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THE IMPACT OF A NEW PARTNERSHIP OUTSOURCING ARRANGEMENT: A ROUTINE-BASED CASE STUDY IN DETAIL ENGINEERING

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ABSTRACT

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This thesis investigated the contemporary phenomenon of detail engineering outsourcing. The case organization had pursued a new outsourcing approach with a trusted partner. The goal of this empirical study was to examine the impact of the consequential partnership outsourcing arrangement. Particularly, the beneficence of the arrangement was evaluated based on the underlying organizational routine and the long-term economic implications of its performance outcome. The case study was needed, as the unit will likely have to rely on such distance outsourcing arrangements more and more in the future, and understanding on the impact of such operations is needed.

The main findings revealed that the new outsourcing arrangement is not currently a very attractive strategic option for organizing production. The benefits which stem from the emerged, unique engineering project routine are not significant enough to make the arrangement an advantageous one, especially since increasing partnering costs are being met. This conclusion was drawn via the extended transaction cost view. Benchmarking was done in reliance to an old arrangement from which the new pursuit was a departure from.

The case study then enlightened the engineering unit on the impact of its strategic maneuver by combining the routines-theory framework with contemporary methods of governance structure evaluation. Through this, it was shown that greater efforts are needed to make the new outsourcing approach a more beneficial one. However, the studied arrangement was seen to inhold potential for better results. The findings can be used to capitalize on this.

TIIVISTELMÄ

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Tämä Pro gradu –tutkielma tutki detaljisuunnittelun ulkoistamista. Tutkielman case-organisaatio oli ottanut uudenlaisen lähestymistavan ulkoistamiseen luotetun yrityskumppanin kanssa. Tästä seurannut ulkoistamisjärjestely oli empiirisen analyysin kohteena. Erityisesti tämän järjestelyn vaikutusta arvioitiin tutkimalla sen hyödyllisyyttä. Lähestymistapana oli selvittää kumppanuus-yhteistyötä ohjaavan organisationaalisen rutiinin olemus sekä se, millaisia arvoa luovia hyötyjä ja toisaalta haittoja tämän rutiinin kautta syntyy pitkällä aikavälillä. Case-tutkimus oli tarpeen, koska tämänkaltaisia ulkoistamisjärjestelyjä tullaan luultavasti tarvitsemaan tulevaisuudessa, mutta niiden vaikutuksista ja olemuksesta ei ole täyttä selkoa ko. suunnitteluyksikössä.

Tutkimustulokset osoittivat, että uusi ulkoistamisjärjestely ei tällä hetkellä ole erityisen kannattava case-organisaatiolle. Uudenlainen projektisuunnittelu-rutiini, joka ohjaa toimintoja, ei kykene luomaan siinä määrin arvoa pitkällä aikavälillä, että irtautuminen vanhasta toimintamallista voitaisiin todeta suotuisaksi. Lisäksi yhteistyötoimintaan liittyvät kustannukset oletettavasti lisääntyvät. Rutiiniperustainen analyysi pohjautui erilaisten hyöty- ja kustannus-näkökulmien tulkitsemiseen, ja vertailupohjana aineiston tulkitsemisessa hyödynnettiin jo pidempään esiintynyttä ulkoistamisjärjestelyä.

Lopputuloksena voi todeta, että case-organisaation tulisi jatkossa keskittyä parantamaan ko. ulkoistamisjärjestelyn ja –tavan organisointia. Potentiaalia tällaisessa strategiaan pohjautuvassa ulkoistamisessa on, mutta keskiössä olevien rutiinien tulee realisoida tämä potentiaali. Tämän tutkimuksen tarjoama käsittely voi avustaa tässä tavoitteessa.

ACKNOWLEDGEMENTS

The work is finally done. It took a great deal of effort while being rather challenging at times. However, all things come to an end. My progression followed a set of blueprints which were extremely hazy at some points of the research. It is said that experience is merely the name we give to our mistakes. Indeed trial-and-error was present, but as a whole I truly did experience many joyous moments of enlightenment along the way. And the final result, this thesis, is hoped to be a satisfying one. A big role was played here by my family and friends who are there for me. Mom and dad, Panu and Teemu, Minna and Tiina. You deserve a place in this paragraph. As all of my family does. Also my friends repeatedly provided me with ideas, proof reading services and opportunities to put the pressing thesis matters aside from my mind. All of You who know and believe Your name belongs here, consider this as an act of appraisal. Finally, thank You Ana, especially for the everything.

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"The future has several names. For the weak, it is the impossible. For the fainthearted, it is the unknown. For the thoughtful and valiant, it is ideal."
-Victor Hugo

Let's see.

Lappeenranta, 17.12.2012

Riku Rastas

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LIST OF ABBREVIATIONS

CE	Chief Engineer
DEU	Detail Engineering Unit (case unit)
DM	Department Manager
ECF	Engineering consultancy firm
EDM	Engineering Data Management
EP	Engineering Plan
GA	General Arrangement
HO	Home Office (office of DEU)
IM	Instant messaging
KIBS	Knowledge-Intensive Business Services
PO	Partner Office (distant office)
PTS	Practice Theory School
RBT	Resource-based theory
ROT	Real options theory
SOP	Standard Operating Procedure
TCE	Transaction Cost Economics

1 INTRODUCTION

The topic of this thesis originated from a real-life situation. The case organization has recently taken up on a new outsourcing approach. As a consequence, a new partnership outsourcing arrangement of detail engineering work had emerged. The following chapters provide a thorough coverage of this issue and the thesis evaluates the essential impact of this significant strategic maneuver. This coverage is started by the brief introduction below. The general background of the case study is brought up, and the central concerns of the organization which require investigation are initially clarified. Through this, the fundamental motive and demand for the thesis and the research process are established, and the solving of the research questions is commenced. In the end of this first chapter, the step-wise progression and the structure of the thesis are presented.

1.1 Challenges and opportunities of the modern economy

Change and uncertainty are ubiquitous in the modern economy (Saleh et al. 2009). The hypercompetitive nature of the globalized markets requires firms to increase their competitiveness in several ways. Outsourcing has come to the picture here, as it allows firms to focus on their core operations while acquiring the other needed functions and resources from other producers (Quinn 1999). Outsourcing has indeed grown vastly in the past decades, and as a result of this, the global economy can be viewed as a wide, complex network of interconnected organizations (Kakabadse & Kakabadse 2005).

Especially in the business sectors where knowledge holds a central role, the outsourcing activities have largely grown. In these sectors the productivity differences between firms can be substantial, as knowledge resources can be accessed, utilized and leveraged in various innovative ways (Beardsley et al. 2006). Therefore especially knowledge-based organizations such as engineering units must reach out for the knowledge pools of other parties. By collaborating efficiently with these external providers along the interfaces, value can be co-created and competitiveness boosted (Prahalad & Ramaswamy 2004). As the amount

and complexity of the needed knowledge in different operations has increased manifold over the years (Foray 2004), a sector of specialized knowledge providers, known as KIBS-sector (Knowledge-Intensive Business Services), has emerged to assist firms in coping with their needs. Importantly, outsourcing knowledge services is then fundamentally required of many organizations, but the value creation potential embedded in the consequential collaboration with the KIBS-providers also offers great opportunities (Maskell et al. 2007).

In the field of economics the acknowledgement of how knowledge and resources hold an important role in the competitiveness of modern organizations can be seen. Especially the planning and evaluation of firm boundary decisions have been influenced, since these days firms should not merely seek the most cost-effective ways to organize their value chain, but also the beneficial aspects of each outsourcing and insourcing arrangement option should be accounted for (Blomqvist et al. 2002). This relates to the notion that, regarding the competitiveness of firms, it matters what they actually achieve with their accessible resources. Costs are not the only issue, since strategic advantage is also driven "inside-out" (Tranfield & Smith 1998), and as Ohmae (1989) puts is, beating the competition ought not to be the first principle of strategy in the modern firms. This thesis accordingly follows these insights, and the evaluation of the new outsourcing arrangement, i.e. a novel way of organizing long-term production, of the case organization is conducted in a way that acknowledges the influential dynamics, challenges and opportunities of the modern economy. Also the contemporary views of strategy research are incorporated, as the coverage builds up on dynamic issues relating to transaction costs and the way resources are utilized (Madhok 2002).

1.2 The case unit and its situation

The case organization of this thesis is Detail Engineering Unit (DEU) of Company[1]. Company is a large project-based industrial manufacturing company headquartered in Finland, and DEU provides detail engineering work for Company's customer deliveries. The role and position of DEU

[1] Due to confidentiality issues the names used in this thesis are pseudonyms.

inside Company's organization is demanding, as the amount, scale and scope of the infrequent projects change from one period to another. The unit then outsources most of the needed engineering services from KIBS-providers. This is done to keep the organization flexible and light while the needed competencies are procured. Also at times when the backlog has cleared up and the market cycle is on a slump, DEU must not be too-heavy-to-float.

Outsourcing the needed engineering capabilities is not a trivial matter for DEU. The local and global market is not abundant of skilled engineers, and the continuous integration of operations with external providers demands big efforts. Due to several additional pressing circumstances, DEU has then pursued to establish partnerships with a few selected KIBS-providers as a part of its strategy. Particularly one partnering maneuver with one of the providers, termed Partner, has been a notable action in this strategy. An office has been set up by Partner to host some of its contracting engineers who previously worked on DEU's projects at Company premises. Now, the target is to establish a distance outsourcing arrangement between the partners' offices, as this sort of outsourcing is seen as a viable option to cope with the current and especially the future demands of the industry. As such, one aspiration of DEU has been to pursue a new strategy-induced (distance) outsourcing approach which is manifested currently as the novel arrangement of organizing production between the two offices[2]. The target is not however to rely solely on this new approach in outsourcing relations, yet it is perceived as a particularly attractive option of the future.

The actual consequences of the new approach are not very clear to the stakeholders. The split engineering teams execute continuous project work, and this activity is social and knowledge-intensive which makes it complex to arrange efficiently. The detail engineering work provided by DEU is nevertheless highly valuable for Company, as the quality and content of the deliverables have a high impact on the value delivered to the customers. This makes it important that DEU is able to operate in an efficient, value creating manner. This requirement holds also for the new

[2] To clarify, the strategic pursuit which utilizes distance outsourcing is termed as the new outsourcing *approach*, yet the focal concern here is the actual manifestation of this approach; the new *arrangement* of production organizing. As they denote the same phenomenon, the terms are cross-used in the thesis.

partnership outsourcing arrangement which is a departure from the old operating model. While the content of the work has not changed, the context has. This can be expressed to have an impact on the value creating performance of the concerned engineering teams, and for DEU this is significant issue. The impact of the novel way of organizing the project work can be seen to be combined from two aspects. First, the nature of the operations has changed. And second, the changed operations also create a different long-term economic outcome. When comparison is made to review what kind of departure has occurred, naturally the new arrangement should not be a step downwards from the old.

To be clear, for DEU it is crucial that the new arrangement is able to facilitate efficient engineering operations. This efficiency is either achieved or not through the on-going performance of the project teams. Following a recent stream of economics, this performance is seen here to be driven by the underlying organizational routine, in this case the engineering project routine of the arrangement (e.g. Pentland & Rueter 1994). Therefore the emerged nature of this routine essentially encapsulates how the operations differ from the old. In addition, it is through this routine that the different beneficial and cost-incurring outcomes of the governance structure are born. In other words, the economic outcome of the arrangement is based on the routine. As such, a routine-based evaluation of the overall impact of the arrangement is needed. It is needed, because DEU must ensure that its new approach is suitable and able to create increasing value. As of yet there is not much clarity if this is the case or not, and the dynamics of the distance project work are not entirely realized.

1.3 Literature review and the questions to be solved

Like stated, the conundrum for DEU is that the resulting impact of the new partnership outsourcing arrangement is not realized. This thesis will tackle the issue by constructing a contemporary evaluation of the case phenomenon. For this, the past literature surrounding the topic was thoroughly reviewed.

Collaboration between industrial firms and their KIBS-providers has been much studied recently, especially in the field of engineering (e.g. Ojanen

2007). While this stream of research has covered many issues, there is however a lack of in-depth case studies to be found. This is especially the case with the often secreted engineering collaboration arrangements. Studies which would analyze and identify the true operational level interactions between the parties are scarce to find, yet it is just at this level where the concrete performance takes place. For DEU especially the performance which occurs throughout the projects is pivotal, as it determines the economic value of the operations. In fact, in Finland there is a realized need for studies which would cover the true nature and impact of the partnering arrangements which are emerging between manufacturing and engineering consultancy firms in a growing fashion (Ahvenainen et al. 2010).

Studies of economic activities have been recently focusing on organizational routines in an increasing manner (Becker 2004). Case studies on routines have been advocated to enlighten researchers and managers on the causal mechanisms behind perceived performances (e.g. Peng et al. 2008), and as such they can be seen suitable to provide basis for this thesis as well. However, empirical case research on routines is still rather rarely occurring, and no clearly established research paradigms exist (Furneaux 2012). Case studies are then needed to further this stream, especially since they enable researchers to obtain rich data also regarding engineering activities (e.g. Baark 2001; Becker & Zirpoli 2008; Sari et al. 2009; D'Adderio 2011). These findings are very useful in evaluation processes such as the one performed in this thesis.

Finally, an important stream of literature has pondered how different governance structures ought to be purposefully evaluated and compared in the context of the modern economy. Extended transaction cost view is a part of this advancement, and it maintains that for example outsourcing arrangements ought to be evaluated based on the overall benefits and costs which they inflict over time. This view is pertinent particularly in the knowledge-based functions, such as detail engineering. The framework also suits this case study well, as it acknowledges that the different long-term benefits and costs are the result of the underlying, evolving routines, which the activities of organizations are based on. (Blomqvist et al. 2002)

Overall, it is clear that the past research has provided insightful ingredients from which to construct this case study. Much of the research regarding KIBS-partnerships, organizational routines and the evaluation of governance structures has nevertheless not focused on the actual performative level of real-life cases. The black box of the routines and the governance structures inside KIBS-partnerships has then not been opened much. A study framework which is able to provide meaningful answers for DEU remains to be built. Figure 1 portrays this apparent state of affairs found in the literature review.

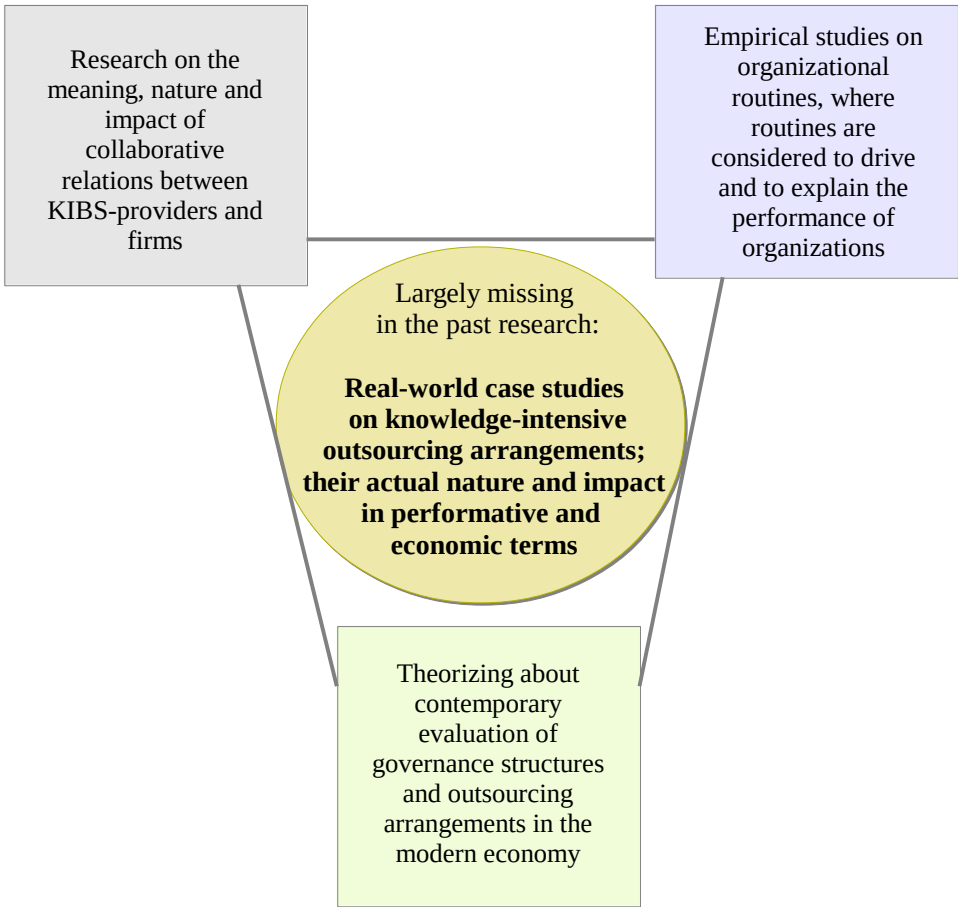


Figure 1. The uncharted area of research between the focal research fields.

This thesis positions itself to the center of Figure 1. Theoretical framework and research methodology are constructed by the author to incorporate the past insights of the related research fields. This is done to allow a thorough, insightful and case-sensitive study which enlightens DEU about the overall impact of its new outsourcing arrangement. Since it is important for the unit that an unsuitable strategy is not followed and

that sufficient value will continue to be created also via the new approach, the main research question to be answered is: *"How beneficial is the new outsourcing approach of detail engineering project work?"*

As stated, the beneficence of the approach is determined by the nature of its resulting performance as well as its economic implications. Therefore the main research question is answered by solving two interrelated sub-questions: *"What are the unique features of the new routine when contrasted with the old one?"* and *"What does the difference of the new routine imply in economic terms?"*

This coverage introduced briefly the relevant research questions which are summarized in Figure 2. The lack of answers to these crucial questions forms the motive for this research project. Once the relevant theories and the multifaceted nature of DEU's situation are explained in more detail, a more specific description of the conducted research process is provided.

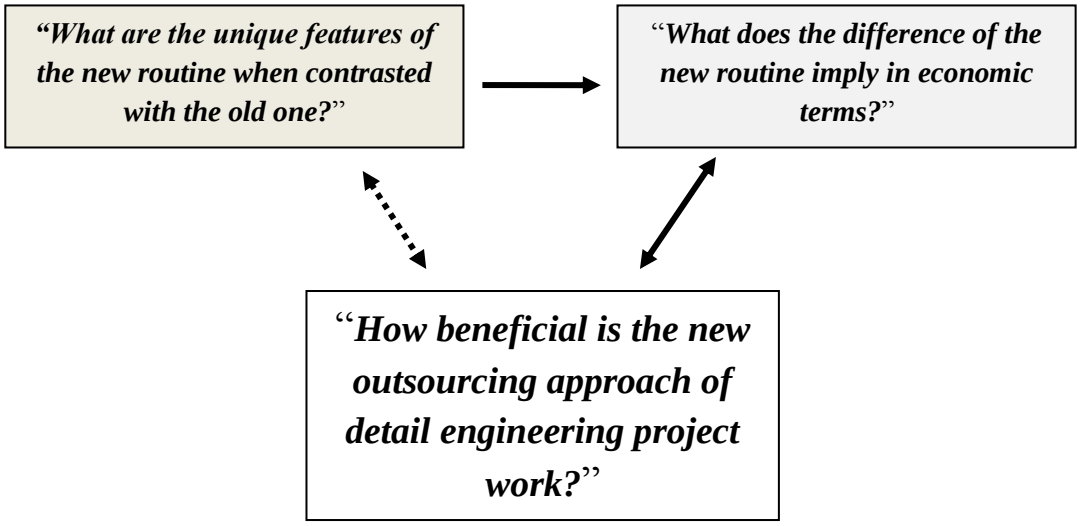


Figure 2. The main research question of this thesis, solved through two intertwined sub-questions.

1.4 Delimitations

This thesis deals with a dyadic outsourcer-outsourcee relationship. Specifically, the point of view of DEU, the outsourcer, is the focus.

Additionally, the research is only concentrated on the beneficence of the particular arrangement with Partner. Therefore evaluation on the suitability of Partner to be the chosen KIBS-provider is not carried out, and no alternative distance outsourcing options are envisioned or theorized about. The study will neither present consulting suggestions for the future course of actions, although the thorough coverage is able to provide valuable insight on this.

The research deals with the continuous project work taking place in the two compared outsourcing arrangements. As such, wider partnership issues relating to managerial level actions, partnership maintenance and the refinement of the overall relations are omitted from the coverage. Also such engineering related topics as knowledge management on the firm-level are worthy of a thesis of their own, and this study limits and focuses itself solely on the overall continuous project performance of engineering teams in the operational level. To conclude, the studied case operations are taking place in Finland which has its distinct culture, meaning that the coverage is not readily applied to provide insight to multinational operations.

1.5 Structure of the thesis

The theoretical and empirical parts of the thesis are structured as follows: First, the basis for evaluating the beneficence of different governance structures is established. Then, the fundamental drivers of organizational activities, organizational routines, are covered as a unit of analysis in economics. Third, the activity of detail engineering is introduced, and the state and dynamics of the engineering industry are explained. Also the background of the recent trend of partnership arrangements found in the industry is brought to light. After that, the case organization DEU is further characterized and its new outsourcing approach is viewed upon. The central research questions are additionally drawn together in more detail to set forward the empirical analysis. Then, the theory-based research methodology is constructed. This is followed by a thorough presentation of the empirical findings of the case study. Chapter 7 provides elaborated analysis on these findings to clarify the overall impact and the investigated beneficence of the novel outsourcing arrangement.

The main findings of the thesis are concluded in the last chapter which also binds together the progression of the thesis, summarized in Figure 3.

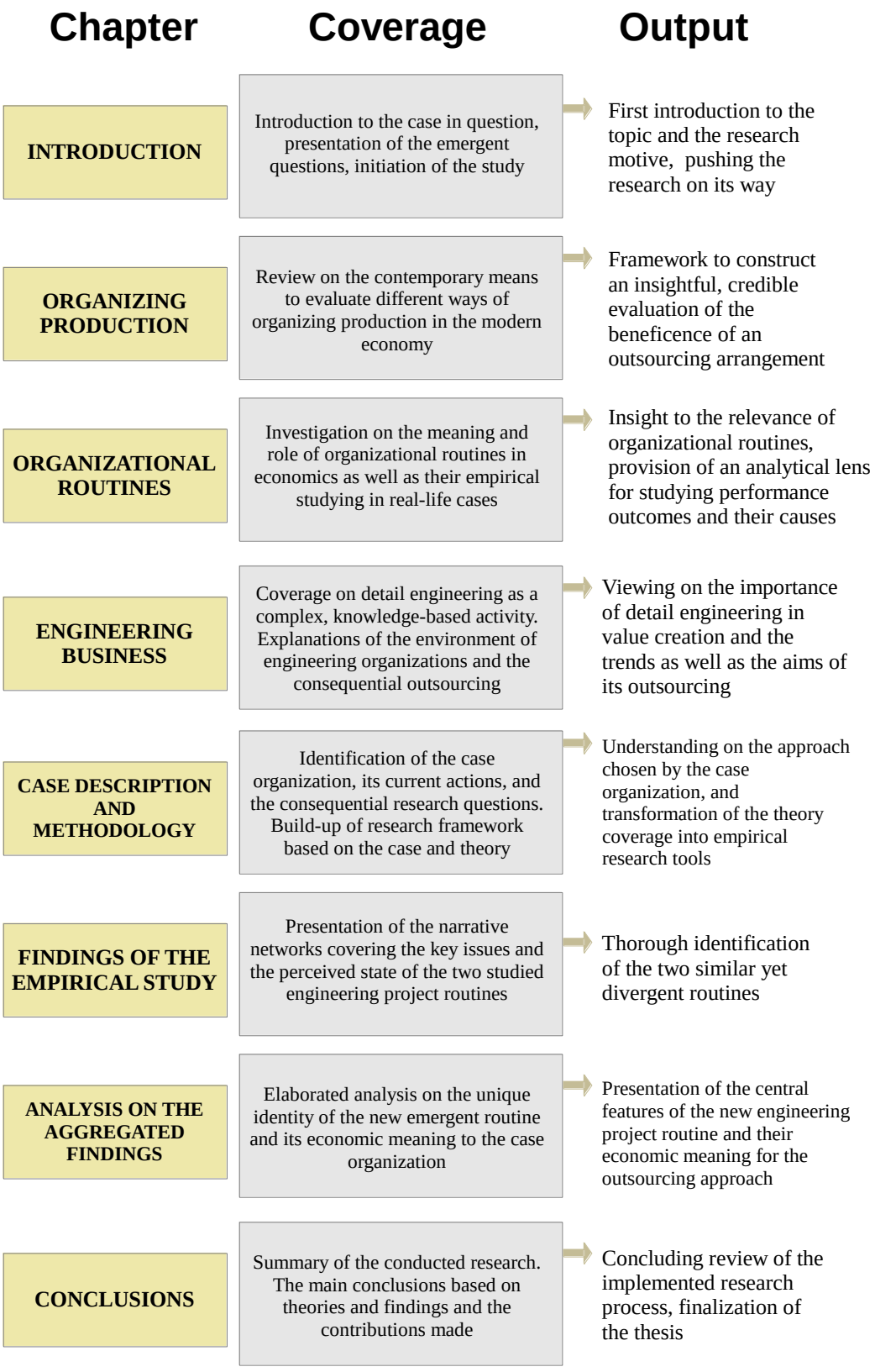


Figure 3. The structure and progression of the thesis.

2 ORGANIZING PRODUCTION

The following chapter covers how production ought to be organized in the modern economy. In addition, contemporary ideas on evaluation of and comparison between different strategic options of governance modes are explained. As corollary, a framework for analysis on the possible beneficence of particular outsourcing approaches is provided.

2.1 Transaction cost economics

Traditional transaction cost economics (TCE) has been used to a large extent to explain why some production is organized within the boundaries of a firm instead of the market. This is because there is a price to pay while using the price mechanism of the markets. When production is organized in the confines of the firm and entrepreneurial coordination of resources takes place, the transaction costs of operating in the market are avoided. Therefore a firm, as opposed to non-frictionless markets, is at times the less costly institution in which certain production ought to be organized. (Coase 1937)

Williamson (1975, 1985) later drew on Coase's ideas and articulated that transaction costs stem from environmental factors (*uncertainty*, *asset specificity* and *frequency of the transaction*) as well as human behavioral factors (*bounded rationality* and *opportunism*). The incurring costs can be roughly split into motivation and coordination costs (Milgrom & Roberts 1992). These determinants shed light on the decision of which way of organizing production is more suitable in a specific situation: *Hierarchy*, in which internal authoritarian coordination takes place, or *market*, where the pricing mechanism coordinates. Sometimes the prevailing environment is most suitable for the intermediate governance structure *hybrid*, in which the coordination of production is done among several parties. (Williamson 1991)

Relying on Coase's and Williamson's theories TCE has then illuminated some basic explanation of the arrangement of production into different institutions. Traditionally TCE has maintained that a firm should lean

towards a governance structure which economizes total production and the costs related. This can be achieved by combining the use of hierarchy, hybrid and markets. This notion of how economic activity ought to be organized has influenced the boundary decisions of firms and the academia alike. TCE has gained tremendous attention in research papers and evoked a lot of discussion. (Rindfleisch & Heide 1997)

Transaction cost economics has been also heavily applied to the research of outsourcing, as it provides a framework with which to analyze suitable firm boundaries and production planning (Espino-Rodríguez & Padrón-Robaina 2006). However, as TCE has met a great deal of criticism (e.g. Carter & Hodgson 2006) it has not done so the least in the field of outsourcing studies. Static transaction cost theory, which is based on the cost implications of governance structures and views hierarchy mainly as a result of market failure (Madhok 2002, 536) does not provide an insightful basis to analyze and explain the networked global economy (Blomqvist et al. 2002). Hybrid arrangements which are a mixed mode of the three categorical governance structures are widely present these days. By choosing a hybrid arrangement a firm may pursue the offerings of scale and scope from the market while focusing on its internal core competencies. Hybrid structures can always be constructed in variant ways, even between same partners. The importance and nature of hybrid structures however is largely omitted from the traditional TCE literature, and focused research on them has mainly just gotten started (Ménard 2004). While the single mindedness is a severe handicap of TCE, in the past years the framework has been refined further to include some insightful theories of modern strategy research (Boubreau et al. 2007). Next it is in order to go through some issues which have made this refinement process imperative.

2.2 Outsourcing and the modern economy

Outsourcing is an on-going and growing phenomenon inherent in the modern economy, also termed as "New Economy" (e.g. Kinnula & Juntunen 2005). When a firm is outsourcing, it compensates an external party for providing it with some service which is related to the operations of the firm. Outsourcing trivial functions such as property maintenance

and cleaning has been a rather straightforward and obvious process for firms in the past. However, nowadays the global economy and tightening competition demand a lot from firms. Global logistic networks, scattered manufacturing, expansion of markets as well as other challenges mean that firms must rely in an increasing fashion on other firms to provide them with the required resources. No one can master it all by themselves, and the consequent wave of outsourcing has created debate in societies, media as well as among researchers (Mosco 2006). The growing stack of scientific papers on outsourcing have aimed at grasping the mechanisms, meaning and effects of this activity, and over the years advancements have been made. (Kremic et al. 2006)

Outsourcing decisions are mainly based on cost, political and strategic issues (Kremic et al. 2006). While they all can be considered in the planning phase, many firms nevertheless have not met their goals in the tough task of outsourcing. This is potentially very harmful for firms, especially if me-too -imitators convinced by the growing number of outsourcers end up outsourcing the "crown jewels" of the organization, ending up with hollowed-out, anorexic firm (Bettis et al. 1992). As firms try to adapt to the global economy, outsourcing is nevertheless the way chosen by ever-growing number of firms (Kakabadse & Kakabadse 2005). At times firms also simply must outsource, for example due to laws and regulation. Strategic outsourcing, in which decision-making of "make-or-buy" is a more holistically ran process, has gained followers as the problems and complexities of outsourcing arrangements have become evident to managers (Gottfredson et al. 2005). Essentially firms do not decide these days whether they ought to outsource or not, but rather "How?" (ibid.). When several functions are outsourced, the arrangements should suit the overall firm structure. Yet there is still much to clarify on what makes outsourcing beneficial and how it ought to be done. Certainly incorporating the characteristics of the modern economy into the mix is a step needed.

The modern economy relies heavily upon the use of knowledge. David and Foray (2002) state that the knowledge-based economy is an enormous change from the economies which preceded it. With the help of advancements in the field of ICT, knowledge production is continuously accelerating, innovating activities of all sorts become more

crucial for competitiveness of firms, and the importance and growth of intangible capital at the macroeconomic level is rising (Foray 2004). This means that firms must be able to create, use and access knowledge of all sorts in order to thrive. As a result, an important service sector inhabited by specialized knowledge-based firms has emerged (Tanninen-Ahonen 2003). The role of this KIBS (Knowledge-Intensive Business Services) sector is especially paramount in small advanced economies such as Finland (Ojanen 2007). To be competitive, Finnish firms must gain access and utilize knowledge to their advantage. Consequently, outsourcing arrangements surrounding knowledge-intensive activities are rapidly growing (Lith 2003).

The impact which the birth of economies of knowledge has caused on firms has naturally been noticed in the academia. Resource-based theory (RBT) especially is a vital field of the modern strategic management research, centered on this topic (Acedo et al. 2006). It has pulled attention as the competitive advantage of firms has been realized to be related to the internal factors of a firm rather than being merely dictated by the external environment surrounding the firm. Competitiveness is then seen driven "inside-out" rather than "outside-in" (Tranfield & Smith 1998). Therefore it matters which resources a firm has, how it utilizes, refines and preserves them (Wernerfelt 1984). RBT is also concerned by the implication that firms can gain edge by effective use of knowledge in their business, as firms operate as heterogeneous, evolving institutions integrating knowledge (Grant 1996). Finally, the importance of the capabilities of firms to "integrate, build and reconfigure internal and external competencies to address rapidly changing environments", known as dynamic capabilities, has been underlined in RBT (Teece et al. 1997, 516).

RBT acknowledges the shift of the economy into a dynamic, knowledge-based one while pointing out that firms are heterogeneous organizations consisting of varying, changing resource bundles utilized differently through routines. These differences lead to asymmetrical competitiveness. Especially if resources are valuable, rare, inimitable and non-substitutable, genuine competitive advantage can be achieved (Barney 1991). Resource-based considerations provide then more

perspective to how firms can proactively compete successfully by interacting efficiently with other organizations. (Acedo et al. 2006)

Resource-based ideas have also infiltrated the field of outsourcing research. Gaining support for core competencies and efficient utilization, not mere accessing, of external resources through contracting are viewed as important factors in outsourcing decisions (Arnold 2000). Uncertainty and change are growingly contributing to the mix as well. Firms must cope with these factors by outsourcing in a way that allows success today and in the (possibly radically different) future. Especially this is the case in the radically uncertain sectors of the modern economy where no dominant designs exist and the evolution of the technology is rapid (Ståhle et al. 2002). Also in the more mature sectors outsourcing must allow successful adaptation to the changing markets. The case unit of this thesis for example has to navigate in the midst of uncertainty stemming from large volatility of the scale and scope of the demand. When the ingredients of these aspects are included to the process of production organizing, dimensions are also added to the analysis of the perceived attractiveness of different governance modes. Importantly, as RBT has underlined, governance structures do not only inflict costs, for they also create benefits. Efficient coordination of resources creates them. This being the case, an extended form of transaction cost economics is needed to understand what makes certain governance structures more preferable than others. This sort of framework additionally provides more explanatory power to the rise of different sorts of hybrid arrangements in the knowledge-intensive businesses. (Blomqvist et al. 2002)

2.3 Analyzing different governance structures in the modern economy

The attributes of the new knowledge-based economies require extension and increase of explanatory power from the traditional TCE analysis. The relevant elements of the consequential extended view are covered next. With them, determining optimal governance structures for different situations can be achieved. As such, comparison between different strategic options for outsourcing is allowed.

2.3.1 The relevant elements of costs and benefits

As it has become clear from the past discussion, outsourcing decisions which would lead to success are not easy for firms to conceive. This is the case even though outsourcing is a frequent, common activity and a multitude of guidelines have been created for the process (Willcocks et al. 2011). The traditional TCE has been useful to understand the logic behind production activities being organized inside different institutions (hierarchy-hybrid-market), but as it has focused solely on transaction costs, it does not sit well in the modern networked economy[3]. Firms also target benefits by accessing and utilizing external resources, unique or complementary, or by performing operations in-house. In pharmaceutical and other highly knowledge-dependent sectors the possibility of benefits can in fact be the main vantage point of strategic partnering maneuvers (Schweizer 2005). Extended transaction cost framework has built on this idea to highlight the main sources of costs and benefits in each governance mode. For firms, this framework provides a more holistic and thorough tool to view outsourcing questions. (Blomqvist et al. 2002)

Blomqvist et al. (2002) view a firm as a value chain constituting of several activities. These activities are based on routines or bundles of them, capabilities. They determine how resources are put to use. Echoing the notions of RBT, a firm should choose its competitive strategy by deciding which of these routines/capabilities should be maintained in-house and which ones outsourced. Through partnering, internal and external routines can be jointly exploited. Boundary decision-making should then be resolved when the consequential cost and benefit implications of different arrangements are taken into account. What is important here is that activities are acknowledged to be dynamic, which means that benefits and costs are being created in an on-going fashion. Next a short walkthrough on the fundamental cost and benefit determinants is required. (Blomqvist et al. 2002)

Cost factors

As the traditional TCE suggests, governance structures involve costs. Hierarchical organizing of activities results in ***management costs*** related to

[3] Since the era of Coase's initial work, the economies have transformed largely from product-based form into service-based nature. While costs are still an important factor, the grown meaning and impact of intangible capital and services has outdated pure cost-centered evaluations. (Boudreau et al. 2007)

controlling, monitoring and administering internal operations with low-incentivized bureaucracy. (Blomqvist et al. 2002)

When market is given the productive task, ***transaction costs*** arise from the need to search, plan, negotiate, enforce and monitor the transactions and contracts. In addition, dynamic costs are involved since renewal of capabilities, persuasion of continuation and learning activities must occur over time. (Blomqvist et al. 2002)

Hybrid structures are somewhat neglected in the traditional TCE view even when they are strongly present in the business world. Hybrid ought to be the governance structure when the circumstances speak both for vertical integration and markets. Management and transactions costs are then present as ***partnering costs***, since interfirm arrangements along the firm boundary require genuine participation from both parties. (Blomqvist et al. 2002)

Benefit factors

When activities are coordinated under a governance structure through routines and capabilities, certain circumstantial benefits are created over time. In-house coordination involves ***management benefits*** ascending from cumulative learning, economies of scope, and exploitation of monopoly power. (Blomqvist et al. 2002)

Transaction benefits relate to the market option and they include flexibility, variation of offering, economies of scale of specialized producers, and high-powered incentives. (Blomqvist et al. 2002)

Hybrid, or ***partnership benefits***, as Blomqvist et al. (2002) named them, come up when joint production is established and both the outsourcer and the outsourcee take part in the activities. Utilization of complementary assets, joint surplus creation via melting of complementary resources, supermodularity effect of resource combining, dynamic effects of economies of scale and scope, and build-up of trust leading to decreased

opportunism; these are possible benefits from interfirm actions. (Blomqvist et al. 2002)

While the benefits of insourcing and outsourcing through hierarchy or market are understood in TCE to a degree, the benefits stemming from the resulting performance inside a governance structure have been viewed as black boxes. This is especially a handicap in the case of partnerships (hybrids), since only by acknowledging the dynamic benefits of hybrid arrangements one can begin to convincingly explain and understand the partnering and strategic outsourcing wave of the past years. (Blomqvist et al. 2002)

Partly drawing on these insights Foss and Roemer (2010) note that firms are a portfolio of resources, including real options. Real options theory (ROT) takes into account a firm's actual and potential resources, and thus incorporates the notions of change and uncertainty by valuing the flexibility offered by these resources[4]. For example in hybrid structures, while utilizing the strengths of internal and external organizations, the partners can share uncertainty, resources and capabilities between them over time. New possibilities to expand collaboration also can emerge or be born via continuous cooperative efforts which result in learning. These options have value since they are not acquirable purely from the market at arm's-length yet they may proof valuable when a change of circumstances takes place. ROT genuinely looks into the dynamic picture, and with RBT and TCE it is beneficial in the contemporary strategic theorizing of firms in the modern economy. (Foss & Roemer 2010)

By counting in the potential future results of a governance mode, the benefits-view adds significantly to the explanatory power of cost-based TCE: Resources and the uncertain future matter. Below in Figure 4 the generic sources of benefits of each production arrangement are presented in a governance structure continuum (Blomqvist et al. 2002, 9).

[4] Jeff Bezos, the CEO of Amazon, for instance considers real options central in Amazon's strategic planning. The idea is to " - - plant seeds and wait a long time for them to turn into trees" (Kirby & Stewart 2007, 76). He does not however use the term "real options", and it is not clear how much ROT is being used in the real world (Block 2007). In engineering systems the field is just coming about (Saleh et al. 2009).

markets	*partnership*	*hierarchy*
+ economies of scale	+ focus on core competencies in the value chain	+ economies of scope
+ lesser risk	+ ability to coordinate disperse knowledge	+ economies of scope through learning
+ less investment in specific assets	+ ability to create incentives for coordination e.g. trust	+ effective management and control through ownership
+ increased flexibility	+ risk sharing through separate ownership of assets	+ cost-efficiency through economies of joint ownership
+ increased variety	+ investments in relation-specific assets	+ competence-enhancing innovations
+ high-power incentives	+ communication and information sharing	+ exploitation of monopoly power
+ efficiency through fierce competition	+ improved quality	+ efficient internal communication network
	+ shorter time-to-market	

Figure 4. The sources of benefits in each governance structure. (Blomqvist et al. 2002, 9)

2.3.2 Determining the optimal organizing of production

The main statement of the extended transaction cost view is that a firm should establish a governance structure by mixing insourced, networked and outsourced transactions in order to maximize the sum of production and benefits while minimizing the costs. This consideration must be done in dynamic terms. Uncertainty and change are inherently recognized by the view since over time a structure which is currently costlier can prove the optimal one overall because of the beneficial impacts of the arrangement. Particularly the capitalizing on real options is determinative in knowledge-based sectors. The gains from accessing, melting and leveraging unique resource pools can easily outweigh high costs. This is the main point here. Again it should be noted that this view regards institutions as consisting of *activities ran by routines and capabilities*. Importance is then shed on how the different parties *perform* under a certain governance structure. Sheer potential of benefits does not make an arrangement advantageous if these benefits do not come to existence. The essential driving determinant is therefore the resulting performance of the routines involved. (Blomqvist et al. 2002)

The existence of transaction costs is neither neglected. This means that for instance the classic *hold-up* problem created by asset specificity, uncertainty and frequency of transactions should not be forgotten to have high cost implications, even when partnering would pose to create tremendous benefits (Ståhle et al. 2002). Figure 5 presents the combined main determinants of an optimal governance structure option (Blomqvist et al. 2002, 4).

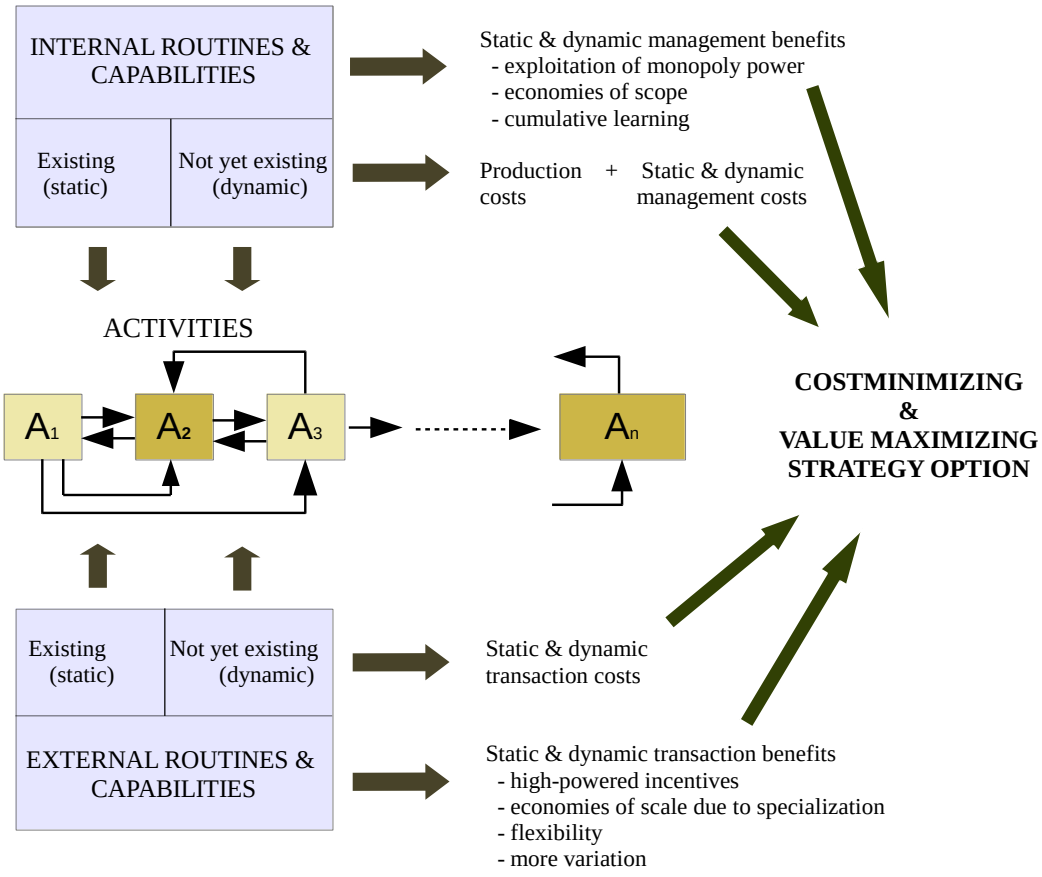


Figure 5. Determinants of the optimal governance structure. (Blomqvist et al. 2002, 4)

This extended framework is very insightful when the beneficence of a particular governance structure is under questioning. Binding the pertinent characteristics of knowledge-based economy, the traditional TCE is credibly complemented here. Rationale for recent outsourcing

trends and partnering is provided. Firms themselves can benefit from the framework, as the dynamic impact to competitiveness of specific options can be better grasped. For example, if production is organized in a new fashion, the framework allows deliberation whether the novel arrangement is for the better or worse, and why. For deeper analysis on the impact, the underlying routines creating the costs and benefits of the structure must be identified. This notion takes seriously the recent stream of economic literature advocating routines as the focal point of operations and competitiveness (e.g. Peng et al. 2008). A routine-based analysis on a governance structure effects is then suitable, when the black box defining the outcome is to be opened up. This is the standing point of this thesis.

2.3.3 Comparing the beneficence of different strategic options

Wang (2007) points out from her literature review that a wide variety of divergent approaches exist for analysis on firm boundary choices and the measurement of TCE-related factors in different governance structures. Whinston (2003) argues that this wide development of transaction cost approach made in the past decades is an essentially important advancement in industrial organization research. As a part of this, the extended view presented previously has particularly been found to hold explanatory power while empirically assessing governance arrangements in sectors such as ICT (Kuittinen et al. 2009). In addition, performance comparison between governance structures and the co-existence of different modes of production organizing inside a same industrial sector are some of the most rigorously explored issues regarding hybrid organizations (Ménard 2006). For example, Mahapatra et al. (2010) studied five different hybrid arrangements in one OEM based on TCE and RBT viewpoints. They compared the divergent nature and impact between the arrangements. This thesis also employs comparison to see how a novel outsourcing arrangement (i.e. way to organize production) in the case unit differs from the old one. While the new approach of distance outsourcing is not an extensive departure from the old model, the arrangement still contains a unique set of attributes leading to a different long-term economic outcome. Figure 6 depicts how cross-comparison between governance modes is made possible.

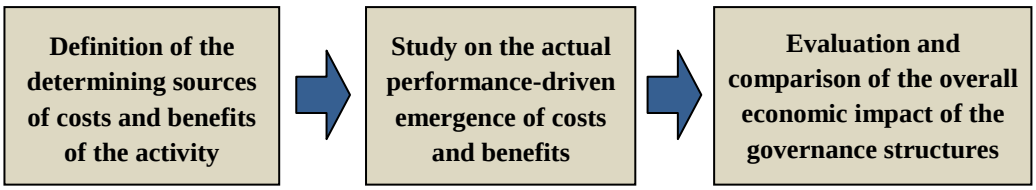


Figure 6. The process of evaluating the economical beneficence of different governance structures.

Contemporary views of beneficial organizing of production are now covered. With the framework provided, deeper and more focused analysis of the impact of an outsourcing arrangement is made possible. This is important as firms must pursue competitiveness-increasing outsourcing arrangements. Intuition and good intentions do not carry very far in the hypercompetitive world. For the case unit of this thesis, a constructed and much needed evaluation of its novel outsourcing approach in detail engineering is achieved through the framework. In order to allow this evaluation, the underlying routine and its impact on the critical benefit and cost factors have to be examined. The basis for this is provided in the next chapters.

3 ORGANIZATIONAL ROUTINES

This chapter covers organizational routines, or, routines, in the field of economics. The meaning and role of routines in economical theories is introduced. Additionally the established conceptualizations of routines are brought to light. The following sub-chapters also establish the rationale and framework on why and how a contemporary routine-based study is suitable for this thesis.

3.1 Organizational routines in economics

Routines-thinking has gained proponents exponentially. The meaning given to routines in economics and the perceived role of organizational routines inside organizations are given next.

3.1.1 The idea of organizational routines

Organizational routines have gradually emerged as an intriguing unit of analysis in many research fields. In social sciences and especially in the business-related streams of research, organizational routines have been found as a very prominent study object in the quest to create more understanding on what happens in organizations, the interaction of organizations and the change which occurs in organizations (Becker 2004). Contributing to this growing appreciation of the explanatory power of organizational routines are advancements made in the fields of behavioral theory of firms (March & Simon 1958; Cyert & March 1963) and evolutionary economics (Nelson & Winter 1982). Besides these seminal contributions, Penrose (1959) placed processes ran by routines into the limelight.

Economics in general has been enriched by the development of "Routines theory" (D'Adderio 2009). Resource-based theories on firm success and competitiveness for example have been criticized of edging on tautologies (e.g. Priem & Butler 2001), yet through the implementation of a clear central unit of analysis, the routines, insightful results can be obtained about what is actually practiced in organizations and what causes this

performance (Becker & Zirpoli 2008). After all, routines themselves are resources. And they are the key factor causing heterogeneous behavior and performance between organizations. Because of this, Becker (2008, 3) suggests: "To understand routines is to understand organizations".

Pentland and Rueter (1994, 484) state that "...routines occupy the crucial nexus between structure and action, between the organization as an object and organizing as a process". The statement underlines the importance which routines have in understanding firm performance. Evolutionary economics especially has taken up on the notions and possibilities offered by organizational routines -thinking, and Giovanni Dosi characterizes this stream of economics as: "Economic theory done right" (Nelson 2004, 1)[5]. Routines are sticky and complex, not easily changeable and therefore very troublesome to be purchased readily from the markets (Becker et al. 2005). As organizational routines also embed non-trivial, interconnected parts and agents, they can provide sustainable competitive advantage for firms. This happens when a routine is able to provide efficiencies and valuable performance outcomes for the firm. Put differently, routines are the basic ingredient of competitiveness over time (Witt 2011). A common definition of a routine is: "A routine is an executable capability for repeated performance in some context that [has] been learned by an organization in response to selective pressures" (Cohen et al. 1996, 683). While much remains to be done in the characterization of the meaning of routines, routine-oriented studies are rapidly growing in numbers. This development has branched off to constitute three distinctive schools of thought: *Organization theory school*, *Competence theory school* and *Practice theory school* (Hansen & Vogel 2011).

The Practice theory school (PTS), as identified by Hansen and Vogel (2011), specializes particularly on the research of routines themselves, whereas the Organization and Competence schools of theory include routines as sub-topic of wider discussion of organization interactions, their impact and nature. While these scientific communities are interrelated, the PTS is where the growing number of empirical studies of routines-in-action is situated. It is a relatively new stream of studies yet it

[5] Routines gain growing attention. As an example, the journal *Industrial and Corporate Change* dedicated an issue on routine-based research (2005, 14, 5). And more recently, *Journal of Institutional Economics* published a special issue covering "Business routines" (2011, 7, June).

shows that routine-based research is also growingly empirical. The richness of these studies has helped to develop the "Routines theory" forward and to back it up. However, just as is the case in the concepts of resource-based theory in general, the definitions and meanings attached to routines vary a great deal (Ray & Ramakrishnan 2005). There is no shared view of routines in the economic research, which is a handicap for generalizability of the studies. Dominant research paradigm is yet to come, even when rather consensually routines have been acknowledged to provide a framework for analysis on firm behavior and performance (e.g. Dosi et al. 2008).

3.1.2 The role of routines in organizations

Regardless of the several variant interpretations and conceptualizations of routines taking place, some generic attributes have been attached to the role which routines possess. Routines have been described to act as central repositories of organizational knowledge and to provide the building blocks of organizational capabilities and change (e.g. Teece et al. 1997). Cyert and March (1963) used a metaphor of routines as performance programs, and Nelson and Winter (1982) portray routines as habits or skills of an organization. Routines allow certain type of performance to be repeated, however as they adapt to the changes provided by their environment, routines rather paradoxically are seen to provide both stability and change inside organizations (Pentland & Feldman 2005).

Another analogy often quoted to describe routines as facilitating firm actions is "routines as genes" (Nelson & Winter 1982). Indeed this simple expression depicts well how routines allow continuation and evolvement of operations, though Nelson (2009) states that the biological analogy should not be understood literally as firms can actively choose and shape their "genes". So while routines do not explain everything about firm competiveness, they can be altered and they count for much of firm behavior. This makes them an important focal point and imperative for firms. To Summarize, routines are organizational patterns which have been socially learned and accepted (Kyläheiko 1998), and they establish coordination, learning by doing as well as savings on cognitive resources (Becker 2005). Further inquiries on the nature and role of organizational

routines are constantly made[6]. For empirical research purposes of this thesis, further conceptualization of the ingredients of routines is needed.

3.2 Conceptualizing routines

In their insightful publication "Organizational routines: advancing empirical research", Becker and Lazaric (2009, 6) express that the hallmarks of an advancing research field are growing and continuously standardized use of similar methods and terms. As this progress is taking place, some fundamental concepts of routines and their mechanism have received support recently. Especially initial concepts of what constitutes the actual, real-life routine have approached to synthesize the established thoughts on routines in a way that is consistent with empirical evidence and provides a convincing, usable framework for further theorizing (Becker 2004). Every empirical study which operationalizes routines-thinking must rely on some sort of a concept, as routines can be messy and non-trivial (Feldman & Pentland 2003).

Becker (2004) has pooled the eight broad characteristics attached to routines in the present literature: (1) patterns of action, (2) recurrent, (3) operated collectively, (4) can correspond to a mindless or effortful task, (5) a process, (6) context specific, (7) path dependent, and (8) skills of organization. The basis for solid conceptual foundations are incrementally building up, yet there is on-going dispute for example on whether routines emerge from the individual to the collective level or vice versa (Vromen 2011). This variation of ideas and concepts can be clearly seen in the theoretical papers covering organizational routines. The use of different concepts halts a directed advancement of the field. Becker (2005) states that three dominant conceptual interpretations can be found in the plethora of recent publications. First, routines are referred to as "recurrent interaction patterns" as they exist in collective behavior, whereas habits are their individual equivalent (Dosi et al. 2000). Second, Hodgson and Knudsen (e.g. 2004) consider routines as dispositions which result in a certain sequential behavior once triggered by the environment. Third, a widely empirically applied interpretation is provided by Martha

[6] Open research questions of different routines-researchers can be viewed at: http://www.gredeg.cnrs.fr/routines/discussion.html (accessed 22.11.2012)

Feldman and Brian Pentland (2003, 2005). They regard routines as generative, emerging systems influenced by artifacts and constituting from an ostensive and a performative side.

The idea of "dual reality" of routines proposed by Feldman and Pentland (2003) has been largely adopted by many empirical researchers (Becker & Lazaric 2009). Consequently, their works have a central position in the co-citation network of the Practice theory school categorized by Hansen and Vogel (2011, 92). The concept has been found credible and usable. One of the main benefits of the ostensive-performative approach is that it allows a routine to be analyzed internally, by penetrating to the deeper level (Becker & Zirpoli 2008). Similar to the case of governance structures in TCE, most routine-based studies have considered a routine to be a "black box" which creates outcomes. These studies have not covered the internal mechanisms and dynamics obtained by routines. This monolithic approach has descriptive power, for example when different inputs and outputs are evaluated without deeper analysis on the routine-at-work. Feldman and Pentland (2005) argue that more understanding is gained, nevertheless, once the distinct parts of a routine and their dynamics are brought to light. Next the interrelated key elements of a routine; ostensive part, performative part and artifacts are explained. (Feldman & Pentland 2005)

Ostensive aspect

The ostensive side of a routine is an abstract or a generalized pattern of the routine. It is used as guidance: It is referred to and accounted for in specific performances of the routine. It can be considered as a narrative or a script of the routine, and because of this the understanding which the individuals have on the ostensive part tend to differ from one to another. As a result, there is not just one shared narrative description of how to perform actions inside an organization. Agency indeed is important in routines. Also, the abstract pattern which the ostensive aspect provides can include endless variations and be highly context-dependent. (Feldman & Pentland 2005)

Performative aspect

Performances are the specific actions which people carry out at specific times and phases while engaged in a routine. The actors have the

personally held ostensive pattern which to follow, yet the performance in practice is inherently improvisatory. This results from the fact that each course of action is novel to some degree. Improvisation and adjustment are needed to cope with the circumstances of different situations. Open-endedness is always inherent in routines which are never merely "played back" like film clips. Performance is then different than the ostensive side, the cognitive intention, as nothing ever goes completely according to a pre-intended plan. (Feldman & Pentland 2005)

Artifacts and organizational routines

Artifacts include the part of a routine which can be physically seen. There can be an immense number of artifacts, as they range from more obvious to relatively unrealized ones. A rather obvious artifact could be a codified standard operating procedure, which would attempt to capture the ostensive aspect and inform it to the performers of the routine. Then again, an architectural plan of an office space facilitates routines to occur in a certain way, making it an artifact. Also non-physical artifacts exist, such as managerial philosophies which guide the maneuvers of an organization. As artifacts enable and restrict the related routines, they also present an important aspect of organizational routines. (Feldman & Pentland 2005)

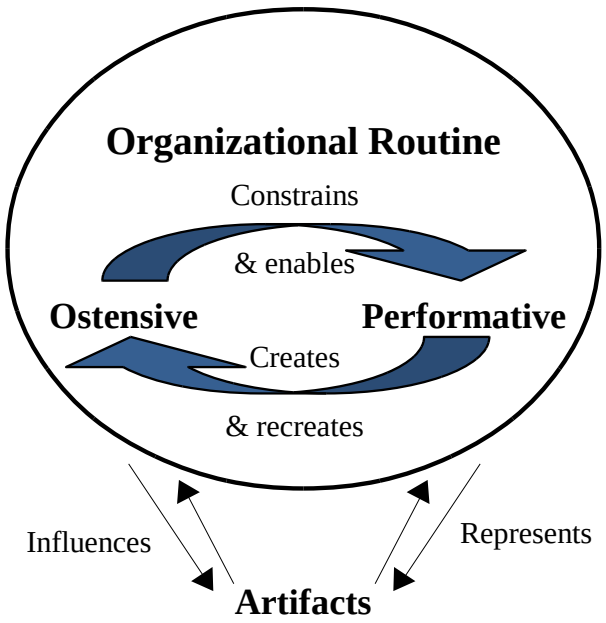


Figure 7. Internal structure of organizational routines. (Pentland & Feldman 2008a, 241)

The Figure 7 above summarizes the key elements and dynamics of organizational routines. It is seen that the two parts of a routine interact with each other while being influenced by artifacts. This is a central issue related to routines, as they are noted to create both stability and change endogenously. For example, if the ostensive part differs noticeably from an effective emergent performance pattern, the ostensive side may alter to capture the narrative of this successful practice. Similarly, a top manager of a firm may impose a new ostensive part of a routine through a process description, changing the actual performance of participants. External stakeholders also have the ability to inflict changes. And while adaptation triggered by internal or external influences may occur, the two parts of routines also act as organizational memory of past performance, allowing repeated runs of a same routine. (Feldman & Pentland 2005)

Lately the role of artifacts regarding routines has been brought to a more central attention. D'Adderio (2011) especially has advocated the importance of artifacts as mediators of human cognition and activity. Artifacts, in her view, are not merely passively guiding and constraining entities. Cognitive and physical artifacts actively shape the nature and outcomes of routines. Labatut et al. (2012) also have advanced this idea by categorizing different sorts of artifacts and observing their role in the change and internal mechanisms of routines. All in all artifacts create an important element in routines. However, artifacts such as operating manuals should never be taken as accurate indicators of a routine as the cognitive and behavioral elements must accounted for. Managers and researchers should not confuse the map for the terrain (Suchman 1995).

To summarize, the ostensive-performative conceptualization of an organizational routine has received merit and attention. It enables researchers to understand the mechanism of a routine which leads to both stability and change. While not exhaustive, the conceptual frame has been able to articulate the past literature of the nature of routines more precisely (Salvato & Rerup 2011). The dynamics which are at play as routines are practiced can be more readily grasped through the dual concept. Without the ostensive side guiding there is nothing to perform, and without the performative part there is nothing to guide. All the elements of a routine then jointly contribute to its performance. This mechanism must be then acknowledged whenever a routine is studied. The same holds for managers in firms, and Pentland and Feldman (2008a)

especially warn managers to beware of the folly of creating artifacts and believing they will then result in certain desired pattern of actions. This "'Naïve top-down-ism"[7] is commonplace activity in firms. On the whole, the presented conceptualizing of routines does not make them less complex or messy, but more informed analysis, evaluation and influencing on them is permitted. Even while acknowledging that organizational routines "have a life of their own" (ibid., 249). The pivotal issues of the economic theories concerning organizational routines are sketched in Table 1. The table additionally includes the much needed, natural follow-up on these theories; the operationalization of routines in empirical studies. Routines are proving to be a promising unit of analysis. (Pentland & Feldman 2005)

3.3 Routines as unit of analysis

The understanding about routines in the field of economics has gradually increased. As part of this, organizational routines are also being empirically studied. What comes next is some insight on how routines can be applied to case studies with routine-based analytical lens.

3.3.1 Applying routines for analysis

The usability of the "dualism approach" has been noted by empirical researchers (Hales & Tidd 2009). With the concept provided and used, more fertile grounds for analysis on evolution and change in economic activities are established. Routines are not fixed black boxes; they are emerging entities with complex internal mechanisms providing change and different action patterns and outcomes (Pentland & Feldman 2005). Notions of stability and change provided by continuously emerging routines correspond with the idea of static and dynamic routines inherent in the previously explained extended transaction cost view. Same routines can provide different outcomes over time since they evolve. As routines guide performance, it is good for firms to realize what kind of behavior takes place now and what can be expected of tomorrow. This can be achieved when the characteristics and the resulting impact of a particular

[7] Expression used by Sidney Winter at the Second International Conference on Organizational Routines (Nice, France, 2005) according to Pentland & Feldman (2008a, 245).

routine are brought to light. This demands a well-constructed analytical lens.

Table 1. Research of organizational routines in the field of economics.

Routines - theme:	Central notions:	Acknowledged contributors:	Example:
Routines in economics	Organizational routines have significance in the performance taking place in firms. Routines drive the utilization of resources and form capabilities. If a routine is an efficient one in its task, it allows genuine competitive advantage. This makes them a crucial element in firm behavior and performance analysis.	Nelson & Winter (1982) March & Simon (1958) Cyert & March (1963) Penrose (1959)	"*...routines occupy the crucial nexus between structure and action, between the organization as an object and organizing as a process*" (Pentland & Rueter 1994, 484)
Role of routines in organizations	Routines coordinate work, allow saving on cognitive resources and capture the learning-by-doings. Therefore they provide stability and change to organizations. They are sticky and complex, not easily created or acquired.	Nelson & Winter (1982) Cohen et al. (1996) Teece et al. (1997) Dosi et al. (2000)	"*Routines as genes*" (Nelson & Winter 1982)
Conceptualization of routines	Routines are contextually embedded recurrent patterns of action which guide collective processes, mindless or effortful. They are path-dependent and contain the skills of an organization. In addition routines are complex multilevel mechanisms.	Cyert & March (1963) Becker (2004) Pentland & Feldman (2003) Hodgson & Knudsen (2004)	"*Recurrent interaction pattern*" (e.g. Becker 2005) Routines are generative, emerging systems constituting from an ostensive and a performative side (Feldman & Pentland 2003)
Empirical operationalization of routines	Routines can be operationalized and applied in quantitative and qualitative studies. This way performance differences can be noted and the causal mechanisms investigated.	Pentland & Feldman (2005) Becker (2005) Becker & Zirpoli (2008)	*"In order to understand an organization and its behavior, analyzing its routines thus seems an appropriate starting point since they capture systematic and endogenous (rather than exogenous or one-off) performance drivers, and what can be considered typical for an organization"* (Becker & Zirpoli 2008, 129)
Current interests and further research	Deeper and more detailed theories as well as empirical studies are required in order to advance "Routines theory". In the future they provide an insightful analytical lens, especially if consensual paradigm comes to being.	Lazaric (2009) Vromen (2011) Helfat & Winter (2011) Pentland et al. (2011)	"*How do everyday individual actions shape organizational routines and capabilities and, by implication, firm performance?*" (Salvato & Rerup 2011, 477)

Both qualitative and quantitative empirical studies have been conducted in the arena of routines. Becker (2005) for example has characterized and

outlined parts of routines which could be researched in quantitative analysis, and event-sequence -analysis is a prominent stream of contemporary research which has allowed systematic comparison and analysis between routines (e.g. Pentland et al. 2009). On the quantitative stream, narratives describing the presence, identity and meaning of the investigated routine are common. These "narrative networks" (Pentland & Feldman 2008b) are often based on the previously described dualism approach, for it allows researchers to acknowledge the distinct parts of a routine (Salvato & Rerup 2011). Other concepts additionally have been used in empirical studies, such as Nooteboom's (2004) branches-nodes-architecture approach which focuses on changes in a routine without penetrating its inner mechanism. Case studies with rich data are found particularly useful, as the tradition of routine-based research is still relatively new and case studies provide the deep insight required to cover the complex workings of routines (Labatut et al. 2012).

Once empirical research on organizational routines is carried out, a level of granularity must be chosen. Not everything can be covered, and the researcher must decide just which topics of the routine he wishes to analyze and in which depth (Pentland et al. 2009). As the unit of analysis, the "routine", is viewed as an action pattern, each researcher defines where this pattern begins and ends, resulting in flexible use of scope between studies (Sari et al. 2007). A choice is also made whether a routine is a one entity or consisting of several subroutines (Pentland et al. 2011). In any case, researchers initially define the routine they are covering in order to focus their attention. In this thesis, two similar yet unique "engineering project routines" are analyzed. This classification resonates with "design routine" case-studies of Gaskin et al. (2011).

3.3.2 The essential areas to be covered in a study of routines

In order to study and identify the complex nature of routine, the relevant areas of a routine must be charted. Several empirical studies have explored detailed issues and nuances of routines. However, in his extensive literature review the author found no widely used framework for studying the key areas of a particular routine. This obviously is a result of the divergent streams of research foci and the relative newness of

routine-based empirical inquiries. Of the recent developments in this field, Pavlov and Bourne (2007) have constructed a framework which provides a sufficient overall description of a real-life routine in its environment. After going through the past empirical literature on routine-based studies, they conclude that combining the characteristics of five categories regarding a routine combines the essential elements which form the unique nature of the studied routine. Their classification of categories indeed synthesizes the relevant issues of this thesis and its focal activity, detail engineering. These categories include: *change, contextual embeddedness, process, nature,* and *attributes*. Salvato and Rerup (2011, 477) additionally follow a similar thread, advocating that the future research of these areas is an important continuation of the routines and capabilities theory. There are several dimensions related to each category. By indicating their state, a holistic coverage of a routine is possible. It is also notable, that in fact a routine cannot be measured but instead identified and reconstructed (Truijen et al. 2007). The dimensions categorized by Pavlov and Bourne (2007) comprise the areas which are to be looked at a routine. Examples of past research on these dimensions is given next (for a thorough review, see Pavlov & Bourne 2007).

The category of *change* relates to occurrence of stability and changes in a routine. Indicating change has been covered in the past for example by observing the rewritings of manuals (Knott 2001) or charting the degree of stability of action patterns via questionnaires (Akgun et al. 2006). *Contextual embeddedness* covers the surrounding environment, in which a routine exists, and its perceived impact. On this, Gossart (2005) charted the contextual influence by analyzing the effects of external regulation to actions, and Howard-Grenville (2005) specified the number and type of organizational structures relevant to a specific routine. *Processual characteristics* depict what is the pattern of actions, i.e. the process, which the routine follows. For example, frequency of particular patterns occurring in a routine (Knott 2001) and the speed of each step of a process (Cohen & Bacdayan 1994) have been studied to enlighten the dimensions of process. Finally, the *nature* and *attributes* of a routine describe the traits of a routine which are of interest in each individual empirical study. These qualitative categories include dimensions such as complexity of the routine (Levitt et al. 1999) and the stickiness of routines (Szulanski 1996). Figure 8 visualizes the five categories of dimensions which cover a routine.

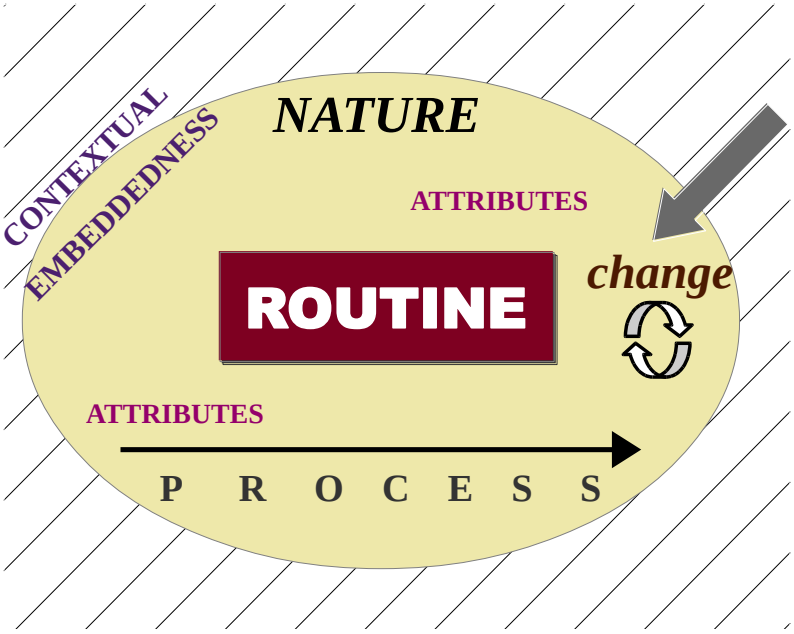


Figure 8. The five focal areas of a routine in an empirical identification. (as categorized by Pavlov & Bourne 2007)

The past empirical studies then have provided a framework with which a routine can be empirically analyzed. While this is a clear advancement, each researcher however must continue to apply the aforementioned framework into the case context. KIBS-related studies for instance must acknowledge the presence and importance of knowledge which is of lesser relevance in other routines, such as the simple tasks of some manual laborers. Simply put, the features of the activity matter a great deal and must be accounted for if valuable analysis is aimed. The perceivably wide and overlapping categories of Pavlov and Bourne (2007) nevertheless provide a standing point from which tailored data gathering methods and research targets can be constructed. This helps in the build-up of a deep, thorough case study on routines.

As routines are complex and changing, it has been questioned how they can be empirically analyzed. Pentland et al. (2011) state that in the (n)ever-changing world, routines remain even as they adapt to changes. Becker and Zirpoli (2008) note that in this context, routine-studies attempt to portray how the pertinent activity is usually carried out while stability and change take place. Here the understanding of how routines are constituted of and operate through the ostensive and performative parts provides the needed perspective. And while routines can never be exhaustively identified or charted with complete accuracy, Truijen et al.

(2007) maintain that the "dualism approach" focuses on what routines really are. Naturally the approach has met critique, for example Iannacci and Hatzaras (2011) state that the conceptualization is fitting but needs to be refined to embed artifacts and social structures more thoroughly to the mix. In spite of these on-going disputes between the scholars of organizational routines, the concept has widely been found meritorious and applied. The two presented frameworks are then used in this thesis. First, the relevant dimensions of a routine-in-action are charted. Second, the concept of how routines construct dynamically from their interrelated parts is acknowledged. By assimilation, these notions provide the analytical lens needed in this thesis: How routine is understood and where it ought to be looked at. Figure 9 exemplifies how the routine-based study is then crafted.

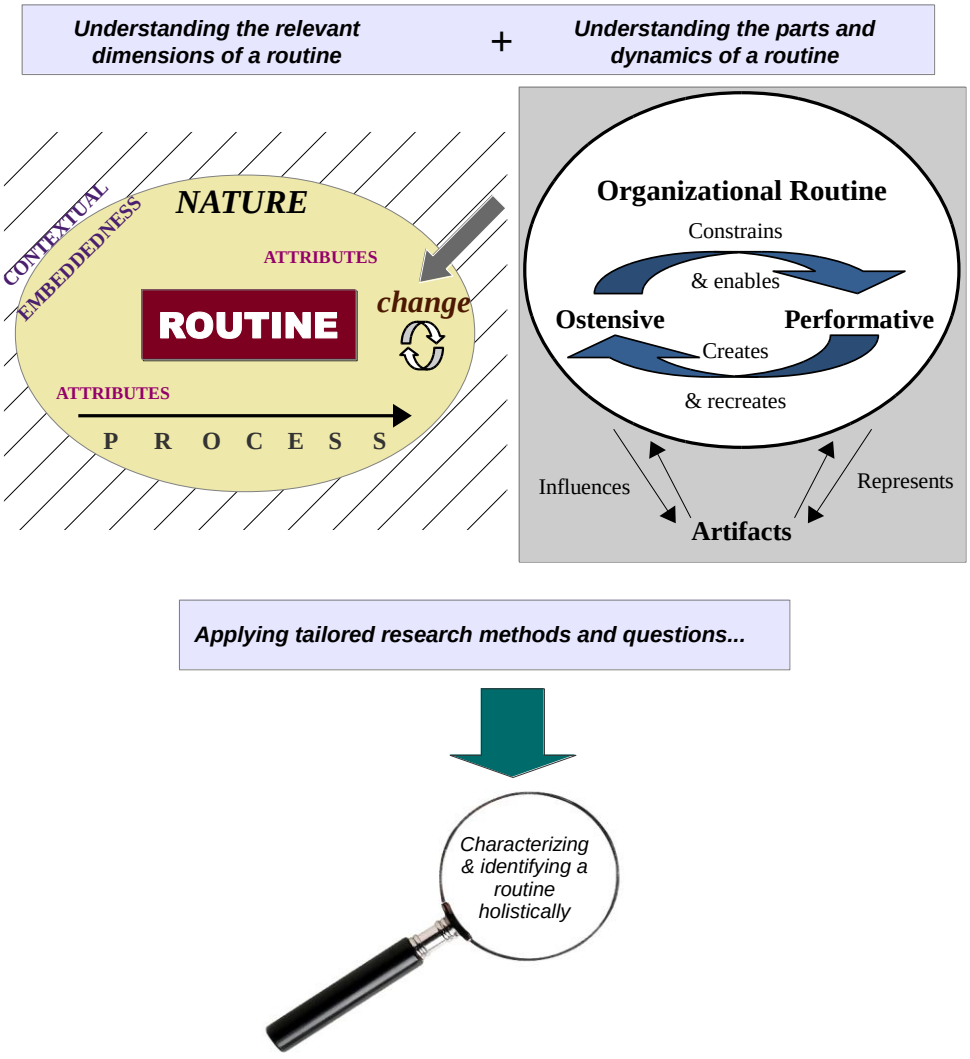


Figure 9. Contemporary analytical lens for studying real-life routines.

3.3.3 Summary of routine-based analysis

The conducting of empirical studies on organizational routines has accelerated in the recent years. Once more clarity has been gained on how routines can be conceived and how they can be empirically studied, the understanding of the performance and change in organizations has grown. Analytical generalization of empirical findings has allowed researchers to identify routines and to conduct cross-sectional comparison between them (Pentland & Feldman 2008b). This thesis follows this common path.

The analytical lens presented in Figure 9 takes routines for what they are: constantly emerging action patterns with internal dynamics. These dynamics are considered by charting the artifacts as well as the ostensive and performative parts. In practice this means that the intentions, ideas, actions and surroundings of the agents (the respondents) are taken into consideration. Consequently, causal analysis which sheds light on the corners inside the black box is achieved, not just viewings on the outcome. Importantly, Pentland and Feldman (2008b) underline that the researcher must realize which part of the routine is being viewed at each point and that all the parts must be charted in order to grasp the true routine. For example, relying on an artifact, like written process description, for creation of the ostensive part does not capture the real situation, i.e. how the individuals view the routine. Also if only some of the actors of the routine are being studied, only partial view is achievable (ibid.). These issues are noted in this thesis. And by adjusting the analytical lens to the field of detail engineering and its nuances, precision and deep insight is gained through the case analysis.

The routine-based approach then allows contemporary identification and cross-comparison of the two outsourcing arrangements present in the case unit. Routines lead to performance outcomes, which means that the accumulation of benefits and costs under a particular governance structure is driven by them. By focusing also on how routines face and create change, dynamic view is present. Comparison of the value obtained through divergent routines in different settings has been studied before (e.g. Darr et al. 1995). The economical outlook and beneficence, in other words the impact of different ways of organizing production is illuminated in this thesis as well, through organizational routines.

4 ENGINEERING BUSINESS

This chapter introduces the focal activity of the thesis: detail engineering. However, the discussion is provided mostly in a larger scope, positioned in the engineering sphere. This is due to the overlaps between different engineering fields and the wide, varying use of the terms "design" and "engineering" in the academia. The insights and issues raised here apply to technical engineering in general. Namely, the chapter covers detail engineering and its outsourcing from the vantage point of project-based organizations. Dyadic arrangements involving continuous operations are of the particular concern here.

4.1 Detail engineering as an activity

To allow structured analysis on the complex activity of detail engineering, its nature, performers and meaning are covered briefly.

4.1.1 Description and meaning

Detail engineering (or detail design) belongs to the sphere of engineering activities. Engineering is a widely used term for activity which includes several technical disciplines and ranges from R&D activities to the relatively straightforward work of drafting technical plans. Detail engineering is done when some pre-engineered technical piece requires design finishing with certain specifications and detailing. In other words, detailing completes the design process and allows customized technical solutions to be manufactured. (Salmi et al. 2004)

Engineering work in general involves finding ways to engineer a required technical solution. This can be a machine, piece of equipment or a plant; anything which requires technological knowhow to find out how a required solution is achieved. The position of detail engineering in the value chain of a manufacturing firm is vital. When manufacturing requires technical documents and plans in order to physically produce a needed product, detailing work finally transforms the efforts and output of R&D and product development into blueprints of customized technical

solutions. Therefore, if R&D and manufacturing operations are seen as the two faces of a coin, detail engineering forms the physical coin, connecting these parts into one entity (for an illustration of the complexities and nature of an industrial manufacturer's value chain process, see Mutka et al. 2010). In research studies detail engineering has however received less attention than R&D and manufacturing functions have. This is possibly a result of its inclusion to either one of these two broad topics when research scope is defined[8].

Detail engineering as a function is nevertheless an important area for manufacturing firms to excel at. Capabilities in mechanical engineering, including the transformation of product development offerings into deliverable final products, i.e. detailing work, have been found to be a substantial differentiator between OEMs (Murmann 1994; Ketokivi & Schroeder 2004). In addition, when technical engineering work produces concrete outputs, they can vary extensively in the value of their technical characteristics. Energy savings, enhanced performance, material use optimization, lowered operational costs and other valuable attributes can be present in the designed products. These attributes differentiate the heterogenic offerings of firms and engineering teams (Viitamo 2000). This is especially relevant in industries in which substantial time and effort are consumed by customers before they decide which expensive technical solution they will invest in. Thus, it is said that engineering has a long shadow over projects. Figure 10 depicts the position, meaning and value of detail engineering to the value chain.

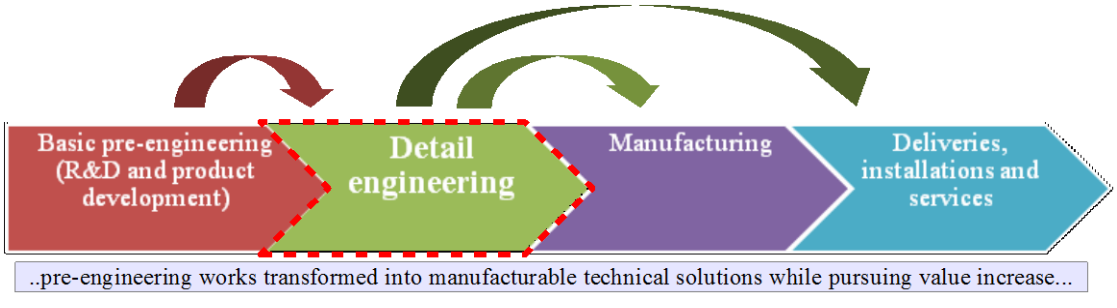


Figure 10. Detail engineering as a part of industrial manufacturing firm's value chain.

[8] Detailing is pivotal. As illustration of this, business class seat customizations requested by competing airline companies have caused severe scheduling delays to aircraft deliveries. The seemingly minor, additional detail design performed by Airbus and Boeing has not been trivial, leading to increased design and manufacturing costs while cannibalizing the vast R&D achievements in fuel-efficiency etc.(Rothman & Jasper 2011)

4.1.2 Engineers and engineering work

Engineers are often highly educated, high-cost workers who utilize their technical knowhow, skills and past experience to their work. Their target is to come up with a solution to a technical problem, and the output of the work is normally a codified document. The design process must take into account the task specifications, laws of nature, bureaucracy issues, safety regulation and other standards and usable tools (Pahl 2007). And all the while it must be maintained that each design part fits well with the entire technical system in all the interfaces. What results is an activity requiring high competence (Kasanko & Tiilikka 1999).

From the description it becomes clear that engineering as activity is knowledge-intensive. Indeed, Ognjanovic (1999) has called engineering a process of information transformation. In business context, this means the conversion of the needs of the customers into manufacturable solutions. Open-endedness is also a part of engineering work, as each task involves novelty of some extent and requires some improvisation by the performer. Therefore knowledge-workers, such as engineers, each act differently (Drucker 1999). They must also possess sufficient IT skills, since computers and other machinery are constantly used in work tasks. Knowledge-based work then demands many traits, and productivity differences between knowledge-intensive organizations are paramount (Beardsley et al. 2006). Engineering work is also often team work, resulting in social interaction which demands "soft skills". To succeed, these skills are sometimes of greater importance than technical competence (Shuman et al. 2005).

In order to perform some minor technical engineering work, an engineer mainly has to have the threshold skills required of each and every engineer. However, when the work gets more complex, a more thorough understanding of the specific product and process must be held. This means that engineers must constantly learn in their work to perform well. In the case of industrial mechanical engineering, changes to technologies and methods do not often appear as radical shocks but rather as incremental continuous development in many areas. The consequential, constant need to learn and to apply oneself offers variation to work, and more challenging roles can be given for designers to motivate and cultivate them. Yet the advancements made on the learning curve are

often closely tied to the specific context, i.e. the product or discipline. For firms this means that productivity gains are diminished if the engineer roster is constantly changed.

Because creativity is constantly present, there is no possibility to create generally usable, thorough standard operating procedures (SOPs) or manuals to guide the work process (Hicks et al. 2002). A general guideline and technical information can be provided however to assist the work, but unquestioning reliance on these can yield harmful results like in the case reported by Ramnanan (2010) where faulty basic design drawings were applied, leading to problems further on the line. Active take is needed, since reliability and validity of the utilized inputs must be certain. The success of engineering team interactions can then rely much on proactive individuals who maintain due diligence (Sari et al. 2007). The existence of novelty and variance also lead to mistakes done in the design phase. These are often human mistakes, albeit intentional mistakes are hardly made due to professional integrity and the possible health and safety hazards caused by ill design to end-users (McMahon & Busby 2005). Mistakes also occur due to poor coordination, which makes the work of engineering managers and team leaders important. However, the shift of the commonly technically-oriented engineers into management positions can be a hard one, since different work skills are needed in these posts (Moretti 2002).

Data, information and knowledge play a significant role in the work of engineers and the success of technical design. They are used and produced along the activities. *Data* is defined as mostly textual, alphabetical or numerical, elements which, once combined with context, construct *information*. *Knowledge* resides at a higher level (Hicks et al. 2002). It is described by Awad and Ghaziri (2004, 35) as "understanding gained through experience, familiarity with the way to do something to perform a task and an accumulation of facts, procedural rules or heuristics". And knowledge in many parts in engineering work is tacit. Engineers can sense and pick up new working cultures, methods and procedures merely by being present. Utilizing knowledge in design however requires thorough individual comprehension on the matters, meaning that engineers need to properly grasp the particular situation and apply their skills accordingly. Accumulation of knowledge on the architecture and nature of a product or a process is vital, since it allows more space to

innovate and ability to apply new techniques and ideas to work, i.e. the possibility to come up with novel solutions which can add value and efficiency (Henderson & Clark 1990).

Harmonized interaction of an engineering team is essential. Physical proximity and working communication procedures facilitate the interpersonal exchange while creating trust, and trust between individuals has been found truly important in the engineering world (Eckert et al. 2001). Trust and familiarity mitigate the ease of sharing and acceptance of information (Wang & Wang 2010). When knowledge bits are shared, accumulated and created over time, learning occurs. This learning may stay with an individual or a team as tacit, or it can diffuse wider and be codified to a degree. Depending on the knowledge gained, in the future it can be reused and refined in similar cases, inside the technical domain, in engineering work in general, or as generic principles in work on the whole (Hicks et al. 2002). For detail engineering units there is a constant need to "do better" (Bessant et al. 2005). Therefore facilitating knowledge creation and utilizing the learned lessons are crucial, as efficiency gains can be achieved (Schindler & Eppler 2003).

With all the mentioned issues in mind, it is seen that the nature of detail engineering is not trivial. Additionally engineers frequently face strict time and budget constraints in their work. What follows is often engineers pursuing to achieve a satisfactory level of results in their design work. Performing well enough is the requirement, and dynamic progress is secondary. Double loop learning, which would involve fixing problems and developing new ideas for the benefit of future projects as well, can be offset by single loop learning aiming to quickly bypass ad hoc problems and to get things done somehow in time (Argyris 1977). Hetzner et al. (2009) indeed state that pressure and focus on short-term issues in firms often leave the much needed development of operations on the shoulders of proactive individuals. The prioritized goals of a detail engineering team could then be concluded as: Production of usable technical documents based on pre-engineered products and in accordance to contract requirements, reaching deadlines, efficient use of resources, meeting budgets, avoiding mistakes, and when possible, learning and developing the work process. Combined Figure 11 concludes the nature of project-related detail engineering performance.

Stage: / Typically present with:	Input	Performance in the process	Output
Project-work	-Technical data -Tools and infrastructure -Manuals, guidelines and reference material -Pre-engineered concepts	-Finding solutions to technical problems -Taking notice of technical requirements, orders, possibilities and restrictions	-Codified documents (technical and possibly others, e.g. "lessons learned")
Engineers	-Technical knowhow -"Hard" and "Soft" skills -Past experience	-Interaction and collaboration with others -Finding a (often novel) way to perform the technical tasks	-Possible learnings and/or development of individual & team work -Acquired knowledge and experience
Nature of work	-Novel to a degree -Requires prior knowledge -Possible attributes: codified, tacit, verbal, dispersed, messy, faulty and/or including gaps	-Knowledge-intensive -"Information transformation" (Ognjanovic 1999) -Open-endedness -Complex while crucial -Variation in methods and actions -Coordination of information and actions paramount -Focus/priorities on delivering, not developing	-Satisfactory, not perfect results -Variation in quality -Undervaluation of and underperformance in long-term development

Figure 11. Detail engineering as a performed process in a project-driven environment.

4.2 The modern engineering industry

As a result of hypercompetitive, fluctuating markets and scattered value chains, engineering operations are outsourced more and more. Next, the challenges faced by engineering units are briefly noted as well as the rationale and importance of engineering partnerships. These arrangements have been growing in numbers recently, and it is precisely this approach the case unit of this thesis has approached.

4.2.1 Challenges of engineering organizations

The machine-building and mechanical industry sector has met the expansion of global markets and competition. For the firms inside the

sector this has brought on new possibilities as well as challenges. While pursuing to create more value to their customers, the firms offer increasingly customized offerings to back up their value proposition. In large firms globally scattered designing, manufacturing and sales operations are taking place simultaneously to facilitate this approach. Synchronizing these operations is essential to reap the benefits of the whole value chain and to allow successful deliveries. Like stated before, engineering activities especially have an important role in this systems integration as they enable physical manufacturing and largely determine the value of the deliverables. (Lu et al. 2009)

The operating logic of the industrial equipment manufacturing firms is often project-based, which requires swift adaptability and dynamic skills from their engineering units. This is because the many different technical disciplines involved are continuously developing, and especially if there is large volatility in the business cycles, the resource base and the cost structures of the firms must be responsive to this (Alajoutsijärvi et al. 2012). Each new project must be tackled. Uncertainty and change are then inherently present in the markets. What has followed is an increasing wave of outsourcing all along the value chain (Hobday et al. 2005). Outsourcing is a way to acquire the missing resources when there is insufficiency in the technological capabilities of a firm which are utilized in production activities and in the dynamic development of technology (Kyläheiko et al. 2011).

Engineering organizations inside manufacturing firms resort to external resources in a growing fashion as well, particularly as the advancements of the ICT sector have significantly lowered the barriers of multilocational cooperation. Considered to be the last wave of the outsourcing phenomenon, the previously secreted and protected engineering activities are now co-produced via networks in many firms (Richmond & Miller 2005). As there are changing and developing technological needs from engineering units, the approach is often to keep the core competence in-house while targeting economies of scale and scope from the market. Absorptive capacity must be maintained to fully utilize the external resources (Cohen & Levinthal 1990). Strategic outsourcing through partnership-arrangements is believed by many firms to alleviate the problems caused by the lack of skilled engineering resources in the market as well as the tough task of cooperating efficiently with the service

providers, the engineering consultancy firms (ECFs) (Holcomb & Hitt 2007). Globally a shortage of skilled engineers is being met and OEMs compete continuously to access and acquire the needed skills from the market whenever the internal resources fall short (Lewin et al. 2009).

4.2.2 Acquiring external engineering services

Engineering services of many sorts are provided by the ECFs. Ranging from turn-key deliveries to professional advising, these firms are heterogeneous and operate either nationally or globally (Salmi et al. 2004). In detail engineering, ECFs provide their engineering workforce to customer's projects. The external engineering contractors then bring their past experience, skills and knowhow to the usable resource pool, and ECFs act as gateway of knowledge diffusion from markets to customer firms (ibid.). As the competition in the consultancy business is also globalized, the firms rely on their references and reputation to attract new customers. Trust is of essence especially in tighter knowledge-intensive relations. This can be seen to reduce opportunistic behavior in established relations. In order to adapt to the dynamic markets and to offer services to a large customer base, professional service firms often approach a degree of productization of their services (Levitt 1981). Even when the success of each particular customer relationship is related to the depth of customer-orientedness and the capability to cater the specific needs of the client by efficient interaction (Schön 1983).

The cooperation of engineering consultancy firms and their customer firms has received attention in the research field. Innovation through – and within – KIBS particularly has raised interests, but as a whole the collaborative nature and dynamics of these relationships has been also examined (Ojanen 2007). The business logics of the parties differ. The ECFs normally attempt to have all of their engineers constantly committed to customers' projects and activities to be profitable through high capacity utilization rate, while the customers themselves hope to fill the gaps of their internal resources to achieve well-functioning engineering operations. Ideally both of the parties reach this goal, and in continuing relationships they learn and develop together through the cooperation. This is why constant one-off market purchases of engineering services are not the optimal long-term option. Hybrid

structures, which constitute of a mix between hierarchical, partnering and market-relying modes of governance, are seen in close outsourcing relations. It is inside these collaboration structures where the actual engineering operations take place, project by project.

The partnership benefits, introduced in Chapter 2, are especially relevant here. For example, by pooling complementary assets together, these hybrid arrangements can create surpluses. In a knowledge-intensive area like engineering, the obtained benefits can be extensive, since utilizing and leveraging the combined engineering assets can happen in many ways. Real options are present, and they relate to the possibilities of refinement of the engineering interactions or the quality of engineering (Saleh et al. 2009). Completely new avenues for beneficial cooperation can also emerge when tight relations are established to jump at opening possibilities brought on by change. This future potential can be the one key driver for establishing industrial partnerships (Forsström 2005), and engineering units strive to gain more reliable, privileged and flexible access to valuable external resources through partnering. Dynamic adaptation to markets, while avoiding risks and exposure through separate ownerships, is often the aim of these units.

Management and transaction benefits are also present in the partnerships of detail engineering. The core functions of an engineering unit are maintained in-house to be refined. They also coordinate the use of variable, scalable and incentivized market offerings. Naturally there are risks and cost issues present as well. A firm may expose its IPR (intellectual property rights) in a harmful way for instance, or it can hollow-out its engineering competence by outsourcing too much in a particular field[9]. Besides maintaining the required in-house capabilities and paying for the contractor work, outsourcing firms also face motivation and coordination cost when they push their partners to evolve with them (Milgrom & Roberts 1992). Figure 12 summarizes the hybrid nature and the perceived strengths of engineering partnerships.

[9] A classic example of harmful outsourcing comes from IBM. Dominating the nascent PC markets in the early 1980s, IBM outsourced most of its PC manufacturing and designing operations. Eventually the firm hollowed-out its capabilities in the field, which resulted in a massive drop of its market share. (Leavy 2004)

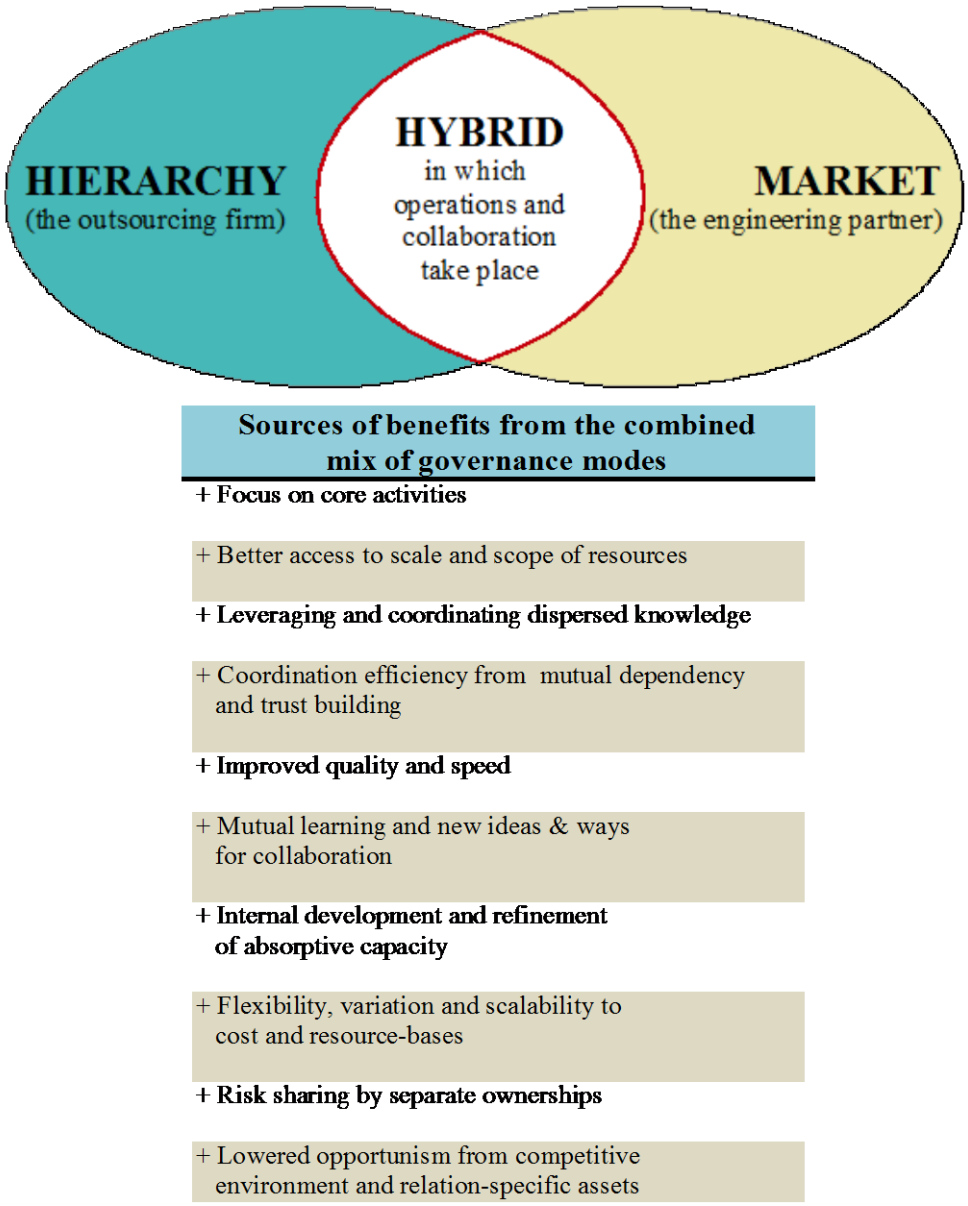


Figure 12. The constitution and available benefits of a typical engineering partnership structure.

The outsourcing of engineering functions through partnerships then involves a mixed hybrid governance mode. There are several benefits available, yet only through appropriate performance inside the projects these benefits come to existence. Good static and dynamic cooperative efforts are needed here, since especially in detail engineering the

organizations must execute projects diligently but also develop their skills and offering over time. This is easier said than done, as focused development is often neglected for the sake of acute operations due to limited resources and time. The pursuit is to exploit the current structure, not to explore new avenues (Benner & Tushman 2003). Technological advancements and the constantly changing world however demand adaptation. When a detail engineering unit chooses to pursue partnering, the resulting performance outcomes of the jointly handled projects must cover for this. This is understood widely in Finnish industries for instance, yet presently there is little awareness of the dynamics, nature and true outcomes of the widely emerging joint engineering efforts between ECFs and their partners (Ahvenainen et al. 2010).

4.3 Partnership performance

From the previous illustration the performance aspect of detail engineering dyads comes to the center stage. Capability to collaborate is according to Ulrich and Smallwood (2004) a trait held by well-performing firms. In this context, this collaboration capability would result in continuous joint creation of partnering benefits between the outsourcer and the outsourcee (ECF). Value is co-created in the hybrid structures when the involved resources are efficiently put to use. If this is the performance outcome, the engineering unit and the entire firm can benefit tremendously, as detail engineering has plenty of value increasing potential and it can create competitive edge.

In order to analyze the performance of any partnership, the performance has to be brought to light somehow. The framework for analysis provided previously by organizational routines is suitable here. As the detail engineering partnerships take place mainly through projects, the "engineering project routine" is an appropriate, studiable unit of analysis at the heart of the partnership operations: the projects. It is in projects where sufficient engineering deliverables are to be produced in the given timeframes. And beyond this static dimension, projects are also the domain where the parties ought to constantly do better through development (Mezher et al. 2005). Studying the engineering project routine of a particular governance arrangement then not only

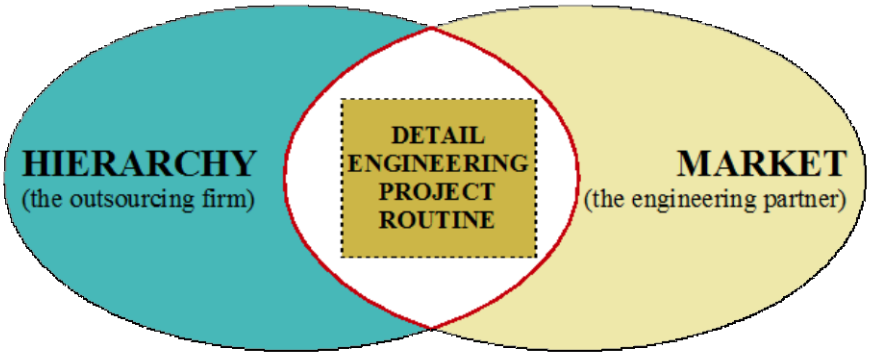
encapsulates how beneficial the arrangement is but also the routine structure, i.e. the causal mechanism, behind this state of affairs. Pavlov and Bourne (2011) on their part advocate routines-lens in performance evaluation for these exact reasons. An engineering unit can then first grasp the nature of its partner operations, and then nurture them.
As it was stated before, the partnering hybrids can allow many benefits from several sources. There are infinite elements which, if present, can create more obtainable value from the project-based work. Project durations can decrease, quality of deliverables and working methods may improve, design mistakes can be reduced, knowledge can be combined and used in new ways in order to achieve gains, learning may occur in the team and individuals, and the available and accessible resources can be utilized more efficiently. Trust building and familiarization of parties can also improve coordination, and mutual dependence and reciprocity can hold back opportunism. These benefits can be the result of many things, but what is important for partnerships arrangements in detail engineering is that the underlying value creating factors are present. This way there is current diligence as well as development. And the firm as a whole can leverage and not merely use the works of its detail engineering organization.

When there are hindrances to project performance and development, value is diminished and there are extra costs met in projects. Also, the relative efficiency of a particular engineering arrangement may become eroded in the long run if it does not develop as much as the other arrangements. Costs accrue for instance if new inexperienced engineers are constantly brought in to perform difficult design tasks in an unknown environment. The organizational routine of the engineering project work must then efficiently *coordinate* the work, establish *learning* and *save on cognitive resources*, as these are outcomes of a routine fit for its purpose (Becker 2005).

Value has no universal definition and form but it is closely related to the concerned activity[10] (Forsström 2005). Based on analysis of detail engineering as an activity and the views of the professionals working at the case unit, Figure 13 provides a summary of the factors creating value as well as the factors diminishing value creation in the performance of a

[10] Efficiency, benefits and value are considered very interrelated things in this thesis. Efficiency in something is considered to create benefits over time, which then again results in creation of value. These are positive things, and they come about from several sources.

detail engineering project routine. The factors are clearly overlapping and implicit; they simply provide an articulated representation of the relevant areas which are of greatest importance in the context of this thesis. The factors in Figure 13 can be manifested in different ways in the real-life performance of the routine, and they stem from several sources. They relate to the current state, development and learning embedded in the routine, and as such indicate how the possible benefits and costs of a partnering approach are truly coming to light. For the outsourcing firm the important thing is that the factors on the left side in Figure 13 are largely present. Then the performance is on the right track, and the trajectory is upwards.



Increasing value and efficiency	Efficiency diminishing elements
+ **Quality increase in the content and usability of the involved technical documents**	- **Mistakes made in the design and process**
+ Increased speed of process	- Hindrances to work completion and communication
+ **Accumulation of knowledge and its put to use**	- **Barriers to learning**
+ Trust building and "coming together" as teams	- Non-functional team coordination and work
+ **Efficient coordination of knowledge and work**	
+ Efficient use of available resources	
+ **Meeting budget and time constraints**	
+ Reducing and avoiding mistakes	

Figure 13. The factors resulting in increased or diminished value in the performance of a detail engineering project routine.

To summarize, it is evident that the routine which takes place in a partnership's operational part, in the detail engineering project environment, should allow efficiency statically and benefits dynamically. This way the engineering unit is from its part contributing to the competitiveness of the whole firm in a sustainable fashion. The outsourcing arrangement is not then merely a challenge but an asset. The desired performance is nevertheless hard to come by, as detail engineering is a complex activity. Suitable engineering project routines can neither be merely purchased from the market, thus making it increasingly paramount that engineering units hone their operations to concretely benefit from the utilization of external resources.

5 CASE DESCRIPTION AND METHODOLOGY

Next, the case unit and its operations are introduced. The nature of a detail engineering project in the mechanical sphere is highlighted. As outsourcing is a crucial matter for the case unit, clarity is provided on why and how the unit is heavily relying on external resources. The main questions relating to the new chosen outsourcing approach are shaped into research questions of this thesis. Review of the applied empirical study methods concludes the chapter.

5.1 Introducing the case unit

The case unit, providing detail engineering services for its firm, is described next. The nature of the project-based unit is brought to light. Also the typical flow of a project is described to illuminate the environment where the engineering project routine takes place.

5.1.1 The case firm and its Detail Engineering Unit

The case firm is a large Finnish industrial company, named "Company" in this research. Company provides its customers with technical plants, equipment and services. The customers are generally large industrial firms themselves. Purchases made by customers are rather large investments made on their part, resulting in thorough analyzing and bidding done before a provider is chosen. As the products and services of Company often situate in the important areas of the value chains of the customers, the quality and suitability of the offerings matter a great deal. In the midst of the heavy competition, especially issues such as peak oil, energy usage, recycling and emissions concerns are related to the industry. Company then offers its customers value by providing tailored solutions and trustworthy, technically capable offerings to ensure that the customers get reliable and fitting assistance required by their business processes.

Company acts globally through networked, scattered operations. Its largest business area includes a detail engineering unit (hereafter named as Detail Engineering Unit, DEU). The unit operates in Finland, though global ties are present along the unit's interfaces. The unit in its current form is a relatively new one and developmental steps are done to allow seamless operations internally and with other Company units. Most of the detailing work is outsourced through ECFs working under DEU's supervision. The unit consists of six departments which handle the needed engineering work of different technical disciplines and documentation. Machinery and equipment design belong to DEU. The purpose and mission of DEU is to provide and ensure the needed detail engineering work regarding customer deliveries. Through their work, manufacturing is made possible. This happens inside the incoming projects. Detail Engineering Unit has to execute diligently the infrequently arriving projects in order to deliver the valuable customized, purpose-fitting solutions promised by Company to its customer. Like in many engineering-to-order units, the changes in the amount, scale and scope of the projects requires a lot from DEU which needs to be agile, light and to keep up with the developing technology demands (Little et al. 2000). The unit focuses on the project performance and cooperation with other project organizations of Company. Product development and technological advancements are mainly left for others to conduct.

5.1.2 General overview of typical project in DEU

DEU's environment is project-based. It is inside the projects where the engineering routines of DEU take place. While working with the entire project organization, the optimal target of DEU is to conduct the needed engineering tasks of a customer delivery as quickly as possible while keeping the costs down. Projects enter the unit as they are negotiated with customers. As stated, the number and quality of the proprietary equipment needed to be designed fluctuates. Regardless, DEU's organization must manage the dynamic demands through its routines. Most of the detailing is done in the mechanical sphere, and a short review of how a project is typically handled in the mechanical department is provided next.

Typical project in the mechanical department

Initial phase

A Chief Engineer (CE) familiar with the specific product is assigned to the project to handle the engineering work needed from DEU. The role of a CE is to act as the liaison officer to other project interfaces and to lead the engineering team of DEU. The team consists of a Chief Engineer and a required amount of design engineers who are attached to the project according to a consensual decision between the CE and the head of the department, Department Manager (DM). Depending on the project, usually 2-10 engineers are taking part in the drafting. The participants can be internal or external workers.

Beginning of team work

In the beginning the CE gets acquainted with the specifications and needs of the project. Based on the technical information he is handed over, he sets up the engineering team and a project kick-off is held. This meeting lasts for several hours, and the team plus additional relevant stakeholders are present to discuss the project and its details. Division of labor is decided, schedules gone over, and the content of the project is gone through. The focus is on the outlook of the project. The purpose of this live meeting is to get everyone heading to the same direction and to make sure the premises for carrying out the project exist. Preconditions need to be in order to allow efficient project work.

Roles and duties of the engineers

The project work, which sets off after the kick-off, is divided between the CE and the design engineers. The Chief Engineer as the responsible person coordinates the work and finally approves the resulting deliverables of his team. He makes sure the detailing work is technically feasible, fits the processes and standards of Company, matches the works of other technical disciplines and departments, and that the deliverables contain the required specifications.

The design engineers carry out the actual drafting work and prepare the required documents. In addition, communication must be upheld with other stakeholders to ensure the right criteria and information is used. The work can be strictly led by the CE or the design engineers may act more independently on their part. The engineers can usually achieve

better results in less time used when they have experience on the specific product, process and project environment. Then they also need to be guided less, allowing the CE more time for other tasks. However, even if engineers have advanced in the learning curve and are self-guided, the validity, reliability and up-to-datedness of the used data must be in order. In essence the CE ensures all the engineers are up to their tasks and are able to perform, and the project must advance along the same lines as the whole customer delivery. Chief Engineers have several on-going projects in their hands, as the engineers may have as well, and therefore time and effort must be divided to several directions.

Guidelines

Process descriptions exist to describe the project flow in broad strokes. In addition there are technical manuals and other assisting documents which are scattered to different locations electronically and physically, and they can be used if a person is aware of them, has access to them and finds it beneficial to use them. The project teams have acquired individual working processes for their projects, and these CE-lead paths are followed by the engineers who adjust to their surrounding environment. Regardless of these tacit cultures, naturally the broad outlines of each CE's methods are similar, since the project outcomes must be similar. Since it is not easy to create design guidelines for complex, changing everyday use, DEU allows this personal take for the individuals and the unit handles and creates written guides loosely.

Change orders

Changes to requirements and specifications often come to light during the projects. They are known to be problematic, as designs may have to be redone and the team's course altered. Originally missing handover information, false information or changed or revised technical data are communicated to the CE as they come up. He then has to inform the engineers on these changes and their impact. This is especially important as the CE must ensure that the work of his team fits together with the whole technical solution.

Tools

The tools which engineers use at DEU are many. Computers with different software and databases are used in practically everything

engineers work on. Network drives and databases allow access for each team member to the relevant data. Design is done electronically, yet additional office staples assist the work. The suitability and top condition of ICT systems is clearly a threshold requirement for successful team work.

Communication

Communication is a very relevant issue in the engineering team's work process as the activity is "transforming information". Official and unofficial talks take place as information flows between several parties in the "engineering community" of Company. The communication loop ranges far beyond the engineering teams. In general, physical proximity allows quick and rich communication methods, but instant messaging (IM) tools, SMSs and emails are also used, for they allow documenting and wide distribution of the information exchange. Distant locations naturally rely more on codified informing. When needed and relevant, such as in the occurrence of a wide scope change, live meetings are held to gather everyone in the same place in order to discuss and to make sure everyone will know what is happening.

Mistakes

Mistakes happen in the design process. Human mistakes occur, false or outdated information can be the reason for problems, or some other additional factor can cause mistakes. The usual work process includes engineer peers reviewing the work of their colleagues before the CE finally approves each document. If a mistake slips through this cross-checking and approval process, it might still get noticed further along the production line, resulting in its fixing. All in all mistakes cause extra work, manufacturing problems and product deficiencies and therefore they create costs. Subpar choices on material usage and other issues also reduce the value gained through engineering.

Project results

The description above summarizes the fundamental elements of a project. Typically a project takes a few months of detailing work. By the end of the project, all the required technical documents have been transferred forward for manufacturing purposes. The participants and the teams acquire new knowledge throughout the process. However these lessons

learned are not actively gathered, although some debriefing sessions can be held to document them. Typical for static performance-oriented engineering units, the utilization and institutionalization of the knowledge created during the projects is not a pivotal focus point in DEU (Schindler & Eppler 2003). Constant development of operations is understood as important, but this development occurs mainly reactively through tacit learning and only sometimes proactively when individuals or small groups single-handedly implement new methods. When the development happens on the side, exploitation is overpowering exploration.

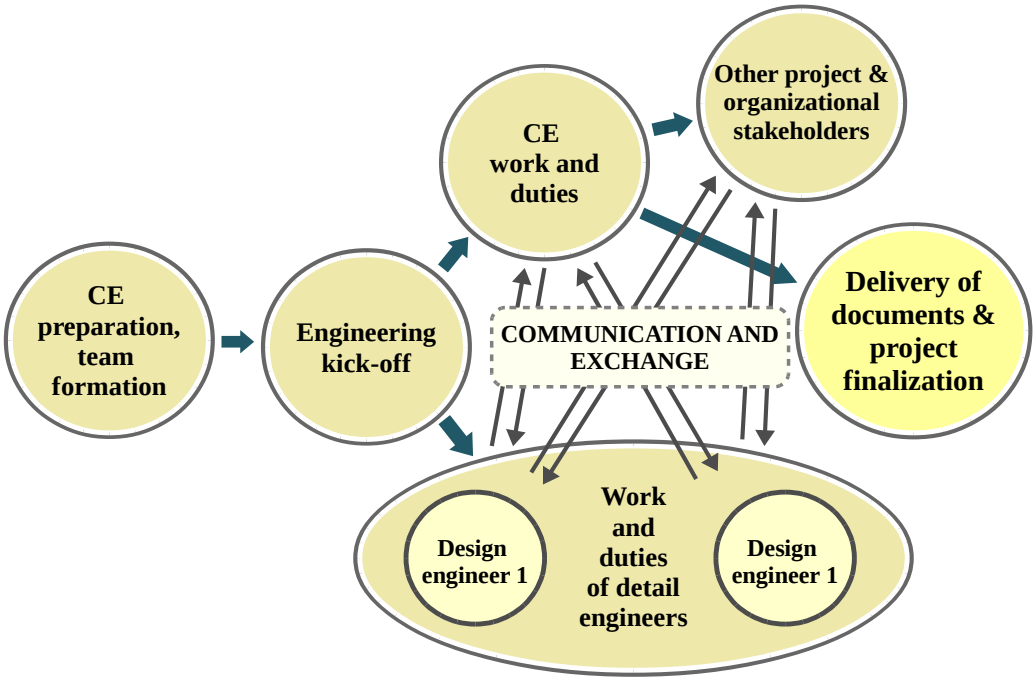


Figure 14. The general process of DEU's engineering project with two design engineers.

The described process, summarized in Figure 14, was a generic view, and ideally the work is carried out without complications in a smooth manner. Deviances to optimal progress however take place, and consequently each project is in some way individualistic. As Gaskin et al. (2011) state, design routines are fluid, and the open-endedness of project work results in varying quality of the resulting deliverables and also the design process itself. The technical aspects are not as complicated here as in some higher-

tech fields such as aerospace industries, yet there is plenty of maneuvering space for innovative design decisions within the teams. This affects directly the value created by DEU for the benefit of Company. Riddled with social interaction, evolving surroundings and a plethora of artifacts, the knowledge-intensive engineering project routines of different settings have very divergent identities. This can be hard to perceive, if the focus is on the surface of the black box that is the routine and merely the outcomes of each project setting are taken into account. Yet for instance D'Andrea et al. (2012) maintain that even in volatile project environments an underlying routine resides, and it is responsible for much of the seen outcomes. A routine-based analysis is then warranted, if the underlying dynamic mechanisms of project work are to be clarified.

5.2 Outsourcing in the case unit

DEU outsources engineering to accomplish its goals. The following shows why and how this is done. The new outsourcing approach taken by DEU is also explained. Finally the central questions related to the impact of this approach are articulated for this thesis to solve.

5.2.1 Rationale for outsourcing

The Detail Engineering Unit of Company has outsourced most of its engineering work. The internal and external workforce holds varyingly around 250 people who work to ensure the fulfillment of DEU's mission. As the amount and nature of work differs from one period to the other, DEU has followed the industrial trend and maintained only the core areas of the work in-house. This means that the coordination of work, highly relevant and constantly needed technical expertise and the management of business processes are carried out internally, while the rest of the work is handled by procuring services from engineering consultancy firms. These firms either operate from their own premises or the contractors come to DEU's office, depending on the case.

DEU has annual frame agreements with ECFs, and these contracts establish the rules of the business relations as well as the price levels of the services. According to these arrangements, the unit then acquires the

needed amount of available, appropriately skilled engineers from suitable providers to work in the engineering projects. Constant negotiating is needed between the parties of these dyadic relationships to make sure the right amount of the needed technical expertise is always available when it needs to be utilized. This way DEU can focus on its core operations while maintaining a proper level of absorptive capacity. When the external capabilities are accessed only when needed, this allows a low cost structure and flexibility for DEU while it also helps the unit to cope with different business cycles. But, amidst the scarcity of skilled engineers, this type of scaling of workforce is challenging.

5.2.2 Partnering approach

Recently DEU has proactively developed a new approach for outsourcing its engineering work. Outsourcing had already taken place due to the "typical" rationale for engineering outsourcing. Now additionally the limited and competed supply of engineering competence from the market, proven track-record of certain service providers, and the will to reduce the number of effort-consuming relations are reasons why Detail Engineering Unit is pursuing partnerships with selected ECFs. These partners have been able to cater the needs of DEU in the past, and trust has been created between the parties to allow tighter connections. Both DEU and the partners essentially look for a win-win situation from long-term cooperation in which collaboration is enhanced over time. For DEU, this approach is meant to allow a light cost structure and a genuinely scalable and flexible network of external engineering capabilities to cover for the occurring needs. For the KIBS-partners, the pursuit is to increase the much needed reliability of continuous demand from a big customer. EFCs also prefer to deal with liked, easy customers.

DEU is not aiming to widely transform its outsourcing. Hybrid structures remain with CEs leading external engineering contractors (design engineers) and no additional functions are pushed beyond the unit's boundaries. Also the prices face no premiums. The closer relations are fundamentally expected to create more trust inside the dyads, and a status of "preferred partner" is to be established. Increased trust is expected to ease the coordination of the project-based operations. In the project working level, better access to ECFs' available resources is targeted. Also

the utilization of these resources is enhanced, as the harmful turnover of labor is to be decreased. In other words DEU can more rely that the proven, experienced contractors will remain in its circle. Both sides expect that their engineering competencies will be mutually increased, thus increasing the knowledge levels of the individuals and the quality of the detailing work. Because these beneficial real options exist, DEU is keen on pushing for these partnerships. Naturally these motives will not automatically turn into benefits, but through the approach the unit aims to secure its operations and to increase the value gained from the jointly handled projects.

Risks are still avoided as the partners in each dyad avoid too much exposure and reliance on one another. In addition, when the arrangements can still be dissolved relatively quickly if any shenanigans or subpar performance exists, opportunistic behavior is reduced. Opportunistic, one-sided moves are also easily perceived in the daily operations. Mutual dependency and reciprocity take place. Therefore hold-up problems are largely omitted from the arrangements. The parties must also preserve their reputation as a trustworthy, reliable actor, and the ECFs especially rely on their image in the market while acquiring customers. The advancements in the operations and the knowledge gained by the contractors are largely relation-specific, creating disincentives for ECFs to steer away from the mission and the spirit of the partnerships. Whatever new is created between the partners, it is of most value inside those very arrangements[11]. As a whole it seems then that DEU and its partners have incentives to refine the relations. Naturally the parties are not naïve, expecting immediate benefits: Long-term collaboration is targeted.

5.2.3 New arrangement with Partner

On the level of project execution, the partnerships do not have an extensive effect on the way the engineering teams operate. One clear step however in the partnership approach has been a setting up of a new project office premises by one of the ECF partners (termed here as "Partner"). Continuous workload regarding DEU's projects is intended to

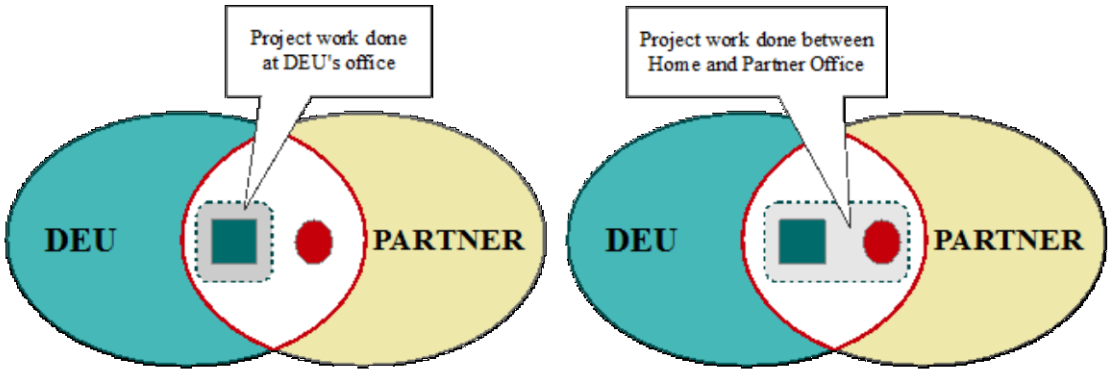
[11] IBM for instance is keeping its high-cost, high-skilled engineering laboratories in Germany intact because the accumulated skills and knowledge influenced by and related to the surrounding environment vastly outweigh other cost-based options (Blau 2007).

be assigned there. This office ("Partner Office") is located a few dozen kilometers away from DEU's own premises ("Home Office"), and visits between the offices are then relatively easy. Partner Office (PO) is a Company-dedicated, secured work space. The sunk costs for creating the office went to Partner. The push for creating this new working space came from the imminent lack of physical space at Home Office (HO) and the trusted ECF's desire to operate from its own office. When the contractors are at PO instead of HO, immediate cost savings accrue from reduced meal and travel compensations. In addition, DEU does not face the many problems of hosting and situating the external contractors. Yet more importantly, Partner can now more easily attach and detach its engineering force to DEU's projects. Scalability is increased, and Partner may dedicate its strongest competence for DEU.

Distance outsourcing through external offices has proven a viable option in the past. In the case of Partner Office, it is acknowledged that the arrangement will not immediately reap high rewards. While the content of project work has not changed, the context has. This matters a great deal in engineering (Gaskin et al. 2011). Regardless, distance outsourcing will likely acquire a bigger role in the future, as the hypercompetitive environment pushes engineering units to utilize the global resource pool, not just the individuals at close proximity. Partner Office has been used in over a dozen projects since late 2011. In this thesis, this novel approach for distance outsourcing which has resulted in the Partner Office arrangement is termed as the "new (outsourcing) approach" while the previous and still continuing Home Office-situated arrangement is based on the "old (outsourcing) approach". The old approach continues to cover the largest portion of work.

The motives for partnering and the rationale for Partner Office are presented in Figure 15. Operating through PO is not a drastic departure from the old approach. Yet, the engineers in the new Partner Office were moved from DEU's premises where they had been accustomed to the people, products and processes to a degree. Due to path-dependency, distance and the complex nature of detail engineering it is not plausible to assume that Partner Office is easily aligned to DEU's operations or that it immediately able to provide the desired outcomes. The many facets of an

efficient engineering project routine do not come together "just like that". But it is essentially the routine which dictates how well the intentions and the possible benefits of this particular partnering move come to existence.



Motives for tight relations with Partner	(Additional) Rationale for the new outsourcing arrangement
-"Preferred partner" status (better access and utilization of engineering skills)	-Lack of physical office space
-Less turnover of contractor engineers	-Meal and travel costs reduced
-Learning and developing together in the long run	-Partner has the will to operate from "home"
-Coordination with more trust, less costs	-Increased possibilities for scalability
	-Adapting to future demands of engineering outsourcing

Figure 15. DEU's motives for partnering and the rationale for the Partner Office arrangement.

5.2.4 Research questions to be answered

From the coverage it is apparent that detail engineering is not a trivial or negligible activity. DEU is tackling the challenges brought on by uncertainty and change by targeting reliable relations with a few suitable partners. In the case of Partner Office, the rationale for setting up the

office is admissible. Regardless, there is currently little understanding on what is the actual operative level performance of the project work in the PO arrangement. Are the contemplated partnering benefits delivered through this performance? How has the routine changed? Is value created more or less over time, when the contractors are shifted to the distant office? What causes this state? In short, is the new approach the suitable step forward that isn't?

This thesis provides a constructed look into the questions above. By this the resulting overall *impact* of the new outsourcing arrangement is clarified. It is done by answering the main research question:

"How beneficial is the new outsourcing approach of detail engineering project work?"

To allow this, two tightly interrelated sub-questions are resolved. The solving of "***What are the unique features of the new routine when contrasted with the old one?***" and "***What does the difference of the new routine imply in economic terms?***" is started by introducing the methodology utilized.

5.3 Research method and process

The empirical study conducted for this thesis was a qualitative one. The main purpose here was to "solve a mystery", and for this qualitative methods fit well (Alasuutari 1995). The mystery is presented in the main research question, which asks how beneficial the DEU's new distance outsourcing approach with Partner appears to be. The question is tackled by building up the identity and the long-term economic effects of the unique "engineering project routine" found in the Partner Office arrangement. These elements denote the essential impact of this strategic maneuver. A reference point is provided by the old, Home Office-based approach. As the new distance outsourcing is a departure from the old arrangement and not a completely novel type of pursuit, benchmarking

allows a meaningful interpretation of the implications of the new approach, as no quantitative data is available to be utilized.

Qualitative case studies have been noted to be both needed and useful in the firm boundary analysis (Macher & Richman 2008) as well as in the expanding field of routine-based research (Becker & Zirpoli 2008). This is because qualitative methods provide deep insight into the specific studied cases, and the idea is to allow analytical generalization to be made (Yin 2009). The usability and prominence of the routine-lens in governance structure evaluation is additionally examined here, and the case organization receives valuable, thorough analysis on this important element of its future operations. No new theories or industry-wide generalizations are aimed to be provided in this thesis. Irani (2011) underlines the importance of case-based, real-world research for the advancement of manufacturing firm strategies and industry knowledge. Due to its descriptive power case research has recently received an acknowledged role also in the more technical-oriented fields, such as software engineering (Runeson & Höst 2009).

The conducting of empirical research qualitatively and especially the consequential analysis of the results demand many skills from the researcher (Voss et al. 2002). Logical, reliable and scientific touch must be maintained throughout the process. The relevant data must be acknowledged and gathered while keeping in mind the time constrains and the limits of the study (ibid.). This research combines elements of exploratory, comparative and descriptive research (Yin 2009). Therefore no theory-based hypothesizes were tested nor were any predefined "truths" set in stone about the case. The research process of this thesis was abductive. In abductive process the researcher goes back and forth the theory building and the data gathering work to build up the research (e.g. Forsström 2005)[12]. This way tailored methods and focal issues of the case were able to be synthesized and taken into account. Case-sensitive touch is warranted in routine-based studies, since routines are not trivial or universal (Salvato & Rerup 2011). The research process is summarized in Figure 16.

[12] The research process involved organizational champions who paved the road for the inquiry, allowed access, provided input and understood the importance of the study. Meanwhile, the author remained with free hands to perform the research from academic point of view. This is a very favorable circumstance (Barnes 2001).

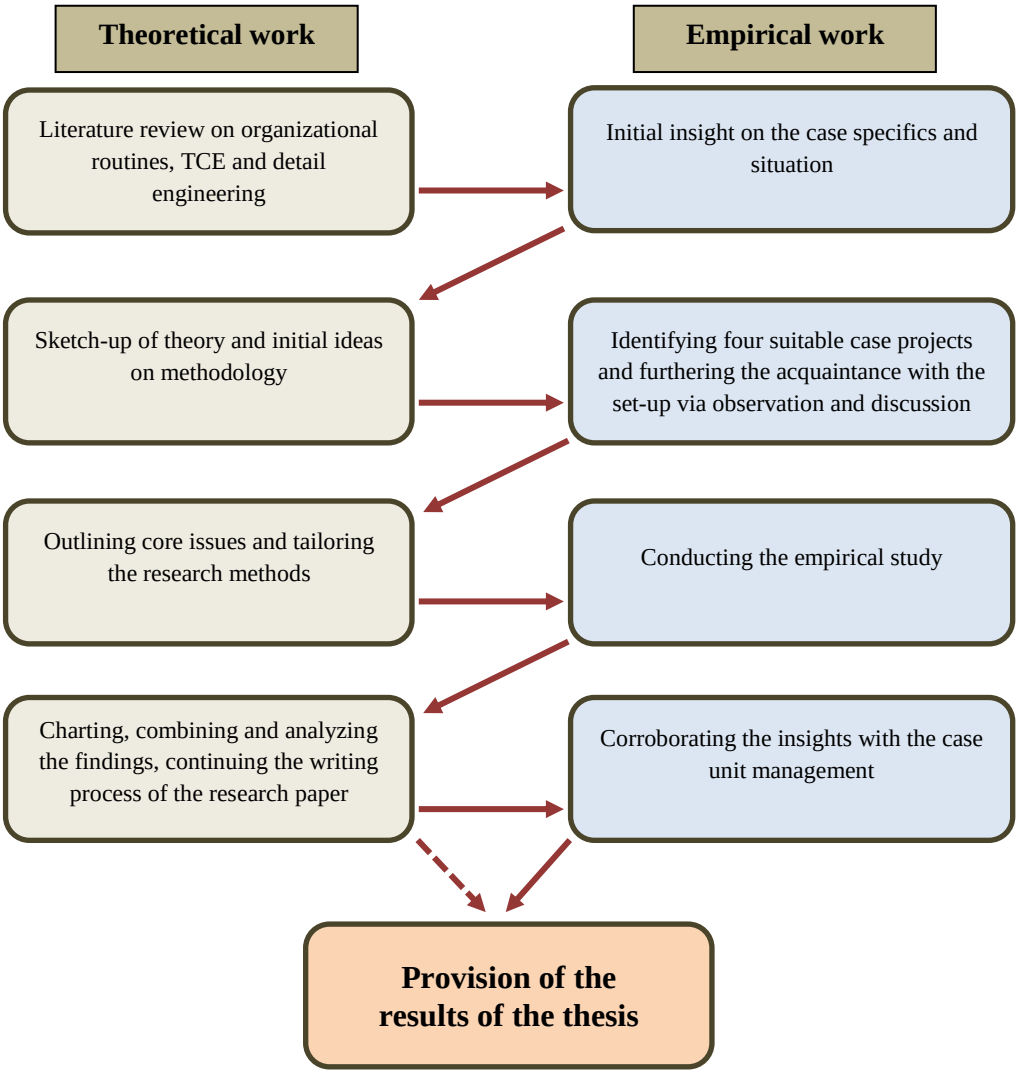


Figure 16. The rough outline of the abductive research process of the thesis.

5.3.1 Case projects

Four projects were chosen for the empirical study. These projects are embedded units of analysis in the same case context (Yin 2009). A project is viewed here as a process which has an "engineering project routine" (hereafter "engineering routine", "project routine" or "the routine") occurring as the driver of the process. Two projects were chosen from the new and the old outsourcing approach. All of the projects had been finalized prior to the research and they resembled one another in the amount of engineering staff and the type of project. Naturally there were differences between the projects, but these ones seemed the most suitable

since they were similar and had occurred recently. A locational move of DEU's office was avoided by choosing finalized projects, and any sudden disturbing event could not affect the closed cases. Relying on two projects instead of one in each outsourcing arrangement allowed generalizations to be made without too much influence from one-off events or individual project nuances. Two of the studied projects were led by a same Chief Engineer, and one of the design engineers was working on both Partner Office projects. This shows how the individuals of the engineering community typically distribute effort and time between several projects.

All the projects were from the same mechanical engineering department to allow cross-sectional comparison. The data itself is rather unique relating to the secreted nature of engineering operations. This secrecy has possibly caused the lack of in-depth case studies in this important arena. 14 individuals were participating in the case projects. Overview of the case projects is in Figure 17.

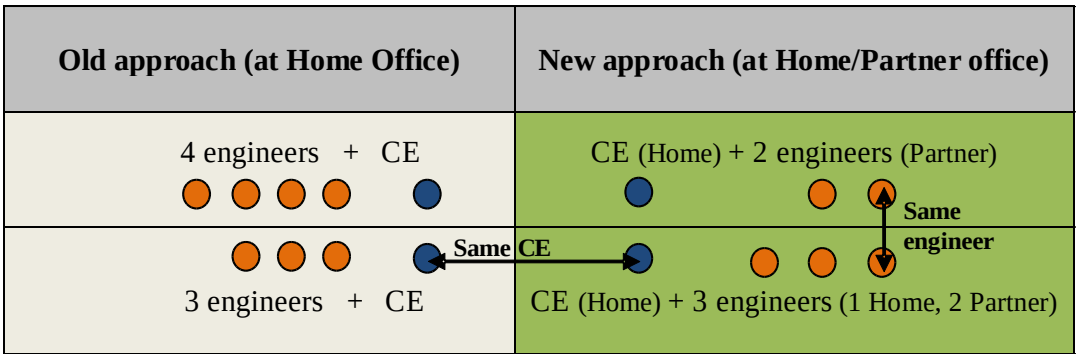


Figure 17. Overview of the four case projects.

5.3.2 Identifying the unique constitution of the new routine

The first sub-question asked what makes the routine of the new approach unique from the old one. For this analysis, the two widely used routine-study approaches, identification and cross-comparison, are used. The underlying reason for this part of the analysis is that the engineering project routines of the two settings are seen to deliver their performance outcomes over time.

Tailoring is required whenever routines are to be characterized in a meaningful way in their environment. In this thesis, the analytical lens for studying routines, which was constructed in Chapter 3, was utilized. This allowed the acknowledgment of the different parts (ostensive, performative and artifacts) and the dynamics of routines (Pentland & Feldman 2003). Additionally the routines were charted according to their relevant dimensions (Pavlov & Bourne 2007). To add to this, the specific, central issues of detail engineering project work as a value creating activity were focused on. This was done by targeting the investigation on the sources which create benefits in engineering project collaboration between partners. Consequently insight was gained on how these sources, presented in Figure 12 in the previous chapter, were present and leading value to be created as a part of the routines. Also the complexities of the knowledge-work in question were taken into consideration.

Questionnaires and interviews were used to perform the empirical study. This approach has been utilized in engineering routine-studies for instance by Gaskin et al. (2011). Questionnaire is a time- efficient tool which can be used to ask specific, closed questions in an effective way. Interviews allow in-depth data gathering and are time consuming, but they make clarifications and follow up questions possible (Barnes 2001). Both of the methods are widely used in case studies and together they form a more reliable methodology for investigating than they do individually (Robson 1993).

The questionnaires charted the opinions, ideas and recollections of the particular projects and the working environment. Each questionnaire was tailored based on the status and location of the individual. Open text fields were encouraged to be used to elaborate on the answers given to direct, statement-like questions. Both particular performances and general views were charted. The questionnaires did not focus on quantitative analysis but provided complementary data for the interview sessions. In the semi-structured interviews the progression of the particular project was gone through with the respondent. These sessions allowed free discussion and in-depth coverage. The respondents also had the possibility to enlighten the author on various relevant topics, since no pre-determined “truths” or narrow discussion views were enforced by the author. The performance and the evolution of the routines were then considered. Dynamic view

was included by charting the propensity, possibility and likeliness of different changes which would shape the routine from its current form. Appendix 1 covers the main content and elements of the used methods.

Data gathering took place in a 6-week period during the summer 2012. The quieter summer season allowed time for the respondents to participate fully. Each questionnaire was always sent first electronically to the respondent to be answered in a few days' time. After the submission of the questionnaire, the answers were preliminarily gone through by the author. In the interview which followed a few days after the submission, the questionnaire with its responses served as heads up for both parties. The written answers were elaborated on as well as clarified, and the author's interpretations of them got verified. The open discussion allowed several topics to be covered. The interviews took place in quiet, appropriate meeting rooms in suitable times for the respondents. The 14 interviews, lasting from 45 to 75 minutes each, were recorded and transcribed nearly verbatim soon after. All the related individuals took part and provided useful insight. Archival data and informal discussions with other stakeholders were used to clarify the picture even more. The organizational champions and the realized importance of the study assisted here tremendously.

The gathered data was explored to find a general thread which to follow. As all the project participants were involved, a holistic coverage of routines was achieved instead of only partial views. The findings were generalized into narratives, a common method in routine-based case studies (e.g. Rerup & Feldman 2011; D'Adderio 2010). These "narrative networks" explain how the ideas, performances and artifacts related to the routine determine how a project is usually carried out (Becker & Zirpoli 2008). Caution was exercised to make sure no biased opinions or misguided statements had too much influence on the build-up of the analysis. While the results will obviously not present an exhaustive and completely accurate coverage, a required depth is believed to have been gained.

The narratives serve to grasp the underlying routines of both approaches. They also make comparison possible. In order to realize how the newly emerged routine is a departure from the old, the unique and divergent

features of the new routine are identified. Naturally the routines have similarities, but the new one includes influential differences. By focusing on these areas, it can then be perceived how the value creating mechanisms of the new approach, the novel outsourcing arrangement, contrast with the old. The impact regarding the routine is revealed. Figure 18 summarizes how the routine-based lens allowed the identification of the new, different type of a routine.

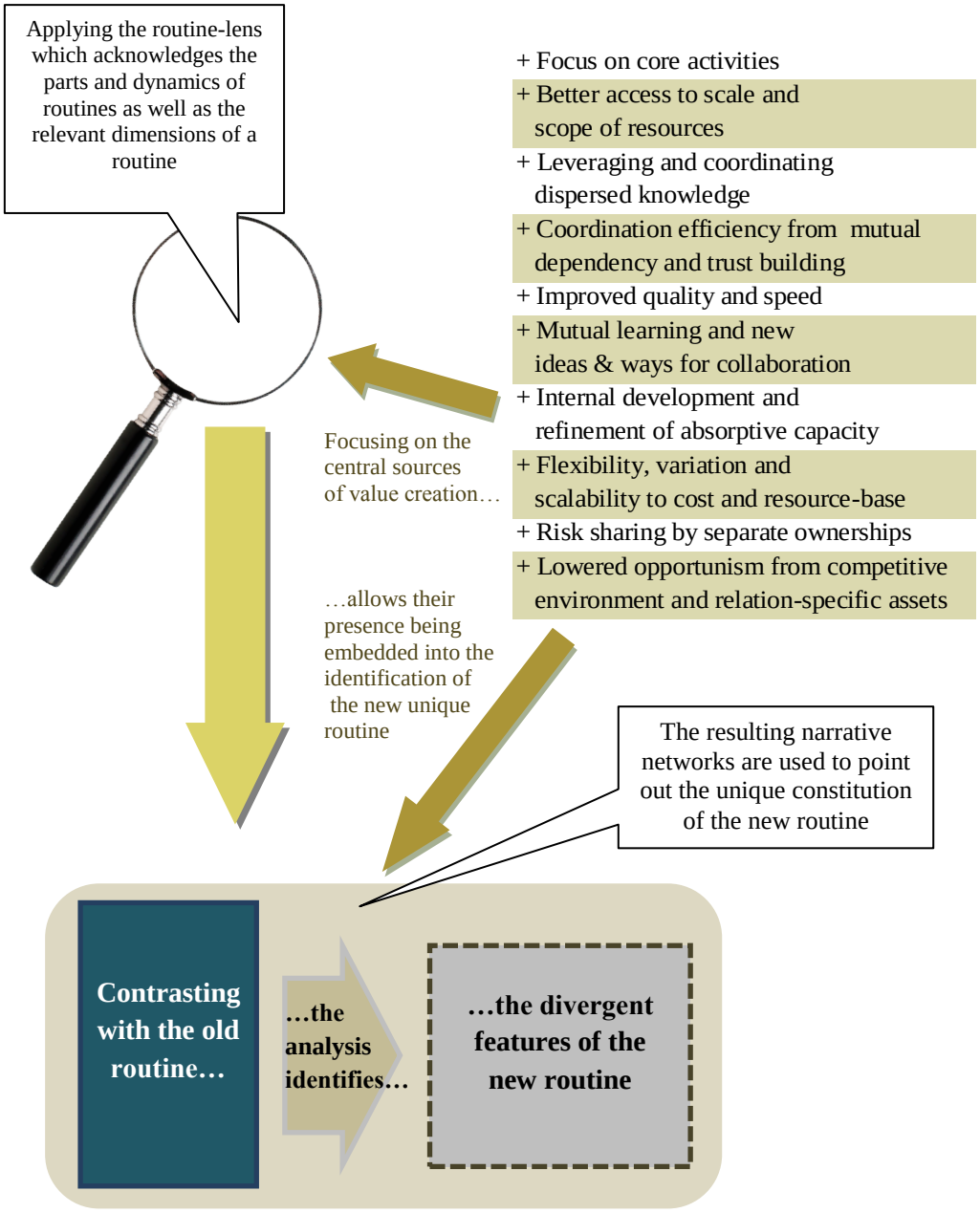


Figure 18. The empirical research process identifying the unique, new routine.

5.3.3 The economic impact of the difference of the new routine

Solving the second sub-question transforms the answers provided to the first sub-question into economic meaning. The impact caused by the different features of the new arrangement, specifically its routine which results in performance outcome, is evaluated. As the performance has changed, also the value implications of the approach have altered from the old. This is an important issue for DEU, since the routines should be able to provide current efficiency and long-term benefits. Exploration, not merely exploitation of resources is warranted. Benchmarking with the old approach is needed here to provide a proportional viewing, as it is not good to accept a new pursuit which delivers less valuable results and the state of which should become enhanced. It is important to remember that in this thesis the focus is on the continuous project work and its state. Wider issues related to partnerships and Partner Office are not the focal points, as the project-based DEU relies on the performance received inside and along the sequential projects.

The economic analysis positions itself on the observed unique identity of the newly emerged routine. This identification, categorized into distinct areas, is embedded with insight on how the sources of value creation are differently at play inside the routine as opposed to the old. Therefore it is possible to note how value creation is being increased or diminished as a result of this novel arrangement of production. The investigation utilizes Figure 13 from the previous chapter, which summarizes the possible factors which increase or diminish the creation of value in the detail engineering project work. By reviewing how these factors are being manifested as a part of the routine, clarification is received on how well the possible benefits of the collaboration are being seized over time and at which costs. As a whole an overall outlook on the impact of the governance structure is then achieved. The beneficence of this strategic option comes finally to be shown when its benefit and cost implications are derived via the extended transaction cost framework. The fundamental concern here is that organizations should optimally pursue a mix of governance modes which economizes the sum of costs while maximizing the obtained benefits, or, value, in dynamic terms (Blomqvist et al. 2002). Figure 19 visualizes the analysis on the economic impact of the new outsourcing arrangement.

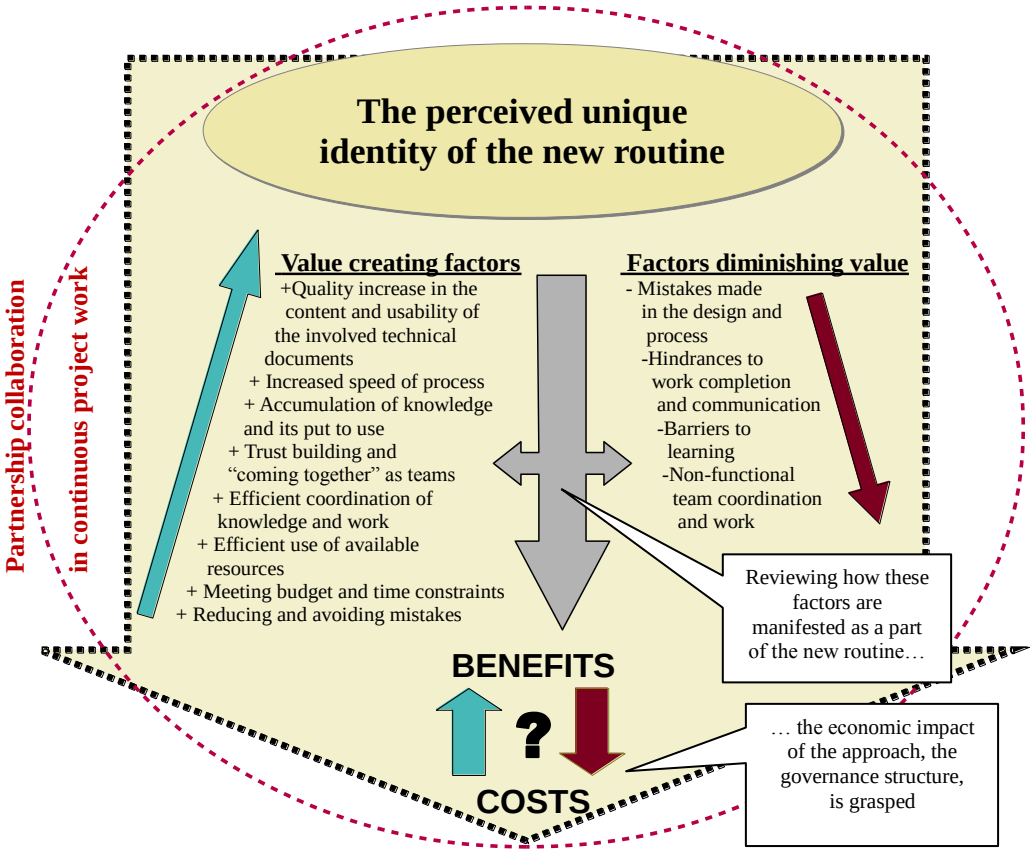


Figure 19. Analysis of the economic outlook of the governance structure resulting from the new outsourcing approach.

The routine and the economic analyses are based on subjective evaluations of the gathered data. Oxley (1999) suggests that empirical analysis on governance changes has been elusive for it is difficult to isolate impacts and the relevant dimensions. Transactions costs and benefits arise from several sources over time, and their quantification explicitly is impossible[13]. Therefore an overall focus is required. Actual costs of each project are also unknown due to accounting complexities and the use of different licenses etc. in the design duties. Costs are additionally viewed here on a wider perspective than mere monetary transactions, as for example continuous activities which demand more time and effort from the individuals than other duties are costlier overall. The coverage applies itself to the case situation, and therefore the relative impact of each economic factor is acknowledged. This way the qualitative approach provides meaningful results for DEU while the nature of detail engineering projects is considered.

[13] Viipuri -laureate Sidney Winter rather comically dismisses the use of pure mathematics when evolution and performance are to be observed and analyzed inside firms. It would be impossible to narrow down and to quantify the behavioral elements to any purposeful meaning, both for academic and professional arenas. (Winter 2006, 126)

5.3.4 Reliability and limitations

Ostensive and performative aspects are possible to be drawn from participant responses (Pentland & Feldman 2005). This increases the reliability of the approach, especially when the so called "objective" measures regarding organizational activities do not necessarily yield data any more objective than perceptual measures supported by logical framework for analysis (Ward et al. 1998). In addition, the use of two case projects in both arrangements allowed a more general routine-based description to be built. The presence of one same engineer in two different case projects, and a CE involved in both outsourcing approaches also fortified the construction of the distinct identities of the routines. Interviews and questionnaires complement each other well (Harris & Brown 2010), and the data received from the respondents followed similar lines, assuring that credible, trustworthy answers were given. While DEU's management corroborated the credibility of the used framework and the findings, it is believed the empirical study is reliable.

Naturally there are limitations to this study. Longitudinal study would provide more data on how the routines are shaped over time in different engineering teams (Pentland & Feldman 2008b). This was not feasible however, as the time constrains of the thesis do not allow long periods of data gathering. Dynamic issues were then investigated based on the past progression of the routines as well as their likeliness and propensity to change. Wild speculation of the future beyond that is not plausible. This is inherent in real-life research. In addition, direct observation of performance would have been useful yet tremendously difficult with tacit knowledge continuously at work in separate locations (ibid.). The limitations of the study arriving from the author's limited skills were alleviated by a thorough literature review and analysis, backed up with a logical study framework.

5.3.4 Summary of the study and answers provided

All in all, the research framework tackles the main research question. Routine-based evaluation of the economic impact regarding the novel arrangement is done. This process allows the evaluation of the beneficence of the new outsourcing approach as a departure from the old. Figure 20 portrays how the main research question was answered in this thesis.

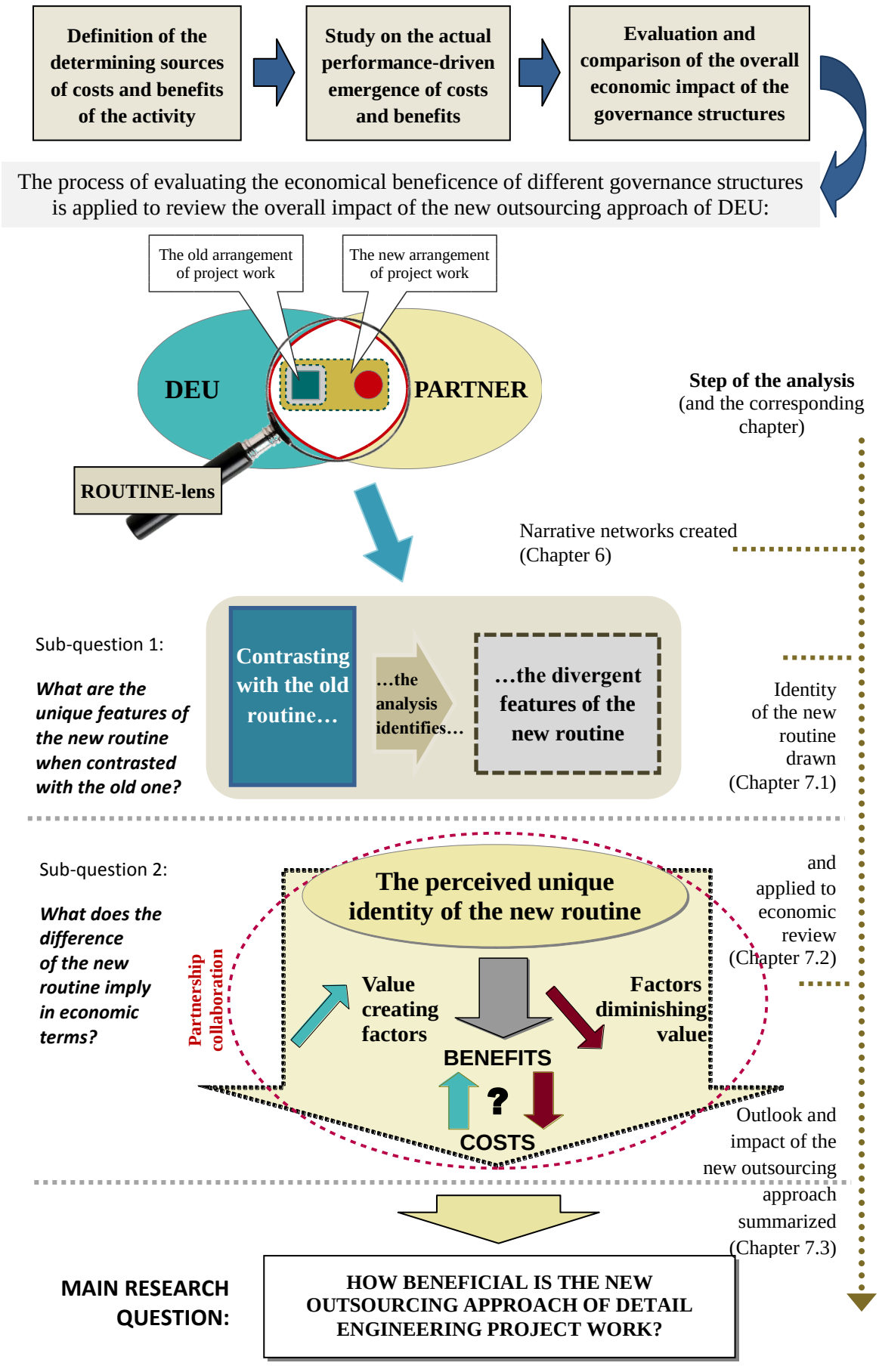


Figure 20. The empirical study process and its answers.

6 FINDINGS OF THE EMPIRICAL STUDY

After the data was gathered the material was meticulously put together, broken down to pieces and synthesized to give responses to the relevant questions. With the aim of creating a description of the routines, the general tendencies and the issues which seemed most influential to the topic were aggregated. How projects are usually carried out in their environment is then clarified. The narratives are based on the combined results from the respondents. The issues presented naturally do not apply to each individual and project *per se*, yet the descriptions below illuminate the underlying nuances of both approaches. The subchapters are rich in description, as cutting corners in the narratives would omit several important issues causing the perceived combined outcome of the routine. Particular focus is put to see how the routines fulfill their organizational role of coordinating, facilitating learning and allowing savings on cognitive resources (Becker 2005). These are shortly noted after both narratives.

6.1 First narrative: The routine of the old approach

Lighting up the projects

Both of the projects were started officially with a kick-off meeting. The individuals involved prepared for the projects differently, with engineers attempting to get previous work duties finalized, and the CEs (Chief Engineers) preparing and gathering the project data to the best of their abilities. One of the projects had had a very slow start with extensively prolonged project handover to the detail engineering department. The other project did not face this sort of trouble. In this project, the majority of engineering work coordination was to be handled by an experienced engineering contractor while the final responsibility and leadership rested upon an engineering manager of Company. In broad strokes the projects were organized in a very typical manner, the respondents noted.

Initiation of project work

In the kick-off sessions, held at the premises of Company, the project specifics were introduced and discussed. Mainly the participants had already heard of the project through unofficial talks, but these live meetings finally got the participants acquainted with what was to be done.

Covered in the kick-offs were product design sheets; documents which provide the central technical data of the equipment which is to be delivered to the customer. Also the general arrangement (GA), which acts as the bridging element between the several technical substance providers of the project, was examined. Both of the projects had gaps in the initial information of the technical specifications. This was noted to be the unfortunate yet usual state of affairs. Nevertheless, the responsible engineers of Company had created an Engineering Plan document for their project with the information that was available. Engineering Plans (EP) include the engineering team, division of labor, schedules, document coding principles, standards and design criteria to be used, storage place of files, and other essential project elements. One of the projects took a stand to pursue the creation of lighter design models to boost robustness for change, and individual project-based learning targets were set. The EPs do not have a standardized format, but they are mandatory for each project.

Besides the issues relating to the initial technical data of the work and the Engineering Plan, reference material and additional topics were gone through regarding the projects. As an example, the protocol on using Engineering Data Management (EDM) was underlined. EDM is the central IT system with which design documents are shared, shaped and stored. Also important lessons learned from past projects were brought to everyone's attention. For instance, in previous projects there had been problems with engineers creating designs which did not take into account the component assembly order of the installation procedure of the equipment. Issues like this can be excluded from the thinking process among the detail engineers, but they cause problems and troubles further on in the manufacturing and installation chain. As a whole, the kick-off meetings provided the direction and means which were to be followed by the engineering teams.

The surrounding context

Not all the engineers taking eventually part on the projects were present in the kick-offs. This shows particularly the nature of the work done at DEU, since project scopes and schedules face changes when more information is given to the Chief Engineers. As a result, the roster of the engineering teams live; some engineers are taking part only on part of the project, engineers can work in different stages of the project, and the

work advances at a different pace between the design modules. The teams live, yet they contain a hazy core. For these narratives the centric groups acted as respondents.

Restricted possibilities to "do better"

A key element in the charted projects was the ever-flowing changes coming from other stakeholders. As the projects proceed at different speed in different units, the specifications were altered, revised, and modified along the projects, requesting an adaptive touch from the engineering teams. The performance-oriented role of Detail Engineering Unit was clearly present. DEU is not to develop the specific proprietary equipment masters, known as concepts. Product Lines are responsible for their maintenance and development, and DEU merely assists on this on the side. DEU's mandate is then to provide tailoring to the basic engineered product concepts for the customer delivery purposes. And while the organizations collaborate, DEU on its own is not to touch the concepts. The organizations must constantly interact, as the life-cycle of the manufactured equipment spans far beyond the detail engineering phase. Technology, supply and service viewpoints are to be considered, thus making any "unofficial" DEU-designs ill-suited for Company purposes. As a whole, DEU's projects must then follow a fine line, and development can be done mainly in other areas, such as in the way the teams handle their projects. The unawareness of the direction Product Lines are heading at is creating barriers for proactive preparations to do this work, and some issues which are relevant to DEU's detailing are not in the priorities of Product Lines, causing their omission from product concept optimization. This takes away chances to "do better" truly effectively.

Openness and tacitness

An important ingredient of the projects was also the organizational culture prevailing in the unit. The engineering contractors were considered to be equals in the engineering community. Full access to places and data was provided if necessary for the projects. The idea of "one big family" was noted to be appreciated by the respondents. Company was liked both as an employer and a customer. Some contractors stated that they had been treated as second-class citizens in some previous customer firms, but regarding Company, which has ranked high also in the annual Best Finnish Employer –surveys, the opinions

were positive. Accompanying the open atmosphere of the detail engineering community in Home Office was the departmental managerial mentality. Low-authoritarian, project-centered management prevailed. The CEs were given relatively free hands to arrange their engineering work and teams, and what had resulted was an organization with several divergent methods for handling project issues. While allowing the stakeholders to act according to the changing environment, the culture of the rather new organization also lacked a clear description, a generic thread of the usual work being done, as the methods, culture and organizational knowledge were largely tacitly embedded in the particular individuals and processes.

The content and style of the documentation of the case projects varied. Kick-off meeting memo, Engineering Plan and a design review are the documents required from each project. While other documented data exist, such as the designed, checked and approved design documents, grasping the actual path followed by an individual project by sole reliance on the documentation is impossible. This is due to the fact that the projects include various, complex steps which would be very time-consuming to document, if indeed even possible. Closely related to the novelty and complexity met by the projects is also the state of codified guidelines and manuals. These documents were stated to be constantly evolving, as the design process and the technology advance. Besides this, it is not possible to provide exhaustive guides for all the problems and issues faced by the engineers and they must therefore always ultimately rely on their own thinking. It became obvious from the answers of the respondents that several assisting documents do exist, but their use, location, content, usability and relevance were not anywhere near of an optimal state. Process descriptions additionally provide a simplified overview of actions and steps of different stakeholders, yet they fail to incorporate the nuances and true progress of these detail engineering projects, resulting in their omission from use in the hands-on work. As a whole, no universal protocol or management of textual guidelines considering the project-related work was to be found.

The social aspects of work

The engineers taking part in the two projects formed a heterogeneous group. Some of them had years of experience on similar projects, while some were newcomers, entering the engineering community through the studied project. This affected the projects, as newcomers needed lots of

guidance, teaching and learning to act appropriately. Furthermore, the experienced engineers influenced the flow of the projects with their expertise while continuously assisting the newer engineers. During the projects, the participating engineers got to know each other better and work more efficiently together. In other words they "came more together". The turnover of labor all in all is considered to be low. Generally the main engineer group remains the same. This has allowed learning and development of the CEs and the engineers, internal and external, while efficiency gains in performance have also been met. Mainly changes occur by newer contractors being replaced or moved to other organizations, although the growth of Company has now required more and more engineers, hence the setting up of Partner Office. The changes occurring to the roster are tied to the need and availability of suitable engineers as well as the perceived skills of each individual.

Good deliverance on the projects

As a whole it is easy to see there were many surrounding issues influencing the project work and performance. With the positive and negative effects of these artifacts, the general routine existing in Home Office seemed to lead to good performance overall. The project durations and budgets did not blow out of hand even with change orders and scope increases met by one of the projects. The fluidity of the routine allowed this. The Chief Engineers were satisfied with the involvement and performance of their engineers, and the engineers themselves felt that they performed well and knew their roles. The respondents felt their competence was put to use well, for example the 3D modeling skills of one engineer were put to good use.

No external influence or disturbances were perceived by the engineering teams. In general the environment was said to be peaceful for work purposes, and the engineering contractors were in almost no contact with their own employer firm: they acted as if employees of Company. Some even felt they were more part of Company than their own firm. The superiors in Company neither influenced the work, and the projects met challenges mainly due to the change orders and the efforts required by other on-going projects.

Closely-knit participants in a resourceful environment

The close proximity of the engineering teams was an important factor in the projects, in their coordination and communication. With the

engineers seated close to each other, interaction was frequent and rich. Tricks to software usage, interpretation of hand-written figures and texts, experiences on the use of a certain material in a certain place; these are some of the topics which were discussed inside the project work of the engineers. The knowledge pool of the teams was genuinely utilized widely in both of the projects. The benefits of closely quartered engineering teams were widely acknowledged and a categorical "yes" was expressed to the ease of interaction. It was explained by an experienced respondent that in the past a project was being executed by engineers situated in two different buildings, leading to vast difficulties in coordination. As a result the approach nowadays is to keep the collaborating engineers in the same premises at Home Office, and indeed the engineers felt that even the slightest distance to someone was hindering the interaction. A Chief Engineer noted however that a small space between CEs and engineers is a positive thing, as then the actively communicating engineers have at least some barrier preventing them from asking questions spontaneously. This leads them to figuring out more things by themselves. The comment encapsulates the fact that the interaction at Home Office was active, and the busy, burdened CEs had difficulties, missing possibilities and consequential reluctance to devote their time and efforts extensively to any single instance.

The steady flow of information and constant communication among the teams benefited the project work. While some of the information related to the projects did not reach all the engineers immediately, water cooler talks and casual chatter also allowed the sharing of news and the situation of the project. On the side of verbal talk, emails, phones and an Instant Messaging (IM) tool were frequently utilized. These textual tools especially allowed storing and further diffusion of the discussions and decisions for storing and monitoring purposes, and the use of visual representations regarding technical drawings was made possible by online screen sharing and exchanging screenshots. This was done mainly when face-to-face interaction next to a work desk was immediately not either possible, sufficient or necessary, since walking up to another team member and discussing acute matters was easy and effective. Only one engineer, who was relatively new and seated a bit further away, felt slightly detached from the community regarding the two projects, and his minor distance and the results of it were noted also by the others. The

participated engineering contractors from two different ECFs noted to be pleased to work in the environment of DEU.

Alongside the continuous discussion and collaboration efforts, several meetings were held in both projects. One of the project teams convened every two weeks or so, depending on the necessity and the possibility, and the other project team met almost weekly after the CE had been able to manage the initial problems relating to missing information and the required extensive up-scaling of the amount of engineers. The live meetings went over the project, the occurred and possible changes, and the individual status of the engineers. The meetings were found very enlightening by all the engineers, and the CEs regarded them as imperative to make sure all the relevant topics are made clear to each member of the team. These sorts of meetings are also advocated by the management, since it is important to keep the CE on the map and each individual of the team heading for the same direction. Meeting memos are documented and emailed to participants, making it even easier to remember and understand the state of the project.

The importance of active individual participation

Regardless of the presence of continuous informing and exchanging of views, it was maintained that each member of the engineering teams had to act proactively on the projects. For example, the CEs noted that they pushed their engineers to ask for assistance and to pull feedback to their own ideas. There were no parts in the projects in which working in a vacuum for a week without interaction with others was possible. Going "under the radar" by solo-artists was not approved nor looked upon softly. One engineer was found to slightly disregard the works of others, the accepted working protocol and the incoming, more accurate data, and this sort of activity created concerned thoughts for the CEs and the peers alike. The result was faulty design and reduced efficiency for others. On another instance, one engineer stated that he had assumed a particular piece of information to be still accurate without actively verifying it. The result of this was outdated, thus not appropriate, design part which then needed to be fixed. The engineer concluded: "One should never assume", pointing out that changes are continuous, they can get unnoticed, and that they must be taken into account at all stages. The informing on changes is not currently handled in a thorough, holistic manner at DEU. Individuals

must then actively fill their possible information gaps created by incomplete diffusion of the changed parameters.

Closely attached to the need of proactivity are mistakes done in the projects. While neither of the projects faced any critical or big mistakes, several smaller occurrences did take place. Besides the mentioned assuming-without-checking, human mistakes in design did take place. An engineer for example noted that he had not written some information down, had forgotten it, and performed design work with outdated data. Also engineers saved documents in wrong format, had problems with the use of tools and forgot to inform others on things. Problems also arose when different individuals viewed, interpreted, explained and used same information differently. This is a central element in Home Office work, as the engineering team discusses a lot to make sure everyone is on the same page, and the engineers learn over time to acknowledge how specific people view, understand and explain things. The mistakes can be spotted in the cross-checking of work done by peers or the approval check done by the CEs, and many of them were. However, some mistakes slip further to production, causing troubles. As a whole the mistakes done in the projects were stated to accrue from human errors and the complexity of handling and utilizing knowledge in team work.

Processes and knowledge embedded into people

An important result of the open, non-authoritarian culture of the unit was person-embeddedness which was clearly present in the two projects. Specific individuals had certain roles, methods, attitudes and place in the processes and these were not found in any available written form. One had to learn, sense and to realize them. Big amounts of tacit knowledge and personal preferences were said to be possessed by the experienced engineers, and the working and coordination methods of each CE differed. This also became obvious while looking into the progress of the projects. As such, especially the newer engineers had to proactively learn who to contact, what to do, where to scavenge certain information, etc. Also the communication and interaction between DEU and other stakeholders was based on the specific individuals. This caused for example a new engineering team member being left out of an email-chain since the names of the receivers were typed from memory and according to the bounded knowledge of the stakeholders. Also a long leave taken by an interface mediator of another internal organization took also the relational and the collaborational knowledge away with it. Things are

learned by doing, not by reliance on any single official protocol, since there isn't any. As a result the culture and the working processes are tacit, requiring experience and sensing especially from the new members. This is the way the unit and its members have been able to adapt more appropriately to new, varying projects and the changing engineering base. However, what happens inside each project is then hard to grasp for outsiders. Also a CE noted that a big instant turnover of the engineers would hollow out enormous portions of the unit's competence. Additionally an engineer noted that he had in the past attempted to learn and store the tacit knowledge of a soon-to-be-retiree, yet this task had proven extremely difficult and bore little fruit. Then, the specific individuals are central in the project routine.

The actual design work of the projects did not meet unusual hindrances. The EDM system was already previously implemented to use, but its slowness and disallowance for offline work created some idle hours and reduction of work speed. Major distortions to progress of individual work were coming from the changed specifications and other tasks which needed to be done. Typically an engineer was engaged in more than one project, performing design and corrections for the project which had the greatest acute priority. Also when additional smaller tasks were needed to be done, scheduling of work and prioritizing work duties caused some problems for the individuals. The work got done eventually, and one of the engineers stated that long working days are common in the unit. The presence of several separate duties was not seen problematic by the respondents, since reasonable time was given for performance even with tight schedules, and different tasks are seen as a way to learn and to create wider knowledge of the technical sphere. Also the CEs find changing tasks good for the engineers, since it offers variation, creates wider technical understanding, and especially gets the needed engineering works done. The Chief Engineers especially noted that good a knowledge-base will always be needed at Home Office in order to have ad hoc tasks carried out with relative ease.

The hardship of joining the project work

Much of the time consumed in the projects was related to assisting others, and especially the new engineers needed to learn how to perform well in the community. As illustration of this, one engineer taught and showed others how to make lighter, more robust design models in 3D

environment. Instances such as this allowed efficient learning and further development of the skills and knowledge of the engineering teams. The new members especially learned a lot while participating in the interaction. They shared the general view of the respondents noting that codified instructions are demanding to be put to use, and a hands-on approach is dominating in the unit. One engineer stated that noting down instructions is not done much, since the engineers are not novelists, and then again one CE stated that no one wishes to go through extensive manuals anyhow. Strong focus on execution of design work had indeed prevented clear instructions to be born. Also the complexity of work and the changing technology needs have hindered this. Design guides, technical documents and process descriptions exist and they were used in the projects, but one new engineer expressed that these could be managed a lot better: Currently each newcomer has to go through the same trial-and-error phase, which takes "huge amounts of time and a lot of effort", while a more focused and usable set of guides could ease this. Nevertheless, even with applicable guides present the engineers must ask and be taught the nuances of the work in order to perform well. This was realized by all the respondents, although the CEs had limited time to guide their teams. Generally the respondents expressed empathy and understanding to the hardships and needs of the CEs and the engineers, creating an impression of a trusting, helping and closely-knit community. This was said to be the aspiration of the unit as well.

The presence of change

The main stages of the projects lasted a couple of months. During this period the largest part of the technical drawings got done. Development also occurred. Reactive ad hoc fixes were done whenever an individual or a team realized that something should and could be altered. These small steps allowed the acute work to be done more efficiently, like in the case where one engineer called for EDM support to solve a problem in order to get his work done, or when another individual asked to be added to a specific communication loop to receive the pertinent information directly. As noted, no universal guideline for diffusion of new data and change orders was involved in the projects, resulting in several occasions where corrections and updating had to be done reactively when things got problematized. Regarding the Chief Engineers honing the operations, one CE had for example previously noticed that bottom-up, communally discussed and derived division of some design work parts was an effective

organizing method. This was used and it also gave better results on the engineers refining their individual knowledge and skills.

Internal changes to the routine

It seems that a "truce"[14] existed in the projects between new ideas and the current state of performing. Gatekeeping took place as experienced professionals controlled the use and implementation of ideas. This is because they obtain more thorough understanding on the crucial parameters of the design and the effect of changes. It seems that at times they also were path-dependent and pleased with the familiar way of doing things. In engineering teams some ideas brought betterments, some were rejected. One of the projects for example battled with overabundance of document controlling, and new methods and ideas to handle this workload were born. This development will most likely reap some benefits in the future as well, but most of the advancements related to a one-off specific situation or technical issue. A consensus existed among the respondents that, *ceteris paribus*, a new similar project would be done with more speed and quality. Quality and speed are constantly increased by incremental steps, and the CEs noted that this must always be the case.

Personal incentives and motives guiding the long-term development

It appeared that there was some divergence between the project teams relating to proactive pursuit for developing the actions. As noted, one project team set proactively the target to pursue lighter design models. This notion became reality as lighter, more easily used models were developed and put to use to enhance the project work. The work took some additional time, and there was no pre-existing certainty that the development task would pay off. However the respondents noted that this improvement work paid off during the project and especially afterwards in the consecutive projects. The devoted additional efforts clearly are growing interest. Besides this, eagerness of the engineers to come up with new useful methods was present and promoted by their CE. For example blogs were conceptualized to promote instant codification of ideas, sharing thoughts and charting down developments. Many of the creative ideas which were discussed and some even implemented did not take off due to various reasons. But incremental and larger efficiency gains

[14] Nelson and Winter (1982) coined the term "truce" to describe the ever-changing outcome of the mechanism creating stability and change in organizational routines.

resulted from the proactive search of the team for smoothing out the operations and preparing for the future.

The other project team also had openness for ideas and creativity. One of the respondents even noted that the possibility to be creative is what drives engineers to the profession. However, in the project the leading engineers were experienced contractors who were given much power by the responsible engineering manager of Company. The project work seemed to follow this thread, as it appeared that while small improvements were done during the project and a novel partition of technical parts proved successful, the engineering team focused mainly on execution. Development was secondary, and it was even hinted that perhaps some of the engineering members devoted too much time thinking of betterments when the task was to perform the design work. This seems like a natural outcome of a situation where the leaders (contractors) are hired officially to execute tasks, possess no mandate to devote project resources to development, and lack a strong push or personal incentives to proactively enhance Company's project work. The focus was then on exploitation of given resources, and one engineer for example noted that more space for creativity could have been allowed, although the expertise of the more experienced individuals was appreciated. All in all the projects then differed to an extent in their development efforts, yet single-loop learning and quick fixes were strongly trumping. The role of DEU as performing engineering organization became obvious, and development was noted by the engineers to be considered in the higher managerial level as something nice to happen but also something that cannot tie too much focus. The responses made this point clear. One Chief Engineer hoped to increase efficiency gradually by developing one particular working aspect in each project, but it should be remembered that any technical development beyond Company's official standards cannot affect the design outcomes. This narrows down possibilities.

Development "off the books"

The pace of the work performed and the constant various demands of the engineering team members led to a situation where the improvements conceived became mainly institutionalized tacitly and locally. By doing and talking the operations got better among small groups, but not many external representations of this were born. Codification of performance

results in other areas besides project documentation and the technical deliverables was mostly non-existent. The CEs had pursued to harmonize their actions more and to come up with methods to allow a more centrally controlled development, but this was done infrequently "on the side, without managerial drive" and one of the respondents stated that these pursuits of harmonization seize once the small-scale planning meetings adjourn. It seemed that the enhancement of operations arching over longer periods than project-duration was then scattered to groups and dependent on the personal will of the individuals. A cost allocation place exists for time used in development of operations and internal work. It is available for Chief Engineers of Company, but it is used to various different purposes covering a wide array, and it appeared that sufficient time, resources and space for thoughtful development were not at the hands of the engineering teams. The respondents felt no strong aspiration and push for learning and training by Company, and the hectic schedules prevented focused efforts to align the unit under one operating model. Lessons learned during the projects are meant to be gathered and used in the upcoming projects, but it appeared that this process as well was much dependent on the few individuals, their time and motivation. Many noted debriefing sessions to be desired and useful, and some engineers even insist on having them.

Nature of the routine much appreciated

In general the projects succeeded to meet their goals and the project routine at Home Office was suitable to execute the detail engineering. Despite the prioritization of exploitation of resources over exploration some development did take place. While the CEs, management and the engineers were mostly satisfied with the outcomes of the projects, things remain to be done in the future. Past the obvious problems of the changing project specifications, increased interaction between DEU and other parts of the value chain is perceived as useful. Visits to manufacturing sites had proven vastly beneficial for the design work quality, and the engineering teams implied that interaction with other project organizations and even lower barriers between the many parties could assist a great deal. Many noted that DEU and the teams were performing already on a high level compared to their previous employers, but expectations and possibilities of further advancement were stated. The existent project routine was believed to be appropriate, and many felt that it should not be touched. Related to this was the awareness of the

emergence of Partner Office and the increasing trend of the industry to handle projects via several networked locations. There was a general lack of knowledge and vision regarding the future developments, as the respondents felt that they do not possess clarity on their future role and the direction where DEU is heading at. The future and plans of DEU operations did not seem to be signaled explicitly to the engineers by the management, so it is plausible to assume that also this lack of concrete expectations is reducing the long-term development efforts.

Overall outlook of the old routine

All in all, the engineering project routine at Home Office is seen to allow good results. Coordination is achieved as the closely-knit teams actively interact to reach the goals set by the CE. Saving on cognitive resources also exists since the individuals learn gradually how to act as a cogwheel in the changing teams, although initial hardships on this are met. Learning is also allowed. On-the-job learning naturally occurs, but also the openness of the culture allows proactive, ambitious individuals to implement long-term developments regardless of the obvious lack of support from Company's structure. Artifacts such as the small distances between the engineers, and ostensive aspects like the mutual compassion for peers and their problems clearly shaped the performance outcome. Change is also involved, and the routine seems appropriate to allow adjustments to the changing projects. Naturally more could be gained from the projects, but the young organization is at least capable of delivering satisfactory results at the current state. The routine from which the new Partner Office-routine is a departure from is now described in detail. Next, the emergent routine which facilitates the distance outsourcing is reviewed.

6.2 Second narrative: The routine of the new approach

The background of the physical move to Partner Office

Partner Office was designed to possess a constant work load. Whereas other external offices have provided scalability and flexibility, the new office is planned to be a closer one, with a more frequent presence in the projects. With the engineering contractors working from their home office, the costs for Company to host them are removed, and the expenses of possibly having to arrange new locations for them are reduced for both parties. Also Partner can more readily assign their engineers to other duties while they operate from home, yet it is understood and attempted

by both parties to keep these individuals in their current positions, as they are highly experienced and specialized to the DEU setting.

It was realized by both parties that the performance will not be tremendously high from the beginning, but the actual changes to the operations was not much thought of or grasped beforehand. Distance work even in another continent had proven possible, which created positive expectations. The following is the emerged routine of the new arrangement, based on the review of projects.

Three experienced engineers moving to a new environment

The move of some design engineers (contractors) to Partner Office took place rather quickly, with a short prior notice after months of infrequent discussions held on several levels. Three engineers were deemed suitable for the move, and they were finally decided by the involved Department Manager of DEU. These engineers had previously been working on several projects at Home Office under the leadership of DEU. Their accumulated knowledge on the technical aspects of products, as well as their personal track record and skills had previously earned them a foothold in the engineering community. Engineering contractors working at DEU are continuously and passively monitored at their work, and their technical results and team working traits are evaluated. These three individuals had shown growth and skills, thus keeping them in the roster. Now they were considered trustworthy and capable for carrying out distance work.

Moving to Partner Office came in a natural phase between projects. The concerned engineers stated that they did not have a specific idea why it was at this point that the move was done. The planning of the office and the timing came from higher-ups. Also the CEs stated that the main driving rationale behind Partner Office was not communicated explicitly, leading to divergent ideas of the new set-up. It was understood that the lack of office space at Home Office and a genuine pursuit for low fixed costs and scalable engineering force were some of the motives. Also the partnering motives were understood, however the expected benefits, financial outcomes and the future outlook of Partner Office clearly had no clarity in the minds of the engineering teams. Nevertheless, even if the move was not preferred by the CEs, they acknowledged the business dynamics and trends of the industry and started utilizing the distant engineers in their projects.

Organizational preparation for the operations

While it was obvious that the shift of an engineer group to a location a few dozen kilometers away required some adjustments for the project work, not much preparation was done beforehand. EDM was set up at Partner Office to accommodate the work, and new computers and office equipment was provided for the new occupants. Like at Home Office, issues of intellectual property rights did not cause many worries in the open environment. Company's network drives were however out of reach for the distant engineers and one CE noted that some useful material was then lost in the drafting work. Manifesting the non-authoritarian laissez-faire culture of DEU, the Department Manager stated that not much else was thought through in advance. No new protocol or guideline for handling the project coordination was established, and the interaction and collaboration of the offices was much left to be evolved through practice. One experienced engineer of Company stated that a new sort of coordination method surely will be born. It appears that working from Partner Office was nevertheless considered mostly just as an additional attribute, and the resulting effects to come were unclear. Interestingly, only one of the Engineering Plans drafted for the two case projects even included a non-elaborated remark of Partner Office being part of the project.

Like stated, external offices even in other continents had been used before with good results. Also in Finland there are offices of ECFs being used, and one of them appeared as a reference point on several occasions in the answers of respondents. These offices worked however through a different logic. They were locally lead engineering communities providing ad hoc resources to specific projects, and they were coordinating their work with DEU's Chief Engineers. Partner Office then again had only design engineers who had been moved to this location after having gotten acquainted with the project routine described in the previous narrative. The amount of engineers at Partner Office was planned to be derived from the current and forecasted business outlook, and it turned out that a lower number of engineers than was suspected were required in the upcoming operations. As a result only three engineers moved to an office space designed for around 20 people. Also a few other Partner's engineers working with other areas of Company were seated in the office. All in all it seems that due to the small engineering team at Partner Office and the previous successes of external offices delivering satisfactory results rather

autonomously, the alignment of Partner Office to Home Office's project work remained unplotted. That said, Partner Office had a novel kind of background and it was planned to carry a continuous workload from DEU's projects. But looking at the responses reveals that the ideas of the nature and the role of Partner Office differed between the management, the CEs and the engineers. Against this backdrop, a new kind of engineering project routine emerged.

The initiation of two projects

The two case projects differed to a degree in their scale and nature. One of the CEs noted that he was extremely busy at the time of the project, and he made this point clear to the engineers who were working from Partner Office (PO). In other words he was not to be extensively attached to the micromanagement of the project. As a signal of trust and the expectation of self-coordination, the other CE also had a lower control of his distant engineering team as he too was facing heavy prioritizing, resourcing and scheduling demands. No new clear protocol of project work was envisioned by anyone for the engineering teams, and although not explicitly stated, the CEs trusted the PO-engineers enough in order to steer much of their focus and efforts to actions at Home Office (HO). For them Partner Office then had acquired a role of distant location of diligent execution of detail engineering.

The projects lasted a couple of months and the work did not meet any big unusual distortions. The PO-engineers who were taking part on the project from the beginning went to the kick-off meeting to Home Office, as being present was considered an immensely important prerequisite of project work, regardless of the actual working location. As the work began, the idea was to function in the same manner as what had been the case at Home Office. In the beginning of operations at Partner Office it was noticed that the crucial EDM system did not in fact work although it was set up in advance, but this unexpected instance was rather quickly fixed. This then allowed the engineers to access and to work on the documents related to the project.

Lacking deliverance on the projects

As the project work went under way, effects started to arise from the two central elements present: geographical distance and the lack of a clear operating procedure. As a whole, the effects seemed to relate to three overlapping areas deduced by the author. These areas are: *Exchange*

channels, Work and its coordination as well as *Development*. The effects seemed to be reasonably similar in both projects, although the CEs' preferred way of handling projects and the project nature obviously added minor nuances to both projects.

Disappeared roles and leaders

The apparent disappearance of the Chief Engineers from the familiar, daily interaction with the engineers became clear to the PO-engineers. Additionally the Department Manager, who was believed to possess the best sources of departmental information and the highest authority and ability to discuss about the future outlook, disappeared completely from the picture in the eyes of the Partner Office-engineers. This partition came as a surprise for the concerned engineers, and some felt they were put slightly aside and were given not much focus.

One clear issue rose from the responses; the issue of the unclear roles of people. One of the PO-engineers said that he remembers having discussed a bit about him taking some coordinative tasks at Partner Office. This notion had come up in the management, yet the idea involved a larger group moving to the new office. Additionally the role was rather vaguely introduced to the engineering community. As the project work began, the three engineers however found it wise to be individually in contact to other locations since they were used to this. And had they been present at Home Office they would still have had individual interaction with the community. Self-coordination of Partner Office's actions was then largely without central coordinator and focus, while it was nevertheless expected to a varying degree at Home Office. The new group discussed at its own office, but acted as individuals with other stakeholders.

The CEs differed in how they desired to coordinate each action of Partner Office. To add to that, there was no clear guidelines found as to when a CE was to take to be included in the interaction when third parties beyond the team were involved. The PO-engineers stated that in this hazy environment, the use of written instructions and interaction with the CEs was easier to cope with than vague verbal notes. As a result, more the interaction was becoming more formalized.

More difficult, changed communication

Naturally the methods of communication between the offices were very different than at Home Office. With close proximity and the ease of verbal

talk lost, emails and phone were used. While it allowed much of the interaction to be codified and thus stored and redistributed, it also made the communication more time-consuming, slower, and less frequent. The use of visual representations of work was also made more difficult through the loss of the IM communication tool and the lost possibility to easily look at the computer screens of others. This matter was slightly alleviated by a commentary function of EDM, and one of the CEs also had Skype (IM tool) installed and put to use in his team. Firewalls and infrastructural policies of Company however halted the various attempts to implement versatile, usable tools for communication. Some of these attempts were initiated even by the Department Manager.

With the roles, ease of interaction and the tools being changed in the new project routine, synchronized coordination of efforts became tougher. The communication turned into project-centered instead of wide exchange of thoughts. In other words the interactive link dried up and there were no venues for swift, rich informal talks. This meant that it was harder for both parties to exchange information and thoughts. While the CEs pursued to coordinate the project flow, an additional engineer of Partner who was located at Home Office was added to the communication loop. His role was to partly coordinate the exchange between the two offices and particularly to mediate the transactions of one of the projects, but his placement was a reactive, ad hoc development of affairs. This resulted in continued haziness of the coordination efforts, as the coordinator, the CEs and especially the engineers at Partner Office did not share the same idea of his role. This became clear in the responses. Protocol was missing, and as the coordinator was not a thoroughly experienced engineer on the products and technologies, he could not perform with much independence and swiftness as a mediator. As illustration of the incoherence related to his inclusion to the mix, one of the PO-engineers became only aware of the coordinator's role through informal discussion with another Partner employee at Home Office. Even after the projects one engineering member at HO had not heard anything official about the coordinator's role or his tasks, even though he had been involved and interacting with Partner Office. In the weekly live meetings held at Home Office as a part of one of the projects, the Partner Office-engineers did not participate. The newly introduced coordinator gathered the relevant discussion topics from Partner Office so that they were covered in these meetings, and he also informed the PO-engineers of the

outcomes of these meetings. Even this arrangement was unclear to some, and one PO-engineer assumed that the coordinator was present at these meetings, yet he was not sure of this.

Professional, appropriate drafting on-site

The actual design work itself was done without additional problems. The engineers noted that the design performance came naturally through the gained experience. The work performed at the work desks was noted to be standard. The engineers knew their position and tasks relating to detailing, so while drafting the deliverables they met no new obstacles. Indeed it was even thought that the brand new computers and the working space were more suitable for the job than the ones found at Home Office. The working environment was peaceful without disturbances, and the engineers discussed over matters, commented on the work of others actively and even were able to cover for one another when needed. The engineers noted no gaps in their chemistry of working together, and the coordination of daily actions between the desks was mainly successful. Communally they felt comfortable to be working at Partner Office. Idle hours were created due to the slow EDM system, although one engineer evaluated that EDM perhaps worked a bit better at Partner Office. The slowness of the system had still followed them to Partner Office. If "the doughnut (processing symbol) was revolving", other tasks and preparations were made, since at any point of time the engineers had to head at some direction. The execution of work duties then took place whenever the needed data was available in its accurate form. The availability of this data was termed by the PO-engineers as the bloodline of their capability to act, but the flow of it was subpar.

A clear gap of information between the offices

Proactivity remained critical in the project work. In fact, with the geographical distance born, acting with rigor in the interface was even more required. Actively pulling and pushing information between the offices was a threshold condition for effective collaboration. Due to the confusion of roles and the divergent ideas held at the offices, the interaction nevertheless turned out to be passive. Partner Office expected to be informed on the incoming changes and decisions. The engineers there faced however another reality: the inwards diffusion of these things was not automatic. For instance the engineers became aware that new a type of platform was used as the base for the technical drawings in one of the projects. During the project they noticed that the old and new

platforms were however individually, seemingly randomly updated without any notification of this to Partner Office. Without clear guidance and communication line, the reliability of the data in each part of the design was then compromised. Also there were occasions where different versions of the used software resulted in problems, and Partner Office had to remind Home Office that the documents needed to be saved in the instructed file format. Full compatibility of the used tools was not then present, and this caused small hindrances. The PO-engineers stated that whenever these sorts of puzzles came to light they asked them to be resolved. Adding the Department Manager as a receiver of a copy of an email was even used as a method to achieve responses and to get things done. According to the PO-engineers, resolutions then always happened reactively in reasonable time, and the problems created for Partner Office were understood and apologized for.

The responses given by Home Office individuals tend to differ from this view. It was clear for everyone that Partner Office was dependent on the data, yet it seemed that the distant engineers were found rather passive in their efforts to make sure the information at hand was accurate. Active pulling of information was said to be desired, and without any centrally coordinated link of information transfer towards Partner Office taking place, there was no shared idea what had been informed to the engineers and what had not. PO was expected to cover this problem by reaching out when needed. Yet one engineer at Home Office felt he was pushing data with a rope, and another respondent noted that he made calls to Partner Office since they were not making themselves heard of. There was some sentiment that Partner Office did not go the extra mile to nurture itself, and the PO-engineers were seen as performing as individuals inside the comfort zone of the team. Here the expected self-coordination and activeness of Partner Office collided with Partner Office's own expectations and the understanding of its role.

The issue of inefficient giving and receiving of information mildly escalated on a few occasions. As no general rule existed as to how information was to be communicated, a hiatus of a few weeks was met in one project. When Partner Office started asking where things were at, they were informed that another office was now taking part in the project and the engineers were to ask information directly from this office. This state of affairs had slipped past the PO-engineer who only then initiated

contact. Later, information given by this third office was used in technical design. But at Home Office the design was noticed to be faulty. The third office which was to be interacted with directly had provided mismatching data, consequently resulting in outdated work at PO. Partner Office then faced a situation when the reliability and validity of the several information sources was questionable. Home Office and the CEs especially on one hand wished that Partner Office would actively seek its needed data in its correct form without extensive overlooking, yet on the other hand the missing protocol and several informants created a situation where the distant engineers did not know who possessed the needed information at any given time and whether this data was reliable. These problems of missing coordination were reduced over time, especially when the emergent coordinator came into the picture in one of the projects. The problems did however raise concerns to some as to who exactly had which responsibilities, and what level of performance was expected from PO under the fuzziness of the situation.

Reduced support and complementary resources

Quartered at Partner Office, the engineer group had much less people around it. Access to the office space devoted to Company's projects was deprived of other Partner employees besides the few engineers working there. The IPR-secured premises then facilitated only discussion among the three engineers. Ideas, opinions and information were exchanged between them, but other people seldom took part in the conversation. Also at times the PO-engineers did not share their relevant information to their peers by accident. Instances occurred when this was found out later on, and the reasons were mostly forgetting or not realizing the needs and the information level obtained by the colleague. The knowledge and skill pool was all in all much smaller than at Home Office. Additionally the engineers did not mingle much with other colleagues and discussion about Company-related issues was not authorized in any case. Creation of social network for information gathering was noted by many respondents as an important part of working at Home Office, and the Partner Office-engineers felt that these networks did not move along with them. There were not enough engineers seated at Partner Office to create a similar discussing and assisting community as the one taking place at Home Office, and thus there was less presence of assisting and complementary resources in work execution and development. Also one engineer pointed out that it is possible that while Partner Office is remotely located, the

engineers there can become more and more distant from the rest of the community. Trust and efficient interpersonal interaction is fostered by shared acquaintance of the people, and this will only diminish when people do not work at the same location. Knowledge about the stakeholders of operations is reduced. And when a non-Company email address is accompanied with the growing unawareness of the existence and the identities of the PO-engineers, bureaucracy and suspicion can take place outside the central engineering circle. One engineer did state that a slight additional "taste" had emerged to communications.

A distant, taken-for-granted working force

In a sense the PO-engineers were operating in the projects as rogue teams. When the drafting work was done outside the eyesight of the CEs, they mainly saw the mere outcomes of the performance. The actions, thoughts and logic behind the performed design work were stated to be much more of a mystery for the CEs than it was at Home Office. Monitoring and supporting the skills and development of design engineers is a part of Chief Engineers' work. Indeed one CE stated that working in a self-coordinating manner at Partner Office would hopefully and likely allow the engineers to greatly further their knowledge on the products and the logic behind them. However, the work tasks were already rather familiar to the PO-engineers, and they continued to work in a similar manner than they had at Home Office. As such they seemed not too preoccupied to devote any additional efforts to increase their efficiency and knowledge. The CEs could not sense the progress of work like they could at Home Office, and the reviewing of progress was carried out at specific points of time when the scattered engineering team discussed the matters. This practice was described as if it was correcting the walking direction of a disoriented man after each few steps, and some additional mistakes were done due to this sequential reviewing. One CE arranged three design review session via phone, but he stated that more instances would have been normal and much desired. Only through emails and phone conversations the issues beyond the actual technical drawings, such as problems faced with drafting techniques, were possible to be covered. The EDM system provided no usable methods for the CEs to get a sense of the overall actions and progress of the engineers.

Not only the CEs had these problems to acknowledge the work done at Partner Office, but also the other engineers at Home Office did not gain much clarity on the status of PO. Additionally the distant engineers

neither knew exactly what was happening at the main office. DEU's status and the on-going projects were not clear to all. Traveling between the locations not too far apart had been urged by management to allow better discussion possibilities, but due to various reasons the visits done in the projects were close to zero. The issue was partly solved after the emerged coordinating engineer started visiting Partner Office weekly to discuss matters and to diffuse information between the offices. However this method was covering only the discussion issues relevant and remembered at the time of the visits.

The multi-engaged CEs noted that perhaps they could have travelled more in the projects, yet it seemed that while Partner Office was trusted, visits between offices were not seen as imperative as other busy tasks. The CEs stated that the PO-engineers could come for visits, but the engineers on their behalf did not seem to have much desire or perceived need for that. It appears that the respondents who were not present in the actual collaboration between the offices envision that frequent visits are compulsory and that they would definitely visit the other office frequently, yet the people actively involved did not do this. Larger meetings including engineers from a third party would not be possible at Partner Office since the employees of Partner's competitors could not be allowed access to Partner's offices. Larger meetings are then possible only at Home Office. Also operating from Partner Office was hinted to include additional negative issue regarding collaboration. It seemed to some of the PO-engineers that interaction with engineering contractors of competitor firms was not as efficient as before. Especially as some engineers feel that the tacit knowledge they have accumulated is a personal asset to nurture, the interaction between "competing" parties for the benefit of Company was noted to be harmed when the working proximity and the acquaintance between the parties are reduced. This was suspected to be the case also by one of the CEs. Absent Company's presence and push for development of interaction, the competing firms are unlikely to devote resources for these Company-specific matters. Without any live meetings and efficient venues for sharing thoughts, the distance then ultimately narrowed and lowered the interaction. No video meetings or other such methods were planned, and the possibilities to acquire new interaction tools installed seemed like a tough bureaucratic task according to the respondents.

Trusted, experienced individuals left to carry out their tasks

Despite the shortcomings of the new setting between the offices, the engineering work did get done in due time. Affecting here was the perceived lower amount of smaller tasks met at Partner Office. The idea had been that PO would also conduct smaller jobs. But, without the ease of assigning these tasks to another location the CEs relied on the engineers seated close to them. This allowed the PO-engineers to schedule their work slightly better and additionally it allowed them to focus more on the main design tasks at hand. On the negative side, the decreased multitude of tasks was stated to diminish the wider creation of knowledge on the technical matters, and one engineer stated that there was even too low amount of tasks to be done at times. There were no fresh engineers to be assisted and guided either. The PO-engineers stated that more time was available for reading guides and that in general the environment was less hectic. Design guides were also boosting their knowledge creation and execution of work. With a wide focus on distance working, these new design guides had been created recently by the CEs and the superiors. Visual representations of "typical" problems were included, and EDM allowed easy access to the guides, although coordinated management of the entire portfolio of guides was missing. Partner Office-engineers were also able to rely on Partner's own database which included assisting documents. Guides made by Company's staff had not focused explicitly on the PO-operations. This meant that the usability of some of the guides was not at a high level. The possible input to future guides coming from the PO-engineers was also not really being thought of by anyone. It became clear that the experienced engineers at PO relied much less on the written instructions than the newcomers at Home Office. However they did use them with more focus at PO, and even added some things of their own. Nevertheless it remained unknown how well engineers with less experience could utilize these guides to achieve efficient performance. After all, the engineers at Partner Office performed "under the radar" without constant support from the CEs.

Partner Office suiting well the design engineers

Reactive responses which were made to fix any underperformances of the collaboration between Home and Partner Office allowed the projects to be done and work to be executed. Especially the more focused coordination which slowly emerged helped here, as did the slight decreasing of passiveness between the offices. Consensus about the

quality of the work done and the actions of Partner Office did not however exist in the responses. Responsibility taking and professional conduct had naturally been expected from the PO-engineers, and these expectations were mostly met. The CEs did not worry about occasional laziness or slumps in the efficiency of work at Partner Office as long as the deliverables got done in due time. And they did. On the other hand the Chief Engineers did not appreciate the loosened control they had or the uncomfortable silence which existed for the most part of the projects. The CEs noted that the final results satisfied them, but also that they would desire more vigor coming from Partner Office. Stronger self-coordination of actions and a more critical approach to the design outcomes of the group were called for. If the amount of separate questions coming from and individual talks held with PO is not at a lower level, the CEs will become increasingly burdened since the new communication methods demand more effort. In addition, if the quality and correctness of the PO-drafted and cross-checked documents are not up to standards, the slightly detached Chief Engineer has to meticulously review and approve all the work results, and this takes significant time and focus. As noted before, the perceived passiveness of PO was hoped to be replaced by proactivity, especially in the larger projects including many interfaces.

Partly relating to the different expectations and views regarding the duties of Partner Office, the PO-engineers noted on their behalf that their own work met no problems when moving to PO. The new office had in fact increased job satisfaction according to some, and by solving the issues regarding the understandably problematic start the arrangement was stated to be working well. Not much feedback had been given to the engineers, and feedback beyond technical evaluation of results was rare in both offices. This manifests the focus devoted to project execution as well as the common task-orientedness of the engineers. Requests made by PO for updates and information were answered in reasonable time, and communication as a whole was not a great concern for the contractors. This was the sentiment of the engineers even if at times they had felt that Partner Office was “out of sight, out of mind” for the others. Should the amount of engineers increase at Partner Office and the critical mass be achieved, the PO-engineers held the belief that the collaboration would work out well. While they had no desire to move back to Home Office, some of the engineers at HO emphatically assumed that the distant group must have felt detached, forgotten and perhaps bored at the new office.

The possibility and the belief of the operations getting more efficient between the offices in the future were largely quoted. In fact the results and the efficiency regarding a single project were said impossible to evaluate, as a plethora of changing parameters are involved. Therefore there was no clear idea yet of the impact of the arrangement. With the single loop fixes being carried out, more speed and quality were assumed to come to light over time also with this new distant office.

The problem of developmental ties

Development and learning taking place at Partner Office differed largely from the case of Home Office. The small amount of engineers sharing thoughts and knowledge at PO was a clear determinant of this. The project teams noted that openness to new ideas and betterments was present, and the CEs and the engineers did agree on implementing some new methods. Some of the project-induced innovations diffused from one office to another, like a new way of using a software tool proposed by a PO-engineer. Without live contact between the communities this diffusion had to be actively driven by the stakeholders. The CEs and people acting as coordinators did this partly, and also the engineers communicating to each other over distance took part in this. Various talks between the engineers at separate offices did take place, yet they were not able to even out the imbalance of knowledge and ideas taking place between the offices. This lack of natural, efficient channels for sharing new innovations hindered the mutual advancements of the offices, and it seemed obvious that the development of them proceeded along two different rails. And as development is not considered an organizational priority the tacit nature of the advancements done in the engineering enclaves makes it hard for them to be widely shared. Also, when the development is person-embedded and hardly codified, the updating and synchronizing of any new methods shared between separate locations is not easy. The innovative efforts done by the communities mainly aim to create efficiencies relating to the specific environment, tools and people. Therefore much of the development is highly context-specific and does not suit well to other environments, i.e. offices. The current information channels do not allow the richness and high frequency of interaction required here to assure that the engineering community would advance as a one unit. Indeed, one CE noted that electronic communication killed some innovative potential in the project. And while individual proactivity serves as the key driver of development efforts at Home Office, the PO-

engineers possess no mandate and seemingly no strong personal incentives to compose and to pursue long-term, Company-specific enhancements of operations. Work was being considered as done when the required drawings were done in the given time frame. Also, development was stated not to be a part of the role of a design engineer, and Company respondents implied that individual overperformance or pursuit for perfection coming from engineers should not jeopardize budgets and schedules. Company was said to be willing to pay only for execution. Harshly put, the generic duty of the engineering contractors is merely to execute the given tasks according to the customer's requests, nothing more.

The CEs interacted only with the engineers of Partner, not their superiors, and they made no clear attempts to push forward a proactive mentality for Partner Office. Also suggestions made by the engineers to smooth out the operations were few. This seems to be partly caused by the lack of knowledge on the future developments. Evolution of actions is then occurring only when its needed by the projects, and also at Partner Office the people gradually acquired silent roles and positions through self-coordination. As an illustration of this, one engineer was mainly handling the interaction with EDM support services. These sorts of developments emerged to be a part of the silent culture of the office without visible signs outwards. One Chief Engineer worried that these divergent, individual developments occurring at different locations will create distinctly separate "silos" of engineering competence. This tendency would go against the notion of a single, open engineering network of DEU.

Coping with the unclear situation

In general it appears that the new and continuously refined project routine allowed the projects to be carried out. The reactive measures to clear the main barriers of transactions paved the way for the exploitation of this new distant engineering competence center. Catalyzing this path was the non-authoritarian management and the absence of central coordination, which allowed the engineers to find a way to work together. The respondents had not expected seamless collaboration in an instant, and especially due to the missing predetermined roles and protocols this smooth sailing did not appear. One respondent of Company even stated that the efficiency and quality of the performance of engineering teams will "surely" decrease when separate offices are bound together instead of

just one. However, the need for this sort of outsourcing was understood as somewhat necessary, although the ultimate motives and the expected outcome of this particular maneuver were not clear to many. It is feasible to assume that the smaller-than-expected amount of the engineers who moved to the new location caused the passive and reactive emergence of operations.

Dire need and hope for a proactive reformation

As the need for more thought-out, unified guidelines to facilitate the collaboration became clear during practice, new plans were set. Even if Partner Office-engineers did not explicitly seem to think so, a responsible coordinator was perceived as needed at PO by the Home Office stakeholders. The process of placing a Partner employee as a coordinator to manage the work done at PO initiated after the projects. This was because the self-coordination and activeness of the community did not occur in the desired form. Even this corrective process was however vague, and the respondents had no clarity what sort of a coordinator was to emerge. Also the views on the future role of the coordinator differed: one CE imagined that the person would act as a Chief Engineer at Partner Office, while another respondent guessed that the role would be mainly overlooking and supervisory without actual participation on the design work of the projects. This divergence of the ideas concerning the needed and planned higher link to smoothen the collaboration between the offices resembles the overall situation. The participants seemed to have misaligned frames of mind about what was pursued or required by each party, and without coordinated planning and discussion, only quick fixes took place.

The lessons learned during the projects had not been gathered and they were not much called after by the respondents. While the problems which were faced had been discussed in separate groups and some of them had been solved, the projects showed that the preconditions of the project work were not in a good shape. The emerged routine was not nearly optimal, even when only few engineers were involved. Many at Home Office felt that to ensure diligent execution in the future the conditions of collaboration ought to be proactively shaped. This is especially the case if the upscaling of the engineering force at PO is to take place. The future of Partner Office roster was unknown during this study. Upscaling will not be easy however, since the engineers going to Partner Office must have DEU-specific knowledge and a sense of things acquired at Home Office

before they can operate well in the projects. The CEs felt that perhaps more time at HO would have been needed even for the three first-movers, yet interestingly one PO-engineer stated that new design engineers without Company-background could join the group at Partner Office. The views on the needed time for the familiarization phase at HO seemed to correlate with the status and the employer of the respondent, as the engineers saw much less obstacles for efficient design performance at PO than the employees of Company who were concerned about higher-order issues.

The overall outlook of the new routine

With the benefit of hindsight it is easy to note that more could have been done as preparations to allow more efficient project work. This was admitted by superiors. There was no alignment of the ostensive part of the routine between parties. No one with appropriate mandate either held a clear idea of proactive development regarding the problems present in project work. The performance of the two offices also followed a different "map", and no one seemed to grasp the real terrain; the need to align the ideas, tools and protocols to actively pursue a better collaboration. As a result the routine did not coordinate the project work well. The participants saved on cognitive resources mainly through their wide experience, which any newcomers would possibly not possess. Also learning is lost from the priorities, and the focus is on static deliverance of smaller amount of tasks than before. These aspects reflect strongly to the identity of the new routine. Next, this divergence is summarized and its meaning for DEU is constructed.

7 ANALYSIS ON THE AGGREGATED FINDINGS

With the routines now described in depth, analysis on the findings ensues. The unique and divergent features of the newly emerged routine are charted first. This is done to show how the performance-driver of the new arrangement is different from the old. After this is achieved, the resulting impact of the routine, i.e. its economic meaning, is derived. This serves to point out just how beneficial the new approach for outsourcing project work is for DEU. And while doing that, thorough review is done on the causes of this state of affairs.

7.1 Synthesizing the divergent features of the new routine

Combining the elements of artifacts, ideas and actions which were present in the projects, an overall picture of the routines was created above. The advantages coming from several respondents' views, opinions and recollections being accompanied by archival data are evident here, as a "narrative network" with actively part-taking agents was to be created (Pentland & Feldman 2008b). Reliance on only few random or pre-selected viewpoints of participants could not have covered the juxtaposition of thoughts and impressions, for example in the understanding of Partner Office's duties, or enlightened enough on the causes behind the performance outcome of the routines as a whole, such as in the case of proactive, development-driven individuals and their effects. The routine-lens was befitting and penetrating.

The analysis focuses then on the unique features of the new emerged routine. As engineering project work itself is not a novel issue in DEU, reflecting the different nature of the new routine as opposed to the old one is the basis of this analysis. The investigation expresses how the central elements of project work, the sources of efficiency and value, are differently present in the Partner Office arrangement. Many similarities, such as the non-optimal interfaces with the wider project organization existed in the routines as they both take place in the same underlying context of DEU. While the new routine was able to deliver decent results in the case projects much like the old one, it nevertheless had fundamentally a different, unique set of features. These matter in the long

term. The following will take note on these features by summarizing them on the part of the new routine.

As stated in the narrative, there were three identified main areas where the new routine differed. These areas resemble Becker's (2005) statement on the three central roles of a routine: coordinating, saving on cognitive resources and learning. The following coverage then can be seen to present the routine from its pivotal points. Issues relating to *Exchange channels*, *Work and its coordination* as well as *Development* were differently constituted as a part of the new outsourcing arrangement. The categorized areas are of course intertwined and overlapping, yet for the sake of clarity the key issues are presented below under these particular fields.

Exchange channels

The distance which exists between the offices naturally caused a new form of exchange inside the projects. In the projects and the engineering environment in general, three issues were present: (1) Vastly different communication tools and methods, (2) increased passiveness and (3) alienation of the (Partner Office) teams. Figure 21portrays this.

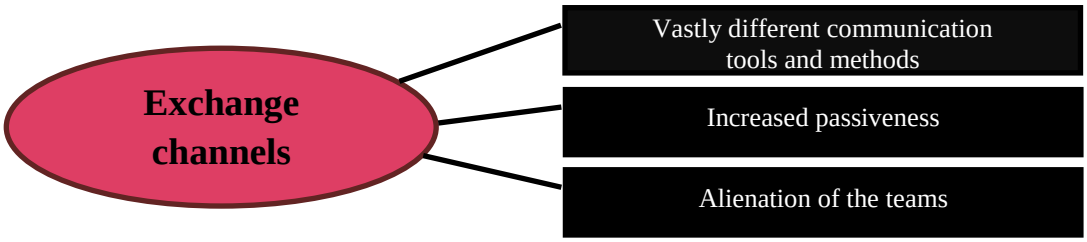


Figure 21. The novel features of the exchange channels.

Vastly different communication tools and methods

The communication process between the CEs and the engineers had taken a new shape. Distance communication tools were much more used. Without the initially anticipated live meetings really taking place, the natural venues for frequent, versatile talks between the parties mostly disappeared. The mediators who took some part in the interaction could not cover for this, since they do not posses all the required experience and knowledge on the relevant issues. As such, the communication narrowed

down to cover the project-specific issues and little else. The used tools also required more effort to accomplish the flow of information and getting it comprehended by others, and discussion via phone was not automatically spread to a wider audience. Partner Office did not include many engineers and neither possessed thorough information of the progress of the projects, which resulted in increased concern of reliability, validity and up-to-datedness of the data which was received from several sources. Hence, written instructing and messaging was appreciated for the sake of clarity, narrowing down the communications to the utmost focal issues.

Increased passiveness

The two offices taking part in the project work had different expectations from one another. Through this, passiveness ensued. While more proactivity was expected from the other party by both sides, the interaction was reduced. There was no universal protocol to clarify the contact-making responsibilities of each stakeholder. The distant engineers expected to be automatically notified of the current state of the data while Home Office relied on Partner Office acquiring itself the needed information at any given point. Active touch being the fundamental expectation of each individual at Home Office, the PO-engineers continued this practice to some degree. Nevertheless the missing ease of diffusion of data would require additional efforts from them or the CEs, and as neither party met any overbearing difficulties in the projects to catalyze these efforts, the passive atmosphere caused less frequent interaction. The activities carried on by the offices then became more blurred for the opposing sides.

Alienation of the teams

The PO-engineers became more detached from the DEU's daily activities. As much of the activities are based on individuals knowing who to contact and when, the detachment made it more difficult to sense how interaction should occur towards Home Office. While the community at Partner Office had close contacts within itself, the touch on other members of the engineering community became thinner. The personal ties with the already familiar, yet now distant colleagues eroded slightly, and it especially became harder to interact with the more distant and formerly

unknown stakeholders of the projects. The ties to the social network of Company's engineering platform were then loosened.

At times Partner Office felt forgotten and put aside in the priorities, and although this did not create consent, it underlined clearly that the office was a remote one. Additional "taste" of bureaucratic behavior was added to the non-face-to-face outward communicating. And with the engineers from other competing ECFs some reluctance to fully collaborate was marginally sensed. As the engineering contractors at Home Office felt closely attached to Company's engineering community, some even more than their own employee, this was not so much the case at PO.

Work and its coordination

The projects got done in both outsourcing arrangements, and the Partner Office-engineers enjoyed their new location. Regardless, distinct elements to working and its coordination emerged in the project routine. Visualized in Figure 22, the (1) overlooking and monitoring by CEs was hindered, (2) assigning work tasks and coordinating them was less easy, and (3) the design engineers performed mostly from an established comfort zone.

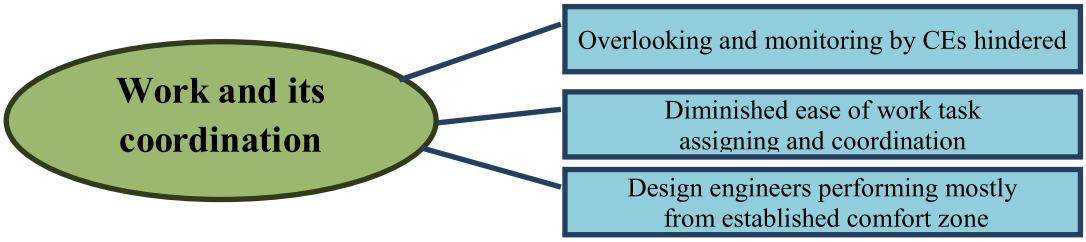


Figure 22. The unique characteristics regarding work and its coordination.

Overlooking and monitoring by CEs hindered

The CEs were not able to clearly note the work progress and specific moves made at PO. As a consequence, they then merely perceived the outcomes of the work process. This did not allow them to alter the actions before they saw the results of them. They neither had the possibility to note the mistakes and things done feebly before the documents were presented to them, which happened sequentially. The experienced engineers at Partner Office were supposedly able to perform their "usual"

design tasks even from distance, and this allowed the CEs to rely on them making progress even with lesser overlooking. Yet the Chief Engineers have the will and the responsibility to closely monitor their engineers, and there were worrying concerns regarding the everyday actions due to the distance and the uncomfortable silence. The existing methods did not facilitate an easy way of sharing thorough updates. Some additional mistakes and correction needs followed. And consequently the missing clarity of the reasons behind mistakes and the lack of advising evoked concerns at both offices on the capabilities of the other to cater the other's needs.

Diminished ease of work task assigning and coordination

Smaller tasks are a part of DEU's daily business. These tasks were not divided much for the Partner Office-engineers. The CEs trust and rely on the close-seated engineers at Home Office, and even when the PO-engineers could perform these tasks, the chores are more burdensome to hand over to another location. The amount of work tasks was then reduced at Partner Office. Prioritizing tasks became slightly easier there, and for example the design jobs included reasonable time frames for the engineers to conduct them peacefully. At times there were not even enough duties to fully occupy the engineers who were constantly under payroll. This issue is not readily dealt with, as the Chief Engineers do not possess a clear idea about which engineering contractor is able to and competent enough to do additional tasks at any given point. Like said, it is neither effortless to outsource smaller tasks to the other office, so closer options (i.e. Home Office) are preferred. The passiveness additionally fosters the non-distribution of extra chores, and the balancing of the workload between offices is not prioritized amidst hurries. Over time the CEs capabilities to assign design tasks can become lowered, when the overall competence of the distant individuals and teams is less comprehended.

Design engineers performing mostly from established comfort zone

Path-dependency of the Partner Office-engineers was present. Having become used to the culture and methods at Home Office, the altered state of circumstances demanded adaption from them. Solely performing design tasks without wider concerns of pulling information from others did not ensure diligent execution. Also while the engineers at PO

coordinated sufficiently the actions between them, active alignment of the actions of the office as a one group to DEU's operations did not take place. This resulted from the contractors settling down inside their established comfort zone where they were able to perform the required tasks when data was given to them. No active, authoritarian push to do more was coming from anywhere. Then, no active expanding of the PO-engineers' roles took place. Development or reaching out was not prioritized, though still incrementally occurring. Also the level of self-criticism towards the results of the team at Partner Office was hoped to be higher. The team which focused on pure execution of tasks was expected to deliver designs according to standards as the very minimum. Obtaining the exact desired outcome of the engineering assignments given to PO was underlined by the CEs as the main importance. Other issues such as the hourly productivity of each moment were not overly concerned with. This emphasis on static, diligent execution partly allowed the engineering contractors to carry on as performance-oriented "blue-collar workers" without focus on broader affairs.

Development

Constant development of working methods and increasing the readiness for future projects to allow more efficiency was stated by many to be imperative for Company's competence development. Developmental issues were also transformed when Partner Office was conducting the project work. (1) Less drive for development, (2) weakened preconditions for learning and (3) a reduced attachment of Partner Office to the development processes of the engineering community were perceived, as Figure 23 shows.

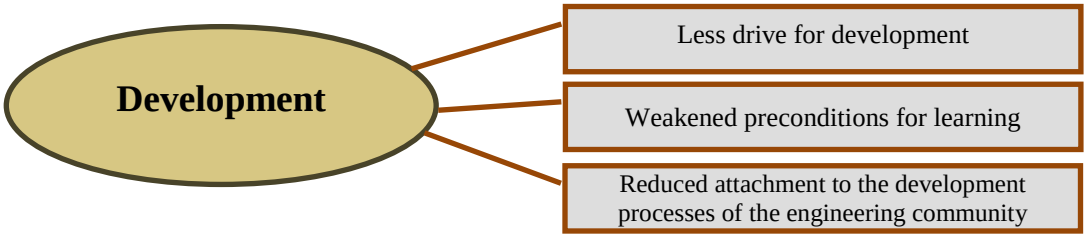


Figure 23. The divergent features of developmental issues.

Less drive for development

At Home Office the incremental development of the project-working platform and methods was driven by individuals. At Partner Office, this drive did not occur in the same manner. Without facing any mandate or authoritarian push to continuously develop the way projects could be done with more ease and value incurred, the PO-engineers settled for the status quo. Clear actions to boost the preconditions of Partner Office to act more efficiently were missing, even when the day-to-day workload was easier to schedule and no constant rush was met. Without anyone championing the higher-order progress, the steps of development were mainly reactive, allowing the continuation of work if situation-specific problems occurred. There was no focused discussion link existing between the involved stakeholders of different ranks to discuss and pursue any wider development plans. The engineers did not even acknowledge what is the future of Partner Office. The result was a vacuum of planning possibilities and incentives to pave the way for the forthcoming projects. No one from Company was championing this either, and DEU-specific betterments were then without "owners". Should the project work include only external personnel, it is plausible to state that the developmental drive would then be very sluggish.

Weakened preconditions for learning

Partner Office has much less knowledge in its close vicinity to draw assistance from. As the product- and process-specific knowledge assets had remained at Home Office, the possibilities of the PO-engineers to leverage these unique and complementary resources were decreased due to the lowered interacting possibilities. The social networks and trusted informants were less easy to contact and communicate with. Moreover, the communication tools did not allow rich "cross-pollination" of ideas and experiences which takes place at Home Office, and as such the innovation potential was reduced. While more time was at the hands of the engineers, they seemed not to possess a strong personal take on proactively acquiring vaster knowledge on the technical aspects and possibilities of the equipment. Learning beyond the job was hoped for but not present. Learning did of course happen, but the group at PO did not maintain a vision of becoming an actively learning office, expanding its role greatly from the execution-based mind set.

Reduced attachment to the development processes of the engineering community

Development of operations in project teams at DEU happens often tacitly and locationally. This means that the advancements done relate mostly to the project-specific context, allowing efficiency gains in that type of setting. Now with two different offices working together this issue has implications. It became increasingly demanding to diffuse these contextual developments quickly and correctly between the offices. And if the concrete developments of one office are implemented to another, different environment, the resulting effects can be unexpected. When there is this detachment between the offices, their progressions then advance along different trajectories. The synchronizing of developments and actions is consequently tougher. Also when written and cultural guides and guidelines follow the context of Home Office, they are harder to utilize at Partner Office. Vague, unexplained influence without perceivable benefits arriving from remote stakeholders, especially outside Home Office, can therefore face underestimation or rejection due to Not-Invented-Here syndrome. Therefore the continuous development taking place at the two offices is not the same, and there exists no system to efficiently alleviate this division of evolution. It was seen that the new routine creates less proactive change. This suggests that development is occurring at a slower pace.

On the whole, not everything was completely novel in the Partner Office routine. There was however clearly a new routine guiding the project work. Especially in the vital areas which matter dynamically in detail engineering project work there were differences from the Home Office project work. Figure 24 found in the next page summarizes the perceived main areas which constitute the routine as a unique departure from the old.

7.2 Analysis on the economic implication of the new outsourcing approach

The previous analysis showed how the newly emerged routine was clearly different from the old one. These unique features also mean that the static and dynamic performance, and thus the economic implication present in the new approach are divergent from the old arrangement. The

identification of the routine was embedded with insight on how the sources of efficiency in detail engineering project collaboration are present or not. Therefore the coverage above implies how beneficial the recently initiated outsourcing approach with its new production arrangement is. Next, this analysis is carried further.

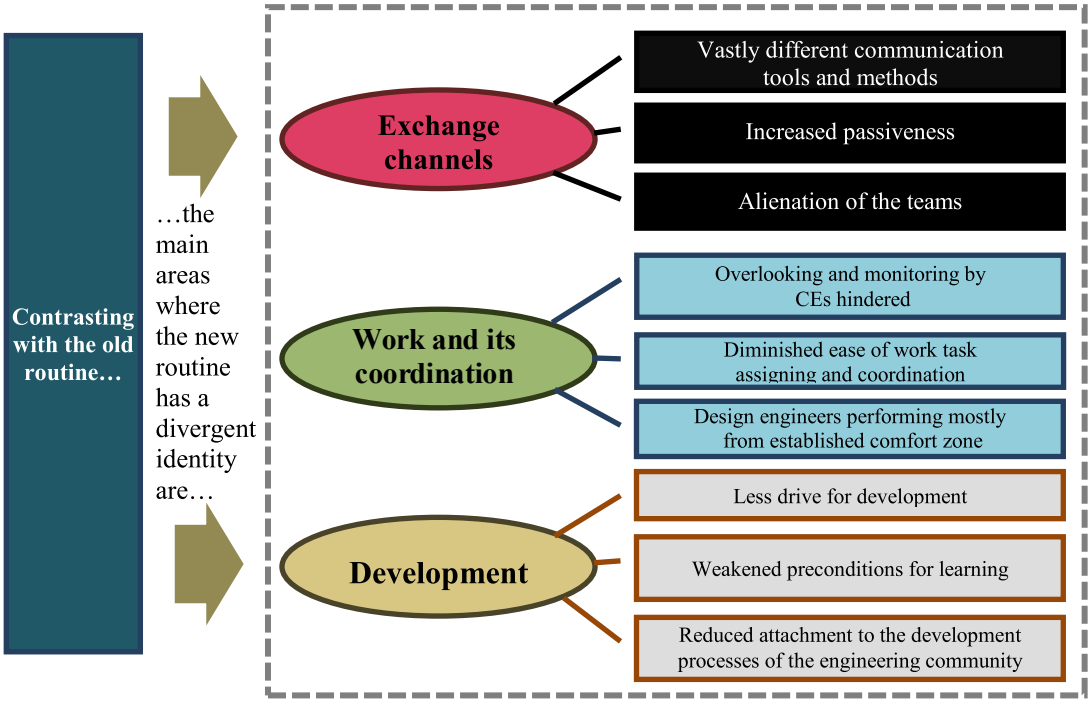


Figure 24. The unique compilation of the new emerged routine.

First, the continued analysis articulates how the pivotal factors which drive the value creation process in the project work are taking place in the new routine. Also the factors which diminish the creation of value are noted. This shows how the potential benefits of the collaborative efforts are actually coming to light and what kinds of cost incurring issues there are involved. After that, a short summary of the aggregated benefit and cost implications of the governance mode is derived. This way the overall impact of the outsourcing arrangement is explained through the routine and its economic implication. Corroboration of the utilized framework and the logic behind the analysis was received from the management professionals of DEU. This ensured that the analysis is meaningful and relevant. Figure 25 portrays how this analysis allows the main research question to be answered.

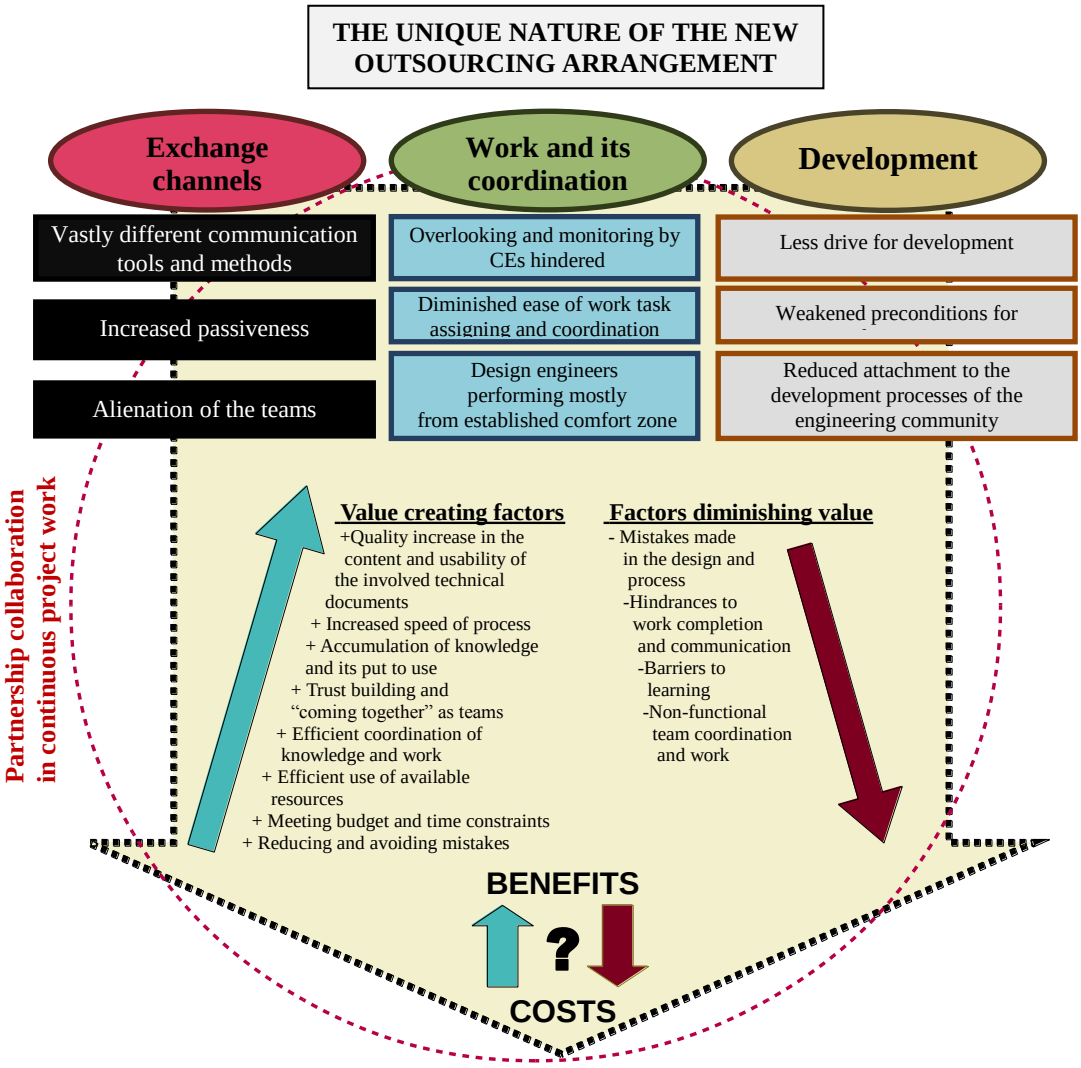


Figure 25. The framework for analyzing the beneficence of DEU's new outsourcing approach.

7.2.1 The value creating and diminishing factors of the approach

In order to see how the beneficial value creating factors are present in the new routine, each of these factors is individually reviewed. The same is done for the undesirable factors which diminish the value gained by the outsourcing arrangement. In addition, evaluation is done on whether the new routine allows more sharing of risks, scalability and lowering of opportunism, since these partnership-related components relate to the value proposition of the engineering project collaboration. So, even though the routine was able to provide sufficient results, the analysis

views how the routine is able to bring about benefits, relatively to the old one. Also it is seen if there are some varied costs involved. This way it is seen whether this departure of project operations is producing an attractive outcome and why.

Value creation:

Quality increase in the content and usability of the involved technical documents

The quality of the used and delivered documents involved in the detail engineering is facing no additional increases. In fact, the quality can be expected to grow at a slower pace, as the detachment and passiveness of Partner Office provide a weaker platform for development. Additional actions would be required to refine the value creation process beyond the mere execution of projects, yet it does not seem that these are likely to take place. There exists no drivers for this development, and it has little possibilities to arise without coordinated efforts.

Increased speed of process:

The engineering projects are not carried out with additional speed. The experienced engineers at PO are often provided with more peace and time to perform their design parts, yet other circumstances erode the possibilities of speeding up the projects. There are no means to efficiently utilize the competence and time of the PO-engineers at each point of time, which results in idleness. Additionally no incentives exist for the engineers to beat the given design schedules. Should this however occur by more proactive individuals or advancements done in the methods, the sequential, not constant, reviewing and coordinating of the projects done by the CEs does not allow capitalizing on such situations.

Accumulation of knowledge and its put to use:

New knowledge creation remains to occur in the engineering projects even when Partner Office is utilized. PO however includes far less resources to feed knowledge creation and it provides little complementary information for the engineers there. Added with the difficulty of interacting seamlessly with Home Office, the accumulation of knowledge can be seen to occur with lesser scale and scope at PO. This means that value created by implementing new ideas and innovations to the project work is less. The issue is especially magnified by the fact that the CEs and the engineers at Home Office are not closely tied to the knowledge

creation process of PO. It is then harder to further utilize widely and efficiently the often tacit, locational knowledge bits born during the activities at Partner Office.

Trust building and "coming together" as teams:

Trust between the individuals of project teams exists as a standing point. Otherwise the particular individuals would not have been kept in the roster in the past nor would Partner Office have been set up. As a part of the new routine the offices are becoming more detached from one another in daily activities. Trust is harder to maintain and to evolve in this state of affairs. The project engineering teams are less knit together as the CE and his design engineers lose their close connection. Familiarity of the people and their actions is then reduced over time and hardly gained regarding new faces. The parties, i.e. the office communities, can still interact, but the easiness and smoothness of transacting provided by trusting relations and group spirit will likely lessen. Trust and its positive effects should then be actively fostered in order to preserve them. They are not slowly accumulating on their own in the new routine.

Efficient coordination of knowledge and work:

Coordination of work done by the CEs is largely sequential when Partner Office is involved. Therefore coordinating the team efforts becomes less frequent. Coordination also becomes looser, as the two offices do not easily acquire knowledge on the actions and progress of one another. This makes it harder for the whole engineering team to align itself in a project. Especially when codified communication has a greater role than quick casual talks, it is harder for the parties to realize gaps, mistakes and development areas in the knowledge and methods utilized in the project design work. As a whole the largest, most pertinent coordinating problems are removed by reactive fixes. However, as no clear constant coordination of the individuals exists, the engineering teams are more loosely synchronized while they aspire to reach their project goals.

Efficient use of available resources:

The engineers at Partner Office are able to perform the assigned tasks. They however cannot utilize very efficiently the resource pool present at Home Office. This makes it tougher to leverage these resources in the current projects and in the long run as well. Also without any push for developmental drive, the probability of PO-engineers producing new

Company-specific betterments is less. This means that some of the potential to leverage their experience and skills is lost. The CEs neither possess the means nor the will to rigorously utilize the available time and competencies of the Partner Office-engineers. Thus, DEU is not fully capitalizing on these resources. In addition, the new ideas and methods born during the project work are often tacit and locational, and therefore the two separate offices cannot fully benefit from the advancements of the other.

Meeting budget and time constraints:
Budgets and project schedules are met in the usual fashion in the projects. Therefore the project routine can be said to be well suited for its executive role, as no specified additional attempts to save time and money are planned as a part of Partner Office -work. Nonetheless, no additional features are present to allow less money or time be used for the project work. In fact, the possibilities offered by experienced engineers working in a less turbulent and undisturbed environment are not seized. The CEs and DEU's management have no clear means to efficiently "acquire something extra" from the Partner Office-engineers. As a result, the project work is carried out in a satisfying manner yet the value gained from each billed hour is less.

Reducing and avoiding mistakes:
Mistakes are not prevented and caught any more efficiently in the new routine. There clearly exists no additional feature which would allow the CE to lead the engineering team in a way that would prevent mistakes from occurring. Also the PO-engineers continue the design cross-checking protocol as before, and human mistakes still happen in the design work and the reviewings. As a matter of fact, some of the additional costs of the new approach are created by the loosened monitoring and slighter self-criticism of the engineering team.

Value diminishing factors:

Mistakes made in the design and process
The design work of the new arrangement is facing additional mistakes. Due to the lack of constant overseeing and discussion of the design work,

the CEs are only able to correct mistakes and wrong turns once they sit down and closely review the work done at Partner Office. This takes time and is less effective as when done at Home Office. In addition, the PO-engineers are not sufficiently pedantic in their peer-reviewing. Once this is combined with the less clarity of events, the passiveness and the diminished thoroughness which the engineers at PO express, scattered focus and mistakes ensue. This feature creates less quality for the work done, and enables possibly costly mistakes. These direct and indirect costs currently go for Company to bear.

Hindrances to work completion and communication:
The engineering projects face new obstacles in their progress. Interaction is not as fluid as at Home Office and this creates delays between asking and answering, consequently leading to idleness and possibly to the use of outdated data. This is a result of more burdensome, narrower communication tools and methods present. Also the inefficient and partly non-existent diffusion of correct data from trusted, reliable and acknowledged sources to Partner Office creates concerns and hold-ups. This relates to the validity and rightfulness of the data which the PO-engineers possess at any point of time. And while the monitoring as well as the steering of engineering team actions is not constantly occurring, the low-incentivized PO-engineers are not pursuing to actively advance the projects beyond their natural flow. The outcome is declined execution and diminished communication. The Partner Office-engineers are also in the dark when it comes to the future steps and actions of DEU, making their responsiveness to changes reactive and colored by delays and confusion.

Barriers to learning:
The CEs and the design engineers at Partner Office continue to come up with new ideas and innovations as the projects are carried out. These efforts are however less, since the two offices mostly view the outcomes of the actions done by the others, and not the precise actions themselves. Therefore it is harder to understand the cause and the need of the developments, which reduces the ability to learn from them. When the wide diffusion of thoughts and knowledge between the offices is not achieved, the learning done by the groups becomes then largely diverged. This is further affected by the lack of push and desire of the PO-engineers to actively expand their skills and competence on Company-specific issues. Coupled with the unawareness of the future and the mission of

Partner Office as a whole, learning and competence enhancement are more deteriorated. The complementarity effects of different assets are also reduced, when the detached corners of the resource pool, the offices, cannot exploit one another with ease. For DEU, this means less innovating and long-term enhancement of the value gained from the projects done at Partner Office by the evolving resources situated there.

Non-functioning team coordination and work:
The efforts to coordinate the project work provided sufficient results in the routine. Regardless, it is tougher for the CEs to lead their remote engineers. Progress is blurred, developmental achievements are dimmed, and active utilization of the contractors and their competence is somewhat reduced. As a result, the new routine includes a CE and a "rogue team" operating under the radar. The experience and professional conduct of the engineers is largely driving the progress between the sequential catching up sessions. In a sense the coordination is then much weaker and the project work is based largely on the self-coordinated performance of the PO-engineers. As such, the design engineers are much less controlled and it is harder to acquire the desired results from them. Especially acquiring anything extra on top of normal execution is more laborious. With loose ties existing between the offices, the actions done at each office are not optimally synchronized either. As Partner Office is only involved in the project-specific issues and not more widely in the ongoings of DEU, its ability to meaningfully prepare for the future is fragile. All in all it will then be harder to maintain the efficient usability and usefulness of Partner Office.

Additional impact of the Partner Office -partnership arrangement:
The new environment does not create changed risks for the operations of DEU. As the costs of maintaining Partner Office go to Partner, no new financial liabilities appeared for DEU from the office premises itself. However, the mistakes and possible inefficiencies of the Partner Office-engineers still create direct costs for DEU. The risks of failing design work and the related costs have then remained. Risks relating to the central, experienced design engineers being moved to work for other customers can be seen as low. This results from the new office pleasing the engineering professionals. Partner can now also easily assign the particular engineers to other customers if DEU's demand dries up.

Opportunism on the organizational level is hardly increased. The Partner Office-engineers are constantly utilized by DEU, and should these engineers be moved to another customer of Partner, their high relation-specific efficiencies and knowledge would go unexploited. Also the use of Partner Office and each individual engineer can still be stopped by DEU at any time. Space and motives to act opportunistically are then hardly present for Partner. Yet for the PO-engineers who now work without direct, visible supervision and tight demands, more opportunities to devote less effort to tasks are present. The Chief Engineers however do not concern themselves about this because sufficient performance is received. This opportunism partly however prevents DEU from obtaining increasing hourly efficiency and more innovative performance from the Partner Office-engineers.

Flexibility and scalability to the cost and resource bases are mildly increased for DEU. With Partner Office hosting the engineers, DEU is not troubled with arranging premises for these contractors or reorganizing Home Office whenever the amount of engineers needs to be scaled up or down. With ample space existing at Partner Office, in the future additional engineers can be conveniently attached to projects by Partner to carry out special one-off tasks, such as stress calculations etc. Easier access to changing, skilled Partner employees is then made possible. However, as the coordination of Partner Office-engineers is not easily accomplished even in the stable, continuing operations, it is obvious that adding additional engineers to the projects will not automatically induce high benefits. The core engineering group at Partner Office which is dedicated to continuous project work of DEU is not either easily scaled up, as hypothetical future PO-engineers must get acquainted with the processes and products of DEU at Home Office prior to moving to Partner Office. Upscaling PO is then a tough move, and overall the attractive possibilities provided by Partner Office do not easily transfer into quick benefits in the actual project work. Opportunities on gaining additional joint surpluses from the new approach are currently scarcely perceivable.

7.2.2 The overall economic implications of the governance mode

The projects are getting done through the new outsourcing approach, and marginal savings are made on the hourly costs of the projects. These should not however be understood as the only relevant issues, as the coverage above shows. The current and especially the future performance outcome of the newly emerged routine is the fundamental determinant of the beneficence of the approach. Real options and ambitions matter little unless the underlying routine is enabling their exploitation. The different benefits and costs stemming from the new governance structure were derived from the previous review. These are summarized below. The aggregated cost and benefit implications are concluded in Figure 26.

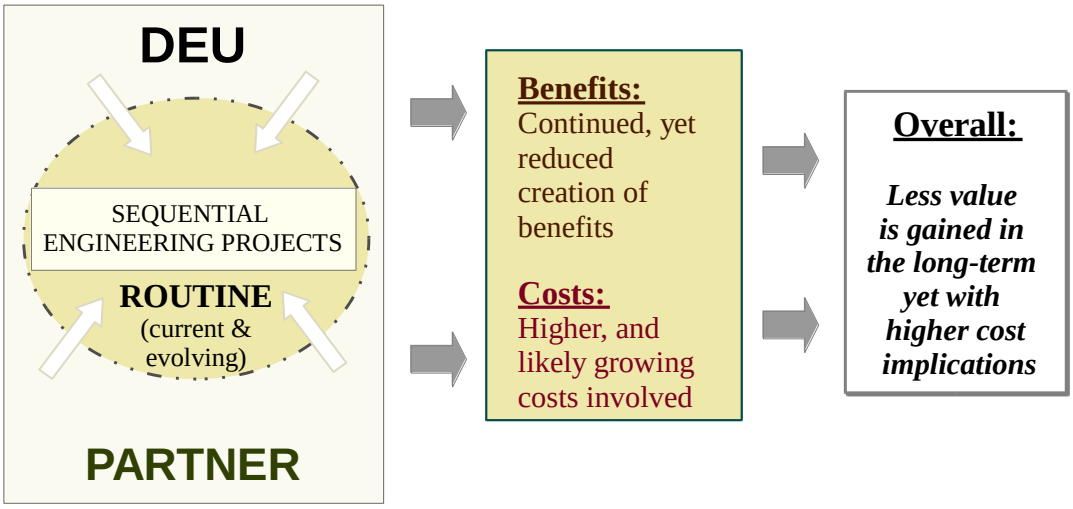


Figure 26. The overall impact of the new arrangement, compared to the old one.

Benefits from the hybrid:

Management benefits are still much present in the new outsourcing hybrid. The Chief Engineers and DEU control and steer autonomously the actions of the engineering teams in order to carry out the projects. The strengths in the project organizing capabilities and know-how present at Company are then put to use. The focus is kept on the core which continues to develop and learns how to utilize distant offices efficiently. Also DEU still maintains the freedom to utilize Partner Office and its engineers only when it sees reasonable to do so, and the unit then continues to possess the liberty to choose other options found in the market. However, the vast

resource pool surrounding DEU is not as easily exploited in the projects. The coordination of distant engineers is also more demanding.

Partnership benefits are born as well in the new arrangement. With the outsourced engineers working from their own premises, they still continue to contribute their experience and skills for the benefit of DEU. Combined with DEU's efforts and input, the resulting complementarity benefits can be expected to grow still as the individuals find more efficient ways to collaborate and gain new competencies. Joint production surpluses are achieved. The existing trust and familiarity, which smoothen out the coordination of the collaborative efforts, are nevertheless being eroded over time. Additionally, communicating, mutual learning and investing on refining the relations between the offices are more troublesome. This diminishes and slows down advancements as well as the "coming together". Opportunities to "do better" are more missed.

Transaction benefits are achieved. Incentives for efficiency are still met on Partner's side due to its willingness to continue the partnership with DEU as well as the presence of competitive markets. The engineering services received will then likely continue to be at a sufficient level, and it is easier for DEU to lay off the contractors at Partner Office if needed. More flexibility and scalability are then available to meet changes and uncertainty. This allows slight cost savings. It can also be expected that skilled engineers will continue to be available for DEU's projects from Partner's side, allowing the important continuation of operations.

On the whole, the new hybrid structure is seen to create benefits over time. This novel conjointment of DEU's and Partner's resources and its realized benefits are however not as ample as when working at Home Office. Additional value increasing elements in project work are slim.

Costs from the hybrid:

Management costs arise from managing the project work. The management of the engineering projects is happening in a new manner. While the projects fulfill their goals satisfactorily, more efforts are needed from DEU's part, i.e. from the Chief Engineers, to meet these goals. Costs

then go up, as controlling, supervising and administering the projects is increasingly laborious.

Costs of transacting efficiently with Partner are also growing. Especially coordination and motivation costs are largely present. DEU needs to increase its efforts to persuade Partner and the PO-engineers to maintain, refine and to renew their Company-specific activities and knowledge. In other words, DEU must act with more rigor to ensure that Partner Office will continue to be competent to take part on the projects. This goes for static and particularly the dynamic view. With low incentives to do more than sufficient execution on each project, Partner Office and the engineers there must be compensated, convinced and lead to pursue increasing returns from future projects. With the reduced synchronization and consensus inside the engineering teams, some obtainable value is wasted since the routine is not allowing the seizing of all the potential ideas to do better.

Costs are also created by opportunistic behavior on the part of the PO-engineers. They face no demand, mandate or drive to perform over the expected results. As the given tasks and schedules are not optimized to exploit the full input of each engineer, the hourly efficiency is subpar.

Utilizing the design engineers of Partner Office can be seen to inhold higher outsourcing costs as a whole. Receiving desired services is costlier, and the partnering efforts accrue less value over time though they demand more effort.

7.3 The overall outlook of the approach

The main research question asked how beneficial the new outsourcing approach of detail engineering project work is. The final analysis above shows that the approach is not a preferable strategic option over the old one. The new unique engineering project routine creates outcomes which come second compared to the old. Less value is gained from the engineering projects over time, and the overall costs of the operations aiming for tight partnership collaboration increase. Therefore it is clear that if DEU would have the simple option to just choose freely between the two outsourcing approaches, the old arrangement should prevail. One

experienced respondent saw no upside whatsoever in the Partner Office-operations, and at the current state of affairs this sentiment is not far off. The project work is not benefiting, as the underlying project routine in its current form cannot much support the long-term partnership targets, i.e. the desired benefits, to become reality.

It should not be forgotten however that the new approach leading to a novel arrangement of outsourcing was not conceived without a perceived need and rationale behind it. DEU must answer the demands of the industry and the uncertain environment, and distance engineering is a suitable and possible way to achieve this. The culture of Company and the realized actions of DEU have not assisted much the newly founded pursuit. There are higher benefits and real options to be exploited in the project work carried out with Partner Office. This was also shown by the routine at Home Office where more dynamic development takes place. So while the outlook of the new approach is not flattering at the moment, more can be gained. Already sufficient performance was received in the static view. The routine is not fixed, without any chance for change. The future demands focused actions to shape the project routine of the hybrid into a more value creating one. This calls for dynamic capabilities from DEU's part. With the thorough analysis and insight provided by this study, naïve top-down-ism can at least be avoided. The management of DEU also acknowledges the demanding nature of this outsourcing approach and that the current operations must be enhanced[15]. Next, the central conclusions derived from this research process are briefly summarized.

[15] Much like in the case of the empirical study of Becker and Zirpoli (2008, 144), the engineering management of DEU appreciated the use of the routine-lens. Valuable insight was gained about the gap existing behind the desired and realized performance, and the routine-framework additionally points out the causes of this gap.

8 CONCLUSIONS

This thesis investigated the beneficence of a novel way of outsourcing detail engineering project work in the case organization Detail Engineering Unit. The impact of this new production arrangement is crucial for the unit, as this recent strategic maneuver represents the future outlook of DEU: While attempting to cope with change, uncertainty and the dynamics of the market, distance outsourcing with reliable partners is believed to provide a suitable, efficient operational model to organize parts of the engineering work. The ideal situation would be to have a genuinely valuable, flexible and scalable engineering network. Distance outsourcing has been utilized before, and it has proven to be a viable option when organized appropriately. The resulting nature of the engineering project operations has gone however somewhat unrealized regarding the new arrangement with Partner. Since it is a departure from the old, home-based operations, the step taken should still allow increasing value creation and reduction of costs. How these long-term needs are coming to existence along with the requirement of efficient static execution, that is the uncharted issue. Consequently, the impact caused by the move needed to be analyzed. This analysis was done by evaluating the beneficence of the recent pursuit, based on the aforementioned determinants.

The conducted empirical study provided useful data. The utilized theoretical framework allowed constructed results to be drawn for DEU. The main findings of the research are concluded next. Also the contributions of this thesis are briefly summarized, and suggestions for future research are presented.

8.1 Main findings

The evaluation of the impact of the outsourcing arrangement was based on the engineering project routine guiding the performance; its unique features and the overall economic implications of these features. These two aspects denote the overall impact of the distance outsourcing approach and therefore imply whether it is beneficial or not. The standing point of the analysis was that benefits must sufficiently outweigh the costs

incurred. Comparison with the old outsourcing arrangement allowed more relevant interpretations of the findings.

The analysis shows that as of now, the new governance structure is not a very beneficial departure from the old one. The engineering project routine is not delivering flattering results. The many possible sources of value creation are mildly capitalized on while the partnering costs of the hybrid are rising. Despite the minor financial savings which are gained, the outlook of the governance mode is then not very advantageous.

With the artifacts surrounding the engineering project teams changed, the ostensive and the performative parts of the routine did not facilitate active development of actions or static performance reaching beyond the expected minimum. In dynamic view the gains from the collaboration with Partner Office will be smaller compared to Home Office operations, as real options are missed out on. As such, it is not plausible to state that the operations are on an admirable state and the arrangement is currently a success. The detailed descriptions provided on the two divergent routines revealed that the emergent routine has a unique set of features regarding developmental issues as well as work duties and their coordination. The changed exchange channels were also found relevant. When these areas had taken a new form, the economic value gained from the operations also differs from the old model. Coordination is hampered, less savings on cognitive resources are made, and dynamic learning effects are inferior compared to Home Office project teams. Figure 27 shortly adds up the progress and results of the empirical study while leading to the final conclusion: Overall, less value is gained with higher cost implications. The routine does not support the governance structure currently.

The results of the thesis are believed to portray the real-life situation rather well. The management of DEU corroborated the logic behind the analysis and provided professional knowledge to ensure that the relevant issues of the operations were accounted for. As the respondents of the empirical study also seemed to openly discuss issues regarding even the personal relationships among the engineering community, it is feasible to assume that the responses were not held back on truthful ideas. The amount of the gathered data was extensive, and ample time was devoted for its categorizing, analysis and deriving conclusions from the findings.

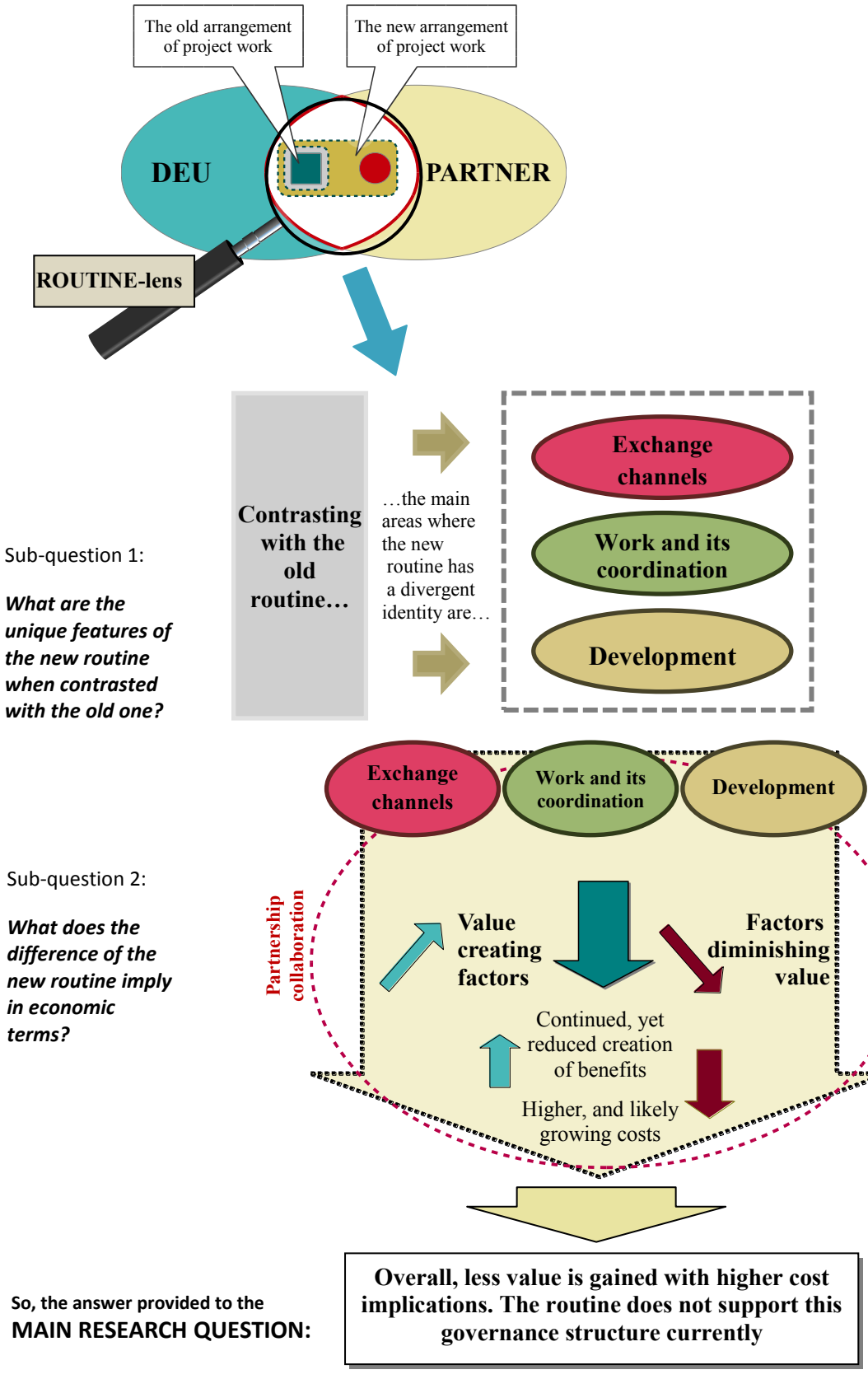


Figure 27. The empirical study process and findings of this thesis

By any stretch of the imagination the results are not expected to represent the full truth of the phenomenon, since it is impossible. Nevertheless, the conclusions are believed to express the main issues of the case. And while the case study was based on a thoroughly built framework, the results are considered to be valid.

All in all, the conclusions signal that DEU ought to refine the Partner Office-arrangement. More value can be achieved for example through increased developmental efforts of the project teams, as the case of Home Office proved. With the benefit of hindsight it can be stated that the prerequisites of the new office were not well established, and as such the preconditions for high creation of benefits were rather bleak. Regardless, the projects still got executed in a satisfactory manner. This shows that the new distance outsourcing approach holds potential even if its manifestation, the Partner Office-arrangement, is currently producing lesser results compared to the old arrangement. Yet it should be remembered that the engineering project routine is not fixed. It evolves and can be influenced. As efficient routines are not available for purchase from the market, DEU must then acknowledge the present situation and act accordingly.

8.2 Contributions and suggestions for future research

For DEU this case study has contributed an in-depth evaluation of the impact of the acute outsourcing arrangement. With the project performance nuances covered, clarity was increased on the true causes and the outcomes of the performance. The determinants of the impact then got analyzed. In the future, the revealed gap between the emerged and the desired operational efficiency can be tackled with more focus and rigor. It is needed, as the perceived situation does not efficiently contribute to DEU's and Company's value creation processes in the long run. What became obvious is that detail engineering needs to be understood as a value creating process, not a cost allocation place. The understanding of the seminal role of the underlying routine and its current identity can assist in the future when the Partner Office-arrangement is refined. Competence development can also take place to allow DEU to build long-term, cost-effective and value creating

partnerships. Actions manifesting "naïve top-down-ism" can be avoided and collaboration boosted to ensure fast and efficient scalability. Strengthening the personnel capabilities for seamless coordination of work may also take place, when the presence of multipart organizational routines is realized. Some respondents noted that thorough evaluations on performance such as this study are needed, because otherwise wrong judgments can be made purely on reviewing project outcomes. As such, the case study serves its purpose well in the eyes of DEU, although only the future will tell how the insights are transformed into action.

In the scientific arena this thesis also delivers some contributions. The novel combination of routines-approach and the extended transaction cost view allowed a fertile research process to be built for case study purposes. The author is not aware of such approach having been utilized before. The framework provided insightful results when the black box of the routines was penetrated and a holistic governance structure comparison performed. Consequently the performed research is a step of advancement in strategy research, although a diminutive one. As the approach yielded appropriate, meaningful results, it is nevertheless a fitting mix of the contemporary views on organizational performance and its economic evaluation. Case studies are called after in these streams, and this thesis contributed one of such studies. In addition, the operational level impact of this specific partnering maneuver between an industrial organization and its engineering consultancy partner was revealed here. These types of investigations are needed by industries as Finnish firms must efficiently adapt to the global challenges by partnering through value creating arrangements. While revealing for DEU, the case-sensitive results provided here cannot be easily generalized to wider domains. Yet, this type of an approach can be applied to further inquiries.

As for the future research in the field, longitudinal routine-based studies on the impact of different partnering arrangements in the engineering sphere could provide the stakeholders more information on how these operations can be organized and supported in order to reap high rewards. While this thesis was situated on the operational level, wider scope of activities also could be chosen to provide more all-encompassing evaluations. Also the ability and possibilities of managers to alter the operations based on the information gained in "routines-mapping" form

an interesting research agenda. For DEU, further analysis on the impact of different production arrangements could proof useful, as the fundamental dynamics of each arrangement are hard to grasp by reviewing only the surface. Should longer periods of project work be observed, and the performance mechanism as well as its resulting outcomes revealed, the unit could more readily leverage the potential of its surrounding resource network despite the obvious complexities related to operational harmonization. This is imperative, since DEU is centrally positioned in the value chain of Company.

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APPENDICES

Appendix 1. The main elements of the data gathering methods

The gathered data was confidential inside and outside the case unit (only the author and the individual respondents became aware of the specific individual responses). Also, the specific terms, actions and structures involved in the case set-up are irrelevant pass their conceptual level. Therefore the exact used questionnaires and interview topics are not presented in the thesis. More information can be obtained from the author if necessary. In any case, each study must tailor and fit its data gathering procedures to the underlying case set-up, and this thesis covered many confidential issues. As such, these descriptions are sufficient. The nature of the content is of importance here, not the specific questions.

Questionnaires:

The questionnaires included directed statements and questions to be answered. The topics related to the particular project which the respondent had been a part of and the working environment (office location) where the person worked. Answering time was approximated to be 20 minutes, depending on the use of free text elaboration. Answering and layout were made user-friendly to assist and to reduce the time needed for filling out the form. Also the particular project was briefly identified in the form to remind the respondent which case is being discussed.

The relevant five categories of routine dimensions; change, contextual embeddedness, nature, attributes and process, were transformed into specific questions in the questionnaire. Also the dual concept of routines was present, as opinions and ideas of the project work were asked while exact examples of performance were revealed as well. The tools were customized to suite the case and the roles of the respondents so that the relevant areas were sufficiently covered. Answering possibilities to the statements included 4-point Likert scale (Very much agree – Agree to some extent – Disagree to some extent – Very

(continues)

much disagree) without the possibility for non-response "Cannot say/I don't know"). Also Yes/No possibilities were used with direct statements. The answers were used to spot trends, chart personal views, and to acquire initial material for the interviews. Also recollections of instances of performance were collected.

Interviews:

The interviews used Figure 14 as a basis. Each step of progression was covered regarding the particular project and the stakeholders. Tools, working environment, communication methods, need for adaptation and adjustment, problems and development needs, presence of managerial influence and artifacts in general. These are examples of the discussed topics. In addition the respondents were prehanded an outline of the major topics of the discussion. These included efficiency enhancing and reducing elements of work. Additional questions were derived beforehand from the questionnaire responses. As a whole, the interviews provided in-depth data of the projects. As the semi-structured interviews did not merely enforce the discussion topics, relevant issues were able to be raised by the respondents. This helped tremendously, as the respondents provided essential information proactively and also when asked follow-up questions.