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Building a Subcontractor's Competence Management Framework for an IT Company

Case: Finnish IT Company

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TIIVISTELMÄ:
Kompetenssien hallinta ja johtaminen on kehittynyt merkittävästi alan kehittymisen, ja lisääntyneen tiedon myötä. Sen merkitys on myös kasvanut, etenkin jatkuvan muutoksen alla olevilla toimialoilla. IT-ala on malliesimerkki nopean muutoksen toimialasta. Tämän tutkielman tarkoituksena on kehittää kompetenssihallinnan viitekehys, joka on erikoistunut alihankinnan kautta työllistyneisiin konsultteihin IT-alalla. Osana tutkielmaa tehdään case-tutkimus suomalaisesta IT-alan yrityksestä.

Tässä tutkielmassa käsitellään kompetenssihallinnan keskeisiä teemoja ja erityisesti IT-alalle tyypillisiä haasteita. Lisäksi tarkastellaan erilaisia strategioita kompetenssien tehokkaaseen hallintaan. Optimaalisten metodien selvittämiseksi, tässä tutkielmassa käytettiin sekamentelmää, johon sisältyi kirjallisuuskatsaus ja case-yrityksen alihankkijoille suunnattu kysely. Koska käsiteltävät aiheet ovat varsin sensitiivisiä, kaikki tässä tutkielmassa osana olleet yritykset ja henkilöt ovat anonymiteetin alaisia.

Löydökset korostavat jatkuvan oppimisen, mukautumiskyvyn, sekä henkilökohtaisten taitojen ja organisaation tavoitteiden välisen yhteneväisyyden tärkeyttä. Ydinosaamisen, tehokkaan kommunikaation, ja palautekanavien strategisen integraation tärkeyttä emoyhtiön ja alihankkijoiden välillä korostetaan. Projektinjälkeiset katselmoinnit tunnistettiin olennaisiksi organisaation oppimisen ja kehittämisen kannalta.

Tutkielman lopputulemana todetaan, että systemaattinen lähestyminen kompetenssihallintaan tarjoaa strategisia etuja kilpaillulla IT-alalla. Ehdotettu kompetenssihallinnan viitekehys pyrkii parantamaan projektien onnistumisastetta, sekä tukemaan laajempaa organisatorista oppimista ja strategioiden kehitystä yhdistämällä alihankinnan kompetenssihallinnan organisaation tavoitteisiin ja edistämällä jatkuvaa osaamisen kehittämistä.

Tämä tutkielma tarjoaa arvokkaita näkemyksiä IT-alan alihankinnan kompetenssihallintaan, ja tarjoaa viitekehyksen, jota voidaan soveltaa erilaisiin tilanteisiin yksittäisen konsultin, sekä yrityksen suorituskyvyn parantamiseksi. Se korostaa strategisen yhteneväisyyden, jatkuvan oppimisen, ja tehokkaan kommunikaation tärkeyttä kompetenssihallinnan alalla.

AVAINSANAT: Alihankinta, Johtaminen, Kompetenssi , Projekti, Viitekehys

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Abbreviations

Acronym	**Full Form**
AHP	Analytic Hierarchy Process
CM	Competence Management
EE	Extended Enterprise
IT	Information Technology
PMBOK	Project Management Body of Knowledge

1 Introduction

Competence Management (CM) is a highly valued topic in a project-based IT industry. It has a critical role in enhancing organizational learning and competitive advantage. Other studies, including Kotnour (1999) and Medina & Medina (2015), have done valuable groundwork by investigating CM within project-oriented organizations, showcasing how projects can act as positions of enhancing organizational learning contributing to an organization's competitive edge. Medina & Medina (2015) particularly noticed a gap in the literature regarding the interaction between projects and the organizations implementing them: a deeper understanding could enable organizations to leverage project-derived knowledge for strategic advantage a lot more efficiently, thus offering benefits for the organization.

Insights from Crawford (2005) and Contractor & Lorange (2002) further emphasize the strategic value of CM in fostering inter-organizational cooperation and enhancing the extended enterprise's competitive stance. Thus, they support the claim that a comprehensive CM framework can significantly contribute to project success and, by extension, organizational performance. This study aims to build upon this foundation by focusing on subcontracted consultants within the IT industry, a segment that has not been extensively explored in existing literature.

1.1 Literature Gap and Research Focus

Much of the existing literature on competence management in project-based settings predominantly addresses the practices within project-oriented organizations, highlighting a notable focus on how individual projects contribute to an organization's broader learning and competitive strategy. However, there remains a distinct research opportunity to explore the nuanced interaction between projects and their executing organizations, particularly in subcontracted consultancy within the IT industry.

This study aims to bridge this gap by delving into the best practices for organizing competence management for subcontracted consultants. This offers a nuanced understanding that could significantly enhance competitive advantage by efficiently utilizing project-derived benefits and lessons learned. The exploration of this interaction, as emphasized by Medina & Medina (2015), suggests a fertile ground for advancing the understanding of how projects can more effectively serve as grounds for strategic organizational learning and competitive enhancement. By expanding this knowledge base, organizations can refine their strategies for managing competencies to maximally leverage the unique insights and capabilities developed through project work, particularly in the complex IT sector.

1.2 Methodological Approach

The purpose of this study is to address the pinpointed gap in research and answer the critical question: **What are the best practices for organizing competence management for subcontracted consultants in the IT industry?** This question is approached through a methodological framework utilizing qualitative and quantitative research techniques. For the purpose of gaining extra insights into solving the research question, a case study was conducted by gathering survey data from the subcontracting companies to garner a multifaceted understanding of competence management practices within subcontracted IT consultancy projects. Using these methods, the research offers a baseline exploration of competence management strategies tailored specifically to the unique dynamics and challenges of subcontracted consultancy in the IT domain.

1.3 Contributions to the Field

This research contributes to the existing literature in three ways. First, it provides a nuanced exploration of CM within the context of IT subcontracting, an area relatively underexplored in current studies. Second, it introduces a comprehensive framework that

outlines best practices for CM, drawing from both theoretical insights and practical observations, including contributions from the existing studies by Campion et al. (2011) and Crawford (2005), among others, on competency modeling best practices. Lastly, it enhances understanding of the strategic role of CM in project-based environments, extending the work of Contractor & Lorange (2002) on the growth of alliances in the knowledge-based economy, thereby offering organizations a pathway to bolster their strategic capabilities through effective competence management.

1.4 Structure of the Thesis

The thesis is structured to guide the reader through the complexity of CM in subcontracted IT consulting settings. It begins with an in-depth literature review, followed by a detailed description of the research methodology. The findings section then presents the insights from the mixed-method research approach, leading to a discussion that contextualizes these findings within the broader literature. The final chapters propose a comprehensive CM framework for subcontracted consultants in the IT industry, outlining practical recommendations for implementation and suggesting directions for future research.

2 Projects and subcontracting

2.1 What is a project?

First, we have to define a project, as it is one of the core concepts of this thesis. Defining a project is more complex than it might seem at first glance, as it can be approached from many different standpoints. The Project Management Body of Knowledge (2017, abbreviated PMBOK) defines a project as a temporary effort to create a unique product, service, or outcome. As projects are temporary, they also have a beginning and end. This, however, does not mean that projects are short by definition.

Projects can end with several different outcomes. The PMBOK (2017) defines these potential scenarios as follows:

> *"The end of the project is reached when one or more of the following is true:*
>
> - *The project's objectives have been achieved;*
> - *The objectives will not or cannot be met;*
> - *Funding is exhausted or no longer available for allocation to the project;*
> - *The need for the project no longer exists (e.g., the customer no longer wants the project completed, a change in strategy or priority ends the project, the organizational management provides direction to end the project);*
> - *The human or physical resources are no longer available; or*
> - *The project is terminated for legal cause or convenience."*

2.2 Business IT Projects

Although projects have similarities across different fields of business, IT projects have their own special set of features, as described next.

Projects where business benefits are achieved through IT deliverables are defined as business IT projects, according to Einhorn et al. (2019). They continue by stating that in

the case of business IT, deliverables alone are insufficient and should be combined with business changes for them to be better utilized. IT projects can be divided into two sections: a) developing the IT products and b) using them in value creation. People of different backgrounds do these two sections respectively. Therefore, finding a common terminology between them can sometimes be difficult. Nevertheless, communication between the two actors is crucial as neither knows all aspects of the project. (Einhorn et al., 2019)

Schwalbe (2019) elaborates further that there are people with different competencies and expertise in the projects, in addition to various hardware and software. For instance, two project members could have the same job title, but it does not guarantee they can complete the same tasks. Due to the diverse nature of IT projects, many specialized competencies could be needed in project delivery, leading to further work fragmentation. This also makes team formation and project leadership harder.

In addition, Sauer and Reich (2009) highlight that IT project management has become increasingly more difficult due to the importance of IT in strategy-as-practice and everyday business functions. They also mention that since the business environment changes rapidly due to competition, IT is seen as a holistic business investment instead of being handled by the IT departments alone. Additionally, the role of IT is often to support other business functions within the organization, which further highlights the requirement of the project members to understand the supported areas (Haines & Lafleur, 2008).

2.3 Causes of IT Project Failure

As with all projects, the "iron triangle" of scope, cost, and time are the most important aspects that a project manager must balance accordingly. Liebowitz (2015) further categorized the reasons behind IT project failures. He has divided them into three sections: 1) process-driven, 2) context-driven, and 3) content-driven issues. Process-driven failures relate to the managerial side of an IT project: project management, project planning,

and change management, to name a few. Content-driven failures refer to the issues with the IT system itself. These issues could emerge from the technology, system design, and related topics. Context-driven failures stem from the environment where the project is being deployed. For instance, these issues could be caused by the firm's culture, internal communications, politics, and user involvement.

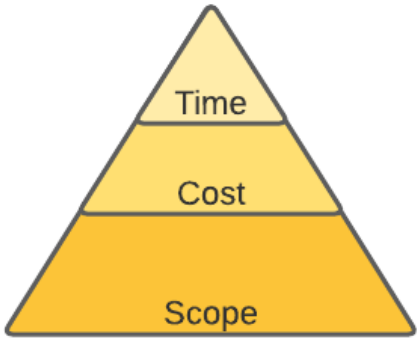

Figure 1: The Iron Triangle of project management. (Adapted from Liebowitz, 2015)

Sweis (2015) also recognizes similar themes. He also adds that high customization, late changes to the design, and underestimating the timeline are key issues in failed IT projects. Most research done in the field agrees with this. Lauesen (2020) has divided the causes of IT project failure into seven different segments according to the part of the development process where they tend to occur: analysis, acquisition, design, programming, test, deployment, and management. Surprisingly enough, only one of the causes relates to programming and testing. The rest of the causes happen during early activities and deployment. Additionally, managerial causes are by far the most common reasons for failure.

2.4 Subcontracting

Since organizations wish to have a certain level of flexibility, companies tie collaborative relations with other organizations to improve their capabilities and competitive

advantages (Seppänen, 2008). Hence, unsurprisingly enough, inter-organizational alliances and corporate cooperation have been booming. This phenomenon dates to the late 1980s. The rate of alliance formation has not dropped; on the contrary, it is accelerating (Contractor & Lorange, 2002). Brito et al. (2013) define cooperation as a joint activity between partners to reach common goals that would be otherwise unattainable or unreasonably costly.

Subcontracting is an example of the aforementioned inter-organizational cooperation. Cambridge Dictionary defines subcontracting as follows:

> *An agreement for an outside person or organization to do work that might normally be done within an organization.*

In this thesis, subcontracting is observed in the project delivery context, specifically the technical aspect of it.

2.5 Reasons behind Subcontracting

As stated in the paper by Häkkinen (2008), there have been many studies about the reasons behind subcontracting. In the paper by Webster & Beach (1999), subcontractors have been categorized as per reason for outsourcing. These reasons included the lack of capacity within the contractor's organization, the need for expertise and technology, cost-effectiveness, and regulatory reasons, such as avoiding clauses dictated by collective agreements and outsourcing the support for older products.

In a study conducted by Hines (1994), Japanese customers were found to have similar reasoning behind subcontracting. 57.6% claimed that the subcontractor had technical knowledge the contracting party did not possess. 48.2% chose to subcontract to concentrate work effort more efficiently. 46.5% had previous business relations with the subcontractor or found them reliable. The flexibility gained through the size of orders was

reported as a reason by 37 % of respondents. A similar portion found lower personnel costs as a reason for subcontracting. Around 30 % saw greater efficiency reached through smaller subcontracting parties. Additionally, less than 10 % of respondents found a reduced operating rate through subcontracting and that the competition between subcontractors ensured high quality and lower unit prices.

Vesalainen (2004) has divided the cooperation process into three mutually managed sections in customer-supplier relationships: 1. Cooperation in production. 2. Cooperation in logistics. 3. Cooperation in product design. Production cooperation could manifest itself through deliveries and product liability, for instance. In logistics, cooperation emerges in information-, and material flows. Product design-related cooperation concerns prototyping and product design, to name a few. Although Vesalainen views the customer-supplier relationship in the manufacturing industry context, similar themes are evident in cooperative relationships in IT project delivery.

2.6 Subcontractor Selection Process

According to a paper by Doloi (2009), contractors' pre-qualification is commonly determined by past performance and financial status, which also affects the project's outcome. Additionally, Doloi (2009) suggests that a project's ultimate outcomes were significantly influenced by business soundness, technical expertise, and positive attitude toward defects liability. Planning and controlling skills also significantly impact effective project management. The results indicate that contractors' past performance has a moderate impact when measured against technical aspects like planning, controlling, and quality management.

While there are not any established decision-making procedures exclusively for choosing subcontractors, there are some general decision-making processes we can use in choosing the subcontractor.

2.7 The Analytic Hierarchy Process (AHP)

The Analytic Hierarchy Process (AHP) is a structured decision-making technique that helps decision-makers evaluate alternatives based on multiple criteria. It was first introduced by Thomas L. Saaty in the 1980s (Saaty, 2013). AHP allows decision-makers to decompose complex decisions into a hierarchical structure of objectives, criteria, and alternatives and then evaluate and prioritize these components using pairwise comparisons. The pairwise comparisons allow decision-makers to compare each element in a hierarchy relative to others. Saaty also introduced the concept of the consistency ratio, which helps ensure that the decision-maker's judgments are consistent throughout the process.

Vaidya and Kumar provided an overview of the applications of AHP in various fields, including supply chain management, manufacturing, healthcare, education, and finance. They highlighted the flexibility and simplicity of the AHP model, which allows decision-makers to handle complex, multi-criteria problems effectively. (Vaidya & Kumar, 2006)

Ishizaka and Labib (2009) analyzed the benefits and limitations of the AHP model compared to other decision-making methods. They noted that AHP's strength lies in its ability to handle complex decision problems involving multiple criteria and stakeholders. The authors also discussed the challenges of using AHP, such as the issue of inconsistency in judgments, the subjective nature of pairwise comparisons, and the possible bias introduced by decision-makers.

In Figure 2, the subcontractor decision criteria Doloi (2009) mentioned have been added to a rudimentary AHP process. It represents a hierarchical structure with the goal on the left, the criteria and sub-criteria in the middle, and the alternatives (subcontractors) on the right.

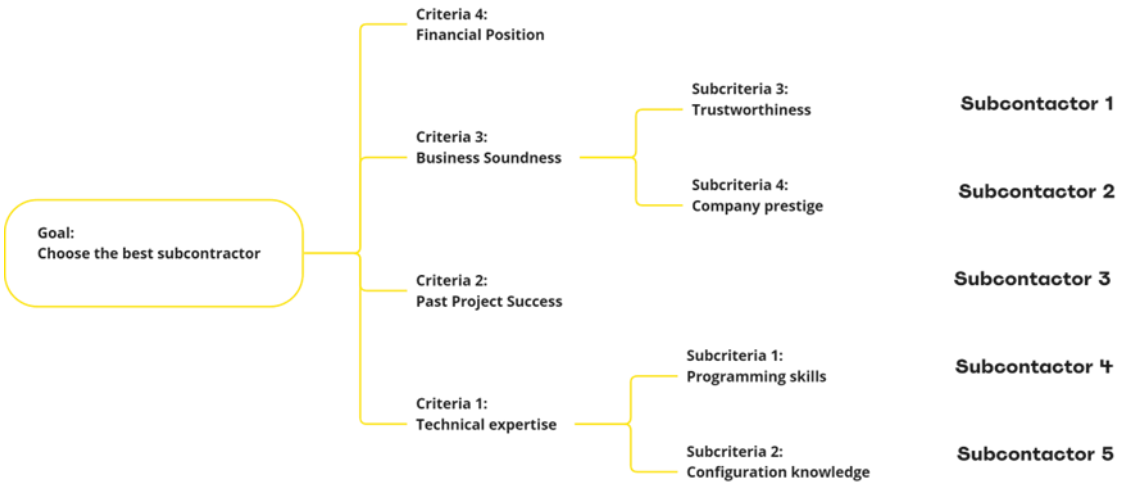

Figure 2: Subcontractor selection criteria in the AHP Process. (Adapted from (Doloi, 2009; Saaty, 2013)

2.8 Extended Enterprise (EE)

Extended Enterprise (EE) is a concept that connotes the collaborative relationships between supply chain actors. For instance, buyers and sellers have a common vision they are working towards in a synergistic relationship (Davis & Spekman, 2004). An adversarial approach with supply chain actors is only effective if beneficial. A study by Henke and Hedge (2015) regarding the US auto industry suggests that if GM, Ford, Chrysler, and Nissan had their supplier relations at the same level as Honda and Toyota, they would have collectively earned $2 billion more in operating profits (Spekman & Davis, 2016). The study highlights the importance of supplier relations to the OEM and its correlation to the supplier's benefits. Both parties gain a competitive edge and achieve greater customer satisfaction than regular supply chains through the common vision (Davis & Spekman, 2004).

EE offers a variety of benefits. Some of them are easy to measure and document: purchase price reduction, quality improvement, and cycle time improvement, to name a few. Other effects, however, can be difficult to be directly accredited to EE. These include bigger market share, better customer satisfaction, and higher customer retention. (Davis & Spekman, 2004)

What makes EE different from other supply chains or subcontracting relationships? One of the most significant aspects of EE is that it is based on the idea that firms are linked as learning organizations. Although firms have their own culture, identity, documents, routines, etc., that assist in preserving knowledge, many organizations need help transferring internal knowledge to external parties. Knowledge integration is an effective strategy for achieving a more efficient product development process. (Spekman & Davis, 2016)

Despite having internal mechanisms, such as culture, identity, policies, documents, and routines, that aid in retaining knowledge, firms still require assistance in sharing this internal knowledge with external entities. While connecting knowledge integration to both upstream and downstream new product development offers clear benefits, scholars caution against excessive supplier and customer integration. This caution arises due to potential overheads, inefficient resource utilization, Intellectual Property violations, and the risk of mismatched management styles, which could result in suboptimal outcomes. (Spekman & Davis, 2016)

3 Competence management

3.1 Defining Competence

What is competence? When reading the relevant literature, one comes across competence and competency. According to Le Deist and Winterton (2005), competence generally refers to functional areas and competency to behavioral areas. They remark, though, that both terms are often used interchangeably. Despite some efforts to establish a unified definition for the terms, more progress has yet to be made (Le et al., 2005). There has been discussion that competence as a term could be clearer. Norris (1991) argues that the need to define and operationalize concepts has caused theoretical confusion and disturbed the practical understanding of the word 'competence.' Due to the reasons above, one could use either of the two terms.

Regardless of the critique mentioned above about the definition of competence, Boon and van der Klink (2003) recognize its usefulness as a bridge between education and job requirements. They also recognize that the definition varies between different geographical locations. For instance, competencies refer to collectively agreed standards in the UK, whereas competencies refer to excellent performance in the USA. Additionally, they recognize that the adopted learning theory and field of application affect the definition. Out of the two most common learning paradigms, the constructivist view underlines norms, values, and beliefs as important elements of competencies.

Boon and van der Klink (2003) have highlighted that the interpretation of competence is not universal, but rather, it is influenced by several factors, such as the geographical location, the learning theory perspective adopted, and the specific field of application. Research has commonly identified two predominant perspectives on competence: the behavioristic and the functional views. The behavioristic perspective emphasizes the actions and behaviors of an individual as the manifestation of competence. This view is in

contrast to the functional perspective, which interprets competence as an amalgamation of various skills, attributes, and knowledge that enable an individual to perform a job or task effectively (Prahalad & Hamel, 1990).

Competences can also be divided into rationalistic and interpretative views. In rationalistic approaches, human work competence is a sum of attributes, such as knowledge, skills, abilities, and other characteristics (KSAO) used to execute a specific work. Furthermore, the rationalistic view has three subcategories: work-oriented, worker-oriented, and multimethod-oriented. The work-oriented approach focuses on the attributes of the work, meaning that they first identify activities that are essential in accomplishing a specific work and then translate them into personal attributes. The worker-oriented approach views competencies directly as the attributes of the worker. On the other hand, the multimethod-oriented approach observes both of the approaches mentioned above. (Sandberg, 2000)

As a separate view, the interpretative approach considers worker and work as the same entity. Therefore, it does not view their respective attributes separately. Essentially, competencies must be distinct from their surroundings. (Sandberg, 2000)

Rutledge et al. (2016) mention that competencies are crucial in talent management, providing a uniform and objective foundation for making recruitment, promotion, assessment, and employee development decisions. Moreover, they represent the organization's values and communicate the anticipated performance levels.

Toney (2002) views competencies as observable and measurable elements that do not require interpretation, embodying a highly rationalistic viewpoint. He further posits that competencies mainly delineate what an individual is expected to do rather than what they should know. On the other hand, Ellström (1997) explored various viewpoints and interpretations of professional competence. His proposed model, illustrated in Figure 3, presents competence from two perspectives. The left side of the model interprets

competence as an attribute of the individual, while the right side views it as a requirement of the job. At the center of the model, a perspective that merges both sides is presented, conceptualizing competence as the interplay between the individual and the job.

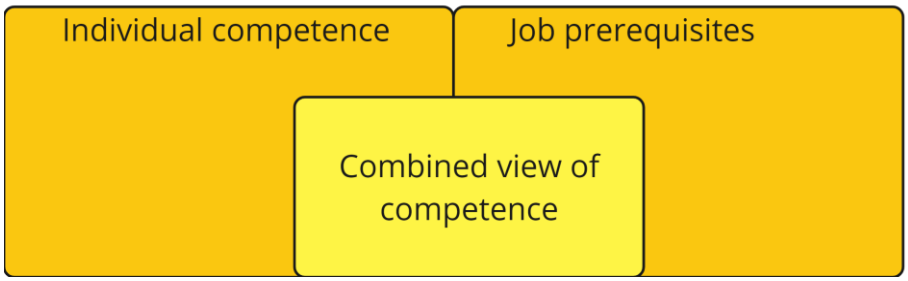

Figure 3: Competence as a combination of the individual and the job. (Adapted from Ellström, 1997)

The model proposed by Ellström enriches and explains the perspectives introduced by Sandberg earlier in this subsection. Although this study primarily concentrates on specific occupational competencies, it effectively illustrates how competencies can be perceived, the varying viewpoints, and their interrelations.

Crawford (2005), similar to Ellström (1997), proposed a framework (as depicted in Figure 4) that conceptualizes competence as a construct that is composed of two main elements: the individual's characteristics and the demands of performance. The individual's characteristics encompass the knowledge and skills that they can apply to a job, as well as the personality traits that guide their actions. These elements collectively constitute the competencies that are inherent to the individual.

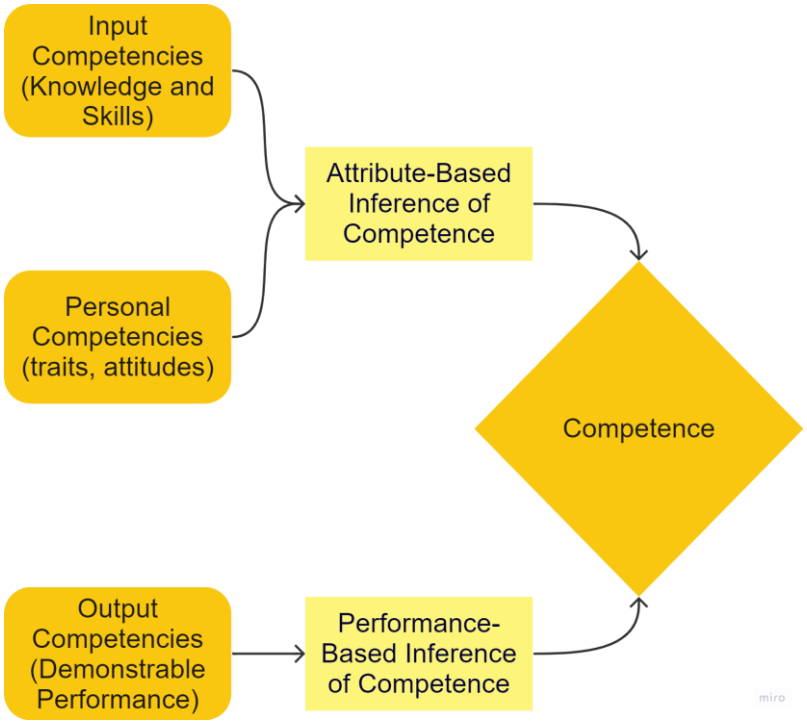

Figure 4: Integrated model of competence. (Adapted from Crawford, 2005)

With the previously discussed competence-relevant concepts in mind, we will go through competence management within an organization.

3.2 Individual and Organizational Competencies

Vartiainen et al. (2003) suggest that competencies can exist at the individual, group, or organizational level. However, in reality, organizational and group competencies rely on individual competencies. Otala (2008) supports Vartiainen's view, stating that individual competencies transform into organizational and group competencies when they are shared, merged, and collectively developed, ultimately leading to shared goals and actions.

3.2.1 Individual competencies

Otala (2008) proposes that an individual's competence is a fusion of personal capabilities, which include knowledge, skills, connections, and experience, along with the capacity

for rapid learning and organizational knowledge and learning. The latter encompasses the abilities of others, techniques, and tools for teamwork, organizational culture, and leadership. This viewpoint is more interpretive as it takes into account the surrounding environment. Vartiainen et al. (2003) put forth the idea that individual competencies are interconnected with collective and company core competencies, a concept introduced by Pralahad and Hamel (1990).

Given that the focus of this thesis is broad, rather than providing a detailed breakdown of the required competencies for each role, it outlines some of the essential skills associated with the most common roles in an IT project.

A significant amount of research is dedicated to the skills and capabilities of a Project Manager (PM). This viewpoint is based on studies like those conducted by Shahzad et al. (2023) and Thomas & Mengel (2008), which concluded that a PM's competencies are a crucial element in attaining success in a project. Furthermore, the role of a PM in any project is often the most flexible, yet it remains constant, irrespective of the characteristics of the project. For instance, the roles and expertise of the project team members can vary greatly.

3.2.1.1 Project manager

Several studies (Shahzad et al. (2023); Thomas & Mengel (2008); Malach-Pines et al. (2009)) note that the competencies most required of a Project Manager are managing individuals, fostering team growth, facilitating communication, and guaranteeing technical execution. Shahzad et al. (2023) also highlight the importance of the project manager's leadership style: a despotic project manager is found to have a detrimental effect on successfully delivering a project. This remark supports the commonly accepted importance of the Project Manager's soft skills (Avença et al., 2023; Castro et al., 2022). These soft skills include communication, leadership, and facilitation skills. The capability to create a relaxed atmosphere within the project was also beneficial. Naturally, project management skills are essential for a project manager. The essential areas of a project

to manage are summarized in the Iron Triangle of Project Management (Figure 1) by Liebowitz (2015).

In IT projects, the project manager is often required to possess technical skills. Vartiainen et al. (2003) highlight that there can sometimes be a conflict between the roles of a Project Manager (PM) and a technical expert, especially as the scale of a project increases. In larger projects, the PM's time and focus are often consumed by responsibilities such as management and leadership, leaving little space for tasks that demand specialized or technical knowledge. Schwalbe (2019) also discusses this issue from the perspective of IT, posing the question of whether PMs should focus on enhancing their technological understanding or prioritize the construction and leadership of the project team. In addition to technical competence, Schwalbe underscores the significance of business competence for PMs, asserting that they must be able to deliver solutions that align with business needs.

Although the target audience of the suggested framework in this study is the subcontracted consultants, it is important to understand the types of skills a project manager should possess as well. This is because, in many smaller customer deliveries, the consultant must be able to act as the project manager as well.

3.2.1.2 Project group members

Instead of the Project Manager, it is typically the project group members who should hold the substantial or technical competencies. Ideally, these competencies should complement each other as much as possible to execute the project tasks and achieve the set goals. The competencies required vary depending on the nature of the project, the roles that team members occupy within the organization, and the tasks they are assigned in the project. Similar to how project managers need interpersonal skills, project group members also require these skills to collaborate effectively with others in the project and with customer representatives (Vartiainen et al., 2003).

Moura et al. (2021) further break down the features of a high-performing project team in Information Systems (IS) projects. Findings underscore several aspects that can be grouped into five primary categories: management/leadership, the emotional and affective state of team members, their work behavior, work cognition, and personality traits. All these categories focus on human and soft skills, except work cognition. Despite being human-oriented, this category also encompasses factors connected to individual technical competencies, which are essential in IT/IS projects (Schwalbe, 2019). These insights suggest that the elements contributing to the high performance of IS project team members are largely interconnected and overlap with those crucial for developing high-performing teams.

3.2.2 Core competence and collective competence

Core competence is a well-recognized idea in strategic business thinking and is believed to be the bedrock of competitiveness. Its wide acceptance could be attributed to this premise. Initially conceived as a tool to help big corporations grow and outperform their competition, it also encouraged and simplified expansion into different business areas. Prahalad and Hamel (1990), the creators of this concept, characterized core competence as the sum of knowledge within an organization, primarily focusing on efficiently managing varied production abilities and amalgamating several technology sources. They later elaborated on this definition, suggesting it encompasses a set of skills and technologies that allow a company to offer value to its customers.

As was established before in Chapter 3.2.1., core competencies are formulated from collective competencies. Collective competencies can be categorized into two types: those at the organizational level and those at the group level. Organizational competencies are crucial as they persist even when individual members come and go. On the other hand, individual competencies are more prone to being lost (Ruuska et al., 2003). This highlights the importance of fostering organizational competencies within a company.

At the project level, research like the one done by Ruuska et al. (2003) found that projects mainly need organizational competencies as skills. Besides the usual project management skills, a common understanding of the whole project and its goals, along with extensive communication not only among the project team but also with other involved parties and stakeholders, are considered crucial for the project's success.

Purna's, Farooq's, and Patnaik's study emphasizes the importance of group-level competencies. They suggest that an effective project team combines individual members and their skills, including shared dedication, team morale, and member interaction. In their research on software development teams, they noted from various prior studies that mutual trust and communication efficacy play crucial roles in team performance. (Purna et al., 2011)

3.2.3 Competence in project delivery

According to Crawford (2005), a project's success relies on project management skills and a comprehensive mix of technical, business, and other relevant skills tied to the project's results. These skills can be associated with individuals based on their respective expertise. However, from the project's perspective, it's about more than who possesses which skills. Rather, the priority is that all necessary skills are adequately represented in the team, ensuring the project's requirements are effectively met.

Vartiainen et al. (2003) further elaborate that in addition to the competencies of team members previously mentioned, a project also requires certain essential project competencies, which significantly influence the project's success. These competencies are determined by the project's environment and the specific requirements of the different stages of the project - from initiation and execution to completion. Thus, these critical competencies are dynamic and must adapt to the ever-changing conditions of the project.

When an organization properly leverages its members' unique skills, it can develop competencies that span the entire organization. This approach enables the organization to become more self-sufficient and resilient to potential changes, such as team members retiring or shifting careers. Furthermore, these organization-wide competencies provide individual team members with opportunities to learn and benefit from skills they might not be able to gain independently. (Vartiainen et al., 2003)

As discussed before, competencies play a crucial role in the successful outcome of a project. Within a project context, competencies are notably viewed as the underpinning of effective project management, forming the cornerstone for the project's overall success. (Schwalbe, 2019)

The success or failure of IT projects or their management has been the subject of many studies. Many of the factors that affect failure or success are related to competencies. Kappelman et al. (2006) found twelve risk factors that were the most common early signs of IT project failure, all linked to people and processes. As mentioned in Chapter 2.3., similar risks were noted by Lauesen (2020) and Sweis et al. (2015), such as poor project planning and documentation, weak project management or team conflicts, lack of motivation or expertise, and management problems. These all have a strong connection to individual and organizational competencies discussed before.

3.3 Why is competence management important?

As discussed in Chapter 3.1., competencies are useful for summarizing important human behavior in work-related settings. They can be applied across different groups of people (individuals, organizations, and markets). Competencies are particularly helpful within an organization because they facilitate effective resource allocation, support knowledge management and informal learning, and enable human resource development. By using competencies, an organization can clearly identify individuals' skills and how they contribute to achieving organizational goals. Given the importance of competencies for

organizational success, they should be managed carefully to maximize performance. (Braun et al. 2010)

According to Draganidis and Mentzas (2006), organizations can greatly benefit from adopting Competence Management strategies, primarily for the following reasons:

1. Competence Management Systems facilitate the recognition of necessary skills, knowledge, behaviors, and abilities to meet both present and future personnel requirements. This alignment corresponds with changes in strategies and organizational priorities.
2. Companies can tailor the growth plans for individuals and teams to bridge the gap between required competencies and those currently available. This adjustment can be made in alignment with a project, job role, or overarching business strategy.

3.4 The general scope of competence management

In general terms, Competence Management (CM) refers to the organization and oversight of skills within a company, whether these belong to a group or individuals within the company. Competence essentially allows for the practical application of knowledge, skills, and attitudes within a specific context. The primary aim of CM is to clearly define and consistently maintain a skill set that aligns with the company's overall objectives. (Harzallah et al., 2006)

Historically, CM was connected to managing people's qualifications and annual evaluations. These qualifications were closely associated with predetermined roles, tasks, and positions in organizations that had relatively stable job-based structures. Standardizing organizational practices was the primary strategy in such environments to sustain or enhance company performance. (Harzallah et al., 2006)

However, as competition between organizations increased and businesses had to adapt rapidly, the strong connection between competencies and standardized organizational roles began to loosen. Consequently, companies had to navigate less structured, less stable, and less standardized processes. (Harzallah et al., 2006)

This organizational adaptation gave rise to two major CM approaches based on individual and core competence, which we discussed in previous chapters. The first approach emphasizes the importance of individual employees' skills in achieving corporate goals. The second approach, on the other hand, posits that companies depend on specific and ideally unique skills - their core competencies - to maintain competitiveness. (Harzallah et al., 2006)

As organizations shifted, CM had a substantial impact on the entire company. According to Harzallah et al. (2006), CM is currently a part of all three company control levels:

1. Strategic Level: CM ensures the necessary competencies for achieving corporate goals are accurately identified. For example, it can help formulate recruitment and training policies or support decisions about reorganization by evaluating required and available skills.
2. Tactical Level: Managers must ensure that they achieve their responsibilities by rearranging work, reallocating staff, recruiting new team members, or deciding who needs training.
3. Operational Level: CM can be used for daily personnel reallocation to handle unexpected situations, such as staff shortages.

With this in mind, we can conclude that there is an irrefutable connection between the previously introduced individual and core competencies, which we have divided into organizational and group competencies.

3.5 Competence management in a project environment

Projects can make competency management more complicated because they have unique and short-lived features. Usually, projects are seen as separate work units, with different people in charge of their management. For example, you might have different project managers for different projects and several levels of managers involved. At the same time, it's normal to have the same group of people working on multiple projects in an organization, and these people may also have other duties besides these projects.

Much of the literature on competence management (CM) in project-based settings mainly focuses on project-oriented organizations (Kotnour, 1999; Medina & Medina, 2015). These studies often investigate how individual projects contribute to the organization's learning process and competitive edge. Medina & Medina (2015), who have reviewed the literature on competence management in knowledge-intensive and project-intensive organizations, propose that there is scope to further explore the interaction between the projects and the organizations that carry them out. By clarifying this relationship, organizations could improve their competitive advantage by efficiently using the benefits and lessons learned from the projects. Moreover, the studies highlight the significance of knowledge and its strategic use in accomplishing the organization's objectives.

3.6 Use of automation in competence management

Tinelli et al. (2017) advocate for using automation in human resources (HR) management. They argue that adopting knowledge-based technologies is going to offer a significant boost to human resources functions. Intellectual capital is a peculiar business asset, as it is intangible and often subjective. Therefore, it is important to choose the correct way to describe it so that it can be successfully exploited. Even though Tinelli et al. cover a wider topic with HR management, encompassing the recruiting process and further employee development, the same arguments could be applied to competence management, which can be seen as a derivative of HR management.

Automation in competence management is a great tool for increasing efficiency. However, it should be noted that such systems should not be followed blindly. There should always be some leeway to add more relevant competencies to track within different organizations. (Hale et al., 1998)

3.7 Theoretical Framework for the CM Model

The key to a successful competence management framework is to ensure it is flexible and adaptable to accommodate the diverse range of projects in the IT industry ecosystem. The unique skills and attributes of the consultants also vary greatly. Therefore, defining the framework must be done by balancing the preciseness and granularity of tracked competencies.

Based on the survey results and the reviewed literature, it is suggested that a framework where core competencies act as the basis should be created. These competencies are then split into two categories: input competencies (knowledge and skills) and personal competencies (traits and attitudes). The sum of these two competencies formulates output competencies (performance). Based on the output competencies, a feedback loop to develop input- and personal competencies is established. The framework also includes the communication loop between principal company's representatives and subcontractors' representatives.

The built framework has elements from Crawford's (2005) approach to competence management, with an added element for core competencies introduced by Pralahad and Hamel (1990). To highlight the dynamic nature of the IT industry, a section was added to address this special feature to highlight the everchanging set of competencies in demand. From a strategic perspective, the importance of this was addressed by Teece et al. (1997). The authors argue that in fast-paced industries, the source of competitive advantage lies not just in the possession of specific assets or resources but in a firm's capacity to

leverage and reconfigure its asset base in response to new opportunities and threats. This perspective shifts the focus from static resource-based views to a more dynamic outlook on strategic management.

The importance of having periodic competence reviews, especially after a project is finished, is discussed by Anbari et al. (2008). In their paper, they argue that reviews impact future projects by providing a historical database for planning and improving project management practices, both from an individual and organizational point of view. Additionally, they claim that post-project reviews are pivotal in developing learning processes that improve the organization's long-term competitive position. The paper also highlights that despite the recognized value of post-project competence reviews in theory, their practical implementation often faces challenges due to various organizational and individual factors, including time constraints, lack of structured processes, and resistance to admitting project failures or shortcomings. However, effective execution of these reviews can lead to significant benefits, such as improved project performance, enhanced knowledge management, and increased innovation. (Anbari et al., 2008)

Dyer and Hatch (2006) delve into the importance of communication loops within network relationships, a concept that resonates strongly with the proposed competence management model. They highlight the role of these loops in facilitating the transfer, recombination, or creation of specialized knowledge, which can lead to competitive advantages. The paper also addresses the concern of losing competitive edge through extensive knowledge sharing, noting that certain capabilities are unique to specific relationships and cannot be easily transferred, thus maintaining competitive edges.

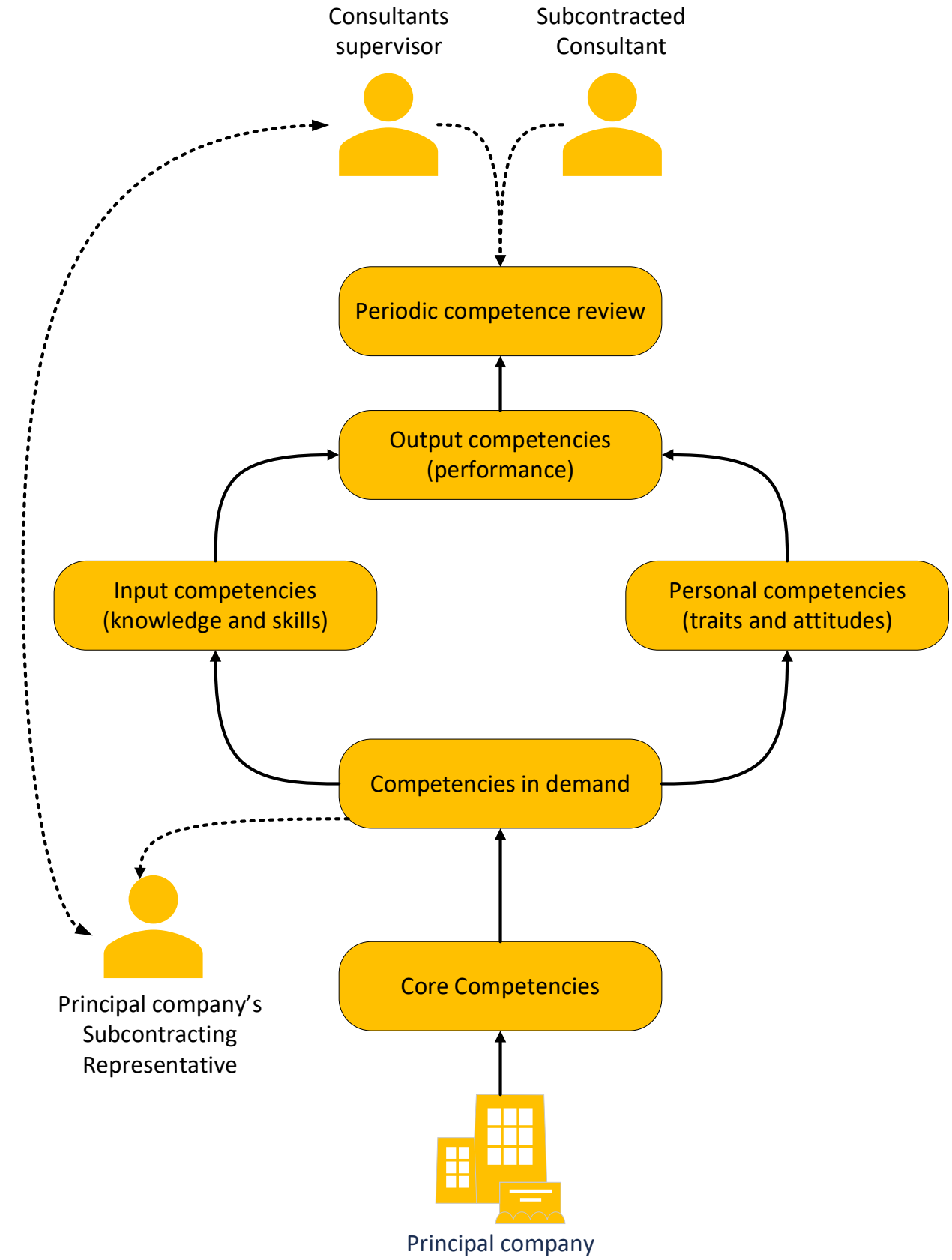

Figure 5: Suggested model for a competence management framework.

In the next chapter, we will introduce the case company and the research methodology utilized in this study.

4 Methodology & Case Participants

The subsequent chapters will lay out the principal company and its respective subcontractors, as well as the research methodology used. An introduction will be provided to Saunders, Lewis, and Thornhill's (2019) onion model (as shown in Figure 5). The model's research and development stages will be detailed in a step-by-step manner as follows:

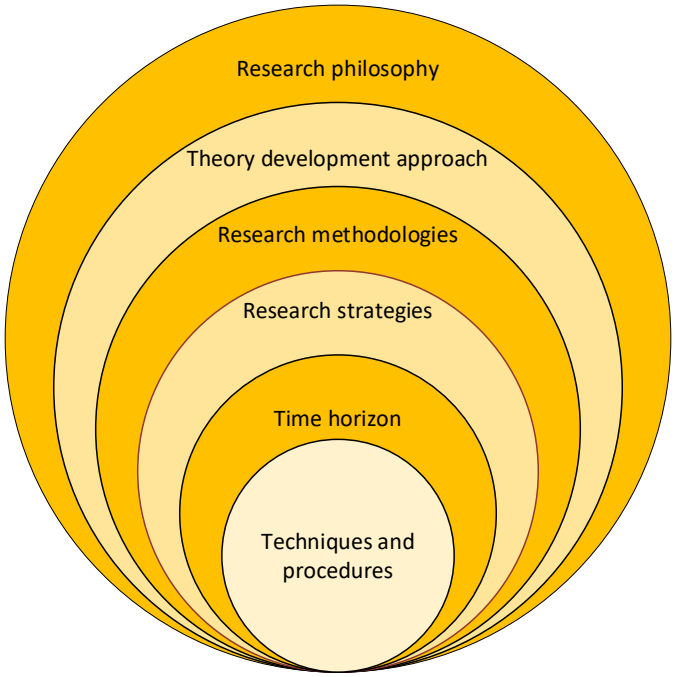

Figure 6: The research onion. (Adapted from Saunders et al., 2019)

The first two external layers of the model, which include research philosophy and research approach, are discussed in section 4.2. After that, we delve into the inner layers, revealing the methodological choices in Chapter 4.3.

This is followed by an explanation of the research strategy and the technique for data collection, found in chapter 4.4. Lastly, in chapter 4.5, we evaluate the research's validity, reliability, and ethical considerations.

Prior to walking through the research methodology, an introduction of the case companies is given.

4.1 Introducing Case Participants

4.1.1 The principal company

The principal company is a Finnish software company that specializes in knowledge work automation solutions. The company was founded in 1987 and currently employs over 500 people globally. Of these, there are 270 employees in Finland and 100 in North America. As stated on the company's website, besides its main headquarters in Tampere, Finland, the company operates branches in the United States, United Kingdom, France, Germany, Sweden, and Australia.

The principal company designs and develops their own software to manage and store documents and other information securely. The company bases its document management on metadata, eliminating information silos from the traditional folder system and giving quick content access. The information in the case company is saved in repositories called vaults, and each vault has a separate structure and features depending on its purpose. Users can have one vault or multiple vaults, depending on their needs. To store the documents correctly, the software uses artificial intelligence to assist the users with creating metadata and classifying information. The software can be connected to Microsoft Office applications and email, allowing for easy handling of the documents. The product can be used on desktop, web, and mobile applications. Every project delivery that the subcontractors of the principal company do is focused on the core software that the principal company offers and develops.

4.1.2 The subcontractors

As the principal company has a large pool of partners and subcontractors (300+ worldwide), the data gathering in this study was limited to covering the biggest Finnish subcontracting companies. Expanding the study to cover a wider subcontractor pool shall be covered by a follow-up study.

Five different subcontracting companies were chosen for the study. Two of them have an overall headcount ranging between 370 to 500 employees. However, only a fraction of them are focused on IT project consultancy. Therefore, the employee pool relevant to this study is about five percent of the overall headcount. The three other companies have a headcount ranging from seven employees to 20. In smaller companies, the entire employee pool specializes in IT project consultancy and delivery, particularly in delivering the case company's software solutions. The selected companies have their headquarters in various cities in Finland, from Oulu to Helsinki. Revenues of the case companies varied between 0,27 and 53,3 million euros.

Company	**Yearly revenue in M€ (2022)**	**Number of employees (2022)**
Company A	56,0	370
Company B	26,0	432
Company C	2,1	20
Company D	1,3	16
Company E	0,27	6

Table 1: Basic information on the subcontracting companies. (Finder, 2023)

All of the selected companies have extensive experience in delivering the case company's solutions to customers. Therefore, their employees also have a good idea of what kind of guidance they wish to receive regarding competence management in future software deliveries.

4.2 Research Philosophy

A study is built or developed based on several philosophical assumptions. Saunders et al. (2019) state that research philosophy represents a belief system about how information about a certain phenomenon should be gathered, analyzed, and used. Saunders et al. (2019) highlight various research philosophies, including positivism, realism,

interpretivism, subjectivism, and pragmatism. This specific research aligns primarily with two of these: positivism and critical realism.

Positivism employs existing research and theories to formulate hypotheses that can be tested. This approach has been implemented in the present study. Empirical data has been gathered to reduce the impact of the researcher's influence on the results. However, the small sample size makes it impossible to make broad, law-like generalizations. As a result, the positivist ideal of comprehensive knowledge based on observation and experiment has to be set aside. Despite all this, the study aims to be as general as the setting allows by introducing the benefits of the final outcome from a business managerial point of view.

This is why critical realism philosophy also provides a partially suitable approach for this thesis. Critical realism seeks to explain our observations and experiences in the context of the deeper structures of reality that influence observable events, as Saunders et al. (2019) describe.

Choosing a research approach boils down to two choices: inductive or deductive. When employing the inductive research method, a researcher collects specific observations and data. From there, they identify recurring themes and patterns within the data. Based on these findings, they then formulate an initial hypothesis to investigate further (Creswell, 2007). As this study aims to support and complement the theoretical framework introduced in Chapter 3.7., the inductive research method is applied.

4.3 Research methods and purpose

The purpose of this study is two-fold: one purpose is to discover the theoretical background and frameworks for organizing competence management as optimally as possible. One must also consider the IT industry's special features when selecting the relevant theoretical frameworks. Another purpose is to carry out a survey to support the

theoretical background of this study, focusing on the case company and its respective subcontractor's competence management practices.

Both qualitative and quantitative research methods were utilized in this study. First, qualitative research was used to choose the best-suited theoretical frameworks. Qualitative research is frequently associated with inductive reasoning because it starts with detailed observations of individual events and then progresses to broader conclusions and theoretical frameworks (Creswell, 2007).

Quantitative research was used to gather data to support and complement the path taken going forward with the selected theoretical framework. Furthermore, the gathered quantitative data acts as a reference point in the likely scenario of a follow-up questionnaire in the future.

4.4 Techniques and Procedures

4.4.1 Data collection

As part of this thesis, a survey was conducted to map out the current situation and the future that the subcontractors want to achieve. The survey includes both qualitative and quantitative questions. Therefore, the survey follows a mixed-method approach.

When applying mixed methods research, it's understood that solely relying on either quantitative or qualitative data might not comprehensively address the research inquiry. The study's generalizability is enhanced by pairing the expansive nature of quantitative research with the depth of qualitative research in mixed methods. This approach provides enhanced context and depth of findings, and credibility is boosted through triangulation, where both data types are reinforced by each other. However, a mixed approach might be deemed unnecessary if the research question can be adequately addressed by a single method. (George, 2023)

Creswell (2018) complements George's (2023) approach by offering practical examples and processes to follow when implementing mixed methods surveys. They offer comprehensive guidance on integrating diverse methodologies to ensure robust and credible results. The authors provide detailed strategies for the sequential designs, which are highly valued in structuring methodologically sound research that aligns with the complex nature of competence management in the IT subcontracting context (Creswell & Plano Clark, 2018).

The questionnaire was carried out using Webropol, and the link to the questionnaire was sent to a predetermined set of respondents via email. The respondents recorded their answers independently. As the questionnaire followed the mixed methods approach, as opposed to a purely quantitative questionnaire, the response rate was anticipated to be quite low. Therefore, the questionnaire was sent to a wide audience of different subcontractor employees from the case company in Finland.

The reasoning behind choosing mixed methods for this study is twofold. Firstly, a comprehensive analysis is achieved when integrating both qualitative and quantitative data types. This fusion allows researchers to capture qualitative research's deep, contextual insights while benefiting from the broader, externally valid implications of quantitative research. Each type's potential shortcomings are balanced by the other's strengths. For instance, where purely quantitative studies might lack depth, including qualitative data provides this missing nuance. Conversely, the inherent specificity of solely qualitative research is broadened and made more generalizable with the infusion of quantitative data. (George, 2023)

Secondly, a mixed methods grant enhances research design flexibility. Rather than being anchored to strict ties to specific disciplines or entrenched research paradigms, mixed methods allow for a more adaptable research framework. This flexibility not only paves the way for a blend of various research elements, resulting in richer outcomes but also allows for the simultaneous bridging of theory generation with hypothesis testing within

a single study, a feature not typically present in standalone qualitative or quantitative research (George, 2023). Although the possibility of testing the research hypothesis was not utilized in this study, the mentioned flexibility offered a huge benefit, as the research question covers such topics that are simply not possible to map out using purely quantitative methods.

4.4.2 Data analysis and qualification

Due to the small amount of data gathered in this thesis, the data analysis and qualification were heavily based on the personal expertise of the mentor at the case company and the author of this study. The mentor has more than nine years of experience working in the case company, which has given them enough expertise to analyze the validity of the received data. Additionally, the author has been working with the case company for five years, three of them delivering projects. The theoretical framework gathered in this study acts as a backbone for validating the data. Even though the gathered data was limited, some preliminary conclusions can be drawn out of it.

5 Survey Findings

5.1 Survey Data Analysis

The questionnaire was sent to 35 recipients. Out of them, seven responded, giving the questionnaire a response rate of 20%. The response rate is admittedly too low to draw conclusions from the questionnaire alone, and it also limits the generalizability of the data. However, it can be used to support the theoretical framework and personal knowledge about this study. Reasons for the low response rate can be addressed as many contributing factors, such as a busy schedule and lack of interest in the subject of this study. Additionally, in hindsight, the sent questionnaire was perhaps deemed too long from the respondents' point of view, as it consisted of 15 questions, both closed and open-ended questions.

Four of the seven respondents were non-managerial staff, and the other three were C-level executives. None of the respondents belonged to the mid-management. The lack of middle management can be explained by the relatively small size of the subcontracting companies. It is quite common for smaller companies to have a flat organizational structure, causing the responsibilities of the middle management to be split between C-level and non-managerial staff. Some of the larger companies involved in this study do not have middle management staff working within the case software's delivery projects; instead, all employees involved are categorized as non-managerial staff.

The implications of the survey results to the suggested competence management model introduced in Chapter 3.7 will also be introduced in this chapter.

5.1.1 The first section of the survey

The questionnaire can be split into two sections. Respondents were asked to answer questions in both sections one and two if their respective company tracks the skills of

their consultants subcontracted to the case company. If not, they were only to answer the questions in section two. 71 % of the respondents answered yes, whilst 29% answered no. The respondents who answered no automatically skipped the next five questions concerning the current methods used in their skills management. Without going too deep into speculating, companies that do not follow the skills of their consultants might prioritize the case company's projects differently, or they may not have a skills management system in place. However, as the results do suggest, this supports the theoretical assertion in the suggested theoretical framework that systematic competence management is crucial in IT subcontracting. This validates the framework's emphasis on the importance of tracking and managing competencies to enhance project outcomes and organizational learning.

Four responses were submitted to the open-ended question regarding skill management methods utilized. One respondent mentioned that their skills are monitored through semi-annual competence discussions, planning, and follow-up. Another highlighted that in their organization, training is consistently kept up-to-date. A third individual noted that monitoring primarily takes place using an internal CV. Finally, another respondent shared that in their company, every employee has a detailed competence development plan created in collaboration with their supervisor, and this plan, which considers both short-term and long-term goals, is reviewed annually. These methods align with the theoretical framework’s components that suggest structured approaches to competence management can facilitate better alignment with organizational goals and project requirements.

The next question was about who is maintaining the skill data of each respondent. Multiple answers were allowed in this question, as the responsibility over maintaining the skill data could be divided among multiple people. 80% of the respondents answered that the employee himself manages the skill matrix, and 40% responded that it's the immediate supervisor or manager. Therefore, it is suggested that most respondents handle their skill data themselves. This underscores the theoretical concepts related to

autonomy and self-directed learning within competence management. It also highlights organizational reliance on individual responsibility and proactive management, which are often critical in agile IT environments.

Regarding the updating cadence of the skill data, the majority of participants, 80%, update the skill matrix annually, while 20% do it quarterly. None of the respondents update it monthly or more frequently. This indicates that most organizations prefer yearly revisions of their skill matrix.

Respondents use varied scales to score skills. One uses a simple numeric scale from 1 to 5. Another assesses skills based on how many years they've utilized a particular skill and their personal preference for it. The third uses a more descriptive 4-tier scale, where the lowest level indicates no mastery and the highest denotes expertise, even capable of guiding others in that skill area. This shows there's no standard method among the participants for rating skills, and they adopt approaches that best fit their context. The implications of this to the suggested model in Chapter 3.7, having a commonly agreed scale would help in managing the competencies among subcontracted consultants from different companies.

5.1.2 The second section of the survey

The next question concerned what kind of competencies the respondents deemed useful in the future. The people who answered no to the question regarding whether or not their skills are managed in their companies were also allowed to answer this and the rest of the questions.

Respondents perceive a shift in the competence needs of their companies. One notes a decline in older skills, particularly as the case company's product transitions to cloud-based platforms, altering job roles and demands. Another respondent highlighted that the successful execution of the case company's projects requires expertise in the delivered software itself and related areas such as database knowledge, programming in C#,

API/VAF, web programming, scripting, and soft skills like project management. Another respondent emphasized the increasing importance of core software-related competencies. The fourth respondent added that competence is a significant aspect of what their company offers. One company also has internal assessment procedures to identify new competence requirements.

These results complement the flexibility and adaptability as central components in the theoretical framework, reflecting the dynamic nature of IT project environments and technology evolution. It supports the necessity for continuous learning and adaptation strategies in competence frameworks. Additionally, it highlights the technical nature of the case company's ecosystem.

A majority (71.4%) of the respondents believe that there's a need for more detailed information directly from the principal company's representatives regarding the skill level of each consultant in the core software environment. Conversely, 28.6% think that the skill level of consultants should be maintained internally within the company. The fact that 28.6% believe skill maintenance should be internal indicates that there's a segment of respondents who feel self-reliant or may have a robust internal training and support mechanism in place. The significant majority (71.4%) want more information from the case company about consultant skills, which suggests a high dependency on the principal company. This could also point to the possibility that they find the current information insufficient or unclear. These results would suggest that there is indeed a need for a common process for competence management, much like the suggested model introduced in Chapter 3.7.

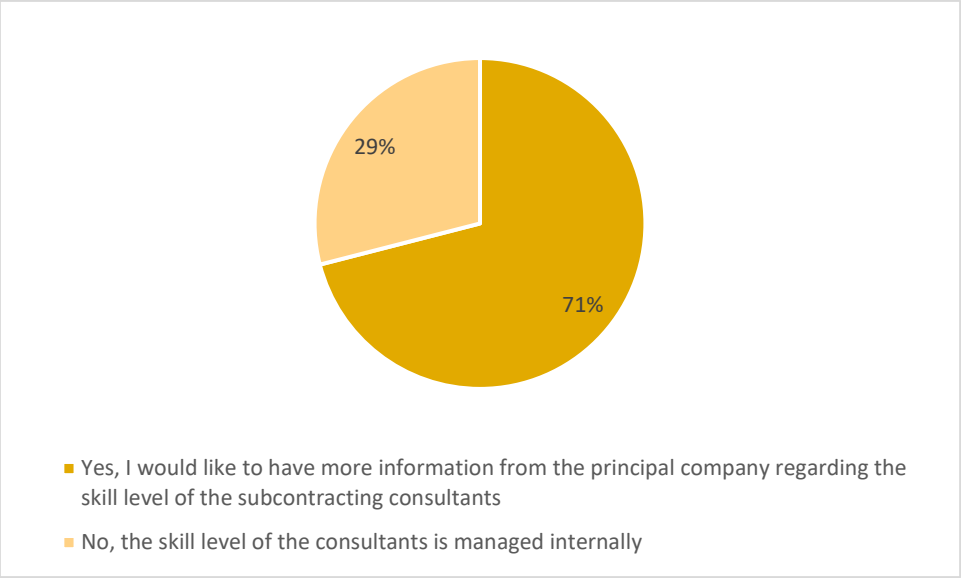

Figure 7: Do you believe that there's a need for more detailed information from the principal company regarding the skill level of each consultant in the core software environment?

The next question was regarding the set of competencies the respondees deemed to need every day in a case software project delivery. The responses were distributed into five basic categories and counted per time mentioned. The distribution of answers can be found in Table 2.

Skills	Number of Mentions
Communication	3
VAF (Coding with Product API)	3
Product Configuration Skills	3
Troubleshooting skills	1
System architecture	1

Table 2: Competencies utilized daily in a principal company's software delivery project from a subcontractor's perspective.

The results in Table 2 support the general hypothesis established in this study's theoretical framework: so-called soft skills, such as communication, are not to be undermined in the competence tracking of software delivery projects. The other competencies were more oriented towards the technical aspects of case software's project delivery.

Respondents were asked to self-assess their level of competency regarding the skills they need during the case software project delivery. Table 3 summarizes the results.

	Minimum Value	Maximum Value	Average	Standard Deviation
Value	7.00	9.00	8.06	0.09

Table 3: How subcontracted consultants self-assess their level of the most used competencies.

The results would suggest that most of the respondents are quite qualified for case software's project deliveries, which wasn't a surprise. As was mentioned in subchapter 5.1.2., the chosen subcontracting companies have a long track record of delivering projects to the principal company. Naturally, one must also keep in mind the possibility that the respondents do not identify shortcomings in their personal skill set and thus rate their skills higher than what they realistically are.

In the next question, the respondents were asked to list competencies that they considered to be core competencies. The breakdown of the responses can be found in Table 4.

Category	# of times mentioned	Specific competencies mentioned
Hard technical skills	4	• Workflow management • User account provisioning • User interface knowledge • Configuration skills • Integrations with other systems • Data migration
Soft, technical skills	3	• Conceptualizing abstract topics • Product operation logic • Understanding product architecture
Soft skills	2	• Customer communication management • Learning capabilities • Communication capabilities

Table 4: Skills the subcontracted consultants deem as core competencies.

The results highlight the practical nature of the daily tasks the subcontracted consultants are expected to do. Actionable abilities are highly valued in the workplace due to their immediate impact on daily operations. Additionally, the more abstract technical skills

mentioned illustrate the importance of strategic thinking and conceptual understanding in managing the software's systems. The lesser emphasis on soft skills, while still acknowledged, could imply that these are either seen as fundamental qualities that all employees are expected to possess or that they are not the immediate focus in a technically driven work environment. All in all, the respondents seem to agree with the categorization of skills introduced in the theoretical framework.

When the respondents were asked to list other competencies they utilized in the principal company's software environment, the answers consisted of different types of hard technical skills. Most of the answers revolved around the technical infrastructure of the software environment. Among the mentioned competencies were REST skills, SQL, PowerShell scripting, and web programming.

As mentioned before, soft skills are not to be undermined in software projects. Therefore, the respondents were asked which soft skills they deem most important in the software delivery projects done for the principal company. The importance of customer contacts was highlighted by saying that they compile approximately half of the daily work. Additionally, empathizing with the customer and understanding their point of view, especially in problematic situations, was mentioned. Overall, every respondent mentioned the skill to communicate and coordinate effectively. The respondents also mentioned the importance of being able to manage one's workload and monitor the balance of tasks. Key cognitive skills, problem-solving, conceptual understanding, and the ability to manage complexities in work tasks were listed. Personality-wise, the desire and ability to help colleagues solve problems and maintain a positive attitude were deemed important.

In the final question of the survey, the respondents were asked to list skills they would like to obtain in the future. Most of the listed skills were technical, both hard and soft. Respondents wanted to gain a better understanding of the logic of how the case software works. One respondent wanted to obtain information on optimizing the system

architecture of the deliverable software's environment. Deeper knowledge of the different add-ons commonly used in software delivery projects was also mentioned. Many respondents were also interested in obtaining coding and configuration skills that could be used in delivered solutions.

In the next chapter, a recap of the key findings will be provided, and how the findings may impact the suggested theoretical framework.

5.2 Summary & Implications to the Theoretical Framework

According to most survey answers, their companies monitor the skills of consultants subcontracted to the principal company's software delivery projects. This confirms the theoretical significance of systematic competence management in IT subcontracting, which shows the need for organized methods to track skills for improving project results and organizational learning.

Responses about the variety of methods used for skill management (semi-annual reviews, training updates, internal CVs, and detailed development plans) suggest that adjustments should be made to the suggested theoretical framework, as it doesn't really take into account the different methods used in skills management. The original suggestion of having annual reviews still remains valid, though, as it is important to communicate the skill level of subcontracted consultants to the parent company's representatives. Otherwise, the critical information regarding competencies does not flow as intended between the parent company and its subcontractors.

A significant portion of respondents manage their own skill data, which aligns with the theoretical concepts of autonomy and self-directed learning within competence management. This indicates a reliance on individual responsibility and proactive management, which is critical in agile IT environments.

Most organizations update their skill matrix annually, which might reflect the operational rhythms of competence development. Respondents use various scales to score skills, including numeric scales, years of experience, and descriptive tiers, suggesting that there is no standard method for rating skills. Therefore, it is crucial to acknowledge and recognize the importance of having a shared rating system that is used to communicate between the subcontractor and the parent company.

Respondents highlighted evolving competence needs, particularly as technologies shift. This finding supports the framework and the importance of the research question in general. There is a need for continuous learning and adaptation to technological advancements and changing project demands, and having a structured competence management system is important to achieve this.

A majority of respondents expressed a need for more detailed information from the principal company regarding the skill levels of consultants. This points to a potential area for improvement in communication and information exchange between the principal company and its subcontractors, which is crucial for effective competence management. The finding also has implications for the suggested framework, as communicating the changing competence needs to the subcontracted consultants directly was not included.

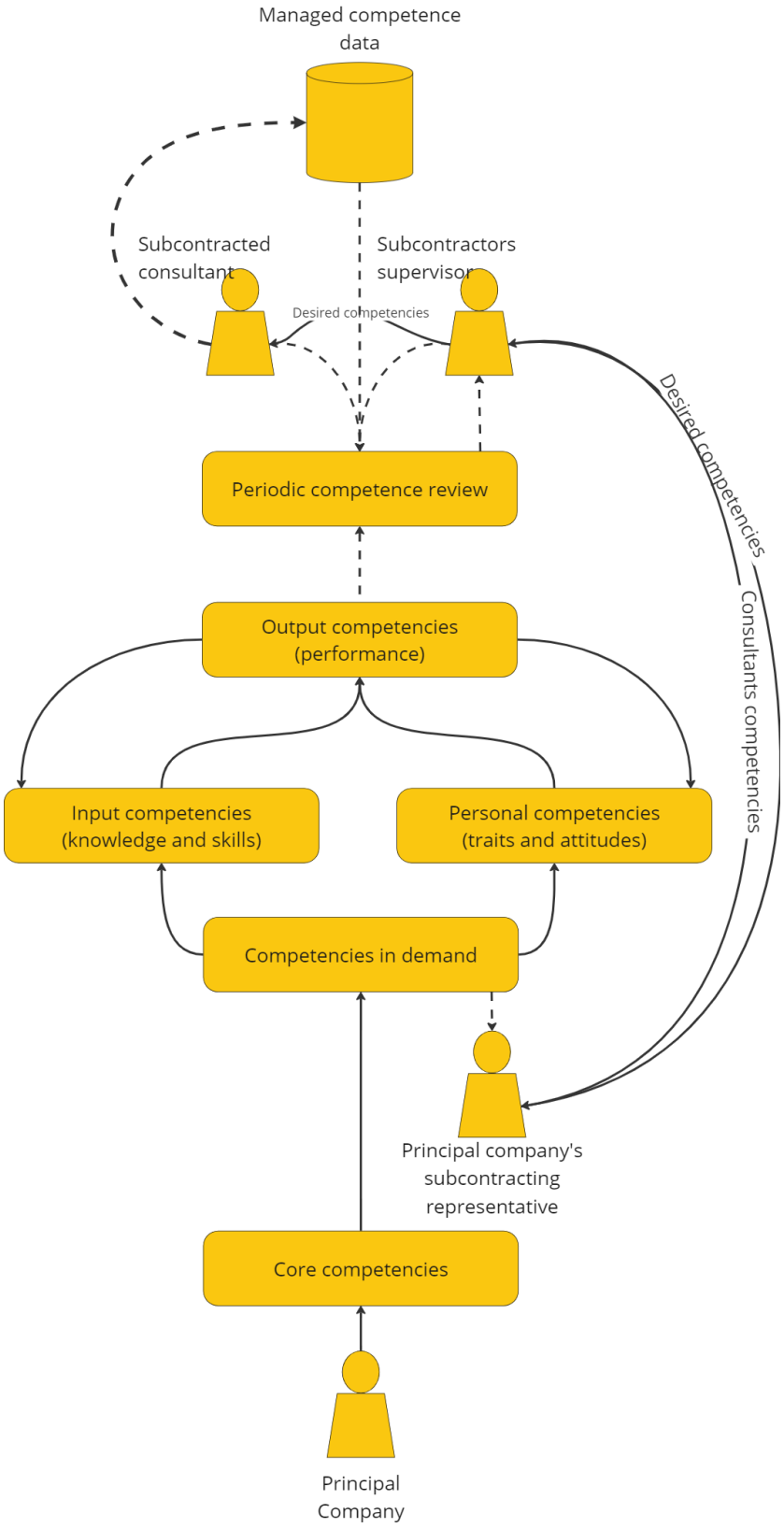

Figure 8: Revised competence management framework.

6 Theoretical Insights and Managerial Implications

In this Chapter, an overview of both the theoretical contributions and managerial implications is given. In addition, the limitations of the study are discussed, as well as the suggested expansive research in the future.

6.1 Theoretical Contributions

This study offers some theoretical insights that can be relevant for different contexts. Instead of focusing on the specific case of the principal company and its subcontracted companies, these observations are made in a way that can be useful for various situations.

On the topic of CM, one of the key contributions is the acknowledgment of how strategic alignment of an inter-organizational workforce can improve the firm's performance. This is highly evident in a project-based environment, which is often the case in the IT industry. By leaning on the existing literature, the introduced CM framework highlights the benefits of having a structured approach to a company's CM. The framework offers another tailored view of the intricacies of the IT subcontracting field using the best literature and pre-existing CM frameworks available. This aligns with the findings of Medina and Medina (2014), who emphasized the importance of strategic alignment in improving organizational performance in project-based settings.

As mentioned before, prior literature regarding CM in IT Subcontracting was limited, if not practically non-existent. This study offered some nuanced insights into this field. This study also showcased how projects can be utilized as places of growth in terms of organizational learning, expanding on the prior studies done by various researchers such as Kotnour (1999) and Medina & Medina (2015), who have highlighted the importance of project-based learning for organizational development.

The introduced CM framework planted the concept of core competencies right at the heart of competence management. Interestingly, previously introduced studies had very few, if any, mentions of the organization's core competencies in their CM frameworks. Introducing core competencies to the framework highlights the role of core competencies in gaining the best efficiency and results from the available workforce. The dynamic nature of the IT industry was also taken into account by underlining the importance of keeping the CM framework as flexible and as adaptable as possible. The recent developments in the field of Artificial Intelligence (AI) are a testament to this dynamicity.

Another somewhat overlooked aspect in the pre-existing CM frameworks was the importance of communication and feedback loops between different actors. This thesis underlines this importance and incorporates these elements directly into the framework. This way, continuous development, and competence alignment are kept up to date. Additionally, none of the referenced frameworks included competence reviews, which are highly important in facilitating projects as places of organizational growth. This thesis included competence reviews directly in the framework, aligning with the perspectives of Anbari et al. (2008), who emphasized the role of post-project reviews in organizational learning and competence management.

6.2 Managerial Implications

From a managerial point of view, this thesis offers quite a few implications for their practices. Starting from a higher level implication, managers should align their subcontracting CM strategies with organizational goals to achieve the optimal performance out of them. By regularly reviewing competencies and strategic goals, which oftentimes affect the company's core competencies, a better alignment can be reached with the subcontracted parties. Clear communication channels are also essential to giving the employees an understanding of how their competencies play a role in achieving the aforementioned strategic goals.

By using the suggested competency framework, the available workforce can be optimized on both ends of the subcontracting system. By using the framework, the skills, and abilities that are relevant for different roles and projects are constantly clear for the subcontracted side, whereas the parent company is always aware of the competence profiles of each subcontractor. The framework also offers a great platform for analyzing the competency needs that must be improved and what competencies are rising in importance. This, in turn, allows the subcontracted companies to implement this framework for their talent hiring strategies and also know what skills should be retained in the company.

Identifying the gaps in skills and knowledge through the competence mapping review sessions helps the organization target training sessions and competence development more precisely, making future project success more likely. Additionally, the desired format of competence development becomes more clear for the supervisor. Continuous learning is also important, considering the aspect of work well-being, offering the employees a feeling of being valued and a feeling of growing in their roles (Nimmi et al., 2023).

By having the core competencies clearly listed out as part of a dynamic competency management framework, the company's distinctive capabilities have become more tangible for the employees to understand. As the core competencies are directly aligned with the business objectives in the framework, it deploys the core competencies by proxy to daily business practices. This, in turn, enhances operational efficiency and innovation. The core competencies remain relevant and aligned with the demand through competency reviews and the communication loop between the parent company and the subcontractor.

As mentioned before, the framework offers a visual way to follow and track the development of the employees' competencies. Having clear metrics of the competence levels to track progress helps the company set up performance standards that are clear to everyone and regularly reviewed by the employees. As the development is more visible for

both parties, certain incentives can be tied to the progress in the form of pay raises, bonuses, or any other form of acknowledgment. By tying the competency assessments to performance reviews and career opportunities, the employees are being held accountable for their own development. This way, the employees get a sense of self-authority: they realize that their own development is within their own grasp. In addition, the clearly set goal of competence development encourages the employees to collaborate and boost each other's skills to a better outcome.

As the framework helps the managers to identify competency gaps, it provides valuable insights from a risk management point of view: it is easier to prepare and set up contingency plans to alleviate the potential risks the shortcomings in the competence pool may cause. These risks may emerge, especially in the project delivery phase. By keeping the competence management framework up-to-date, risk management also reflects reality more.

As discussed in Chapter 6.4, the introduction of AI will bring drastic changes to the way people work. Nonetheless, the suggested framework will still remain valid. The ways to maintain everyone's individual competence profile may change to an AI-assisted method; however, the established communication paths are still very valid, and thus, the framework remains relevant for the future as well. These automation systems must be flexible and capable of meeting the diverse project requirements the employees would be facing in the IT industry. As established in Chapter 3.6, the automated systems should not be used without human judgment, as the competencies may not be tracked accurately.

6.3 Limitations of the Thesis

This study's scope was quite limited in terms of relevant audience. Therefore, the generalizability of this study might prove to be difficult. The study also uses a sample of subcontracted employees exclusively from Finland, causing the potential variations and impacts of cultural and contextual factors on how competencies are defined, measured, and influenced largely unresearched.

As mentioned in the survey data analysis section, the validity and reliability of the data collection and analysis methods may suffer from a small sample size. The study also depends on self-reported and subjective data, which may not match the actual behavior and performance of the respondents and may be affected by their perceptions, expectations, and motivations.

The complexity and dynamism of competence management may not be fully represented by the suggested models and frameworks used in this study and may need more advanced and sophisticated methods and techniques. This becomes more critical as the subcontractor landscape expands in size.

6.4 Directions for Future Research

This thesis can be used as a basis for future research. Due to the complexity of the overall theme of competence management, there are multiple directions in which future research can be taken, but here are a few of the more obvious suggestions.

Firstly, the definition and classification of competencies in information systems project management can be broadened and improved. As mentioned before, this paper is not optimal for a generalized competence management framework for a similar setup.

Secondly, the creation and testing of more reliable and valid measures and instruments for assessing and evaluating soft skills in IT competence management can be considered. More objective and quantitative methods, such as behavioral observations or physiological measurements, can be used. It must be recognized, though, that such methods largely fall outside of the sphere of Business Administration studies. Instead, they are more closely related to the sphere of psychology.

Finally, further highlighting the interdisciplinary nature of competence management, the introduction of artificial intelligence (AI) should also be investigated. By analyzing data,

patterns and trends related to employee performance and skills can be identified, which can then be used to inform decision-making processes. Training programs can be personalized based on each employee's unique needs and abilities, as identified by AI algorithms. Furthermore, AI can be used to predict future competence needs, allowing organizations to develop necessary skills proactively.

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