), pp. 191-199.
- Flouris, T. & Walker, T. (2007). Financial Comparisons Across Different Business Models in the Canadian Airline Industry. *Journal of Air Transportation*, Vol. 12(1), pp. 25-52.
- Frei, F.X. (2006). Breaking the trade-off between efficiency and service. *Harvard Business Review*, Vol. 84(11), p. 92.
- Frei, F.X. (2008). The four things a service business must get right. *Harvard Business Review*, Vol. 86(4), pp. 70-80.
- Galbraith, J.R. (1971). Matrix organization designs How to combine functional and project forms. *Business Horizons*, Vol. 14(1), pp. 29-40.
- Galbraith, J.R. (2002). Organizing to deliver solutions. *Organizational Dynamics*, Vol. 31(2), pp. 194-207.
- Gambardella, A. & McGahan, A.M. (2010). Business-model innovation: General purpose technologies and their implications for industry structure. *Long Range Planning*, Vol. 43(2-3), pp. 262-271.
- Gann, D.M. & Salter, A.J. (2000). Innovation in project-based, service-enhanced firms: the construction of complex products and systems. *Research Policy*, Vol. 29(7-8), pp. 955-972.
- George, G. & Bock, A.J. (2011). The business model in practice and its implications for entrepreneurship research. *Entrepreneurship Theory and Practice*, Vol. 35(1), pp. 83-111.
- Giesen, E., Berman, S.J., Bell, R. & Blitz, A. (2007). Three ways to successfully innovate your business model. *Strategy & Leadership*, Vol. 34(5), pp. 34-40.
- Glick, J.L. (2008). Biotechnology business models work: Evidence from the pharmaceutical Marketplace. *Journal of Commercial Biotechnology*, Vol. 14(2), pp. 106-117.
- Golafshani, N. (2003). Understanding Reliability and Validity in Qualitative Research. *The Qualitative Report*, Vol. 8(4), pp. 597-607.
- Gordijin, J. (2002). E³ -value in a Nutshell. In *International Workshop on e-business modeling*, HEC Business School.
- Gordijin, J., Akkermans, H. & van Vliet, H. (2000). Business Modelling Is Not Process Modelling. In *International Conference on Conceptual Modeling* Springer, Berlin, Heidelberg. pp. 40-51.

Hax, A.C. & Wilde, D.L. (1999). The Delta Model: Adaptive management for a changing world. *MIT Sloan Management Review*, Vol. 40(2), p. 13.

Hedman, J. & Kalling, T. (2003). The business model concept: theoretical underpinnings and empirical illustrations.. *European Journal of Information Systems*, Vol. 12(1), pp. 49-59.

Heineke, J. & Davis, M.M. (2007). The emergence of service operations management as an academic discipline. *Journal of Operations Management*, Vol. 25(2), pp. 364-374.

Hellgren, B. & Stjernberg, T. (1995). Design and implementation in major investments - A project network approach. *Scandinavian Journal of Management*, Vol. 11(4), pp. 377-394.

Hellström, M. & Wikström, K. (2005). Project business concepts based on modularity–improved manoeuvrability through unstable structures. *International Journal of Project Management*, Vol. 23(5), pp. 392-397.

Heskett, J.L., Jones, T.O., Loveman, G.W., Sasser, W.E. & Schlesinger, L.A. (2008). Putting the service-profit chain to work. *Harvard Business Review*, Vol. 86(4), pp. 118-129.

Hobday, M. (1998). Product complexity, innovation and industrial organisation. *Research Policy*, Vol. 26(6), pp. 689-710.

Hobday, M. (2000). The project-based organisation: an ideal form for managing complex products and systems? *Research Policy*, Vol. 29(7-8), pp. 871-893.

Holmström, J., Hoover Jr., W.E., Eloranta, E. & Vasara, A. (1999). Using value reengineering to implement breakthrough solutions for customers. *International Journal of Logistics Management*, Vol. 10(2), pp. 1-12.

Homburg, C. & Garbe, B. (1999). Towards an improved understanding of industrial services: Quality dimensions and their impact on buyer-seller relationships. *Journal of Business-to-Business Marketing*, Vol. 6(2), pp. 39-71.

Isik, Z., Arditi, D., Dikmen, I. & Birgonul, M.T. (2009). Impact of corporate strengths/weaknesses on project management competencies. *International Journal of Project Management*, Vol. 27(6), pp. 629-637.

Ives, B. & Learmonth, G.P. (1984). The information system as a competitive weapon. *Communications of the ACM*, Vol. 27(12), pp. 1193-1201.

Kallio, J., Tinnilä, M. & Tseng, A. (2006). An international comparison of operator-driven business models. *Business Process Management Journal*, Vol. 12(3), pp. 281-298.

- Kambil, A., Ginsberg, A. & Bloch, M. (1996). Re-Inventing Value Propositions. Information Systems Working Paper Series. Available (accessed 5.10.2018): <https://ssrn.com/abstract=1284822>.
- Kaplan, R.S. & Norton, D.,P. (1992). The Balanced Scorecard - Measures that drive performance. Harvard Business Review, Vol. 70(1), pp. 71-79.
- Kastalli, I.V. & Van Looy, B. (2013). Servitization: Disentangling the impact of service business model innovation on manufacturing firm performance. Journal of Operations Management, Vol. 31(4), pp. 169-180.
- Kauffman, R.J. & Wang, B. (2008). Tuning into the digital channel: evaluating business model characteristics for Internet firm survival. Information Technology and Management, Vol. 9(3), pp. 215-232.
- Keegan, A. & Turner, J.R. (2001). Quantity versus quality in project based learning practices. Management Learning, Vol. 32(1), pp. 77-98.
- Kindström, D. (2010). Towards a service-based business model – Key aspects for future competitive advantage. European Management Journal, Vol. 28(6), pp. 479-490.
- Kindström, D. & Kowalkowski, C. (2014). Service innovation in product-centric firms: A multidimensional business model perspective. Journal of Business & Industrial Marketing, Vol. 29(2), pp. 96-111.
- Kujala, J., Ahola, T. & Huikuri, S. (2013). Use of services to support the business of a project-based firm. International Journal of Project Management, Vol. 31(2), pp. 177-189.
- Kujala, S., Artto, K., Aaltonen, P. & Turkulainen, V. (2010). Business models in project-based firms – Towards a typology of solution-specific business models. International Journal of Project Management, Vol. 28(2), pp. 96-106.
- Kujala, S., Kujala, J., Turkulainen, V., Artto, K., Aaltonen, P. & Wikström, K. (2011). Factors influencing the choice of solution-specific business models. International Journal of Project Management, Vol. 29(8), pp. 960-970.
- Lambert, S.C. & Davidson, R.A. (2013). Applications of the business model in studies of enterprise success, innovation and classification: An analysis of empirical research from 1996 to 2010. European Management Journal, Vol. 31(6), pp. 668-681.
- Levitt, T. (1976). The industrialization of service. Harvard Business Review, Vol. 54(5), pp. 63-74.

Linder, J. & Cantrell, S. (2000). *Changing Business Models: Surveying the Landscape*. Accenture Institute for Strategic Change.

Maglio, P.P. & Spohrer, J. (2013). A service science perspective on business model innovation. *Industrial Marketing Management*, Vol. 42(5), pp. 665-670.

Magretta, J. (2002). Why business models matter. *Harvard Business Review*, Vol. 80(3), pp. 3-8.

Mair, J. & Schoen, O. (2007). Successful social entrepreneurial business models in the context of developing economies: An explorative study. *International Journal of Emerging Markets*, Vol. 2(1), pp. 54-68.

March, S.T. & Smith, G.F. (1995). Design and natural science research on information technology. *Decision Support Systems*, Vol. 15(4), pp. 251-266.

Martinsuo, M. & Lehtonen, P. (2007). Role of single-project management in achieving portfolio management efficiency. *International Journal of Project Management*, Vol. 25(1), pp. 56-65.

Mensing, D. (2007). Online revenue business model has changed little since 1996. *Newspaper Research Journal*, Vol. 28(2), p. 22.

Morris, M., Schindehutte, M. & Allen, J. (2005). The entrepreneur's business model: toward a unified perspective. *Journal of Business Research*, Vol. 58(6), pp. 12-17.

Morris, M., Schindehutte, M., Richardson, J. & Allen, J. (2006). Is the business model a useful strategic concept? Conceptual, theoretical and empirical insights. *Journal of Small Business Strategy*, Vol. 17(1), pp. 27-50.

Mutka, S. & Aaltonen, P. (2013). The impact of a delivery project's business model in a project-based firm. *International Journal of Project Management*, Vol. 31(2), pp. 166-176.

Neely, A. (2007). The servitization of manufacturing: an analysis of global trends. Presented at the 14th European Operations Management Association Conference, Ankara, Turkey.

Neely, A. (2008). Exploring the financial consequences of the servitization of manufacturing. *Operations Management Research*, Vol. 1(2), pp. 103-118.

Ojala, A. & Tyrväinen, P. (2006). Business models and market entry mode choice of small software firms. *Journal of International Entrepreneurship*, Vol. 4(2-3), pp. 69-81.

Oliva, R. & Kallenberg, R. (2003). Managing the transition from products to services. *International Journal of Service Industry Management*, Vol. 14(2), pp. 160-172.

- Ordanini, A., Micelli, S. & Di Maria, E. (2004). Failure and success of B-to-B exchange business models: A contingent analysis of their performance. *European Management Journal*, Vol. 22(3), pp. 281-289.
- Osterwalder, A. (2004). *The business model ontology: A proposition in a design science approach*, DPIO thesis, University of Lausanne.
- Osterwalder, A. & Pigneur, Y. (2010). *Business model generation: a handbook for visionaries, game changers, and challengers*, 1st ed. John Wiley & Sons, 288 p.
- Osterwalder, A., Pigneur, Y. & Tucci, C.L. (2005). Clarifying business models: Origins, present, and future of the concept. *Communications of AIS*, Vol. 15, pp. 1-39.
- Parviainen, T. (2018). *Customer-oriented business models for industrial internet based offerings in a technology company*, Master's Thesis, Tampere University of Technology, 114 p. Available: <https://dspace.cc.tut.fi/dpub/bitstream/handle/123456789/26387/Parviainen.pdf>.
- Pateli, A. & Giaglis, G. (2003). *A methodology for business model evolution: application in the mobile exhibition industry*. Mobile/Wireless Research Group Publications Series 2002-2003.
- Patzelt, H., zu Knyphausen-Aufseß, D. & Nikol, P. (2008). Top management teams, business models, and performance of biotechnology ventures: An upper echelon perspective. *British Journal of Management*, Vol. 19(3), pp. 205-221.
- Petrovic, O., Kittl, C. & Teksten, R. (2001). *Developing business models for eBusiness*. International Conference on Electronic Commerce 2001, Vienna.
- Pitt, L.F., Berthon, P., Watson, R.T. & Ewing, M. (2001). Pricing Strategy and the Net. *Business Horizons*, Vol. 44(2), pp. 45-54.
- Pohle, G. & Chapman, M. (2006). IBM's global CEO report 2006: business model innovation matters. *Strategy & Leadership*, Vol. 34(5), pp. 34-40.
- Porter, M.E. (1980). *Competitive strategy*. Free Press: New York, 396 p.
- Porter, M.E. (1985). *Competitive advantage*. Free Press: New York, 658 p.
- Porter, M.E. (1991). Towards a dynamic theory of strategy. *Strategic Management Journal*, Vol. 12(S2), pp. 95-117.
- Porter, M.E. (1996). What Is Strategy? *Harvard Business Review*, Vol. 74(6).
- Porter, M.E. (2001). Strategy and the Internet. *Harvard Business Review*, Vol. 79(2).

Porter, M.E. (2008). The Five Competitive Forces That Shape Strategy. *Harvard Business Review*, Vol. 86(1).

Quinn J.B., Doorley T.L. & Paquette P.C. (1990). Beyond products: Services-based strategy. *Harvard Business Review*, Vol. 68(2), pp. 58-67.

Rappa, M.A. (2004). The utility business model and the future of computing services. *IBM systems journal*, Vol. 43(1), pp. 33-42.

Rasheed, H.S. (2009). Contrasting e-commerce business models: Performance implications for small enterprises. *Journal of Developmental Entrepreneurship*, Vol. 14(1), pp. 89-101.

Rédis, J. (2009). The Impact of Business Model Characteristics on IT Firms' Performance. *International Journal of Business*, Vol. 14(4), p. 291.

Sabatier, V., Mangematin, V. & Rousselle, T. (2010). From recipe to dinner: business model portfolios in the European biopharmaceutical industry. *Long Range Planning*, Vol. 43(2-3), pp. 431-447.

Sanchez, P. & Ricart, J.E. (2010). Business model innovation and sources of value creation in low-income markets. *European Management Review*, Vol. 7(3), pp. 138-154.

Sasser Jr., W.E. (1976). Matching supply and demand in service industries. *Harvard Business Review*, Vol. 54(6), pp. 132-138.

Shafer, S.M., Smith, H.J. & Linder, J.C (2005). The power of business models. *Business Horizons*, Vol. 48(3), pp. 199-207.

Saunders, M., Lewis, P. & Thornhill, A. (2009). *Research Methods for Business Students*. 5th ed, Pearson Education Limited, 614 p.

Suomi, T. (2018). Tietovirrat kiertotalouden järjestelmätoimitusten projektiverkostoissa, Master's Thesis, Tampere University of Technology, 123 p. Available: <https://dspace.cc.tut.fi/dpub/bitstream/handle/123456789/26446/Suomi.pdf>.

Sydow, J., Lindkvist, L. & DeFilippi, R. (2004). Project-based organizations, embeddedness and repositories of knowledge. *Organization studies*, Vol. 25(9), pp. 1475-1489.

Söderlund, J. (2002). On the development of project management research: Schools of thought and critique. *Project Management*, Vol. 8(1), pp. 20-31.

Teece, D.J. (2007). Explicating dynamic capabilities: the nature and micro-foundations of (sustainable) enterprise performance. *Strategic Management Journal*, Vol. 28(13), pp. 1319-1350.

Teece, D.J. (2010). Business Models, Business Strategy and Innovation. *Long Range Planning*, Vol. 43(2-3), pp. 172-194.

Tikkanen, H., Lamberg, J.A., Parvinen, P. & Kallunki, J.P. (2005). Managerial cognition, action and the business model of the firm. *Management Decision*, Vol. 43(6), pp. 789-809.

Timmers, P. (1998). Business models for electronic markets. *Electronic markets*, Vol. 8(2), pp. 3-8.

Tukker, A. (2004). Eight types of product-service system: Eight ways to sustainability? Experiences from SusProNet. *Business Strategy and the Environment*, Vol. 13(4), pp. 246-260.

Turner, J.R. & Keegan, A. (2001). Mechanisms of governance in the project-based organization: Roles of the broker and steward. *European Management Journal*, Vol. 19(3), pp. 254-267.

Turunen, T.T. & Toivonen, M. (2011). Organizing customer-oriented service business in manufacturing. *Operations Management Research*, Vol. 4(1-2), pp. 74-84.

Ulaga, W. & Reinartz, W.J. (2011). Hybrid Offerings: How Manufacturing Firms Combine Goods and Services Successfully. *Journal of Marketing*, Vol. 75(6), pp. 5-23.

Ushold, M. & King, M. (1995). Towards a methodology for building ontologies. Workshop on Basic Ontological Issues in Knowledge Sharing IJCAI-95, Montreal.

Wallin, J. (2005). Operationalizing competences. *Competence Perspective on Managing Internal Process (Advances in Applied Business Strategy)*.

Van Der Merwe, A.P. (2002). Project management and business development: integrating strategy, structure, processes and projects. *International Journal of Project Management*, Vol. 20(5), pp. 401-411.

Vandermerwe, S. & Rada, J. (1988). Servitization of business: adding value by adding services. *European Management Journal*, Vol. 6(4), pp. 314-324.

Wernerfelt, B. (1984). A Resource-Based View of the Firm. *Strategic Management Journal*, Vol. 5(2), pp. 171-180.

Wernerfelt, B. & Karnani, A. (1987). Competitive Strategy Under Uncertainty. *Strategic Management Journal*, Vol. 8(2), pp. 187-194.

Whetten, D.A. (1989). What constitutes a theoretical contribution? *Academy of Management Review*, Vol. 14(4), pp. 490-495.

- Whitley, R. (2006). Project-based firms: new organizational form or variations on a theme? *Industrial and Corporate Change*, Vol. 15(1), pp. 77-99.
- Wikström, K., Artto, K., Kujala, J. & Söderlund, J. (2010). Business models in project business. *International Journal of Project Management*, Vol. 28(8), pp. 832-841.
- Wikström, K., Hellström, M., Artto, K., Kujala, J. & Kujala, S. (2009). Services in project-based firms – Four types of business logic. *International Journal of Project Management*, Vol. 27(2), pp. 113-122.
- Winter, S.G. (2003). Understanding dynamic capabilities. *Strategic Management Journal*, Vol. 24(10), pp. 991-995.
- Wise, R. & Baumgartner, P. (1999). Go downstream: The new profit imperative in manufacturing. *Harvard Business Review*, Vol. 77(5), pp. 133-141.
- Wu, X., Ma, R. & Shi, Y. (2010). How do Latecomer Firms Capture Value From Disruptive Technologies? A Secondary Business-Model Innovation Perspective. *IEEE Transactions on Engineering Management*, Vol. 57(1), pp. 51-62.
- Yin, R.K. (2009). *Case Study Research, Design & Methods*, 4th ed. SAGE Publications, 219 p.
- Zott, C. & Amit, R. (2002). Measuring the performance implications of business model design: Evidence from emerging growth public firms. Fontainebleau: INSEAD.
- Zott, C. & Amit, R. (2007). Business model design and the performance of entrepreneurial firms. *Organization Science*, Vol. 18(2), pp. 181-199.
- Zott, C. & Amit, R. (2008). The fit between product market strategy and business model: implications for firm performance. *Strategic Management Journal*, Vol. 29(1), pp. 1-26.
- Zott, C. & Amit, R. (2010). Business model design: an activity system perspective. *Long Range Planning*, Vol. 43(2-3), pp. 216-226.
- Zott, C., Amit, R. & Massa, L. (2011). The business model: recent developments and future research. *Journal of Management*, Vol. 37(4), pp. 1019-1042.

ATTACHMENT A: PROPOSED SET OF MEASURES FOR MANAGEMENT OF PROJECT PORTFOLIOS IN THE CASE COMPANY

Customer perspective

The first perspective of the Balanced Scorecard considered here is the customer perspective, or “How customers see us?” (Kaplan and Norton, 1992). Regarding the intersection of the customer perspective and value maximization goal of project portfolio management, the following two measures are proposed:

- Share of key accounts’ purchases
- Customer feedback received.

The share of key accounts’ purchases is included in that it should illustrate the strength of the customer relationship between the case company and its key customers, with the reasoning that strong customer relationships may lead to higher profits for the case company, as visible in the differences between Case A and Case B. The second measure of customer feedback is strongly founded on academic literature (*e.g.* Anderson *et al.*, 1997; Davies *et al.*, 2006; Heskett *et al.*, 2008), especially Heskett *et al.* (2008), with the thesis of service-profit chain where customer satisfaction leads to customer loyalty and higher profitability, and the suggestion by Homburg & Garbe (1999) regarding the measurement of service quality in the dimensions of structural, process-related and outcome-related quality. Both share of key accounts’ purchases and customer feedback are currently unmeasured by the case company.

In the context of customer perspective and balance goal of project portfolio management, the proposed measures are

- Delivery performance regarding schedule and scope
- Share of deliveries: partner customers, transactional customers & new customers.

These measures illustrate the balance goal in two dimensions: balance in the capability to deliver and balance in the customer base.

Delivery performance is a simple enough measurement; performance regarding schedule and scope are both easy concepts and are already measured by the case company. When measuring delivery performance against scope and schedule, one common point of contention is in how to measure in cases where the scope or schedule change from the planned. As this pertains to the customer perspective, the definition here is given as “Scope and schedule changes *initiated by the customer* do influence the target against which delivery performance is measured. Scope and schedule changes *initiated by the case company* do not influence the target, despite customer agreeing on the changed schedule.” In other words, delivery performance as defined here means the ability of the case company to respond to customer requests. The case company does, at the moment, measure its delivery performance, but in general, the perspective is mostly internal, in the

sense “Can we keep our promises?” rather than the external perspective of “Can we respond to the customers’ needs?” proposed here.

Share of deliveries to partner customers, transactional customers and new customers is a measure that is easy enough to implement, with the only complication being the necessity to classify each customer into partner customers, transactional customers and new customers. On the other hand, the number of projects in the portfolio at any given moment is likely to be small enough that the classification can be made, as necessary, on a case-by-case basis. It is also important to note that customers can, over time, migrate from one group to another. Existing customer classifications by the case company do not include any such categorization or the spread of its project portfolio into these segments.

In the context of customer perspective and strategic direction goal of project portfolio management, the proposed measures are

- Share of installations with proprietary compounds or design
- Share of responses to customer requests with full responsibility of the delivery.

Share of installations with proprietary compounds or design is included in the measurement systems, as it measures how much of the value delivered is the result of case company-specific activities. The argument is that in deliveries with external compounds and / or product design, the added value generated by supporting activities within the case company is low or even negative due to the added cost overhead, while in cases delivered using proprietary design, the case company has at least some differentiation power derived from its specific activity choices.

The measurement of the share of cases with full responsibility of the delivery is based on the two literature themes: the focus on the value generation potential of integrated solutions (e.g. Davies *et al.*, 2004; Davies *et al.*, 2008) also recognized in the profitability differences between the cases of this study, and the suggestion to expand services in categories where customer needs are not met (Frei, 2008). It is recognized earlier in this study that the real value creation potential is based on the underlying economics of the business, and thus, no fixed target value for the later measure can be given, especially when the delivery of integrated solutions also increases the risk profile assumed by the company, but instead the case company should actively monitor its share of full deliveries and take necessary actions according to its strategy. Neither of the measures presented here is currently in use by the case company.

Internal Business perspective

The first perspective of the Balanced Scorecard considered here is the perspective of internal business, or “What must we excel at?” (Kaplan and Norton, 1992). Again, regarding the intersection of internal business perspective of the Balanced Scorecard and the

value maximization goal of project portfolio management, the following three measures are proposed:

- Capacity utilization
- Gross margin.

The measures proposed regarding internal business and value maximization are based on the recognized underlying economies of the case company, as well as existing academic literature. For example, as recognized by Kastalli and Van Looy (2013) the relationship between the scope of service activities and profitability is not linear, mostly due to the necessary up-front investments required for service capability, and similar economics are present in the case company's context of project deliveries. Thus, for company-level performance, capacity utilization is one of the key profit drivers.

In addition to capacity utilization, as the number of support activities performed by the case company is significant, and the following costs from performing these support activities are notable, profitable business requires enough scale from projects, practically measurable in aggregate gross margin, considered here in absolute terms. Absolute monetary gross margin is adopted because "percentages don't buy food" as put by one of the case company's managers. In addition, absolute gross margin enables the case company to try its hand on monetary larger projects with lower relative profitability, such as Case B, if seen as a strategically attractive option. Using relative profitability here would by necessity discriminate against the choice of these project types. Both of these measures are currently being measured by the case company, but their measurement is limited to actualization and singular projects, and they are generally followed in different contexts. The proposal here is to extend their measurement to the forecasted project portfolio -level and aggregate as parts of the unified project portfolio management process.

In the context of internal business and balance goal of project portfolio management, the proposed measures are

- Distribution of the portfolio over time
- Distribution of manufacturing technologies in the project portfolio.

The choice of distribution of the project portfolio over time as a measure has three reasons: first, distribution over time has significant impact on the necessary service capacity. Second, the time distribution of the portfolio has a significant impact on the fluctuation of the financial performance of the case company, including capital requirements, forecasted cash flow and forecasted financial performance, as the cost of support activities is not necessarily interrelated to the scheduling of the projects. Thus, the knowledge of the time distribution of the project portfolio helps senior management in understanding the longer-term horizon of the business. Third, the knowledge of the time distribution enables the case company to focus its sales efforts. For example, should it become apparent that a given month is generally lacking in confirmed projects, sales efforts can be spent to *e.g.* reschedule service calls for that time period.

The distribution of manufacturing technologies is included for much the same reason, with the added insight of how much of the project portfolio consists of tried-and-true technological solutions, and how much technical novelty is included; a measure of both risks and learning potential. The spread of project portfolio over time is currently measured by the case company, but as a separate process not connected to project portfolio management, despite some focusing efforts for the sales force, and the distribution of manufacturing technologies is not systematically measured at all.

In the context of internal business and strategic direction goal of project portfolio management, the proposed measures are

- Share of service-type deliveries in the portfolio
- Share of service product sales of the total sales to transactional customers in the portfolio.

The share of service-type deliveries as a measure of the project portfolio is in accordance with Oliva and Kallenberg (2003), who present the insight that the company exists on a scale from services as add-on to products to products as add-on to services, with the idea that a company should determine a target position on the axis and plan & execute accordingly. For the case company, the implication is that the company should first decide on the preferred position on the scale, driven by strategic considerations, and use the measure as a criterion of the progress, as well as a consideration in the selection of projects to include in the portfolio.

The inclusion of the share of service product sales as a measure is the tacit admittance that projects such as Case D will always exist, as well as customers such as Customer E, where the customer is not incentivized to invest its own resources to build a strong relationship with the case company, and that one of the driving forces in the execution of these cases is the transaction cost necessary to satisfy the customer need. The creation of a service product portfolio in this context is intended to make the transaction as easy as possible, decreasing transaction costs for all actors in the value exchange. The service products, as described here, include concepts such as standard service descriptions, pricing logic and standard operating procedures that can be utilized as necessary, with this measure acting as a check onto how this goal is being achieved. Neither measure as presented is not currently in use by the case company, and the case company does not currently even have defined service products, let alone classification of customers into *e.g.* transactional customers. [Components of service product included in the attachments.]

Innovation and learning perspective

The third perspective of the Balanced Scorecard considered here is the perspective of innovation and learning, or “Can we continue to improve and create value?” (Kaplan and Norton, 1992). Regarding the intersection of innovation and learning perspective of the

Balanced Scorecard and the value maximization goal of project portfolio management, the following measure is proposed:

- Number of new customers sites in the portfolio.

The number of new customer sites is especially important for learning and growth of the project-service business by the case company. Typically, customer sites differ in several attributes, such as personnel, physical location and the context into which projects and services are delivered. Thus, in order to maximize the value of the portfolio as it pertains to learning opportunities, exposure to several different customer sites is one of the most applicable measures as to how increase the variance which by itself fuels learning. This is supported in that increased presence in several customer sites might lead to increased share of the customer's total spend, leading to financial benefits in addition to learning ones. Currently the number of new sites is recognized on a meta level by the company, but it is not systematically being managed or measured.

Regarding the context of innovation and learning and the portfolio balance -goal of project portfolio management, two measures are proposed:

- Ratio of new applications to pre-existing ones
- Ratio of new technologies employed to pre-existing ones.

The ratios of new and pre-existing applications and technologies both answer the same question, only from different perspectives. These ratios are key attributes of the 'newness' of the project portfolio. It should be noted that again, the ratios may not perhaps have a fixed target, but instead a balance should be maintained. For example, in a situation where the portfolio has significant share of both new applications and technologies, the opportunities for learning are the greatest, but simultaneously the exposure to risk is the highest. On the other hand, only supplying with pre-existing technologies to pre-existing applications is rather safe bet, but then effects might remain modest. In addition, both of these are necessary, as a situation might arise with only applying pre-existing technologies, with the view that the portfolio would be rather risk-free, but in fact, all of the applications are new, and the technology might not be tested in the new environment, leaving the risk exposure significant. Currently, the measurement system being utilized by the case company does not include anything regarding the technological components of its portfolio.

In the context of innovation and learning as well as the maintaining strategic direction -goal of project portfolio management, a single measure is proposed:

- Number of lessons learned with an implementation plan in the portfolio projects

The key concept here is the "implementation plan". It is recognized here that is clearly not enough to identify lessons learned from preceding projects, as some lessons may only pertain to some project-service types, and that there might exist significant differences in the time between projects where the same lessons may apply. It is also recognized that as the case company completely lacks the culture of disseminating learning, the process

itself does need significant management attention and degrees of formalization. As evident, currently the case company does not measure lessons learned in any way and implementing potential learnings to other projects is more a faint dream than actual practice for the case company.

Financial perspective

The final perspective of the Balanced Scorecard considered here is the financial perspective, or “How do we look to the shareholders?” (Kaplan and Norton, 1992). Regarding the intersection of financial perspective of the Balanced Scorecard and the value maximization goal of project portfolio management, the following two measures are proposed:

- Aggregate revenue
- Aggregate gross profits.

Both of these measures are currently being followed by the case company as it pertains to historical projects, as well as on the revenue -level for already ordered projects, but currently there is no systematic process for revenue and gross profit forecasting. One key attribute here is that the aggregation should include group-level revenue and gross profits, as different from the gross profits measured under internal business- heading. This is because in most cases the project deliveries include several functional business units; typically, “Compounds” business unit delivers raw material to others, and charges internal margins. This margin should be included in both the aggregate revenue and gross profit acquired from the business. The purpose of specifically the revenue here is to gain an understanding of the development of the scope of the project portfolio – it is substantially different whether the scope of the project business in a given time period is 0,2 M€ or 0,8 M€. The same reason is for why the aggregate gross profits should be included in absolute monetary sums, rather than as percentages, as discussed earlier.

The key measure proposed for the measurement in the sector where the financial perspective of the Balanced Scorecard and the goal of balance in project portfolio management overlap, is

- Total financial exposure to risk.

Financial risk can arise from several sources, some of which include guarantees given and the risk of cost overruns in a fixed-price delivery. Currently, the case company does not measure its exposure in any way, and it has historically led to significant monetary damages. Again, the financial exposure does not have a preferred value, as in some cases the assumption of some financial risk is necessary in order to advance the company’s strategic goals, but at the very least, the risk should be assumed with full understanding of its contents, and the extent of the risk position should be explicitly known.

Finally, as the measures combining the financial perspective of the Balanced Scorecard to the goal of maintaining the strategic direction of the project portfolio, two are proposed

- Aggregate gross profits in relation to (budgeted) fixed costs of supporting activities
- Capital employed in the business.

The reason behind these two fiscal measures is that they tie the operative execution of the project business to the necessary support activities to enable it. For example, the fixed costs incurred by the adoption of support activities, such as quality management and R&D are not strongly influenced by any given project, and the decisions made within each project are independent of these influences, but on the other hand, often the support functions are necessary for the delivery of a given project. The purpose of this measure is to both drive considerations of project portfolio choices in that the cost necessary support functions is included in the portfolio choices, but on the other hand, guide the decisions about the extent of the support functions being harnessed to the support of the project business. Currently, the company does not have a cost tracking system for project-dedicated supporting functions, and these support functions are generally managed either in production context, or, more typically, not managed at all.

The reasoning behind including the capital employed as a measurement for project portfolio management is mostly driven by the fact that currently, capital employed is generally not measured on a business level. Project business does, however, involve significant capital expenditures and the cash-to-cash cycles may be long. The role of this measure is significantly more “informative” than of the preceding one, but an important one nonetheless, especially in cases where the project business is by necessity supported by heavy investments into capital equipment.

The criteria presented herein is not intended to be exhaustive and a good fit for all companies operating under the conditions as the case company. However, the methodology and considerations presented here should be universally applicable, and thus extensible for companies with different strategic choices including *e.g.* supporting activities or the preferred customer behaviour.

ATTACHMENT B: PROPOSED ATTRIBUTES FOR A LEARNING SYSTEM FOR THE CASE COMPANY

In light of both the findings of this study and the review of existing literature, the complete lack of any system to either measure learnings or to implement them in practice is a crucial weakness for the entire project business portfolio. Thus, the immediate implementation of a system to codify and disperse learnings throughout the organization is presented. The system proposed here is built around the discovered crucial weaknesses in the case company at its current incarnation. This does not mean that another company could improve its performance and learning practices by adopting the system described here – or even that it should attempt to do so. Again, the important takeaway is the methodology. A learning system should be custom-built around the critical success factors of the enterprise, based on a candid analysis regarding the strengths, weaknesses, opportunities and threats of the organization.

The creation of a system to enable the collection of data regarding the technological performance of the installations of the case company should be the first priority. As evident from cases such as A, C and E, the technological performance of the company's products is of utmost importance to the value proposition of the case company, a feature shared in all its functional business units. Currently, no such system exists, which is, at the very least, perplexing. This creates issues for all aspects of the value creation process of the company, beginning from sales, ranging through manufacturing operations and reaching to service operations as well as other after-sales activities. In addition, the lack of historical data regarding the performance of the company's products creates a significant risk for overpromising and technical failures due to unforeseen circumstances, thus generating high financial risk of claims and damages the image of a technically capable supplier. This should be remedied with an immediate creation of a system to store technical performance of the company's products. The system should store at least

- The product specifics (BOM & routing) of the delivery
 - The material specifics used, especially regarding the rubber compound
 - All technical documents, such as drawings and data sheets included in the delivery
- The specifics of the installation where the product is installed (*e.g.* temperature, material handled, pH, particle size)
- The guarantee period given
- The history of service activities regarding the product
- The total expected lifetime of the product
- The actual lifetime of the product.

The second point of weakness identified is the offering process. Generally, as the case company receives new requests for bid, the creation of a new offer is typically time-consuming and done under conditions of extreme uncertainty. This is because, in addition to

the lack in the tracking of technological performance, the company is severely deficient in tracking its offering performance. The cases chosen here are bids that were, in fact received, but, as became evident during case D, the company does not have a formalized tracking system regarding lost bids. Thus, the company does not have a clear picture of the market prices. This can lead to a cycle where the company is, in practice, in a price war within itself, as the sales team attempts to create an ‘over-competitive’ offering due to lack in understanding the real market rates. This was illustrated in Case B, where the company received unofficial feedback regarding its “extremely aggressive pricing”. This kind of offering tracking system should include at least

- Identification of the offering: customer, site, installation target
- Specifics of the products offered, including the technical documents of the products delivered and the documents upon which the bid was built
- The price and earning logic of the offer (fixed-price, cost-plus)
- The status of the project (won, lost, resolution pending)
- The reason for wins and losses based on the customer and external information
- All information gleaned regarding competitors’ bids, such as who bid, what components, and at what price, if such information becomes available.

The third crucial point of weakness in the case company is, as mentioned before, the near-complete lack of customer information. The company does not have a customer relationship management system and does not actively solicit feedback from its customers nor monitor its performance in relation to customer requests. As a result, the company is in a permanently reactive mode regarding its surroundings and lacks the ability to use knowledge learned with one customer to develop its relationship with others; a crucial area of excellence should the company aim to increase its share of customer relationships to the likes of the relationship between the case company and customers A and C. To remedy this deficiency, the company should

- Investigate the opportunities for CRM acquisition
- Implement a customer feedback tracking system and institute a methodology for collection of customer feedback in accordance with the proposed scorecard
- Institute a process for customer relationship management, including systematic reviews of the company’s position vis-à-vis its most important customers, analysis of the feedback received and efforts to interpret, disseminate and enact lessons learned.

The case company’s operations management is also troubled due to the deficiencies in the learning systems. The issues are apparent in factors such as capacity reservations and scheduling. During the concurrent running of cases B and D, it became apparent that the company likely had significant overcapacity during the execution of these projects, due to the poor estimates used in capacity reservation. This was visible in the involved business units’ internal income statements, despite the overall acceptable project-level profits. To remedy this, two factors are proposed: first, a post-fact calculation process focusing

on the total capacity utilized in the projects in comparison with the capacity reserved. This is then to be used as a supporting factor in estimating the capacity requirements of upcoming projects. As several of the business units included herein have a significant share of rented, and thus flexible, workforce, it can be estimated that such an initiative can lead to significant decreases in overcapacity. This should be done in conjunction with especially the findings by Auramo and Ala-Risku (2005) considering the goal of increasing the predictable share of demand.

Second, the company should develop an internal best-practice manual that includes labour in the factory environments as well as on customer premises. The company personnel should then be trained in accordance with this manual, especially in that personnel involved in service operations should be fully familiar with the state of internal best practice and be able to execute accordingly. This manual should be continuously revised and updated based on feedback and results from the field, and a learning plan should be crafted for the employees in order to ensure a standard level for best practice in the case company. This is significantly harder in conjunction with outsourced service operations, and from an analysis of the company's finances, it seems that the utilization of external workforce did have a lessening impact on the performance of the company, reinforcing the claims by Turunen and Toivonen (2011).

Thus, in conclusion, in the case company there are four crucial areas of weakness due to the lack in learning systems; lack of knowledge regarding the technical performance of the products, lack of understanding about the underlying dynamics of the offering process, lack of customer relationship management systems and knowledge, and lack of best practices and support for operations management. These deficiencies should be removed by creating a learning system targeted at these key issues. The suggestion is not to create four separate systems for four separate issues, but rather a comprehensive system for learning, with the four aforementioned focal areas. The reasoning for significant focus given here to the learning systems is that learning and other dynamic capabilities are found before to be a crucial source of competitive advantage, especially as the business environment evolves over time, and business is executed in the context of unique project deliveries (*e.g.* Ulaga and Reinartz, 2011; Davies and Brady, 2000). The system proposed here is not exhaustive, and the actual implementation should be made while keeping in mind the time pressures generally present in project business (Keegan and Turner, 2011) and the perspective of learning by explorative projects and dissemination of learning via exploitative projects (Davies and Brady, 2004). This study also suggests that in some cases, risks can be taken in the name of learning.

As mentioned earlier, this is not a blueprint for a learning system that will work for all organizations everywhere, rather, this is a targeted approach for a unitary company with certain underlying economics and value chain. For example, for a company where the focus is purely on transactional relationships, that does not do its own technological development and basically acts as a pure subcontractor, the creation of a system to monitor

the technological performance of its installations, would be expensive, and probably would not create tangible results. The key here is to focus on the underlying drivers of the economies of the focal company, and tailor the focus of the learning system accordingly.