



LUND UNIVERSITY
School of Economics and Management

In the Pursuit of Competitive Advantage

A single case study investigating how the deployment of product innovations is challenged within Knowledge-Intensive Business Service Firms

by

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III. Abbreviations

B2B	Business-to-Business
KIBS	Knowledge-Intensive Business Services

Abstract

Title: *In the Pursuit of Competitive Advantage* – A single case study investigating how the deployment of product innovations is challenged within Knowledge-Intensive Business Service Firms

Keywords: Knowledge-Intensive Business Services, Productization, Product Innovation, Deployment Challenges, Customer-Collaboration

Research Question: *How is the deployment of product innovation challenged in KIBS firms?*

Methodology: The methodological framework of this study includes a qualitative, single case study within the construction industry. It builds on previous literature in the fields of knowledge-intensive business services and the deployment of product innovations, thereby combining the inductive elements of qualitative research with deductive elements into an overall abductive approach. The empirical data collection was based on the conduct of unstructured and semi-structured interviews, being followed by the data analysis method along the approach by Gioia, Corley, and Hamilton (2013), ultimately resulting in the derivation of grounded theory.

Results and Implications: This study found five emerging challenges that have been identified as the core barriers to the successful deployment of product innovations in KIBS firms, namely: *Mindset, Knowledge, Process, Resource Management, and Customer*. Thereby, KIBS specific attributes, *Knowledge-Intensity*, and *Customer Collaboration* have been identified as being reinforcing elements to the respective barriers. Additionally, a connection between all five barriers has been identified. In light of this research, relying on the two key attributes in the context of deploying product innovations within KIBS firms, it is suggested that a conflictual relationship exists between the relevance of these specific attributes for KIBS firms and their supposedly challenging impact on the success of product innovations.

This research contributes to existing literature by providing an in-depth study regarding challenges that affect the deployment of product innovations in KIBS firms as well as case study research on the role of both knowledge-intensity and customer collaboration, as emergent findings of this study.

In sum, this study contributes to preventing challenges for innovation, hence, promoting competitive advantage. Thus, attentiveness for managers is provided aiding the investigation of possible causes for deployment difficulties and conversely, a foundation on which solutions can be built on.

1 Introduction

1.1 Background

Knowledge has become a critical asset for competitiveness and progress in knowledge societies (Ciriaci & Palma, 2016; Drucker, 1993; Powell & Snellman, 2004; Yum, 2019). Research acknowledges Knowledge-Intensive Business Services (KIBS) to have become one of the main drivers in this knowledge economy, suggested to represent a crucial role in its development and innovation (Andersson & Hellerstedt, 2009; Ciriaci & Palma, 2016; Horváth & Rabetino, 2019; Miles, 2003; Muller & Zenker, 2001). As such, innovation in KIBS contribute to the territorial innovation landscape, by further enhancing the existing processes of companies across multiple industries as well as developing the overall innovation landscape through the provision of complex, specialized knowledge (Horváth & Rabetino, 2019; Lafuente et al., 2019).

In of itself, KIBS define one part of a larger group of business services, which are being attributed as the primary source of jobs and wealth for numerous decades, thus representing a critical contributor to the growth of the service industry (Järvi, 2016; Miles, 1993; Yum, 2019). The service industry and its rise have brought several benefits with it, such as novel assets for competitiveness or new opportunities to meet customer needs (Järvi, 2016). Interestingly, one can observe that the progression of the service economy evolved in tandem with the development of the advancing knowledge and information economy; an increasing share of services are knowledge-intensive (Hipp & Grupp, 2005; Howells et al., 2004; Järvi, 2016).

With knowledge as their primary in- and output, KIBS are acknowledged as producers and processors of knowledge (Gallouj, 2002; Miles et al., 1995). As such, KIBS contribute to the territorial innovation landscape surrounding them, through their role as a generator and distributor of expert knowledge for fostering other businesses' success (Kuula, Haapasalo & Tolonen, 2018; Miles, Belousova & Chichkanov, 2018). Consequently, the introduction and generation of new knowledge also impact the competitive landscape as a whole (Horváth & Rabetino, 2019; Lafuente et al., 2019). This landscape is comprised of disruptive change and innovations at an ever-increasing pace (Doloreux, Amara & Landry, 2008; Horváth & Rabetino, 2019), changing how KIBS firms and their collaborators innovate (Cainelli, De Marchi & Grandinetti, 2020). Within this collaborative environment, those corporations operating more innovative and entrepreneurial are better positioned to regulate the increasingly threatening, more complex

and dynamic external environment (Bettioli et al., 2013; Biege et al., 2013; Horváth & Rabetino, 2019; Lafuente et al., 2019). More precisely, the proactiveness, ability to innovate and tolerance towards risk defines a corporation's ability to create change in that environment, establishing new customer segments, new markets, and thus rephrasing the rules of the competitive landscape (Kuratko & Hoskinson, 2019; Lafuente et al., 2019). Therefore, KIBS firms' innovation efforts and its management are of critical strategic importance to the success of the individual companies (Cainelli, De Marchi & Grandinetti, 2020; Esteban Lafuente, Yancy Vaillant & Juan Carlos Leiva, 2018; Huggins, 2011).

These KIBS innovations can range from highly customized service innovations to their own innovations, thus confirming their role as a processor and producer of knowledge (Cabigiosu & Campagnolo, 2019; Gallouj, 2002; Huggins, 2011). KIBS firms, as a producer of innovations, were given critical attention regarding the difficulty to efficiently create innovations (Järvi, 2016; Valminen & Toivonen, 2012; Valtakoski & Järvi, 2016). This challenge of efficiency has been connected to the nature of knowledge, being intangible (Gallouj & Weinstein, 1997; Harkonen, Haapasalo & Hanninen, 2015; Hipp & Grupp, 2005). Hence, the focus on replicating knowledge, as the foundation for the effective provision of innovations, has given rise to the importance of systematizing, thereby tangibilizing knowledge (Harkonen, Haapasalo & Hanninen, 2015; Jaakkola, 2011). This systematization has led to the emerging focus on developing product innovations inside KIBS firms, through productizing services (Valminen & Toivonen, 2012). Consequently, productization has emerged as a critical topic analyzing the process of how to create knowledge-intensive products, providing KIBS firms with an indispensable addition to their value creation.

However, value is found to only be generated from innovations, if successfully implemented into the market (Datta, Mukherjee & Jessup, 2015; Nerkar & Shane, 2007). Thus, deploying innovations is attributed as being the critical factor to the overall innovative and thereby competitive success of KIBS firms (Cabigiosu & Campagnolo, 2019). This gives rise to the importance of considering and understanding the determinants of deploying these innovations.

1.2 Problem Discussion

The innovation of KIBS has been strongly associated with collaboration (Ferreira & Fernandes, 2011; Kuula, Haapasalo & Tolonen, 2018; Miles, 2005), constituting a general difference in the traditional service innovation process compared to other service companies (Biege et al., 2013;

Cainelli, De Marchi & Grandinetti, 2020). Collaboration, thereby building the foundation of the ideation and development of KIBS innovations, impacts and differentiates said innovation process through the high intensity of expert knowledge dominating its progression (Biege et al., 2013; Cainelli, De Marchi & Grandinetti, 2020). The combination of specialist knowledge and the operational processes of the collaboration partners result in co-created KIBS innovations (Lafuente et al., 2019). Co-creation and knowledge transformation, thus distinguish the KIBS innovation process from traditional service innovation processes (Biege et al., 2013; Cainelli, De Marchi & Grandinetti, 2020).

The exploitation of knowledge is seen as a critical success factor, as well as a challenge for KIBS firms (Lafuente et al., 2019). The success is illustrated, in that KIBS firms profit from the creation of knowledge-intensive innovations as it facilitates market growth (Campagnolo & Cabigiosu, 2015; Lafuente et al., 2019). Regarding the exploitation of knowledge, Valminen and Toivonen (2012) find, however, that a challenge arises as a high focus on customization results in redundancy and difficulty in the conversion of the expert knowledge. Service literature finds that this challenge can be overcome with a strategy to codify knowledge, meaning the documentation and capturing of the intangible nature of services (Jaakkola, 2011). This service productization approach has sparked KIBS-related literature in the pursuit of formalizing a process for KIBS firms to not only productize their knowledge but to develop a product in of itself (Järvi, 2016; Valminen & Toivonen, 2012). This has led to the conceptualization of a customer-specific productization process, building a foundation for the innovation of products in the context of KIBS firms, which is still found to be scarce in literature (Kuula, Haapasalo & Tolonen, 2018; Valminen & Toivonen, 2012). This systematic process for creating product innovations has thus been found to be imperative for the success of KIBS firms, however, result in challenges for the later value exploitation of the respective (Järvi, 2016; Kuula, Haapasalo & Tolonen, 2018; Valminen & Toivonen, 2012; Valtakoski & Järvi, 2016).

A challenge found with the productization of KIBS innovations is the combination of product- and service-like attributes into a single offering (Järvi, 2016; Kuula, Haapasalo & Tolonen, 2018; Valminen & Toivonen, 2012). This combination is challenging due to the KIBS innovations' inherent property of being highly customized, whereas its transformation into a product requires its conversion into a standardized offer (Campagnolo & Cabigiosu, 2015; Kuula, Haapasalo & Tolonen, 2018). Additionally, the accumulation of predominantly tacit knowledge, meaning knowledge that has not been documented or codified, can be invisible to

the customer when packaged into a product (Järvi, 2016; Kuula, Haapasalo & Tolonen, 2018). This customer awareness then proves to be a challenge as the newly created value is not perceived, thus requires understanding of their effect on the exploitation and commercialization (Järvi, 2016; Kuula, Haapasalo & Tolonen, 2018).

The commercialization of innovations, meaning the launch of an innovation to the market, is seen as vital for the success of organizations (Datta, Mukherjee & Jessup, 2015; Nerkar & Shane, 2007). The commercialization in of itself constitutes a complex process comprised of multiple stages (Datta, Mukherjee & Jessup, 2015; De Jong et al., 2003; Wang, Voss & Zhao, 2019). Of these stages, the final stage, referred to as the deployment phase, has found critical attention in service literature (Datta, Mukherjee & Jessup, 2015; Datta, Reed & Jessup, 2013; Nerkar & Shane, 2007; Wang, Voss & Zhao, 2019). Nerkar and Shane (2007) highlight the strategic importance of the deployment phase, as a successful deployment of innovation, furthers, and promotes industry leadership.

Concluding, the KIBS innovations' strong association with customer collaboration, as well as their knowledge-intensity through expert knowledge, has been shown to provide inherent challenges that might affect the deployment of product innovations. However, this effect, to the best of the authors' knowledge, has so far remained unexplored, thus opening up an agenda for further comprehension. Therefore, this research's further investigation, aiming to elaborate the understanding of the challenges that product innovations provide in the context of KIBS firms and their impact on the deployment of these innovations, results in the following research question:

How is the deployment of product innovations challenged in KIBS firms?

1.3 Purpose

As industry leadership of a company has been attributed to the successful deployment of innovations, the purpose of this study is to investigate and analyze the interaction between a KIBS firm's decision to develop product innovations and the effect of this on the final deployment. The current state of literature on the productization of KIBS innovations has focused on KIBS specific challenges and antecedents, affecting predominantly the productization process. Thus, a scarcity concerning the KIBS specific challenges that emerge and impact the later stages of the innovation process has been emphasized (Cabigiosu & Campagnolo, 2019; Valtakoski &

Järvi, 2016). Therefore, this research aims to further understand the barriers that emerge as a result of product innovations in KIBS firms as well as their effect on the deployment of KIBS firms' product innovations.

Due to this study being conducted in the context of KIBS firms and their related characteristic attributes, knowledge-intensity and customer collaboration are taken into consideration (Carnagnolo & Cabigiosu, 2015; den Hertog, 2000; Miles et al., 1995). Thus, this study builds on previous research on both distinctive KIBS' features and the challenges that emerge in this context of developing product innovations (Valminen & Toivonen, 2012; Valtakoski & Järvi, 2016). Accordingly, the aim is to provide depth in understanding by investigating the influence of these challenges, thereby bridging the gap between KIBS firms' product-related innovation challenges and their deployment.

By combining the depth of case study research with the inclusion of existing literature and concepts, comprehensive findings build the foundation for the establishment of future guidelines towards the identification and, ultimately the resolution of barriers to the deployment of product innovations within literature on KIBS.

1.4 Research Context

In line with the authors' aim to investigate the understanding of the emergent challenges of deploying products within KIBS firms, a single case study was conducted in the context of a KIBS firm in the Swedish construction industry. Correspondingly, the firm's offering consists of the provision of highly technical knowledge-intensive services, thus referred to as a technology-oriented KIBS firm, also T-KIBS firm. Additionally, the history of the case company includes a strong collaborative innovation portfolio, thereby including knowledge-intensity as well as customer collaboration into the research environment.

To deliver knowledge-intensive services, the case company has a tradition of predominantly employing technical experts, operating at the forefront of the respective industry. Being at the forefront of the industry has also led to the company offering services covering multiple disciplines, evident in the division of their employees into numerous departments. To advance their innovation efficiency, the case company has struggled with actively pursuing the development and deployment of product innovations, as an addition to their customized complex, technical

service offerings. This has resulted in multiple failures in the deployment of product innovations.

Conclusively, this case company provides a relevant ground for investigating this study's research problem. As the product development and previous deployment initiatives involved various stakeholders of multiple organizational levels, the additional aim to provide depth to existing literature is facilitated.

2 Theoretical Background

This chapter aims to introduce previous and relevant literature regarding this study's research focus.

Initially, the concept of deployment will be introduced with a specific focus on its allocation. Thereafter, knowledge-intensive business services in the context of KIBS firms and their innovations are examined. Thirdly, as this study aims to investigate challenges that arise from product innovations, the process of developing to deploy product innovations in the context of KIBS, will be elaborated. Lastly, theoretical concepts will be brought together to provide an overview of the aspects that will be investigated as challenges to the deployment.

2.1 Deployment of Innovations

Concerning the context of this investigation, aiming to study how aspects challenge a KIBS firm in its deployment of product innovations, a focus is put on the deployment's allocation within the overall innovation process.

2.1.1 Deployment within the Commercialization Process

The deployment of innovations finds recognition in literature as the final stage within the commercialization process (Datta, Mukherjee & Jessup, 2015; Datta, Reed & Jessup, 2013; De Jong et al., 2003; Scheuing & Johnson, 1989). The commercialization of innovation has been defined in literature as the process that supports the innovation to be introduced to the market and as such includes key activities enabling the launch and scaling of the respective innovation (Datta, Mukherjee & Jessup, 2015; Datta, Reed & Jessup, 2013; Nerkar & Shane, 2007). While a wide variety of conceptualizations and definitions on the subject can be found in research literature, a common denominator is principal to the discussion: The ability to commercialize an

innovation is key to the economic success of a company and thus of strategic importance (Datta, Mukherjee & Jessup, 2015; Datta, Reed & Jessup, 2013; Nerkar & Shane, 2007).

Taking different scientific perspectives on the commercialization of innovations into consideration, its processual nature including various key activities has been subject to a variety of academic works (Cooper, 1990; Datta, Mukherjee & Jessup, 2015; Datta, Reed & Jessup, 2013; Johne & Storey, 1998; Kelm, Narayanan & Pinches, 1995; Nerkar & Shane, 2007).

Based on the process nature of the commercialization, Datta, Mukherjee, and Jessup (2015), provide a three-stage commercialization process model, grounded on a substantial number of scientific works. The authors give an initial overview of innovation stages to commercialize innovations and the underlying process, entailing three phases, (1) the discovery, (2) the development and (3) the deployment of innovations, as displayed in *Figure 1*. (1) Discovery in this context refers to the discovery of the innovation in of itself, such as the source and type of innovation (Datta, Mukherjee & Jessup, 2015; Datta, Reed & Jessup, 2013). This is, however, not directly attributable to the commercialization of an innovation, as it does not contribute to the direct market launch (De Jong et al., 2003; Kindström & Kowalkowski, 2009; Scheuing & Johnson, 1989). Thus, the discovery phase will not find further consideration in this work. (2) Development, conversely, refers to the development of entry requirements (e.g., timing, positioning, market) and appropriability measures (Datta, Mukherjee & Jessup, 2015). This also will not find further recognition in this work as part of the deployment process. Finally, (3) the deployment includes the aspects of how and with whom to launch the innovation as well as attributes such as marketing and pricing (Datta, Mukherjee & Jessup, 2015; Datta, Reed & Jessup, 2013; De Jong et al., 2003; Teece, Pisano & Shuen, 1997).

In sum, the above-mentioned stages highlight the processual characteristics of the commercialization and its encompassing activities. This view is also in line with the work by De Jong et al. (2003), exploring multiple studies in literature, concluding that the deployment or launch of an innovation is the final step within the innovation process. Also, the works by Scheuing and Johnson (1989), Kindström and Kowalkowski (2009) were further taken into consideration as they provide additional processual frameworks, elaborating on the positioning of the deployment or launch of an innovation. Thus, the processual nature is prevalent in literature, which hence builds the basis for this paper to use the extensive study by Datta, Mukherjee, and Jessup (2015) as the foundation for positioning the deployment of innovations due to its holistic and comprehensive nature.

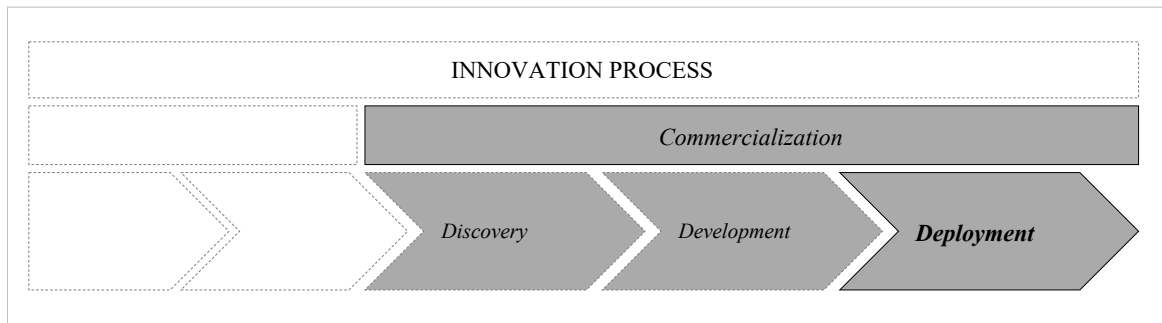


Figure 1: Commercialization within Innovation Process encompassing three phases.

Adapted from: Datta, A., Mukherjee, D. & Jessup, L. (2015). *Understanding Commercialization of Technological Innovation: Taking Stock and Moving Forward: Understanding Commercialization of Technological Innovation, R&D Management*, vol. 45, no. 3, p. 228.

2.1.2 The Deployment of Innovations

Focusing on the deployment of innovation and considering the key activities of this process phase, literature has had various views of which activities to include in each step of the deployment process (Chiesa & Frattini, 2011; Datta, Mukherjee & Jessup, 2015; De Jong et al., 2003; Kindström & Kowalkowski, 2009). Based on the framework by Datta, Mukherjee, and Jessup (2015), the activities included in the deployment stage are collaboration and customer inclusion, launch time, licensing, pricing, distribution, and marketing. These attributes also find recognition in the work by Chiesa and Frattini (2011), investigating these aspects in their study. Moreover, Aarikka-Stenroos and Lehtimäki (2014) highlight among the activities attributed to the deployment of innovations, the market strategy and market implementation, which coincide with the distribution activity by Datta, Mukherjee, and Jessup (2015).

Furthermore, entry requirements and appropriability measures of the development phase within the framework by Datta, Mukherjee, and Jessup (2015) (see *Figure 1*), have been found to exceed the development stage, making them part of the final deployment phase (Aarikka-Stenroos & Jaakkola, 2012; Aarikka-Stenroos & Lehtimäki, 2014; Laursen & Salter, 2014; Pellegrino, 2018; Sirilli & Evangelista, 1998). Therefore, in the later research regarding the deployment of innovation, activities that originate from earlier phases and overlap with the deployment phase will be considered as activities of the deployment phase, namely, the appropriability measures as well as market entry and feasibility considerations (Aarikka-Stenroos & Lehtimäki, 2014; Chiesa & Frattini, 2011; De Jong et al., 2003).

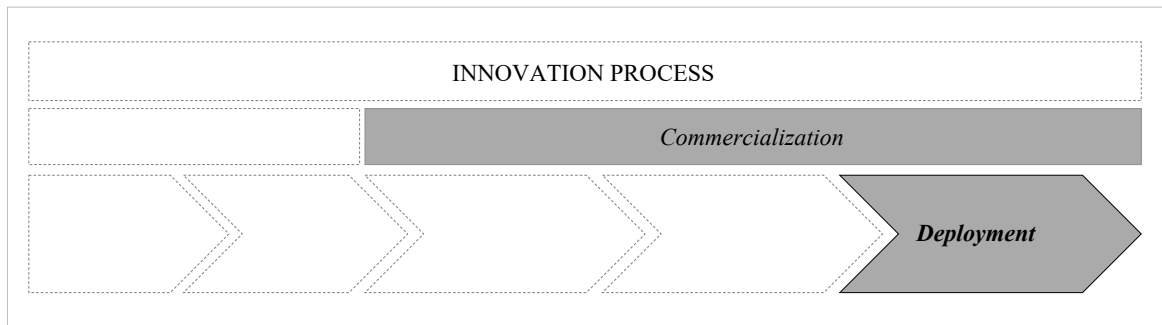


Figure 2: Deployment as the last phase of the Innovation Process

Adapted from: Datta, A., Mukherjee, D. & Jessup, L. (2015). *Understanding Commercialization of Technological Innovation: Taking Stock and Moving Forward: Understanding Commercialization of Technological Innovation, R&D Management*, vol. 45, no. 3, p. 228.

Concluding, literature has found the deployment phase as being the final step in the commercialization process, including key activities that are required for a successful deployment of innovations (Aarikka-Stenroos & Lehtimäki, 2014; Datta, Mukherjee & Jessup, 2015; Datta, Reed & Jessup, 2013; Kindström & Kowalkowski, 2009). Concerning the key activities, literature acknowledges various approaches to define these, however, finds that marketing, pricing, licensing, distribution, timing, and positioning, appropriability, as well as collaboration, are critical activities that have to be addressed for the deployment of innovations (Aarikka-Stenroos & Jaakkola, 2012; Aarikka-Stenroos & Lehtimäki, 2014; Chiesa & Frattini, 2011; Datta, Mukherjee & Jessup, 2015; Datta, Reed & Jessup, 2013). Hence, this work will take the process view by Datta, Mukherjee, and Jessup (2015) as the foundation of the deployment stage, including the abovementioned key activities.

2.2 Knowledge-Intensive Business Services

As the focus of this study is on KIBS firms and their deployment of product innovations, an examination of their specificities, attributes, and innovations are presented in the following.

2.2.1 Knowledge-Intensive Business Service Firms

Empirically, the concept of *Knowledge-intensive Business Services* (KIBS) has been investigated increasingly over time due to the emergence of a knowledge-based economy (Gallouj, 2002). The scientific notion of KIBS was initially adopted by Miles et al. (1995), as characteristic attributes of specific organizations attracted the attention of research. Thus, the term KIBS was adopted to refer to consultancy services provided by knowledgeable expert companies to other organizations (Miles, 2005; Miles et al., 1995; Miles, Belousova & Chichkanov, 2018;

Muller & Zenker, 2001). In this, KIBS encompass traditional professional services, as accounting or legal services and technological knowledge-intensive services such as engineering or software development (Biege et al., 2013; Miles et al., 1995; Valtakoski & Järvi, 2016). The research interest, therefore, emerged from the differences in KIBS and traditional services. Among others, key differences include the knowledge-intensity (den Hertog, 2000; Gallouj, 2002; Miles, 2005; Miles et al., 1995) and the relevance of customer co-creation and collaboration (Cabigiosu & Campagnolo, 2019; Ferreira & Fernandes, 2011; Kuula, Haapasalo & Tolonen, 2018).

At the core of KIBS stands the provision of knowledge-intensive inputs to the business- and collaborative learning processes of other organizations, comprising private and public sector clients (den Hertog, 2000; Muller & Doloreux, 2009). These involve economic activities “[...]intended to result in the creation, accumulation or dissemination of knowledge” (Miles et al., 1995, p.18). As such, KIBS syndicate numerous sorts of specialized knowledge to develop problem-specific results (Miles et al., 1995; Muller & Zenker, 2001). More in detail, Miles et al. (1995) defined three principal features of KIBS: (1) the reliance on professional knowledge; (2) the generation of knowledge, either internally used as the source for innovation, or as the key resource to create a client’s process innovation; (3) and their focus on B2B relationships. This value proposition of KIBS firms is underlined by Heikka and Nätti (2018), yet, they also highlight that with the evolving relationship between the customer and the KIBS firms, the provision of knowledge moves from being firm-initiated to customer-initiated with a higher focus on collaboration. Whereas Muller and Zenker (2001) emphasize the role of KIBS as being a provider of knowledge-intensive value to the customer, Gallouj (2002) find that this is inconclusive, as their role also includes the processing and creation of knowledge, tying in with the principles by Miles et al. (1995). Conclusively, KIBS are defined as knowledge-intensive business services that are comprised of professional knowledge and provided by knowledge-intensive companies to the customer as a co-created service (Miles, 2005; Miles, Belousova & Chichkanov, 2018).

KIBS firms represent businesses that generate customized services through creating, accumulating and exploiting knowledge (Lafuente et al., 2019; Miles et al., 1995), thus, processing and producing information with knowledge as their main in- and output (Gallouj, 2002; Yum, 2019). The strong focus on knowledge as a commodity and their provision of services led to the general attribution of a consultancy specializing in the delivery of expert knowledge within

customer collaboration (Muller & Zenker, 2001). Hence, KIBS firms are often represented by knowledgeable service entities such as legal or engineering consultancies (Huggins, 2011; Valminen & Toivonen, 2012; Valtakoski & Järvi, 2016). The delivery of these professional services and their providers have found critical attention in literature within both regional and organizational studies (Amara, Landry & Doloreux, 2009; Consoli & Elche-Hortelano, 2010; Ferreira & Fernandes, 2011; Huggins, 2011; Leiponen, 2005; Muller & Zenker, 2001). In these, it was found that KIBS are critical constituents of innovation systems in services and relevant economic agents (Amara, Landry & Doloreux, 2009; Doloreux, Amara & Landry, 2008; Lafuente et al., 2019; Muller & Zenker, 2001). Herein, the economic potential of these firms is not solely bound to company-specific effects but surpasses organizational boundaries, contributing to the production and generation of knowledge (Lafuente et al., 2019). Likewise, KIBS are attributed as vectors of knowledge transmission between science and market, as they postulate a platform for examining services resulting in innovations, co-creation, and production of knowledge along with their clients (Asikainen, 2015; den Hertog, 2000; J-Figueiredo et al., 2017; Muller & Zenker, 2001).

Among KIBS firms general, literature commonly distinguishes between the more technology-intensive service firms as T-KIBS and those being more professionally-oriented, offering traditional management consulting services as P-KIBS (Doloreux & Shearmur, 2010; Lafuente et al., 2019; Miles, 2008; Miles et al., 1995; Miles, Belousova & Chichkanov, 2018). In this, T-KIBS offer technologically oriented services to generate and transfer knowledge regarding the respective services (e.g., R&D consulting, engineering, etc.) (Lafuente et al., 2019; Miles et al., 1995); P-KIBS focus their offering based on specialized knowledge concentrated on administrative systems and social matters in an organizational context (e.g., business management services, accounting, and legal issues, etc.) (Lafuente et al., 2019; Miles et al., 1995). However, both T-KIBS and P-KIBS are characterized by a predominant B2B setting, thus being dependent on the success and growth of their customers (Lafuente et al., 2019; Miles et al., 1995). Also, offering services of knowledge-intensive and typically complex nature, KIBS firms are reliant on expert-knowledge among their employees (Lafuente et al., 2019; Miles, Belousova & Chichkanov, 2018). Consequently, the workforce of KIBS firms comprises highly skilled and educated staff, constituting the foundation of the firms' capacity to respond to the external environment and their clients' needs (Lafuente et al., 2019; Miles, Belousova & Chichkanov, 2018). This leads to a substantial share of staff encompassing professions with distinct competencies relevant to the respective company (e.g., lawyers, computer scientists, engineers, etc.)

(Huggins, 2011; Miles, Belousova & Chichkanov, 2018). For clarity, this paper will refer to firms specializing in T-KIBS as KIBS firms.

2.2.2 Innovation of Knowledge-Intensive Business Services

Research regarding KIBS innovations emphasizes the dual role of KIBS firms in supporting innovation through their knowledge transfer to clients as well as through a collaborative process between the two entities, enabling the joint production of innovation and knowledge (den Hertog, 2000; Miles, 2008; Muller & Zenker, 2001). Within the respective discussion, Doloreux and Shearmur (2010) accentuate two broad perspectives, characterizing KIBS as either “*enablers*” of innovation, or as “*innovators in their own right*” (p.609, 610). Concerning enabling innovation, it has been found that the accumulation and integration of various knowledge sources are imperative for innovation collaboration (Campagnolo & Cabigiosu, 2015; Corrocher, Cusmano & Morrison, 2009). Moreover, the enabling nature of KIBS firms is also seen in the ad-hoc and problem-related origin of their innovations (Corrocher, Cusmano & Morrison, 2009; Doloreux & Shearmur, 2010; Siahtiri, 2018). Concerning the role of KIBS firms as innovators themselves, the second innovation approach stems from internal knowledge creation (Amara, Landry & Doloreux, 2009; Doloreux & Shearmur, 2010; Toivonen & Tuominen, 2009). In sum, it is argued that the role of KIBS concerning innovation is twofold, stemming from either the delivery of knowledge to external customers or the internal investments into research and development and their resulting innovations (Amara, Landry & Doloreux, 2009; Doloreux & Shearmur, 2010; Toivonen & Tuominen, 2009).

Further elaborating on the dual role, research sees KIBS’s enabling function in that they also facilitate, carry, or become the source of their client’s innovation efforts or outcome (den Hertog, 2000; Miles et al., 1995). Thus, at a client’s level, KIBS firms take on an intermediary role, contributing to their client’s lack of progressing and integrating the required knowledge and information to succeed in their innovation efforts (den Hertog, 2000; Doloreux & Shearmur, 2010). Hence, their initial contribution with regards to innovation is understood as being collecting information and transmitting knowledge through collaborative interaction with their customers (Asikainen, 2015; Miles, 2005, 2008; Santos-Vijande, González-Mieres & López-Sánchez, 2013). However, other literature has found the collaborative nature of KIBS innovations as the only type of innovations insufficient (Amara, Landry & Doloreux, 2009; Campagnolo & Cabigiosu, 2015). Thus, the additional perspective emerged, highlighting KIBS

as innovators in their own right, as they innovate by modeling novel combinations of implicit and intangible knowledge into their main in- and outputs (Campagnolo & Cabigiosu, 2015; Doloreux & Shearmur, 2010). Hence, from this standpoint, KIBS also innovate internally, fostering “[...] *innovation activities that are scientific, technological, organizational, financial, and commercial*” (Doloreux & Shearmur, 2010, p.610). Accordingly, KIBS applies expert knowledge internally to develop innovation within the company. In the framework of this study, the secondly presented stance will dominate the discussion as the objective of the respective is to analyze the challenges regarding the deployment of KIBS firm’s internal innovation projects without disregarding the critical nature of their client relationship.

About different types of KIBS innovations, research elaborates on a distinction that has to be made between process- and product innovations (Campagnolo & Cabigiosu, 2015; Huggins, 2011; Valminen & Toivonen, 2012). Further recognition is found concerning a difference in the desired outcome of the resulting innovation. Process innovations, internally oriented, aim to enhance the efficiency of KIBS concerning cost structures (Campagnolo & Cabigiosu, 2015; Sirilli & Evangelista, 1998). Product innovations, in turn, have been found to enhance the market shares of KIBS firms, making them essential for the economic growth of said companies (Cabigiosu & Campagnolo, 2019; Campagnolo & Cabigiosu, 2015; Skjølsvik et al., 2007). Conversely, product innovations within KIBS firms are found to enhance the overall innovation performance as it increases efficiency and, thus, competitiveness (Campagnolo & Cabigiosu, 2015; Valminen & Toivonen, 2012). However, as Corrocher, Cusmano, and Morrison (2009) find, product innovations appear much more seldomly in KIBS firms and respective literature. This is confirmed in the work of Valminen and Toivonen (2012), which underlines the scarcity of research on product innovation in KIBS firms. Due to their importance, yet, uncommon appearance in literature of product innovations within KIBS firms, this research’s focus will be on product innovations.

Given this discussion, research indicates that the internal product innovation process of KIBS firms is activated by its client’s requirements (Campagnolo & Cabigiosu, 2015; den Hertog, van der Aa & de Jong, 2010). When further investigating the innovation process of KIBS, Cainelli, De Marchi and Grandinetti (2020) provide an outline of the particular: Initially, a KIBS firm is being consulted by a client company for complementing their business efforts through the required skills and missing knowledge (Cainelli, De Marchi & Grandinetti, 2020). As a prior premise regarding this undertaking, research attributes the relationship between a

customer and KIBS firms as being of crucial importance to support the cooperation and quality of the innovation outcome (Cabigiosu & Campagnolo, 2019; Campagnolo & Cabigiosu, 2015). This makes innovation projects customer-tailored (Cabigiosu & Campagnolo, 2019; Campagnolo & Cabigiosu, 2015). Concluding, customer orientation provides the foundation for the role of the client within the innovation process, is either the initiator or the end-user of the innovation (Campagnolo & Cabigiosu, 2015; Miles, 2012).

2.3 Productization

Following, as the critical attribute within the research context are product innovations, an examination of KIBS specific products in light of the productization process will be highlighted. This aims to provide an understanding of how products are created in KIBS firms. Further, current literature on challenges with product innovations in KIBS and their development, which have been found in literature and might affect their consequent deployment, will be elaborated.

2.3.1 Productization of Services

Services have been defined as an operation that is provided by a service provider with application to a customer (De Jong et al., 2003; Gallouj & Weinstein, 1997; Scheuing & Johnson, 1989). This provision is characterized by strong exteriority as well as the predominant attribute of intangibility as it is not defined by a specific result but by the relationship between the service, the customer, and the provider (Gallouj & Weinstein, 1997). Thus, in contrast to products, the service characteristics have proven difficult for the application of standardized development processes, aiming to ensure efficiency (De Jong et al., 2003; Gallouj & Weinstein, 1997; Hipp & Grupp, 2005; Järvi, 2016). An additional challenge in this regard is highlighted by Ritala, Hyöttylä, Blomqvist, and Kosonen (2013), as being the inseparability of service creation and service consumption. Consequently, the key attributes of intangibility and inseparability provide a core challenge when considering the goal of efficiency within new service development (Hipp & Grupp, 2005; Järvi, 2016). This has sparked interest in academic literature, focused on overcoming these challenges, through the concept of productization.

In service literature, the productization of services is referred to as the activity translating services into products through a systematization of its components (Djellal et al., 2003; Harkonen, Haapasalo & Hanninen, 2015; Jaakkola, 2011; Valminen & Toivonen, 2012). This need arose due to the intangible and inseparable nature of services and the contradicting lack of

standardizing service offerings to accomplish replicability and thus efficiency (Harkonen, Haapasalo & Hanninen, 2015). Standardizing processes, hence, represents a key concept of productization, referring to the ability to reuse processes for optimizing the new service creation (Jaakkola, 2011).

To optimize the creation of the new service and define standardized processes, services need to be made tangible and separable (Harkonen, Haapasalo & Hanninen, 2015; Jaakkola, 2011; Valminen & Toivonen, 2012). Tangibility refers to the packaging of services into products, allowing for the concretization of the service offering and thus simplifying the communication of the value to the customer (Jaakkola, 2011; Nagy, 2013). Separability refers to the divisibility of the consumption and the production of the service offerings through packaging, thereby facilitating the replicability and standardization of services (De Jong et al., 2003; Harkonen, Haapasalo & Hanninen, 2015; Järvi, 2016). Systematizing offerings, thus creating tangible and separable offerings, includes the transformation of tacit to explicit knowledge, meaning the translation of individual to collective, shared knowledge (Nonaka, 1994). Tacit knowledge refers to knowledge that is captured within the individual and has the distinct nature of not being directly transferable, yet, finds value in its utilization (Grant, 1996). To achieve the systematization of this knowledge, tacit knowledge needs to be spread within the organization to ensure its conversion into the organization's collective knowledge and clarification for its further use in later knowledge creation (Nonaka, 1994; Nonaka & von Krogh, 2009). 5/20/20 1:14:00 PM

In sum, the ability to systematize a service offering through service productization is conclusively defined as the transformation of knowledge from tacit knowledge to explicit knowledge (Nonaka, 1994; Nonaka & von Krogh, 2009; Valtakoski & Järvi, 2016). Therefore, to enforce the positive impact of replicability and standardization of knowledge, the conversion of all knowledge sources, tacit and explicit, is imperative (Doloreux & Frigon, 2019; Jaakkola, 2011). Thus, the process of productization, thereby creating products through knowledge conversion, has been found to reinforce the beneficial attributes of productizing services, leading to improvements in efficiency (Harkonen, Haapasalo & Hanninen, 2015; Jaakkola, 2011; Järvi, 2016; Valminen & Toivonen, 2012).

2.3.2 Productization of KIBS Innovations

Based on the characteristics of KIBS, namely the focus on knowledge, its high intensity, and its co-creation through collaboration, as also elaborated upon earlier in this work, a literature

stream has emerged focusing on translating the beneficial attributes of productization onto KIBS (Järvi, 2016; Kuula, Haapasalo & Tolonen, 2018; Ritala et al., 2013; Valminen & Toivonen, 2012; Valtakoski & Järvi, 2016). The knowledge complexity of KIBS and the critical importance of the interaction of KIBS firms and their clients presented additional considerations for the productization process (Valminen & Toivonen, 2012; Valtakoski & Järvi, 2016). Thus, the process of productization in the context of KIBS innovations has found scientific attention.

The process of productizing KIBS innovations encompasses multiple approaches in literature (Järvi, 2016; Ritala et al., 2013; Valminen & Toivonen, 2012; Valtakoski & Järvi, 2016). Building on the previously elaborated definition of productization in services is the transformation of tacit into explicit knowledge (Nonaka, 1994; Nonaka & von Krogh, 2009; Valtakoski & Järvi, 2016), further research resulted in a customer-centric productization process within the context of KIBS (Valminen & Toivonen, 2012). Valminen and Toivonen (2012) provide a processual framework that is recognized within research and broadly applied in various works (Cainelli, De Marchi & Grandinetti, 2020; Harkonen, Haapasalo & Hanninen, 2015; Järvi, 2016), also building the foundation of this study's understanding of the productization in the context of KIBS. As such, in the framework of this study and KIBS, productization includes processual elements, following the initial codification of knowledge, thus expanding the definition in service literature to include the specificities in KIBS and provide a KIBS specific process for developing product innovations (Valminen & Toivonen, 2012; Valtakoski & Järvi, 2016).

It is emphasized that the productization process starts with customer orientation and codification to allow for the assembly of different knowledge sources for the KIBS innovation (Nonaka, 1994; Valminen & Toivonen, 2012; Valtakoski & Järvi, 2016). Thus, the initiating stage of productization within KIBS refers to the codification of customer and internal expert knowledge, hence the creation of the innovation concept (Valminen & Toivonen, 2012). This also finds recognition in the approach presented by Ritala, Hyöttylä, Blomqvist, and Kosonen (2013), where the service modeling and modularization of KIBS innovations start with the codification of all knowledge sources. As these knowledge sources represent primarily customer inputs initiating the process, customer inclusion is seen as imperative, thus creating a strong dependency on collaborative communication (Aarikka-Stenroos & Jaakkola, 2012; Jaakkola, 2011; Järvi, 2016; Valminen & Toivonen, 2012). Cainelli, De Marchi, and Grandinetti (2020),

further underline this dependency, by stressing that the customer orientation resembles the foundation for KIBS innovations. Thus, customization and collaboration have been emphasized as the foundation for the creation of the productization process for KIBS innovations (Valminen & Toivonen, 2012).

Following the codification and collection of all knowledge sources, the product itself, its production process, and the required resources are specified, as the realization strategy of the concept is defined (Valminen & Toivonen, 2012). Initially, the specifications of the product are defined through the recombination of the codified knowledge into a customized offer (Järvi, 2016; Valminen & Toivonen, 2012). This process is strongly dependent on intra-organizational processes (Ritala et al., 2013). Hence, the collaboration and communication between internal departments and employees are essential as knowledge structures are assembled (Valtakoski & Järvi, 2016).

The process of detailing the production of the KIBS product innovation includes the specification of roles and responsibilities, as well as the determination of the client involvement, emphasizing the customer-centric productization process (Valminen & Toivonen, 2012). Hence, this aspect of the process highlights the importance of determining key actors in the productization process (Järvi, 2016; Valminen & Toivonen, 2012). Lastly, within this process step, the necessary resources to ensure efficient development of the project are allocated, including both tangible as well as intangible resources (Valminen & Toivonen, 2012).

As the final step in the customer-centric productization process of KIBS innovations, the concepts' evaluation criteria are built (Valminen & Toivonen, 2012). These include aspects such as market orientation and growth strategies, overall, however, these remain scarcely analyzed in the scope and context of productization in KIBS, thus underlining the research's aim to further elaborate on the subsequent activities of the productization process (Järvi, 2016; Valminen & Toivonen, 2012).

A visual representation of the customer-centric productization process in the context of KIBS, defined by Valminen and Toivonen (2012), is provided in *Figure 3*. Building on this model, this study takes the definition of productization within KIBS firms as being a process that aims to conceptualize a product innovation, its product-, process-, and resource specifications as well as its evaluation criteria. Hence, the goal of productizing KIBS innovations, alongside the abovementioned factors of gaining efficiency in the value offering process, is the development of a strategy to create a service with product-like features.

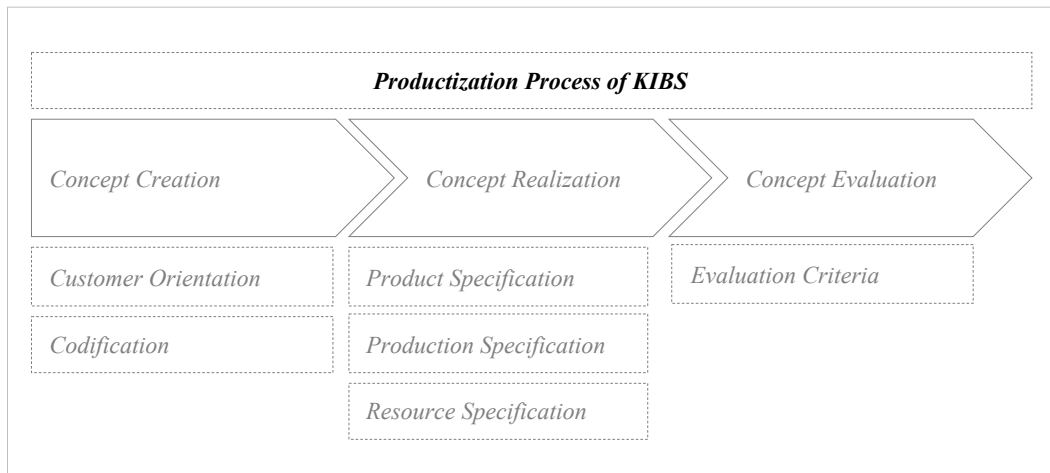


Figure 3: Productization Process of KIBS

Adapted from: Valminen, K. & Toivonen, M. (2012). *Seeking Efficiency through Productisation: A Case Study of Small KIBS Participating in a Productisation Project*, *The Service Industries Journal*, vol. 32, no. 2, pp.273–289; p.287.

2.3.3 Barriers to the Innovation of Products in KIBS Firms

Reiterating the key attributes of KIBS, the use of knowledge, its complexity, as well as the focus on collaboration, further consideration was given to the specific challenges that arise as a result of the innovation of knowledge-intensive products within KIBS firms.

Focusing on knowledge-intensity, challenges in defining common vocabulary has been found as a barrier for product innovation in KIBS firms (Valtakoski & Järvi, 2016). This is due to the complexity of the employed technological and professional knowledge within the context of communicating internally and externally (Chiesa & Frattini, 2011; Valtakoski & Järvi, 2016). Valminen and Toivonen (2012) and Valtakoski and Järvi (2016) find that within the initial interaction of customers and KIBS firms' employees, tacit knowledge is the primary asset, consequently, challenging the codification of knowledge. An additional challenge, arising from the intensity of knowledge, is the difficulty in communicating the value of the product, thereby having problems in including customers into the productization process (Järvi, 2016; Valminen & Toivonen, 2012). This challenge is also found in the research by Chiesa and Frattini (2011) as well as Aarikka-Stenroos and Lehtimäki (2014), highlighting the challenge of missing support from the adoption network, which they also find impacts the acceptance and adoption of the technological innovation. Finally, activities such as marketing and pricing have been identified as challenging within the context of product innovation in KIBS firms (Aarikka-Stenroos & Lehtimäki, 2014; Cainelli, De Marchi & Grandinetti, 2020; Valminen & Toivonen, 2012; Valtakoski & Järvi, 2016). This is a result of the knowledge complexity of the final product, providing difficulties for the communication, thus marketing (Cainelli, De Marchi &

Grandinetti, 2020; Valminen & Toivonen, 2012) as well as evaluating the pricing of the innovation (Valminen & Toivonen, 2012; Valtakoski & Järvi, 2016).

Regarding the co-creation of innovations, further challenges have been identified in literature. Valminen and Toivonen (2012) find that co-creation and collaboration during the productization process can be challenging for inexperienced companies. This primarily results in the first stage of the productization process (*Figure 3*); however, it is also fostered during the recombination of knowledge, as KIBS firms are not familiar with reintegrating customer information (Järvi, 2016; Valminen & Toivonen, 2012; Valtakoski & Järvi, 2016). Valtakoski and Järvi (2016) find that product innovation as a whole can negatively influence the KIBS firm's employees' perception of ad-hoc customer problems. This, therefore, stands in contrast to KIBS firms' strong dependability on their clients, elaborated in the work by Valminen and Toivonen (2012). The dependability is further taken as the foundation for the argued predisposition of KIBS firms being strongly reliant on the organizational culture of co-creation (Santos-Vijande, González-Mieres & López-Sánchez, 2013). This stems from the history of developing services for the customer and results in the focus on providing knowledge-intensive services as the main offering (Aarikka-Stenroos & Jaakkola, 2012; Miles, 1993; Santos-Vijande, González-Mieres & López-Sánchez, 2013)

Further highlighting aspects of the productization process, internal processes play a critical role during the recombination of knowledge and creation of a modular KIBS offering, also causing challenges (Cainelli, De Marchi & Grandinetti, 2020; Ritala et al., 2013; Valtakoski & Järvi, 2016). The importance of knowledge within KIBS offerings has been found to hinder the knowledge sharing of internal knowledge, as it is attributed to the bargaining power of the individual employee (Valtakoski & Järvi, 2016). This reliance on sharing knowledge is also recognized by Ritala et. al (2013). However, the sharing of knowledge is expanded to include both internal as well as external communication to represent the customer as another sharing entity. Finally, strict control of managerial processes during the productization phase has been found to be hindering as employees are argued to prefer flexibility during the collaboration process (Valtakoski & Järvi, 2016).

In sum, various challenges have been found in the context of product innovations within KIBS firms. However, an analysis as to how the challenges negatively affect the deployment of product innovations in KIBS firms has not yet received thorough consideration, confirming this study's research ground.

2.4 Synthesizing Productization and Deployment in KIBS firms

To synthesize the literature streams on productization in KIBS firms as well as the deployment of KIBS innovations, the combination of both processes is derived. Thus, both the productization process as well as the deployment of innovations, are put in the perspective of KIBS firms, resulting in a framework that allows the researchers to investigate how the deployment is challenged by the precluding process and overall challenges within KIBS firms.

Therefore, in the framework of this study, productization in the context of KIBS is referred to as a customer-centric process that systematizes the approach of defining a product innovation and the processes for its development. Reiterating, this process is divided into three steps, namely, Concept Creation, Concept Realization, and Concept Evaluation (see *Figure 3*)(Valminen & Toivonen, 2012).

The deployment of innovations, concerning this study, is defined as the final process phase of the overall innovation process, including key activities that are attributed with bringing the innovation to the market (see *Figure 2*) (Datta, Mukherjee & Jessup, 2015).

As the productization process describes the initial conceptualization and the realization strategy of product-like offerings from KIBS, thus, being parallel to the discovery and the development stages of the commercialization process by Datta, Mukherjee, and Jessup (2015), the reasoning is made that they can be substituted to investigate the challenging effects on the deployment of KIBS firms' product innovations (Järvi, 2016; Valminen & Toivonen, 2012). This is additionally confirmed as the two initial phases of the commercialization process include parallel activities of discovering an innovation as well as planning the development and manufacturing of it (Datta, Mukherjee & Jessup, 2015). These activities are hence parallel to the conceptualization of customer-oriented problems as well as the realization of the KIBS innovation's production (Valminen & Toivonen, 2012). The final correlation can be seen in the activities included in the concept evaluation as well as the final activities within the deployment stage. As the evaluation criteria within the productization process include measurement considerations as well as pricing and marketing strategies, a direct overlapping can be seen with the key activities of the deployment stage (Datta, Mukherjee & Jessup, 2015; Järvi, 2016; Valminen & Toivonen, 2012). Thus, as the subject of investigation for this study includes the deployment of KIBS innovations for the challenges that arise from a product innovation, the individual processes are concatenated. *Figure 4* visualizes the resulting process of a precluding productization process

and the final deployment stage. This underlines the researchers' objective of analyzing how the deployment of product innovations challenges the KIBS firm.

As such, in the context of KIBS firms, the productization process and the deployment are in correlation to one another and subject to the investigation. As the product innovations, challenging the deployment within KIBS, are created during the productization process, a combined process provides an overview of the contextual relationship to the deployment (*Figure 4*). Thus, to investigate how product innovations challenge the deployment within KIBS firms, the framework of the productization process in relationship to the deployment phase is used to analyze how the barriers affect the final deployment.

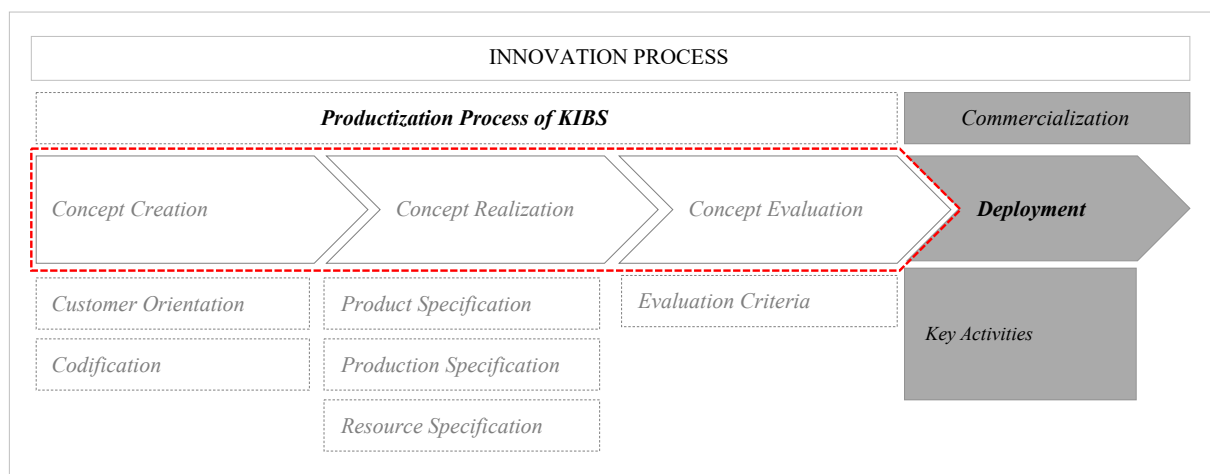


Figure 4: Synthesized model for the deployment of productized KIBS innovations

Adapted from: Valminen, K. & Toivonen, M. (2012). *Seeking Efficiency through Productisation: A Case Study of Small KIBS Participating in a Productisation Project*, *The Service Industries Journal*, vol. 32, no. 2, pp.273–289; p.287.; Datta, A., Mukherjee, D. & Jessup, L. (2015). *Understanding Commercialization of Technological Innovation: Taking Stock and Moving Forward: Understanding Commercialization of Technological Innovation*, *R&D Management*, vol. 45, no. 3, pp.215–249; p. 228.

3 Methodology

The following chapter will present the methodological choices that have shaped this study. Regarding research strategy and design, the data collection, as well as considerations for the approach for the data analysis, are discussed and highlighted.

For the initial choices, the guidelines by Bryman and Bell (2011) were taken as the foundation, whereas the data analysis was shaped by the approach suggested by Gioia, Corley, and Hamilton (2013).

3.1 Research Approach and Purpose

3.1.1 Epistemology and Ontology

The epistemological posture taken in this study is based on *interpretivism*, emphasizing the view that social sciences differ from the field of natural sciences and focusing on how individuals understand the social world (Bryman & Bell, 2011). As the productization of KIBS innovation reflects a challenging process, changing the way said firms “usually” operate, interdependent instances or social constructs such as human-to-human interaction as well as corporate dynamics appear to influence the outcome (Bryman & Bell, 2011). As such, specifically the process of productization and thus the integration of new business logic being unfamiliar to its participant strains the procedure and thus the result. Being influenced by the subjective meaning of social action, the deployment of product innovation is hence complicated. Aiming to understand this explored phenomena, this thesis takes a reflecting posture, considering the distinctiveness of human behavior to comprehend the interplay between the appearing social constructs (Bryman & Bell, 2011).

Building on the conceptions that social phenomena such as the abovementioned deployment of product innovations are created through social actors, they are furthermore updated constantly (Bryman & Bell, 2011). This position of *constructionism* is taken as the ontological considerations in this study. This position also accounts for the subjectivism of the researchers’ accounts, as they themselves present their own perception of their surrounding social environment (Bryman & Bell, 2011).

3.1.2 Research Strategy and Design

The respective investigation follows a qualitative research strategy to investigate the influencing challenges related to the deployment of product innovations in KIBS firms. Ultimately, this study aims to contribute concepts and theory to further develop an understanding of the specific phenomena (Bryman & Bell, 2011). Correspondingly, this investigation follows an approach, aiming to explore how challenges influence the deployment of product innovation in KIBS firms.

Furthermore, the relation built between research and theory in the corresponding work applies inductive and deductive postures in tandem to strengthen the progression of a pragmatic perspective, also referred to as *abductive reasoning* (Bryman & Bell, 2015, p.27; Timmermans &

Tavory, 2012, p.169). More specifically, an inductive theory approach is dominantly applied, as the envisioned objective of this work is to generate theory and derive generalizable inferences from observation (Bryman & Bell, 2011). However, deductive sequences are incorporated as the research process is partly inspired by existing scientific knowledge, “*double-fitting data and theory*” (Timmermans & Tavory, 2012, p.179). This finds application in the following discussion, as the aim is to explain the finding in light of previous research.

As this research aims to derive a grounded theory model that enables a thorough understanding of the challenges that affect the deployment of product innovations in KIBS firms, as well as the possible interconnection between the challenged, a single case study design has been chosen, investigating the multifaceted nature of the research topic and thus allowing for the deeper investigation into the complex interconnectivity it (Bryman & Bell, 2011). Moreover, this supports the researchers’ aim of building a foundation on which to base future research by enlightening the complexity of the investigated phenomena.

Concluding, the research strategy and design follow a qualitative, abductive research approach, investigated by a single case, to generate a more complex understanding of the questioned research topic and thus setting the outline for the collection as well as the analysis of data (Bryman & Bell, 2011).

3.1.3 Research Process

With the overall goal of this research being the creation of theory, multiple steps were taken in order to achieve the goal of emerging grounded theory (Bryman & Bell, 2011). This research began with explorative interviews, asking more general questions, to gain an explorative understanding of the topic at hand, while approaching the specificities of the later research question (Bryman & Bell, 2011). Taking this initial information into account, the formulation of the final research question was done over multiple iterations, while additionally gaining a theoretical perspective to capture the relevant topics and prior research for the understanding of the research phenomena (Bryman & Bell, 2011). This resulted in the narrowing of the research topic, such as the clarification of the deployment phase, being challenged through the inclusion of product innovations, thus, the focus on this specific aspect of the innovation process within KIBS firms. Additionally, it became apparent that the deployment process within KIBS firms differed from other service companies, as specifically, knowledge-intensity and customer

collaboration provided additional levels of complexity (Biege et al., 2013; Cainelli, De Marchi & Grandinetti, 2020).

The researched case company, a medium-sized KIBS firm, resembled an accurate site for this research, as the number of employees and participants within the context of the research topic allowed for a likely theoretical saturation to be achieved alongside their experience with the phenomena that is the foundation of this paper (Bryman & Bell, 2011).

Following these initial steps, the data collection was conducted according to the research topic and site. To grasp the multiple and commonly conflicting perspectives of an organizational context, different information sources and research methods were included (Bryman & Bell, 2011). Hence, the preliminary explorative unstructured interviews were used to gain an initial and broader understanding of the topic. In contrast, the focus of the research was put on the semi-structured interviews as the foundation for the data collection to then, later in the process, generate grounded theory (Bryman & Bell, 2011). These interviews were conducted using an interview guide (see *Table 2, Appendix 1*) to capture the relevant topics to answer the research question. Finally, when later analyzing the data, the researchers reconfirmed finding with the interviewees to ensure that no personal interpretation dominated the analysis process.

Based on the data collection, the data were then analyzed according to the analysis processes of qualitative data, as described by Gioia, Corley, and Hamilton (2013). This resulted in the classification and organization of the selected insights. Moreover, as the goal of the research is to conduct grounded theory, the collection of interview insights was closely connected to the parallel analysis until the theoretical saturation was reached, meaning that no new insights were gained through additional interviews and the emerging concepts were well developed (Bryman & Bell, 2011). This process was conducted iteratively until the grounded theory emerged throughout the analysis. Thus, the result of this iterative process was the creation of the foundation for the grounded theory model to emerge, as well as a further specification of the research question (Bryman & Bell, 2011).

3.2 Data Collection

The methodological choice of the collection of data in the present work has been conducted in line with the research design and strategy (Bryman & Bell, 2011). Appropriately, the data has been collected across a period of three months within the respective case company.

The data sourcing applied in this study followed an explorative advance, initially applying the conduct of unstructured interviews with employees of the case company, screening internal company documents, and taking inspiration from literature to shape the study's scope and research question (Bryman & Bell, 2011). Subsequently, however, semi-structured interviews built the central source of data collection (Bryman & Bell, 2011). While the conduct of explorative unstructured interviews highlighted the initial research problem, the screening of internal documents supported the understating of the organizational context and operational environment of the case company, giving insights on the way how KIBS firms function (Bryman & Bell, 2011). Following, the conduct of semi-structured interviews supported the researchers' aim to gather a more complex understanding of the perceived challenges of individuals involved in the processes of deploying product innovations (Bryman & Bell, 2011). This application of various sources of information is in line with the later applied data analysis method by Gioia, Corley, and Hamilton (2013), which supports the employment of multiple data sources, yet stresses the semi-structured interview conduct as being at the heart of one's scientific investigation.

3.2.1 Sampling and Interviewing

In line with this study's research design, a single case study, the sampling has been built through the encompassment of participants being members of this respective organizational environment. For both, the initial unstructured interviews, and the later semi-structured interviews, adopted sampling criteria were applied, to reach a holistic sample.

Overall, the sample included different managerial levels from the case company, as well as different projects and business units. As the stakeholders involved in the deployment of product innovations within the case company ranged across multiple organizational levels, the initial division of the company into top management, middle management, and (regular) employees ensured the inclusion of different stakeholders as well as the creation of a holistic understanding of the research problem. Moreover, this inclusion was aimed at supporting the study's strategy to triangulate the findings by using the insights gathered from multiple organizational levels and compare the individual level's findings to ascertain the ones that have an overarching impact (Bryman & Bell, 2011).

Referring to the research topic, an overarching requirement was the interviewees' knowledge and understanding of the deployment of product innovations. This knowledge was based on the

study's taken definition by Nerkar and Shane (2007), as well as Datta, Mukherjee, and Jessup (2015), defining the deployment of innovations as resembling the final stage of the commercialization process, including distinct activities. Moreover, the understanding of product-related aspects of innovations in the context of KIBS firms, including the productization process, was taken into account (refer to *Ch. 2.4*).

The interviews, held in English, were conducted by two researchers, with one leading the interview, and the other predominantly observing the setting passively. However, the observer could also intervene by asking probing questions in the case that an issue needed to be investigated further (Bryman & Bell, 2011). This also contributed to a more conversational and comforting environment (Bryman & Bell, 2011). Though, aspects such as time constraints when interviewing with two interviewers, as well as the interplay between the two researchers, were taken into consideration as constraints, as these might impact the quality of the interview (Bryman & Bell, 2011). Additionally, the interviews were conducted digitally via online interview platforms due to political circumstances and company restrictions.

Unstructured Interviews

For the unstructured interviews, *purposive sampling* was used as the goal was to gain a broad understanding of both the case company from interviewing individuals of each respective organizational level as well as a broad understanding of the deployment of product innovations in the case company (Bryman & Bell, 2011, p.442). This resulted in six explorative interviews. The sampling criteria included the employee's knowledge of the deployment of product innovations to foster the researchers' goal to clarify the study's phenomena.

In this step, the focus of the conversation-like interviews was on finding general insights on the deployment process of product innovations and the general challenges that have been perceived through the use of more open questions and pre-determined topics (Bryman & Bell, 2011). Thus, these interviews allowed the researchers to gain an explorative and vast insight into the deployment process while being able to adapt the research question, and thus the later research guide through specific elements that the researchers did not include into their initial considerations (Bryman & Bell, 2011). These insights then helped the researchers in the formulation of the initial research question that was used as the foundation for developing the interview guide for the later semi-structured interviews. Additionally, the respective fostered the understanding

of the interviewee's perception of their environment, while minimizing the risk of including the researchers' presuppositions (Bryman & Bell, 2011).

Semi-Structured Interviews

Starting with the more general notion of early research on the factors that affect the deployment of product innovation, a clearer focus on the topic was created with the formulation of the research question. This resulted in eleven semi-structured interviews being conducted that build the foundation for the later analysis, thus being the providers of data that allowed the researchers to answer the research question (Bryman & Bell, 2011). Based on the nature of semi-structured interviewing, the specificities incorporated into the questions allowed for a deep investigation of the phenomena, however, the ability to adapt during the interview in the order that questions were asked, allowed the researchers to investigate unforeseen topics (Bryman & Bell, 2011).

The initial sampling approach for the semi-structured interviews was also based on *purposive sampling* to ensure the sample included individuals that were able to provide insights that allowed for the answering of the research question (Bryman & Bell, 2011, p.422). To achieve this, three sampling criteria were employed: The initial criteria was the participation of the employee in a product innovation project within the case company. The second criteria was that the project the employee was involved in, encountered challenges that affected the deployment, resulting in either an impeded or failed deployment of the product. The third criteria was that the three previously elaborated-on organizational levels were represented, emphasizing the researchers' goal of providing holistic insights. Accordingly, the sampling criteria allowed for a sample that was able to provide insights into the product innovation deployment and, more importantly could provide insights into challenges that affected the final deployment with various degrees of severity, as both failed and impeded projects were included.

To gain additional depth and broaden the sample to provide a more holistic result, additional *snowball sampling* allowed for the inclusion of employees that shared the abovementioned criteria. However, they were not included in the initial sample (Bryman & Bell, 2011, p.192). This approach ensured that the essential product-related projects that faced challenges during the deployment were represented in the sample.

<i>No.</i>	<i>Date</i>	<i>Position</i>	<i>Relation to Innovation</i>	<i>Success/Failure</i>
1	03.03.2020	Employee 1	Champion of Innovation	Success
2	04.03.2020	Employee 2	Champion of Innovation	Failure
3	10.03.2020	Employee 3	Coaching Innovation Projects	Success
4	11.03.2020	Employee 4	Champion of Innovation	Failure
5	02.04.2020	Middle Management 3	Managing Innovation Champion	Success
6	02.04.2020	Middle Management 4	Managing Innovation operationally	Failure
7	09.04.2020	Middle Management 5	Coaching Innovation Projects	Success
8	14.04.2020	Top Management 1	Managing Innovation strategically	Failure
9	17.04.2020	Top Management 2	Managing Innovation strategically	Failure
10	22.04.2020	Middle Management 1	Champion of Innovation	Failure
11	30.04.2020	Middle Management 2	Managing Innovation operationally	Failure

Table 1: Conducted interviews

3.2.2 Interview Guide, Topics and Question

As discussed above, following the conceptualization and clarification of both the research topic and the research question, an interview guide was created to facilitate the collection of critical questions with the aim of resulting in replies that answered the research question (Bryman & Bell, 2011). To ensure both the fluid conduct of the interview as well as gain different insights, various types of questions were applied, namely introductory- follow-up-, direct- and probing questions (Bryman & Bell, 2011). In line with recommendations by Bryman and Bell (2011), these questions were piloted and iterated throughout the explorative interviews to ensure the alignment with the key concepts presented in the theoretical background section of this study, as well as with the goal of providing answers to the research question.

The overall goal of the respective interview guide is to exploratively investigate how the challenges that arise with product innovation hamper their deployment in KIBS firms. In doing so, the topic (1) *Product Innovation in KIBS*, aims to explore the perceived product innovation process in KIBS firms with a focus on the literature-based key factors of customer collaboration and knowledge-intensity (den Hertog, 2000; Miles, 2008; Muller & Zenker, 2001). This provides the foundation for the further investigation of the specificities concerning the deployment of KIBS product innovations. Therefore, topic (2) *Deployment of Product Innovations* provides

insights into perceived challenges of the product innovation deployment. More specifically, questions regarding how product innovations and their development challenged the deployment in line with the theoretical foundation provided by Valminen and Toivonen (2012) and Amara, Landry, and Doloreux (2009). Moreover, additional questions were aimed at understanding how the highlighted attributes of customer collaboration and knowledge-intensity within KIBS firms were perceived by interviewees in the context of deploying product innovations. Additional follow-up questions provided the insights needed to investigate how these product innovations challenged the deployment in line with the discussed definition by Datta, Mukherjee, and Jessup (2015), as previously discussed (refer to CH.2).

(A) General Topics

The aim of (A) General Topics, was to provide the interviewee with initial information on the covered topics, as well as the process of the interview and key aspects that were to be covered prior to the conducted interview including data processing as well as privacy and confidentiality agreements. A secondary aim was to ease the tension of a recorded interview and make the interviewee feel like opening up towards the interviewers (Bryman & Bell, 2011).

(B) Interviewee Information

The aim of (B) Interviewee Information was to gain further insights into the interviewee's background, their position within the company as well as a more detailed investigation with their relationship with deploying product innovations at the case company (Bryman & Bell, 2011).

(1) Topic: Product Innovations in KIBS Firms?

*The aim of the **initial part** of topic (1) Product Innovations in KIBS Firms was to provide a common understanding of the product innovation process leading up to the deployment of the respective as well as gaining initial insights into the holistic product innovation process at the case company.*

*The aim of the **second part** of topic (1) Product Innovations in KIBS Firms, was to then provide the foundation for the inclusion of KIBS attributes and their effect on the product innovation process. In line with previously studied research such as the work by Valtakoski and Järvi (2016) a focus was put on the attributes of knowledge-intensity and the customer relationship, in the context of productization within KIBS firms. This provided insights into **how** challenges originated in the context of KIBS firms and product innovation. A secondary aim was to smooth the transition towards the more detailed investigation on the challenges for the deployment of product innovations within KIBS firms.*

(2) Topic: Deployment of Product Innovations

*The aim for the **initial part** of topic (2) Deployment of Product Innovations, was to establish firstly a common understanding of the deployment of product innovation in KIBS firms by introducing the concept of deployment based on the definition used and discussed in this study (Datta, Mukherjee & Jessup, 2015; Datta, Reed & Jessup, 2013; Pisano & Teece, 2007). Secondly, initial insights were gathered regarding the challenges to the deployment of product innovations exploratively.*

*The aim for the **second part** of topic (2) Deployment of Product Innovations was to then connect the literature on deployment and previously researched barriers provided in the works by Valminen and Toivonen (2012) and Chiesa and Frattini (2011). This allowed for the investigation of challenges affecting the deployment of product innovations within KIBS firms by combining both literature streams into the formulation of the corresponding questions. Thus, the second part of this interview section was aimed at investigating how the creation of product innovations and their handling inside the firm challenged the later deployment of innovations.*

(C) Conclusion

The aim of the final (C) Conclusion was twofold. The first aim was to conclude the interview and then the interviewee for the participation. The second aim was to conduct snowball sampling, supporting the further development of a satisfied sampling (Bryman & Bell, 2011).

Table 2: Interview Guide used for Semi-structured interview conduct

3.3 Method of Data Analysis

3.3.1 Transcribing

Interviews were recorded digitally and transcribed to allow a more accurate examination of the collected information (Bryman & Bell, 2011). Moreover, a transcription software was used to support the rather time consuming subscription process (Bryman & Bell, 2011). Following, the conduct of manual transcription was applied to ensure correctness.

Transcribing allowed the researchers to overcome misinterpretation by being able to reanalyze the data multiple times (Bryman & Bell, 2011). This is due to the transcription's direct wording being kept intact throughout the entire data analysis process (Bryman & Bell, 2011). Furthermore, during the transcription, the researchers put critical emphasis on ensuring anonymity and transparency of the information gathered for the later stages of the research (Bryman & Bell, 2011). Lastly, transcription further enables the open evaluation of the data as well as the use in later works, supporting the credibility and transparency of the analysis (Bryman & Bell, 2011).

3.3.2 Coding and Data Structure

As the primary and central process of creating the data structure, the initial coding of the interview transcripts was done (Bryman & Bell, 2011). During the coding process, the coding was constantly updated as new indicators of emerging concepts were created throughout the coding process (Bryman & Bell, 2011). During the process of exploratively identifying concepts for deriving grounded theory, open coding practice was followed, thus dissecting and comparing concepts to form the later categories (Bryman & Bell, 2011; Corbin & Strauss, 2015). This is also in line with the analysis theory predominantly followed within this study by Gioia, Corley, and Hamilton (2013). In line with this method, *1st-Order Concepts* were derived from the raw data set, which faithfully captured the wording and phrasing of the interviewee, further ensuring the unprejudiced approach to the data analysis (Gioia, Corley & Hamilton, 2013, p.20).

Following the conception of *1st-Order Concepts*, axial coding was applied in order to link the concepts together in different ways and thus building the categories providing the more in detail analyzed real-world phenomena (Bryman & Bell, 2011). This representation of found phenomena was achieved due to the codes being progressively linked to different patterns and causes (Bryman & Bell, 2011). Referring to the methodology by Gioia, Corley, and Hamilton (2013), *2nd-Order Themes* were developed as emerging themes were observed as a result of the *1st-Order Concepts* being combined. This was due to the researchers' goal of finding similarities and discrepancies between the observed concepts, hence leading to the emerging relationships of the analyzed phenomena, as the researchers acted as “*knowledgeable agents*,” taking the two levels of concepts and emerging themes into consideration at the same time (Gioia, Corley & Hamilton, 2013, p.20).

Finally, as *theoretical saturation* was achieved by ensuring that no new data was needed to further the researchers' understanding of the emerging concepts as well as ensuring that the coding of data has gone through multiple iterations to ensure the fit of the concepts and the overarching categories, *Aggregate Dimensions* were formed (Bryman & Bell, 2011; Gioia, Corley & Hamilton, 2013, p.20). These *Aggregate Dimensions* then condensed the *2nd-Order Themes*, thus building the final *Data Structure* (Gioia, Corley & Hamilton, 2013, p.20).

Taking the established *Data Structure* as the foundation, the dynamic interrelationship between the individual dimensions was derived, thereby moving away from the static nature of the initially created structure (Gioia, Corley & Hamilton, 2013). Thus, the final model aims to explain

the dynamic relationship between the previously established concepts (Gioia, Corley & Hamilton, 2013).

In line with this research, the interconnectivity and dynamic nature of the factors challenging the deployment of product innovation within KIBS companies are visualized. In order to ensure the meaning of the grounded theory model and the later transferability of the research, a critical effort has been put in intertwining the emerging concepts of the researchers' study with previously researched findings, providing the foundation of "*what we already know*" within the newly derived concepts and themes (Gioia, Corley & Hamilton, 2013, p.24).

Overall, this multistage process of the data analysis resulted in 273 *1st-Order Concepts*, which were bundled into 17 *2nd-Order Themes*, and finally 5 aggregate dimensions.

3.4 Reflection on Quality Criteria

The first criterion, *credibility*, is to be approached due to the various possibilities to interpret social reality (Bryman & Bell, 2011, p.396). To ensure this trustworthiness, each step of the research process was transparently highlighted and captured through thoroughly following the qualitative research process approach, according to Bryman and Bell (2011). Further, by including multiple stakeholders of the case company into the sample, triangulation was incorporated into the study, supporting the credibility (Bryman & Bell, 2011). Lastly, the transcripts of the records were provided to the interviewees, thus ensuring the correct understanding of the researchers.

In order to ensure *dependability* throughout the study, the researchers adopted an auditing approach as suggested by Bryman and Bell (2011, p.398). This included the storage of all transcripts as well as other empirical documents that were created during the research process, allowing for an optional auditing process (Bryman & Bell, 2011). Thus, the researchers argue that this study is repeatable to the extent that the kept records allow future researchers to adopt a similar social role in the context of the researched environment, hence, providing dependability to the extent of the limited nature of replicability of qualitative research (Bryman & Bell, 2011).

Notwithstanding the critical feature of qualitative research tending to solely include smaller sample sizes, weakening to conduct of generalizable outcomes, it has been recommended to produce *thick descriptions*, meaning, the provision of depth rather than breadth of the research

findings correctness to achieve *transferability* (Bryman & Bell, 2011, p.398). Thus, in taking a single case study to investigate the research problem, this contextual richness was fostered by the researchers.

Lastly, *confirmability*, meaning the objectivity of research, has been found challenging when conducting qualitative research (Bryman & Bell, 2011, p.398). To counter the challenge of being prejudiced by individual perceptions, rigorous discussions between the two researchers supported the objective conduct of the research (Bryman & Bell, 2011). In line with the considerations regarding the dependability of this research, the provision of the transcripts and concepts allowed the interviewees to act as auditors, thus further removing the risk of personal subjectivity (Bryman & Bell, 2011).

3.5 Ethical Considerations

Ethical considerations have also been taken into critical consideration within this research, including the aspects of harm, the lack of consent, the invasion of privacy, as well as the deception of the involved participants (Bryman & Bell, 2011, p.128).

The consideration regarding harm, meaning physical or mental harm in the form of stress or worry, as a result of organizational implications resulting from the interviewees' statements, took prevalence in the conduct of transcription and interviewing (Bryman & Bell, 2011). By anonymizing all names and other traces that would imply the person through the transcript, emotional and organizational harm was minimized by the researchers. Additionally, the conduct of the interview considered the importance of not forcing the answering of questions, thus the ability to refuse to answer questions was given. This further supports the researchers' goal of preserving the interviewee's privacy, as the refusal of questions was given to all questions (Bryman & Bell, 2011).

In order to assure the consent and the provision of all information regarding the conduct of the research and the interviewees' statements during the analysis, clear information was provided prior to the start of the interview (Bryman & Bell, 2011). This ensured mutual consent to the recording of the interviews. Additionally, all transcripts were provided to the respective interviewees to confirm their consent for the use of the data for the research. Moreover, the attention to the informed consent, also prevented the invasion of privacy as the interviewee could

evaluate, their involvement in the research based on the provision of all information (Bryman & Bell, 2011).

The final consideration regarding deception was prevented by the researchers as the information on the form of recording, and the use of the data was provided before all interviews (Bryman & Bell, 2011).

4 Findings

This chapter introduces and displays the findings of this study in accordance with the data collection and analysis method by Gioia, Corley, and Hamilton (2013).

Initially, a tabular overview of the emergent 2nd-Order Themes of each respective derived Aggregate Dimension is introduced. Following, a summary of the individual findings with the use of representative quotes elaborates on the 2nd-Order Themes. Lastly, an visualization of the overall derived data structure, representing a static image of the findings, is displayed (Gioia, Corley & Hamilton, 2013).

4.1 Mindset as a Deployment Barrier

The aggregate dimension of *mindset* as a deployment barrier highlights the findings that are associated with attributes within the individuals' mindsets. The emerging themes relate to the challenges arising within the perception of the business tradition, the need for change as well as risk aversity.

Int.	Representative Quotes	2nd-Order Themes
MM5	„It kind of shows you that you if you want to succeed with the product, you need to be aware of that there are different assumptions to succeed, then within with the traditional method.”	Business tradition
TM1	„And you have been working with this management, the style and the structure forever, so that's the way you're handling it”	
MM4	„ [...] because now we're talking scalable businesses with another kind of logic.”	
MM3	„If you if you have that in the in your backbone structure of company, all systems all company culture is based on selling hours.”	
MM1	„We are trying to, to sell our innovation all the time according to the business model of [...] a consultant [...]”	
Em2	„We as a company are not used to the amount of resources you have to put [into] the research [...] project.”	Required change
TM1	„ I think that really, at the end, it boils down to this slow cultural transgression from one company to another that is necessary, especially when you have a more radical shift in how your business really works, is very interesting.”	
Em2	„ We need to change the way that our co-workers are living their projects.”	
MM2	„And the reason I'm telling you this story is just as kind of to point out if their mindsets don't fall into the right place, I don't think that projects [are] going to succeed from a business standpoint.”	
Em2	„ We need to take more risks.”	Risk aversity

Em3	„[...] we're not sure; We're a bit scared!”	
TM2	„Employees and managers perhaps in particular, they see the boundaries of the industry and sort of then stop or think this isn't for us.”	

Table 3: Tabular overview on the barrier of Mindset

Business tradition

The theme of *business tradition* as a challenge, refers to the business tradition and its prevalence within the mindset of the individuals, hindering the deployment of product innovations.

Initial data shows that deploying product innovations causes a discrepancy in the perception of the needed and traditional business. The business tradition, meaning the perception of how business has previously been done, is seen as negatively influencing the success of product's deployment. This is due to the assumptions that are currently made, not matching the required assumptions for deploying product innovations (MM5: „It kind of shows you that you if you want to succeed with the product, you need to be aware of that there are different assumptions to succeed, then within with the traditional method. “). Further, it is assumed that the only means of creating value is the traditional way of selling hours (MM3: „If you if you have that in the in your backbone structure of company, all systems all company culture is based on selling hours.”). This is attributed as being a hinderance towards deploying innovation as well as the employees' perception of solely being judged on the number of hours sold.

The challenge of relying on the traditional business is also seen when considering the scalability of deploying products (MM4: „ [...] because now we're talking scalable businesses with another kind of logic.”), as new approaches and structures are not considered within management (TM1: „And you have been working with this management, the style, and the structure forever, so that's the way you're handling it”). This alignment with traditional business, emerging from the data, suggests that the traditional business mindset is standing in the way of the new assumptions and management aspects that are required for a successful product deployment.

Furthermore, the data shows that the reliance on the current way business is done and its operational processes hinders the deployment of innovation (MM1: „We are trying to, to sell our innovation all the time according to the business model of [...] a consultant [...]”). This further leads to an underestimation of the necessary resources and tasks supporting the respective and the way resources are used and spent (Em2: „We as a company are not used to the amount of resources you have to put [into] the research [...] project.”). Thus, the requirement imposed by productization with regard to resources as well as the approach to the overall process,

indicate a resulting conflict in the traditional approach to business, which negatively influences deployment outcomes of products.

Required change

The theme of *required change* as a challenge, refers to the findings that emphasize the challenges of having a resistance towards organizational change, which is imposed by deploying product innovations.

The findings show that a hinderance towards change exists and hampers deployment activities (*TM1: „And I think that really, at the end, boils down to this slow cultural transgression from one company to another that is necessary, especially when you have a more radical shift in how your business really works, is very interesting. “*). Moreover, this perception also finds recognition in the approach of operational processes (*Em2: „We need to change the way that our coworkers are living their projects. “*) as well as the employee’s technical profession. The examples highlight the indication that the required change of how to approach projects, thus the deployment of product offerings, is necessary, yet, missing due to the current mindset and the slow adaption to the change.

Additionally, the data suggests that the implementation of a different culture is seen as imperative for the successful deployment of product innovations (*MM2: „And the reason I'm telling you this story is just as kind of to point out if their mindsets don't fall into the right place, I don't think that projects [are] going to succeed from a business standpoint.”*). Hence, deploying product innovations is seen as eliciting the cultural difference between the current and required mindset which results in a challenge for the actual deployment.

Risk aversity

The theme of *risk aversity* as a challenge, points out the evidence that the current attitude towards risk is hindering the deployment of product innovations.

Employees highlight that the tolerance towards risk is required to progress in their deployment efforts (*Em2: „We need to take more risks.”*). The reason for this is seen as being scared and unsure of the deployment process (*Em3: „[...] we're not sure; We're a bit scared!”*) and stepping over industry boundaries (*TM2: „Employees and managers perhaps in particular, they see the boundaries of the industry and sort of then stop or think this isn't for us.”*). Hence, the

data highlights that deploying product innovations requires a different approach to risk, whereas the current approach is seen as hindering deployment efforts.

Empirical evidence also suggests that there is a prevalent fear of investing in the wrong innovations (*Em2: „That's worse for the company. If we take, take resources that could create great value and spend it on something that will end up in a product that will never reach the market.“*). This fear is accompanied by a long-term assumption that current innovations will lose their value and thus remove the possibility of future investments (*MM1: „[...] because maybe you are going to fund a project with a certain value today, but in two years, this project value will be diminished. So, you will lose the opportunity to fund other valuable projects as well.“*). Thus, the risk of taking wrong decisions is indicated by the finding as hindering the deployment of productized innovations.

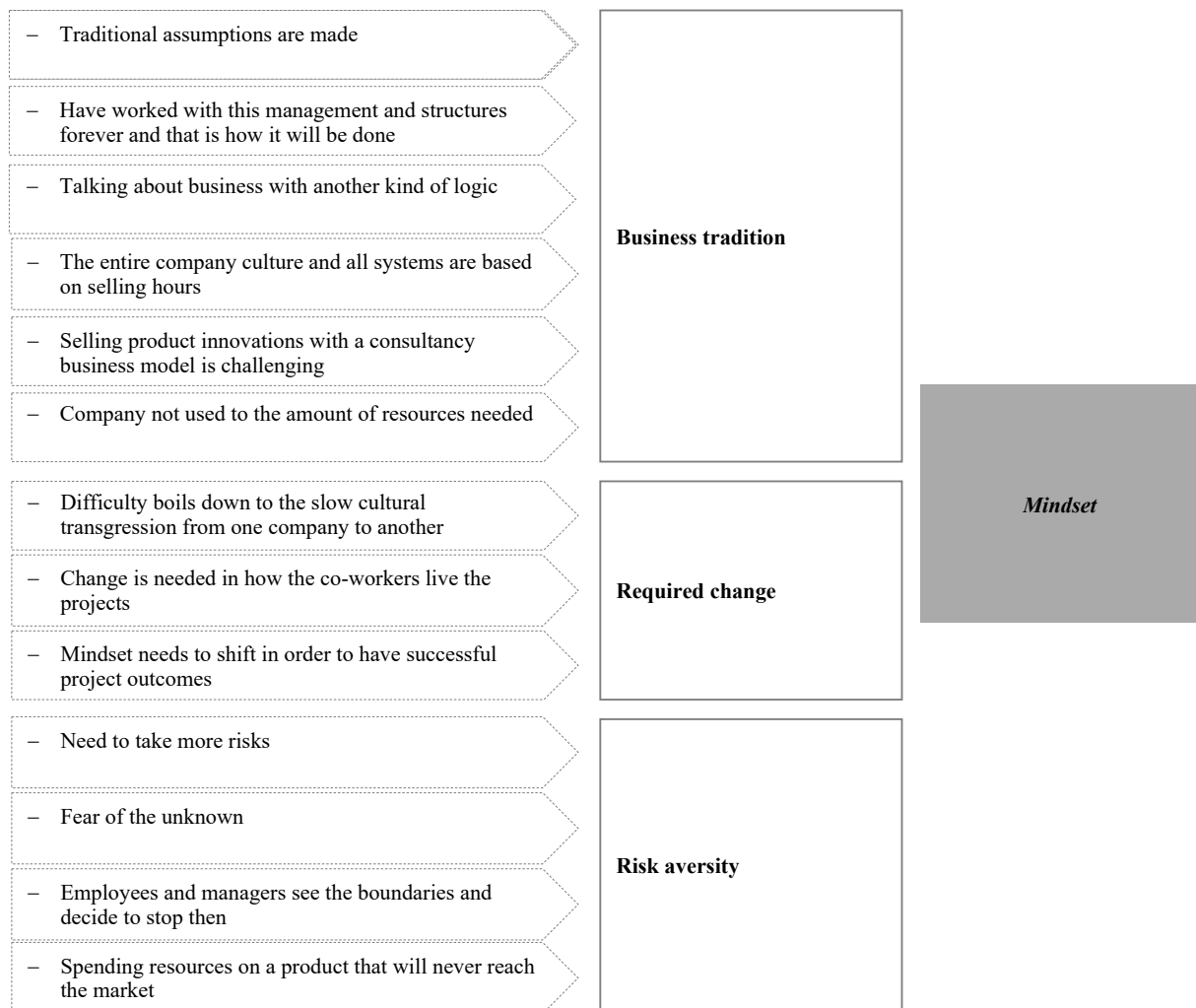


Figure 5: Data structure of the Aggregate Dimension Mindset

4.2 Productization Process as a Deployment Barrier

The aggregate dimension of *productization process* as a deployment barrier, highlights the findings that are associated with the elements of the productization process including the conceptualization and the development of the product. Moreover, it includes aspects referring to the organizational structure for the process that are seen as barriers for the deployment of product innovations.

<i>Int.</i>	<i>Representative Quotes</i>	<i>2nd-Order Themes</i>
MM4	<i>„But then of course, we have the business side, because we really lack expertise in all of the managers.“</i>	Product conceptualization
MM1	<i>„They have marvelous ideas, but they don't have the have the knowledge [...]“</i>	
TM1	<i>„ [...] what do we mean with a product? Is it like a platform? Is it like internal tools and on the business models that are so different, depending on what you would like to achieve [...]?“</i>	
TM1	<i>„You have to understand what, what it means to become to work with products.“</i>	
MM5	<i>„You have to be very good at understanding to describe the vision.“</i>	
Em2	<i>„What do we do after the development project? How do we support actual innovation? because that is where I think we failed today.“</i>	Product realization
MM1	<i>„But we don't know the way and the channels to sell the innovation as a solution, as a complete solution, as integrated solution to the customer.“</i>	
MM2	<i>„So, I think that that's hugely important, just the strategy behind the business and constructing that business model.“</i>	
TM2	<i>"They are not able to scan a product to do strategic marketing, to do strategic pricing to get the right communication out to get the right service and support organization to get it in the right database set up, etc."</i>	
MM5	<i>„Where should these products actually end up in the in the long run?“</i>	
MM5	<i>„ [...] there has to be a completely new kind of approach to these kinds of products.“</i>	
Em3	<i>„ [...] trying to ask the customers what to how to what they would be able to pay for this because [these] questions [are] really hard.“</i>	
TM2	<i>„So, I struggled with finding the tangible evidence that they that we have proper interaction with customers in early stages.“</i>	
MM1	<i>„Developing or making innovations should meet some requirement or needs of the customer and meanwhile solving a problem and by which they can, we can add value.“</i>	
TM1	<i>„We need to shift the focus to actually work with the customer to help them to define their needs!“</i>	
Em3	<i>„I don't think we have a good enough [...] structure for it.“</i>	Product organization
TM2	<i>„I think it's extremely missing a proper home.“</i>	
Em1	<i>„ [...] structure within this company with the support, service development, selling, marketing [...]“</i>	
MM4	<i>„We needed to have a shelf we needed to find a place for this business.“</i>	
Em1	<i>"[...] product organization is the key element to, to a get this full effect to making sure that we are selling faster, better and then with better quality."</i>	
TM1	<i>"But we have no idea I will say what it really takes to become a product-oriented company."</i>	

Table 4: Tabular overview on the barrier of Process

Product conceptualization

The theme *product conceptualization* refers to the challenges emerging from the data attributed with the conceptualization of products within the productization process.

The data highlights that the lack of experience challenges the deployment of product innovations. Management points out that the employees provide great technical knowledge, however, miss the business perspective to successfully deploy product innovations (*MM1: „They have marvelous ideas, but they don't have the have the knowledge [about deploying innovation]”*). Management further points out that this lack of knowledge is also found to be missing in other managers (*MM4: „But then, of course, we have the business side, because we really lack expertise in all of the managers.”*). The data further shows that the understanding of product innovations and products in of itself is missing and thus challenging (*TMI: „You have to understand what, what it means to become to work with products.”; TMI: „ [...] what do we mean with a product? Is it like a platform? Is it like internal tools and on the business models that are so different, depending on what you would like to achieve [...]?”*). Another challenge that is indicated is that the missing ability to define a vision for product innovations results in poor deployment outcomes (*MM5: „You have to be very good at understanding to describe the vision.”*). Consequently, the evidence shows that the concept requirements of productizing innovations meet inexperience and unclarity, resulting in difficulties in deploying product innovations.

Product development

The theme of *product development* refers to the challenges that have been indicated by the data and attributed to aspects that are associated with the development of product innovations.

The findings show that the management of the deployment of product innovations is challenged. Employees highlight that there is unclarity in the management steps to be taken after the development phase of the productization process (*Em2: „What do we do after the development project? How do we support actual innovation? - because that is where I think we failed today”*), as well as for the actual implementation, resulting in unclarity and unsuccessful deployment initiatives. Additionally, management finds that a different approach for the deployment and specific strategic actions, need to be employed for successful product innovation (*MM2: „So, I think that that's hugely important, just the strategy behind the business and constructing that business model.”*). Management also mentions that difficulties in defining the objective and the

reasoning to product innovations stand in the way of its successful outcome. This is joined with difficulty in seeing the long-term perspective (MM5: „Where should these products actually end up in the in the long run?“). Additionally, management also attributes the deployment failures to the lack of understanding of the reason for deploying product innovations, as well as the discrepancy between the current and desired future position.

The data further suggests that there is a perception of needing refined deployment activities for a successful outcome of product innovations (MM5: „[...] there has to be a completely new kind of approach to these kinds of products.“), including the earlier formation of business-related aspects. This is due to the challenge of the employees misunderstanding and failing deployment steps as a result of the productization process (TM2: “They are not able to scan a product to do strategic marketing, to do strategic pricing to get the right communication out to get the right service and support organization to get it in the right database set up, etc.”).

Furthermore, an aspect that is highlighted in the data is the challenge of needing to sell the product innovations in a different way as a result of the productization process. Thus, the unfamiliarity of the new channels has been attributed to deployment failures (MM1: „But we don't know the way and the channels to sell the innovation as a solution, as a complete solution, as integrated solution to the customer.“).

Moreover, the data highlights the employees' perception that a difficulty arises in the selling of the product innovation due to the deployment set-up in place. Employees further mention the unclarity in the present approach to pricing the innovation as a barrier, due to the new product offering. A reason for this has been argued to be the challenge of including the customer in this step as there is unclarity in both the way to price product innovations as well as their own understanding of the product's value (Em3: „[...] trying to ask the customers what to how to what they would be able to pay for this because, [these] questions [are] really hard.“).

Lastly, the customer orientation is seen as a critical stakeholder for the deployment of product innovations. However, the new focus on the client during the productization process has been seen as missing in the current deployment efforts, thus hindering the outcome (TM1: „We need to shift the focus to actually work with the customer to help them to define their needs!“; TM2: „So, I struggled with finding the tangible evidence that they that we have proper interaction with customers in early stages“).

Product organization (structure)

The theme of *product organization* refers to the challenges that the data suggests are attributed to the structural elements of the organization that are missing and would support the product deployment.

The findings show that the aim of deploying product innovations requires different support structures, that are currently missing in the organization (TM1: “*But we have no idea I will say what it really takes to become a product-oriented company.*”). The importance of this product organization and the structural elements was also emphasized by employees for ensuring efficiency and effectiveness (Em1: “[...] *product organization is the key element to get this full effect to making sure that we are selling faster, better and then with better quality.*”). However, over all levels the data indicates that the current lack of a product organization and its structural elements are hindering the deployment of product organizations.

An additional challenge hampering the deployment of product innovations concerning the organizational structure, is seen by employees highlighting the missing product orientation of the organization (Em3: “*I don't think we have a good enough [...] structure for it [the deployment]”*), as well as the corresponding support and development setup (Em1: “*[...] structure within this company with the support, service development, selling, marketing [...]*”). A further barrier perceived by management is a lack of a structure within the organization that allows for the protection and placement of the product innovations (MM4: “*We needed to have a shelf we needed to find a place for this business.*”; TM2: “*I think it's extremely missing a proper home.*”).

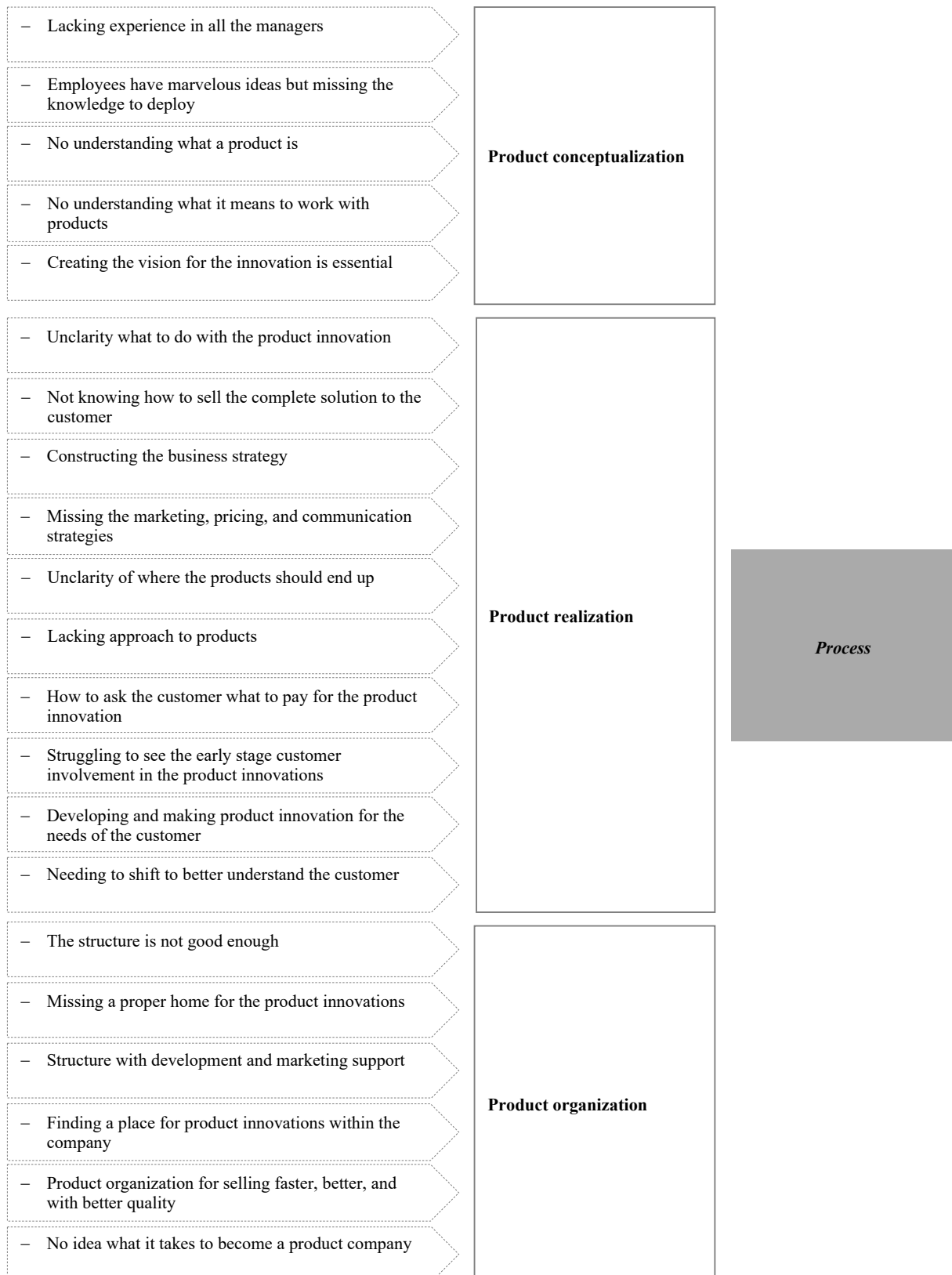


Figure 6: Data structure of the Aggregate Dimension Process

4.3 Resource Management as a Deployment Barrier

The aggregate dimension of *resource management* as a deployment barrier, highlights the findings regarding both the internal resources as well as the management of them that have been attributed to the challenges with the deployment of product innovations.

<i>Int.</i>	<i>Representative Quotes</i>	<i>2nd-Order Themes</i>
Em3	„I feel like it's sometimes hard for him to prioritize because of the other normal work.”	Prioritization
Em1	„ [...] we're seeing now that to [...] get this full effect with this product we need the time and [...] we need to focus [...]”	
MM3	„ And so, you need both to allocate time, but you also need to find a way [to] innovate within the customer projects [...]”	
MM2	„It's hard to actually say, tell the manager, okay, I need time to focus on this when especially in a crisis like where we are right now. So, the manager is a very important stakeholder.”	Management control
MM2	„ [...] so just the department heads, for example, they have to give time to their consultants in order to be able to focus on the innovation program”	
MM5	„If they want this product to succeed, they need to give us space.”	
MM5	„If we are going to evolve this product into what we believe it can be evolved to, we do not want somebody else to control what we do.”	
MM2	„I think it comes down to the team, but the team hasn't really been given the right setup.”	Team management
MM2	„One would be that you have a great team, but expectations have not been placed on them.”	
TM1	„Those experts need to be a part of a context.”	
MM1	„I think [missing] expectations are a hindrance.”	
MM5	„We are already creating this but it's costing too much money and it doesn't really, there isn't any evidence that it actually creates value.”	Financial resources
MM3	„So, there's sort of no room in the budget to add the new stuff [...]”	
MM5	„Whereas the key resources then are like investments that you need money to actually develop something.”	
MM2	„So financing is a massive issue as well!”	Personnel resources
Em3	“[...] we really need more people to help us.”	
Em3	„We would need more resources for like, full-time resources with the right background.”	
Em1	“Finding the right people internally”	
TM1	„I'm convinced that the experts that we have are so needed, but you can't [leave] the whole process to them.”	

Table 5: Tabular overview on the barrier of Resource Management

Prioritization

The theme of *prioritization* refers to the challenges that have been indicated by the data due to the arising difficulties that were felt in being able to prioritize the work on product innovations.

The finding emphasize that there is a perception of needing the time and to focus on the product innovations as the new approach of productizing innovations requires more effort to make it successful (Em1: „ [...] we're seeing now that to [...] get this full effect with this product we need the time and [...] we need to focus [...]”). This observation is further highlighted through employees explaining that prioritizing work on deploying product innovations is difficult due

to the core business and thus cannot be accomplished in parallel (*Em3: „I feel like it's sometimes hard for him to prioritize because of the other normal work. ”*).

Aside from the time, the lack of focus is found to be a hindrance for employees. Conversely, management further underlines the hindrance of allocating time, however, sees customer projects as the environment in which to innovate in (*MM3: „ And so, you need both to allocate time, but you also need to find a way [to] innovate within the customer projects [...]”*). Thus, the data indicates both the and the environment in which to deploy the product innovation as a current challenge to the deployment.

Management control

The theme of *management control* refers to the challenges that the data suggests are attributed to the controlling measures impacting the deployment of product innovation.

The empirical findings imply that the acquisition of space and capacity to work on the deployment of product innovations is hindered through the process of gaining management permission (*MM2: „It's hard to actually say tell the manager, okay, I need time to focus on this when especially in a crisis like where we are right now. So, the manager is a very important stakeholder.”*). Emphasizing this perception, middle management further elaborates on the importance of space, as suggestions are made that it is directly attributed to the success of product innovations (*MM5: „If they want this product to succeed, they need to give us space.”*). Alongside this, the focus on these product innovations is felt as being strongly dependent on the management, thereby bound to their consent (*MM2: „ [...] so just the department heads, for example, they have to give time to their consultants in order to be able to focus on the innovation program.”*). This permission dependency is seen as a direct challenge to the successful deployment of product innovations (*MM5: „If we are going to evolve this product into what we believe it can be evolved to, we do not want somebody else to control what we do.”*).

Team management

The theme of *team management* refers to the challenges emerging from the data, indicating hindrances in the team setup and external expectations.

An initial finding that became apparent is that the highly technical experts were missing a team and context in order to facilitate their expertise, thus successfully deploying product

innovations. This empirical finding is underlined by top management, indicating the need for the aforementioned context (TM1: „*Those experts need to be a part of a context.*”). With this, management also perceives the inadequate setup of the innovation team as a barrier to the deployment of product innovations (MM2: „*I think it comes down to the team, but the team hasn't been given the right setup.*”). Additional discovery is the misalignment of expectations on the team (MM2: „*One would be that you have a great team, but expectations have not been placed on them.*”). These expectations have been attributed to the unsuccessful outcome of the product deployments (MM1: „*I think [missing] expectations are a hindrance.*”).

Financial resources

The theme of *financial resources* refers to the challenges that arise due to the lack of financing during the deployment of product innovations.

Managers point out the issue that there is a difficulty in investing financial resources into the deployment of product innovations. This is highlighted through the perception of missing evidence that product innovations create new value (MM5: „*We are already creating this, but it costs too much money and, it doesn't really, there isn't any evidence that it actually creates value.*”). Further, product innovations have evoked the perception of budget limitations, therefore, not allowing for the inclusion of new product innovations (MM3: „*So, there's sort of no room in the budget to add the new stuff [...]*”). Thus, financing is seen as a key resource for the successful deployment of product innovations (MM5: „*Whereas the key resources than are like investments that you need money to develop something.*”), as well as a critical current hindrance (MM2: „*So financing is a massive issue as well!*”).

Personnel resources

The theme of *personnel resources* refers to the challenges that the data suggests are attributed to personnel resources needed to deploy product innovations.

Employees highlight that personnel resources are required for the product deployment process and need to be found within the organization (Em1: “*Finding the right people internally.*”). This observation is underlined through the necessity of needing help during the current deployment of product innovations (Em3: “[...] *we really need more people to help us.*”). Moreover, these resources also need to include an appropriate background to facilitate product

innovations' deployment (*Em3*: "*We would need more resources for like, full-time resources with the right background.*").

Another aspect that became apparent is that technical experts are seen as critical, however, as the process of developing and deploying product innovations is perceived as giving the experts unfamiliar roles, the successful outcome of product deployments is challenged (*TMI*: „*I'm convinced that the experts that we have are so needed, but you can't [leave] the whole process to them.*”). Thus, findings also indicate that the appropriate way of employing personnel is seen as a hindrance to the deployment in conjunction with the missing resources.

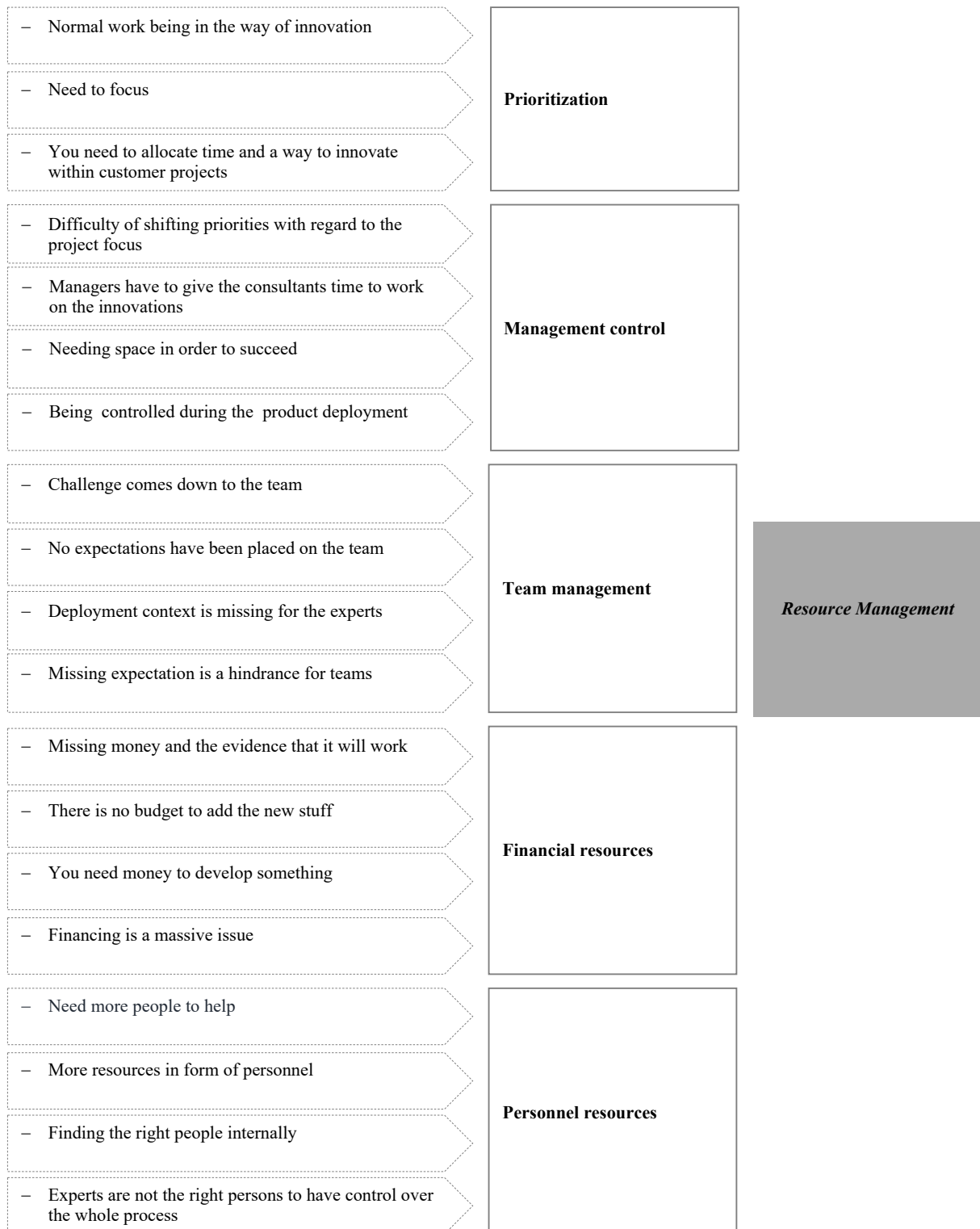


Figure 7: Data structure of the Aggregate Dimension Resource Management

4.4 Knowledge as a Deployment Barrier

The aggregate dimension of *knowledge* as a deployment barrier, explains the findings concerned with the way that knowledge influences deployment outcomes, including the inherent

expert technical knowledge, as well as the way that knowledge is used and protected in the deployment of product innovations.

Int.	Representative Quotes	2nd-Order Themes
MM2	„The team there is so incredibly good and technical, but they are limited to their technical capabilities.”	Technical knowledge
Em3	„ [...] it's hard for someone who's really into structural engineering to me to sell something that's off track.”	
MM2	„You have all these things, but nobody at the forefront of structural engineering wants to serve that market. Because it's not the forefront of knowledge in the structural world.”	
TM2	„So, we're not very good at like packaging, structuring, reusing knowledge.”	Scaling knowledge
TM2	„ [...] we're not systematic about our knowledge.”	
MM3	„That's obviously a challenge when it sits in people's head.”	
Em4	„ [...] who had this idea if he's having a cold or being sick for a month, who's running it then [...]”	
TM2	„We're not very good actually scaling our knowledge.”	
MM2	„It's very hard to scale the forefront of knowledge.”	
Em1	„ [...] take this product and to and to scale this up it is too late.”	
MM4	„But if we should have it in the [X] department, where it originated, I'm not sure if they could manage to fully scale that up.”	Knowledge diffusion
Em3	„ [...] make people understand what we could use it for and, like sell it within projects that we already have.”	
Em4	„I need to involve more people. So, we get a wider spread.”	
Em2	„I think that when we have 10 or 20 coworkers being able to use this product, using it in all the projects, then it will spread organically within the company.”	
MM2	„So therefore, we'll go around the company and share this information with as many people as we can and then they will in turn sell it to our to their customers. That has not worked so well. Historically.”	Knowledge appropriability
MM4	„But when it comes to sort of have IP strategies to what to protect, not to protect, etc. we are not mature, we have not much knowledge about that actually [...]”	
Em4	„We need to be first or it's very easy for someone else to take the same idea to develop their own software service”	
MM2	„[...] but then the thing is the team, like with this failed spin out company, the team quit, and we didn't have [...] contracts in place. We didn't have no; it's called non-compete clauses and employment contracts. So, we did not have that.”	

Table 6: Tabular overview on the barrier of Knowledge

Technical knowledge

The emerging theme of *technical knowledge* refers to the attributes that indicate a challenge from the high focus on being in the knowledge forefront.

The empirical data suggests that the technical knowledge of the employees hinders them in accomplishing deployment related tasks as the specialty hampers the broad perspective of product innovations (Em3: „ [...] it's hard for someone who's really into structural engineering to me to sell something that's off track.”). This limiting factor finds further recognition from a managerial perspective (MM2: „The team there is so incredibly good and technical, but they are limited to their technical capabilities.”), where the technical intensity of the employees' knowledge hinders the deployment of product innovations. This is also highlighted in the unwillingness of employees developing for anything but the forefront of the industry knowledge (MM2: „You have all these things, but nobody at the forefront of structural engineering wants

to serve that market. Because it's not the forefront of knowledge in the structural world.”). Hence, evidence indicates that the intensity of the employees’ knowledge in the context of developing a product innovation, hinders the successful deployment of the respective.

Scaling knowledge

The emerging theme of *scaling knowledge* as a challenge refers to the data highlighting a hindrance to the deployment of product innovation being the difficulty of the requirement in scaling knowledge.

An aspect that data suggests is the inability to scale knowledge (TM2: „*We're not very good actually scaling our knowledge.*”), and the resulting difficulty in scaling and deploying product innovations. Interviewees suggest that this is due to the complexity of the internal knowledge (MM2: „*It's very hard to scale the forefront of knowledge.*”), as well as the point in the innovation process when scalability is of concern (Em1: „*[...] take this product and to and to scale this up it is too late.*”). A further finding regarding the difficulty of scalability is that individual departments are not able to scale product innovations, therefore hindering the successful outcomes of their product innovations (MM4: „*But if we should have it in the [X] department, where it originated, I'm not sure if they could manage to fully scale that up.*”).

Supporting the scalability, a missing systematic approach to managing knowledge is seen as a direct hindrance for the deployment of product innovations (TM2: „*[...] we're not systematic about our knowledge.*”), as challenges arise with knowledge on deployment not being spread throughout the organization (MM3: „*That's obviously a challenge when it sits in people's head.*”). The interviewees further stress that a barrier results from the inability to effectively use knowledge (TM2: „*So, we're not very good at like packaging, structuring, reusing knowledge.*”), as it remains within with individuals and therefore promotes the risk of centralizing it (Em4: „*[...] who had this idea if he's having a cold or being sick for a month, who's running it then [...]*”). This ultimately leads to the risk of losing the knowledge and the unsuccessful deployment of product innovations.

Knowledge diffusion

The emerging theme of *knowledge diffusion* as a challenge refers to the data featuring aspects that are associated with communicating and spreading knowledge.

From a managerial viewpoint a lack is highlighted in the internal diffusion, resulting in a challenge for the later sales process, thus impeding the deployment process (*MM2: „So, therefore, we'll go around the company and share this information with as many people as we can and then they will, in turn, sell it to our to their customers. That has not worked so well. Historically.”*).

Another aspect, as stressed by employees, is the difficulty in selling the product innovations internally (*Em3: „[...] make people understand what we could use it for and, like sell it within projects that we already have.”*). Thus, more employees are seen as needed to be included in the deployment process (*Em4: „I need to involve more people. So, we get a wider spread.”*), as the deployment of innovations faces a barrier of not having an organic spread of a product innovation as it finds no direct usage (*Em2: „I think that when we have 10 or 20 coworkers being able to use this product, using it in all the projects, then it will spread organically within the company.”*).

Knowledge appropriability

The emerging theme of *knowledge appropriability* as a challenge refers to the finding indicating the role of protecting the knowledge and the corresponding challenges.

The findings show that missing experience in the appropriability of knowledge is seen as a challenge towards the deployment of product innovations. Data highlights that the risk of the knowledge being exploited from external entities hampers internal product innovation development (*Em4: „We need to be first, or it's very easy for someone else to take the same idea to develop their own software service.”*). Additionally, management sees the immaturity concerning IP strategies and appropriability (*MM4: „But when it comes to sort of have IP strategies to what to protect, not to protect, etc. we are not mature, we have not much knowledge about that actually [...]”*) as a further challenge, as more efforts have to be put in place during the production process to ensure the protection of the knowledge and correspondingly retaining the employees and their knowledge (*MM2: „[...] but then the thing is the team, like with this failed spin-out company, the team quit, and we didn't have [...] contracts in place.”*).

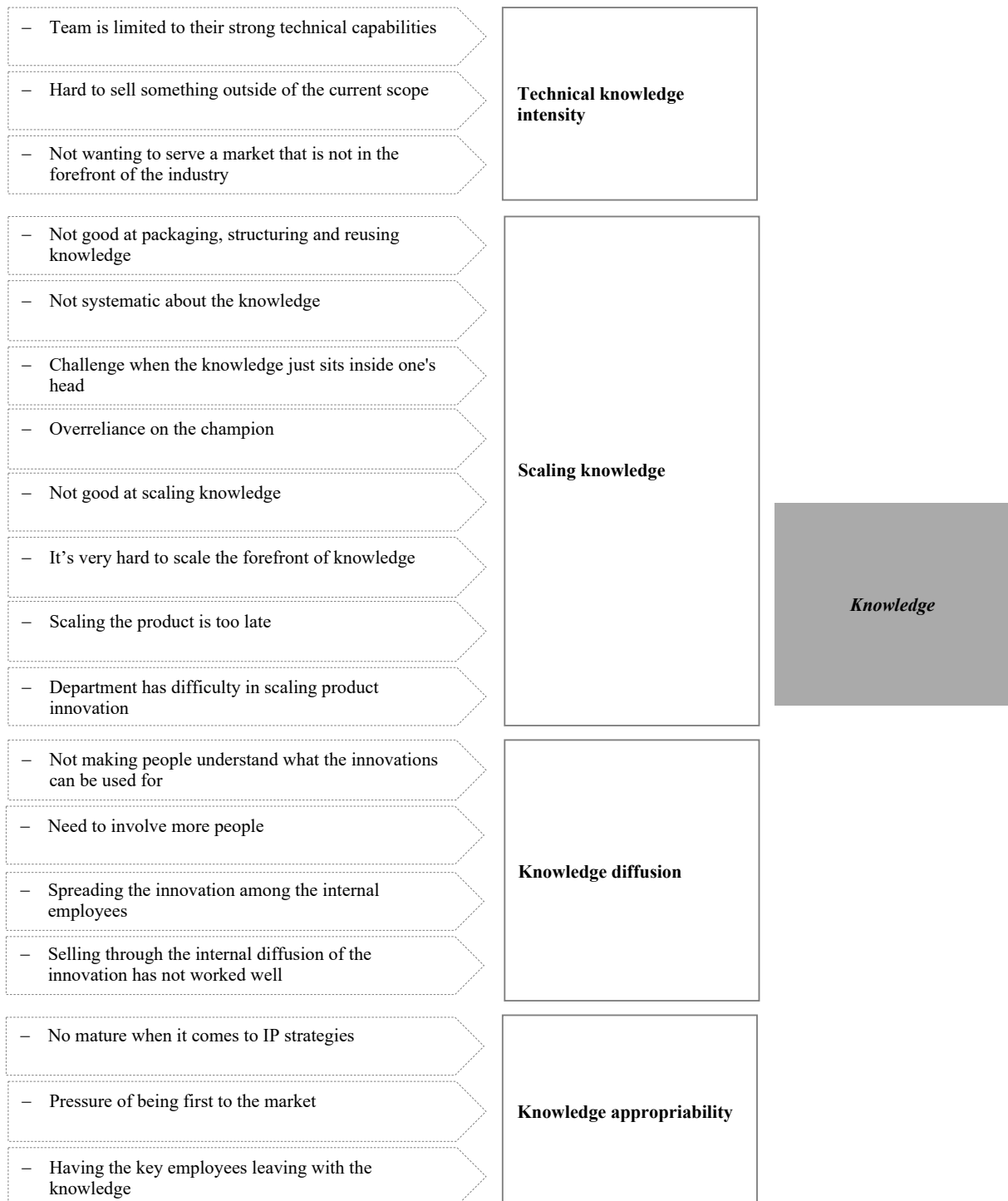


Figure 8: Data structure of the Aggregate Dimension of Knowledge

4.5 Customer as a Deployment Barrier

The aggregate dimension of *customer* as a deployment barrier illuminates the findings regarding the customers' role as a barrier for the deployment of product innovations.

<i>Int.</i>	<i>Representative Quotes</i>	<i>2nd-Order Themes</i>
MM1	„I think maybe our positioning as engineering consultants, somehow [makes it] difficult for us to market our innovations.“	Organizational image

MM4	„So, there are challenges on how they look on us.”	
Em2	"[the customers] are afraid of that they will be connected to [us] if they go for the solution.”	
Em2	„Clients are screaming at us if we are late so and we are yeah all our consultants are also very keen on keeping the client happy.”	Customer expectation
Em2	„We have to be there as well to deliver on the trust that the early adopters have, have shown us.”	
MM2	„Why would we give you the reward? Hmm. We expect you to do the best for us and you. Otherwise, you're not being the best consultants and we'll go to your competitors.”	

Table 7: Tabular overview on the barrier of Customer

Organizational image

The emerging theme of *organizational image* as a challenge refers to the finding signifying the role of the client’s image of the organization.

The findings highlight that the image of the organization negatively impacts the perception of the customer and, thus, hampers the deployment of product innovations. Management sees this difficulty arising in the marketing of the new product innovations based on the prevalent customer image (MM1: „I think maybe our positioning as engineering consultants, somehow [makes it] difficult for us to market our innovations.”), as well as how the customers will perceive them after deploying product innovations (MM4: „So, there are challenges on how they look on us.”). A further insight that employees discuss, is the perception of the fear of a long-term connection from the customers’ side, hence not promoting the deployment of product innovations (Em2: „ [the customers] are afraid of that they will be connected to [us] if they go for the solution.”).

Customer expectations

The theme of *customer expectations* as a challenge refers to the data suggesting the expectation of the customer as being a hindrance for the deployment of product innovations.

An aspect revealed by the data is the pressure from the customers and the resulting stress to deliver on the expectation of the clients (Em2: „We have to be there as well to deliver on the trust that the early adopters have, have shown us.”). This pressure is felt throughout the organization, impacting the focus and consequently the success of deploying product innovations (Em2: „Clients are screaming at us if we are late so and we are yeah all our consultants are also very keen on keeping the client happy.”), as past expectations shift from service to product provision (MM2: „Why would we give you the reward? Hmm. We expect you to do the best for us and you. Otherwise, you're not being the best consultants and we'll go to your competitors.”).

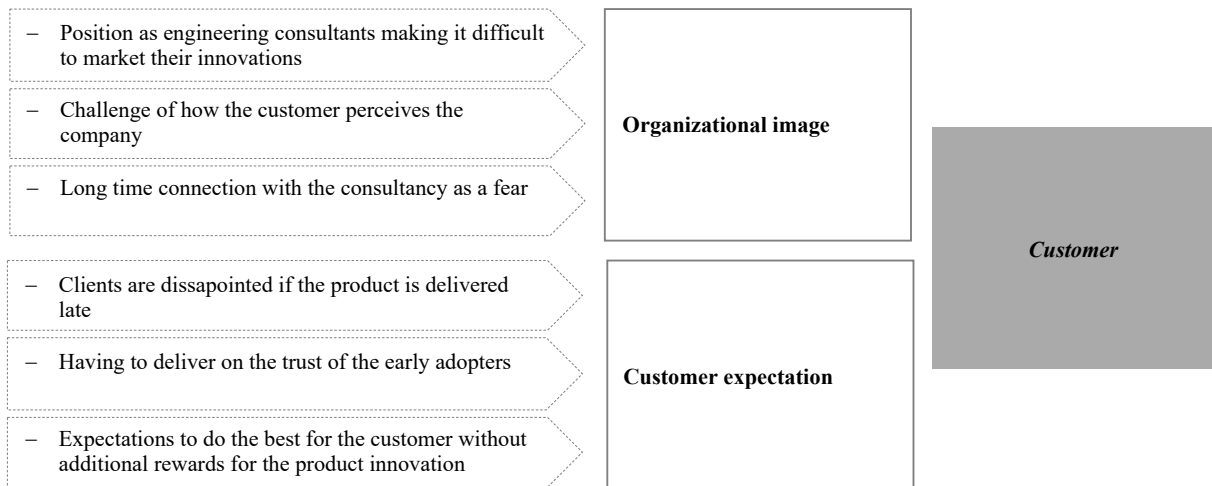


Figure 9: Data structure of the Aggregate Dimension of Customer

5 Analysis and Discussion

In the following chapter, the findings of the present research will be discussed in the context of academic literature to derive the dynamic interrelationship between the emerging phenomena. The result of the chapter will be the introduction of the grounded theory model, based on the discussion above. Thereby, the foundation will be set on which the research question will be answered.

Firstly, an initial analysis is used to indicate an emerging connection between the five dimensions of the findings, reflected in the previously derived aggregate dimensions. Secondly, these connections are discussed thoroughly and put into a contextual relationship.

5.1 Concluding Analysis of Findings

During the empirical investigation, five barriers were identified that challenge the deployment of product innovations within KIBS firms. Initial analysis on how the barriers challenge the deployment of product innovations indicates a relationship between all evident barriers and the two KIBS related attributes of (1) *Knowledge-Intensity* as well as (2) *Customer Collaboration*.

(1) Knowledge-intensity is found to play a large factor in the perceived challenges of deploying product innovations. The findings regarding knowledge as a barrier show that for KIBS firms, the complex knowledge, anchored in its participants and more specifically the expert technical knowledge, results in a lack of understanding what is needed for a successful deployment of product innovations. Moreover, the detrimental effects were evident from the difficulties in scaling this complex knowledge as well as spreading the knowledge internally. Furthermore,

the appropriability of this knowledge has also been attributed to the unsuccessful deployment of product innovations in KIBS firms.

Moreover, it was found that the intensity of the internal knowledge also influences the mindset of the firm's employees. This can be seen in the empirical evidence suggesting that the assumptions that employees make about the traditional way business is made and the knowledge-intensity connected to this, is limiting their ability to deploy a product that is not bound to a traditional customized solution.

MM2 - "But I've I feel that one of the strongest things is that we are a company of technical people and the educational systems and [...] everything that these technical consultants come from is all about solution orientation. So, when the customer comes at you with a problem, you think right away, how do I solve that as a consultant for our customer?"

In this regard, it was also suggested in the data that the reliance on the intense knowledge hinders the change in the overall mindset, as the reliance on the technical knowledge hampers the business-related aspects of deploying product innovations.

MM2 - „And the reason I'm telling you this story is just as kind of to point out if their mindsets don't fall into the right place, I don't think that projects [are] going to succeed from a business standpoint."

Additionally, knowledge-intensity also was identified as being a key attribute in the challenges that were experienced concerning the productization process, subsequently having an impact on the deployment of product innovations. The data shows that the overall understanding of the deployment alongside the missing knowledge of the required activities and specifications hindered the successful outcome.

TM2 - "They are not able to scan a product to do strategic marketing, to do strategic pricing to get the right communication out to get the right service and support organization to get it in the right database set up, etc."

Moreover, the intensity of the existing, technical knowledge and the importance of it for the interviewees, was seen as the reason for a misconception of the required managerial processes required for a successful outcome.

TM1 - "[...] what do we mean with a product? Is it like a platform? Is it like internal tools and on the business models that are so different, depending on what you would like to achieve [...]?"

Regarding the challenges arising from resource management, the empirical data suggests that personnel resources are missing, as a result of a heavy reliance on the establishment of the

firm's expert knowledge. Thus, to facilitate their expertise, personnel resources reflected this in being predominantly in line with expert engineers and complex technical knowledge. Accordingly, it is indicated that the challenge arising from missing personnel skills hindering the deployment of product innovation, is due to the focus on establishing knowledge superiority. *TM1 - „I'm convinced that the experts that we have are so needed, but you can't [leave] the whole process to them.”*

Finally, the shift in the use of knowledge-intensity, meaning the creation of knowledge-intensive products as opposed to services, has been found to further influence the firm's external image, resulting in the customers being more averse to the new product innovations offered. Accordingly, evidence indicates that the understanding of the product itself meets resistance from the customers and the industry as a whole.

MM2 - „Why would we give you the reward? Hmm. We expect you to do the best for us and you. Otherwise, you're not being the best consultants and we'll go to your competitors.”

(2) Customer Collaboration in the context of the customer barrier that was identified, has been shown as being a challenge for the deployment of product innovations. This is suggested as the image that the customers have of the firm as well as their expectations regarding innovations stemming from KIBS firms, hinder the progress in deploying product innovations as well as stemming from their history in collaborating with customers.

Moreover, evidence suggests that customer collaboration is also perceived as influencing the mindset of the employees, as the traditional way of business is required to change, resulting in a change of the customers relationship and their expectations for the deployment of product innovations.

TM1 - „I think that really, at the end, it boils down to this slow cultural transgression from one company to another that is necessary, especially when you have a more radical shift in how your business really works, is very interesting.”

Additionally, data suggests that the employees' perceived boundaries within the industry, implied by the focus on the customer collaboration, hinder the expansion of the firm's capacity to deploy product innovations, which are unfamiliar to the industry.

TM2 - „Employees and managers perhaps, in particular, they see the boundaries of the industry and sort of then stop or think this isn't for us.”

Regarding the productization process, the findings indicate that the customer collaboration influences the deployment of product innovations in that the marketing and pricing of the final product are met with a conflictual perception of the customer, as the offerings differ from the traditional and expected ones.

Em4: "[...] we need to investigate how much it costs, what kind of license - what do we charge the customer, or what do we sell it for [...]"

Moreover, the conceptualization of the product is adversely influenced by the previous customer collaboration as the new products differ from the traditional offering.

Em2 - "[...] the market is not used to product [...]"

Another influential relationship is suggested between customer collaboration and resource management, in that the prioritization of the customer-related projects outweighs the focus on product innovations. Thus, the deployment of product innovations is hindered, as customer projects are prioritized, thereby taking away the time from the employees to work on product innovations and their deployment.

MM3 - "So a lot of the same a lot of the skilled engineers are often so busy stuck in selling projects that they there's no room to sort of think new"

Furthermore, the findings indicate that the lack of financial resources, challenging the deployment of product innovation, is connected to the previous reliance on gaining financial input from customer collaboration.

TM2: "[...] financing, typically, we'd like to try to get some financing out of [partners]."

Lastly, the data shows that customer collaboration is hindering the scaling of knowledge as the relationship has enforced the perception of scaling only to one customer in the context of a customized project solution.

TM2 - "And so then we don't scale properly, obviously, because then we only scale to the customers we have in that little unit."

Additionally, the findings indicate that the previous reliance on customer collaboration for business-related knowledge has resulted in the focus on their expert technical knowledge. This challenges the deployment of product innovations, as the internal development suffers from poorer quality due to the lack of understanding what is necessary to deploy a product innovation.

Em3: "Is it I think it's, they get stuck in the tech order, like their mind in the tech part [...] and they think a lot about the needs for the customers, but they don't know how to."

Concluding, the analysis of the empirical findings indicates the strong influence of both KIBS-related attributes, *Knowledge-Intensity*, and *Customer Collaboration*, on the challenges affecting the deployment of product innovations. Showing a substantial impact, this finding builds the foundation for the following discussion.

5.2 Discussion of Findings

Following the previous analysis of the findings, resulting in an indication that the two KIBS-related attributes of *Knowledge-Intensity* and *Customer Collaboration* influence all emergent barriers that have been identified as challenges for the deployment of product innovations in KIBS firms, this relationship is further discussed. Thus, this discussion aims to elaborate on the dynamic relationship between these barriers and the interrelation between both KIBS attributes and the respective barriers. Thereby, this discussion provides the foundation for the understanding of the dynamic relationship of this study's investigated phenomena within the context of previous research.

5.2.1 The Challenging Role of Knowledge-Intensity

Based on the findings of the study, knowledge-intensity is suggested as being a critical factor in challenging the deployment of product innovations in KIBS firms. This indicates a notable conflict in the overall logic of how KIBS firms position themselves, using their complex expert knowledge as their main value offering (Miles, 2008; Miles et al., 1995). This logic appears to be a challenge for the deployment efforts of product innovations in KIBS firms, implying a conflictual discrepancy between knowledge-intensity as a key attribute of KIBS firms and the ability to deploy product innovations.

Firstly, the findings indicate a reinforcing relationship between knowledge-intensity and the identified barrier of knowledge, challenging the deployment of product innovations. This is suggested as the complexity of the technical knowledge has been attributed with the difficulty in scaling the knowledge to deploy product innovations (*MM 2: „It's very hard to scale the forefront of knowledge.“*). This is in line with Valtakoski and Järvi (2016) as well as Ritala et al. (2013), arguing that the tacit nature of complex knowledge is difficult to scale and package into a product. Thus, the ability to transform tacit into explicit knowledge, building the foundation for systematizing service offerings, evidently is challenging for KIBS, as their traditional offering is comprised of customized knowledge-intensive services (Aarikka-Stenroos &

Jaakkola, 2012; Doloreux & Frigon, 2019; Nonaka, 1994; Nonaka & von Krogh, 2009). This difficulty in transmitting complex information inhibits the effective codification and recombination of knowledge, resulting in a challenge to scale a product innovation, thus their deployment (Biege et al., 2013; Valminen & Toivonen, 2012). Hence, the empirical and theoretical data are in line with the difficulty in scaling complex knowledge.

Moreover, evidence suggests that the complexity of technical knowledge hampers the ability to internally communicate, thus hindering the diffusion of packaged knowledge, which is required for successfully deploying product innovations (*Em3: "But still, if there's a lot of new things coming up, it's hard for people to maybe describe what it is"*). This is in line with the finding of Ritala et al. (2013) that the inability to accurately describe the innovation, negatively influences the successful deployment of product innovations. Thereby, the empirical finding that the KIBS firm relies on internally selling and then distributing their knowledge is suggested as challenging the deployment of product innovations as their distribution channel is impeded (Datta, Mukherjee & Jessup, 2015). This outcome could be explained by the finding of Valtakovski and Järvi (2016), attributing the implied difficulty to the unwillingness of employees to share their knowledge as they perceive it as their bargaining power, thereby fearing to hamper their status as knowledge experts. This study's findings, however, suggests that this lack in communication is not based on the unwillingness to share information, but on the inability to communicate the complexity and purpose of the product innovation internally and consequently to the customer (*MM2: "So, therefore, we'll go around the company and share this information with as many people as we can, and then they will, in turn, sell it to our to their customers. That has not worked so well. Historically. "*). Accordingly, the ability to share and communicate the complex knowledge has been indicated as being a challenge for the deployment of innovations in the findings, agreeing with the insights by Valtakoski and Järvi (2016), yet attribute the cause of this to the complex nature of the product. Conclusively, the barrier of knowledge has been shown to challenge the deployment of product innovations in KIBS firms based on the impact of their knowledge-intensity, incurring both the challenge to scale and to communicate the product.

Furthermore, the study's evidence suggests a correlation between the knowledge-intensity and the mindset of the employees, challenging the deployment of product innovations. This finding is indicated by the employees' reliance on the traditional business. Thus, innovations are carried out as a result of the focus on the complexity of internal knowledge. This is in line with the findings by Sanots-Vijande et al. (2013) that KIBS firms are characterized by their co-creative

mindset and culture, in being a supplier of highly complex knowledge during the co-creation of services. Thus, the finding indicating a proclivity for KIBS firms to focus on the knowledge-intensive mindset can be explained as a result of the role as a provider of expert knowledge (Corrocher, Cusmano & Morrison, 2009; Santos-Vijande, González-Mieres & López-Sánchez, 2013). This explanation also elaborates the empirical finding, suggesting the focus on complex knowledge hindering the mindset from shifting to facilitate missing, more business-related knowledge, imperative for the successful deployment of product innovations (*MM2: “And as we educate [the experts], their mindsets are starting to change. And the reason I’m telling you this story is just [...] to point out if their mindsets don’t fall into the right place, I don’t think that projects [are] going to succeed from a business standpoint.”*). Overall, the data suggest reinforcement of the knowledge-intensity on the indicated barrier of mindset, further challenging the deployment of product innovations in KIBS firms. This is evident as their reliance on the traditional business is suggested as impeding their perception of deployment-specific business tasks as well as facilitating their reluctance to adapt to product deployment.

Additionally, the empirical data implies a relationship between the challenge for the deployment of product innovations stemming from the productization process and the focus on knowledge-intensity. This relationship is suggested by the indication made that the understanding of what the process requires to develop a deployable product, in line with its managerial aspects, is missing (*MM4: „But then, of course, we have the business side, because we really lack expertise in all of the managers.”*). This challenge is in line with the importance given to the definition of the product specifications within the productization process (Järvi, 2016; Valminen & Toivonen, 2012). Thus, the findings of the present study agree with the difficulty for KIBS firms to define the productization process. Thereby, a connection of this challenge to the final deployment of the product innovations is indicated. A possible explanation for this challenge could be the firm’s previous reliance on the customer’s provision of the development-related knowledge, stemming from their collaboration, which is now missing due to the internal development of the product, moving away from customization (Aarikka-Stenroos & Jaakkola, 2012; Santos-Vijande, González-Mieres & López-Sánchez, 2013). However, Järvi (2016), highlights the critical aspect of including the customer into the productization process, thus standing in contrast to the explanation that the customer is not included in the productization process, highlighting the missing understanding for the product conceptualization (Aarikka-Stenroos & Jaakkola, 2012; Santos-Vijande, González-Mieres & López-Sánchez, 2013). Conversely, Valminen, and Toivonen (2012) emphasize the development of the product being

predominantly conducted internally. Concluding, in combination with the study's finding that the customer is not included in the productization process (TM1: „*We need to shift the focus to actually work with the customer to help them to define their needs!*”), the explanation that the change in the role of the customer and the reliance on the previous relationship and knowledge input causes the challenge, holds. Hence, knowledge-intensity is suggested as reinforcing the identified barrier regarding the productization process, thereby challenging the deployment of product innovations, due to a resulting lack of understanding. This results in both a poor conceptualization as well as difficulties in later stages, thereby challenging product specifications such as pricing and marketing, directly challenging the deployment of product innovations (Datta, Mukherjee & Jessup, 2015).

Moreover, this research's findings indicate that the challenge of resource management for the deployment of product innovations correlates with the intensity of knowledge. As such, the focus on expert knowledge and the importance of knowledge as the key asset for KIBS firms could correlate with the data showing that there is a lack of personnel resources and skills. The specificity of technical knowledge has been found to challenge deployment-specific activities such as marketing and pricing, thus underlining this finding (Cainelli, De Marchi & Grandinetti, 2020; Valminen & Toivonen, 2012). Moreover, as the key asset of KIBS firms is the provision of expert knowledge, the internal employee setup has been found to reflect this in the predominant presence of technical experts (Leiponen, 2005). Thus, the evidence that the internal resources in the form of personnel are challenging the deployment of product innovations could be explained by the predisposition of the KIBS firms to employ experts with the technical, yet not the deployment-specific knowledge. Hence, knowledge-intensity is indicated as reinforcing the challenge of resource management, specifically personnel resources, which in turn, challenge the deployment of product innovations. This is evident in the findings arguing that the knowledge-intensity of the employees results in poor outcomes regarding the development of the innovation, resulting in poor product specifications and, ultimately, a poor deployment outcome.

Lastly, the empirical evidence suggests that the intensity of knowledge impacts the customer relationship, as the novel packaging of expert knowledge into a product meets resistance from customers, not understanding the value of the product innovations. Thus, the deployment of product innovations is challenged within KIBS firms (MM5: „*But I think the challenge here is for them to get the industry to understand that the deliverables are the actual value.*”). This

challenge, arising from the missing understanding of the customers concerning the value of the product, can be explained by the inherent difficulty for the KIBS firm to communicate the product value during its development (Valminen & Toivonen, 2012). Moreover, a strong correlation between the difficulty in transmitting the value of a product and its technical knowledge-intensity can be seen in the study by Cainelli, De Marchi, and Grandinetti (2020), emphasizing that the complexity hampers the ability to communicate the value of knowledge and consequently the innovation. Accordingly, the evidence suggests that knowledge-intensity reinforces the indicated barrier of the customer by fostering the difficulty for the customer to understand the product. Correspondingly, the customer as a barrier is suggested as challenging the deployment of product innovations, reinforced by the knowledge-intensity, as the distribution of the product is reliant, yet impeded by the complexity of the product (Datta, Mukherjee & Jessup, 2015).

5.2.2 The Challenging Role of Customer Collaboration

Based on the empirical data of this study, customer collaboration is evident as being a critical factor, challenging the deployment of product innovations. The data indicates that the customer is seen as a direct barrier to the deployment due to the expectations that are placed on the KIBS firm. This finding indicates a conflict in that the customer is found to be a collaboration partner, thus fostering innovations, and this study's finding indicating that the customer directly challenges the deployment as an emergent barrier.

Initially, evidence suggests that customer collaboration reinforces the challenging effect of the customer on the deployment of product innovations, in that the customers' image of the KIBS firm stands in contrast to the provision of products, as customers have traditionally received knowledge-intensive services during collaboration (*MM4: „So, there are challenges on how they look on us.“*). Heikka and Nätti (2018) emphasize that the value proposition changes based on the relationship between the customer and the KIBS firm, thus explaining a possible conflict in the expectations of the customer as their position remains the same. Hence, as the relationship between the customer and the KIBS firm changes as a result of changing towards deploying a product innovation, the expectations of the customers not changing accordingly, could explain the emerging conflict and the challenge for the final deployment. Moreover, KIBS firms conventionally enable their customers during their collaboration to incorporate the KIBS firm's knowledge into a customer's innovation (Doloreux & Shearmur, 2010). Thus, their previous deployment activities predominantly included the customer's leveraging of the experts'

knowledge (Cabigiosu & Campagnolo, 2019). Hence, activities within productization that focus on internally leveraging the knowledge to produce a KIBS product innovation, meet misunderstanding regarding the provision of the KIBS firm's products and their value. This is suggested as challenging the relationship between the firm and the customer (*Em3: "They don't like you coming there and selling stuff like yeah, we have to build a relationship."*). Conclusively, this study's findings indicate that the previous reliance on customer collaboration impacts the indicated barrier of customer, as the suggested challenge regarding the image of the firm as well as the understanding concerning the product, is hampered. This, therefore, challenges the deployment of product innovations.

Furthermore, this study's evidence shows, that the barrier of mindset, challenging the deployment of product innovations in KIBS, correlates with the customers' expectations, thus reinforcing the challenging effect of the mindset towards the deployment. The findings indicate that the past orientation towards the customer has influenced the perception of the firm's approach to deploying a product innovation (*MM1: „We are trying to, to sell our innovation all the time according to the business model of [...] a consultant [...]”*). According to Santos-Vijande et al. (2013), KIBS firms have an organizational mindset that is influenced by the collaboration with the customer in co-creating service innovations. Thus, this mindset could explain the findings regarding the reliance on the traditional mindset and corresponding challenge in deploying product innovation, as a result of the missing customer's knowledge input. This lack of information and thus conflict between the prevalent logics concerning the offering of product and service innovations is further supported in the findings (*MM4: "So once again, it's the conflict in between different logics or businesses."*). Moreover, the findings also indicate that the suggestion of the employees' perception of boundaries, being attributed as a challenge to the deployment of product innovations, is further reinforced by their collaborative mindset (Santos-Vijande, González-Mieres & López-Sánchez, 2013). This suggestion is also in line with the argumentation made by Aarikka-Stenroos and Jaakkola (2012), that KIBS firms have previously relied on the customer as the determinant for industry-specific barriers. Concluding, the tradition of collaborating is inclined as being a reinforcing factor for the barrier of the mindset, challenging the deployment of product innovations as evident in both, their reliance on the traditional business and their perception of boundaries, affecting their innovation outcomes.

Additionally, regarding the productization process, the previous customer collaboration is perceived as not being focused on, thus hindering the ability to align the product with customer

expectations, as the value offering is new to the KIBS firm (*TMI - „We need to shift the focus to actually work with the customer to help them to define their needs!”*). KIBS firms traditionally create innovations in close collaboration with the customer and through directly integrating their knowledge into customer-related problems (den Hertog, 2000; Miles, 2008). This traditional way of innovating thus stands in contrast to the new way of internally and systematically constructing innovations through the recombination of modular knowledge components (Djellal et al., 2003; Jaakkola, 2011). Thus, the absence of the customer during the productization process could explain the difficulty of developing and evaluating products, due to the previous reliance on the customers' skills (Aarikka-Stenroos & Jaakkola, 2012) (*Em4: “[...] we need to investigate how much it costs, what kind of license - what do we charge the customer or what do we sell it for [...]”*). Hence, this finding is in line with the positive correlation between the customer involvement and the productization process (Valminen & Toivonen, 2012). Conclusively, this study's findings suggest that a previous reliance on customer collaboration reinforces the indicated barrier of productization process, due to the missing inclusion of the customer and the resulting difficulty in defining deployment-critical elements such as how to market and how to price the product (Datta, Mukherjee & Jessup, 2015).

Moreover, evidence highlights a correlation between the role of the customer and the indicated barrier of resource management, both personnel and financial resources, as challenging the deployment of product innovations. Data indicates that the prioritization of customer projects is directly hindering the deployment, as resources are used preferably for customer projects in contrast to focusing on product innovations (*Em1: „ [...] we're seeing now that to [...] get this full effect with this product we need the time and [...] we need to focus [...]”*). Research on the co-creative mindset (Santos-Vijande, González-Mieres & López-Sánchez, 2013) and the focus on collaboration with customers as the core of innovating within KIBS (Aarikka-Stenroos & Jaakkola, 2012), indicate that the difficulty in prioritizing product innovations could be a result of the employees' prevalent perception about the customer. This could be an explanation regarding the present study's findings, indicating that the effective use of personnel resources and their focus on product innovations is impeded by the pressure of customers to deliver on the customer-specific projects (*Em2: „Clients are screaming at us if we are late so and we are yeah all our consultants are also very keen on keeping the client happy.”*). Furthermore, Aarikka-Stenroos and Lehtimäki (2014) highlight that financial resources are critical for the success of innovation, thereby indicating that this study's findings are in line with the authors'. An explanation for the missing resources could be the previous reliance on financial resources

from the KIBS firm's customers, as researched by Aarikka-Stenroos and Jaakkola (2012). A further explanation could be that KIBS firms have been found to not invest as heavily into necessary R&D components, as companies focusing on the creation of product innovations (Cainelli, De Marchi & Grandinetti, 2020). These components include both financial as well as personnel resources as the value offering, and hence, the resource allocation has been aimed at the collaborative service provision for customers (Aarikka-Stenroos & Jaakkola, 2012; Cainelli, De Marchi & Grandinetti, 2020; Miles, 2008). Consequently, the present study's findings are in line with both explanations, indicating that the tradition of not investing substantially into internal R&D as well as the firm's reliance on customer collaboration, could be caused. Concluding, this study indicates that the barrier of resource management challenging the deployment of product innovations, is reinforced by their previous reliance on customer collaboration, resulting in the lack of critical financing as well as difficulties in prioritizing the work on product innovations.

Lastly, the empirical findings suggest that the role of customer collaboration in the context of deploying product innovations within KIBS firms is a facilitator of the challenge that knowledge creates in deploying product innovations. This is evident in the perception of only being able to develop for one customer, thus challenging the later efficient deployment and scaling of knowledge (*MM4: "Scalability is a key issue for us in order to survive!"*) In line with Santos-Vijande et al. (2013), this finding correlates and could be explained with the view of the co-creative mindset of the company, thus focusing on their role as a knowledge provider for one customer, hampering the ability to move from customized to scalable product solutions (Campagnolo & Cabigiosu, 2015; Miles, Belousova & Chichkanov, 2019). The ability to scale complex knowledge, however, is seen as the critical goal of productizing innovations, thereby standing in contrast to the explanation of missing the ability to scale based on prior collaborations (Valminen & Toivonen, 2012; Valtakoski & Järvi, 2016). However, Valtakovski and Järvi (2016) further elaborate that the more complex the knowledge is, the harder it is to codify, which is a critical aspect of the productization process. Thus, even though a productization process is followed, the argument that the reliance on previous customer collaboration facilitates the difficulty of scaling knowledge holds. Consequently, the reliance on customers is suggested as adding to both the complexity and the corresponding difficulty to scale intensive knowledge.

Empirical evidence additionally finds a correlation between the role of the customer and the barrier of knowledge by attributing the competitive advantage to the accumulation of complex

technical knowledge (MM2: “[...] the level of how complex your innovations are, has been a historic KPI to our innovation portfolio.”). This indicates a further reinforcement for the challenge of focusing on technical knowledge. Lafuente et al. (2019), confirms this explanation arguing that the competitive advantage has traditionally been associated with the intensity of knowledge and the provision of this knowledge to the customer. Conclusively, the evidence suggests a correlation between the customer relationship and the internal knowledge structures, specifically indicating a reinforcement of the knowledge barrier challenging the deployment of product innovations. In sum, it is indicated that the tradition of collaborating with customers reinforces the barrier of knowledge, challenging the deployment of product innovations, as it facilitates the reliance on highly complex knowledge, thus hampering the scalability and consequently the deployment.

5.3 Grounded Theory Model

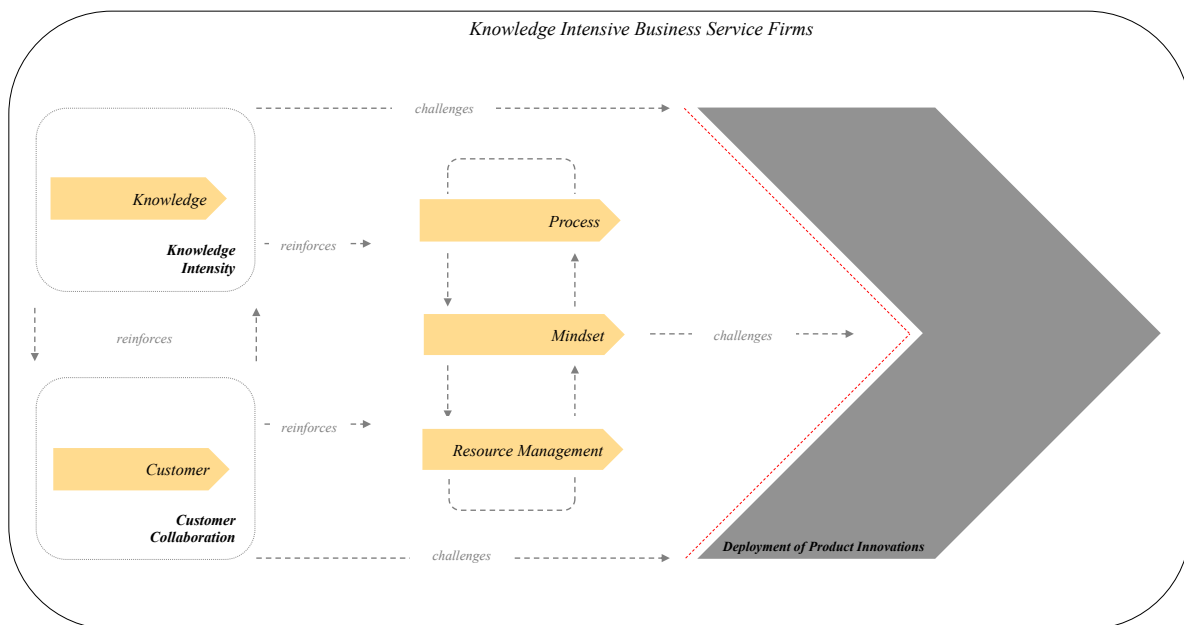


Figure 10: Challenging barriers to the deployment of product innovations in KIBS Firms

The grounded theory model, as can be seen in *Figure 10*, represents this study’s findings in their dynamic relationship. It visualizes the discussed findings of how the deployment of product innovations is challenged in KIBS firms.

The overall structure of the grounded theory model represents four core elements. Firstly, it displays the discussed prevalent attributes of knowledge-intensity and customer collaboration. These are indicated with their previously discussed reinforcing characteristic towards all respective barriers. Secondly, it depicts the reinforcing effect on the deployment of product

innovation within KIBS, reflected in the five derived barriers. In this, the indicated barriers knowledge and customer, are directly associated with the two KIBS attributes knowledge-intensity and customer collaboration, as they resemble an inherent connection. Thirdly, the model visualizes the interrelationship between the remaining three barriers of mindset, process, and resource management. Lastly, the model depicts the deployment phase as a critical element for this research.

In their relation, the abovementioned reinforcing characteristic of the key attributes on all identified barriers is indicated by the arrows between both respective key attributes and the barriers. Additionally, as all derived barriers have emerged as challenging the deployment of product innovations, arrows originating from the barriers towards the deployment stage, indicate this relationship.

6 Conclusion

The final chapter will introduce the implications of this study's findings concerning their managerial and theoretical meaning. This will be followed by limitations that have been found during the research's conduct as well as possible avenues of future research that have been opened up by this study.

6.1 Theoretical Implications

This study aimed to investigate and elaborate on the barriers that challenge the deployment of product innovations in KIBS firms. Moreover, the aim was to build a broader understanding of deployment-specific challenges, their relation to product innovations, and the overarching context of KIBS firms. This was done to answer the research question:

How is the deployment of product innovations challenged in KIBS firms?

This study found that the deployment of product innovations in KIBS firms is challenged through five emergent barriers. These barriers, being indicated as being critical challenges, namely *Mindset*, *Process*, *Resource Management*, *Knowledge*, and *Customer*, have been further shown to be interrelated in their parallel effect of hampering the deployment. More specifically, it was revealed that the two core KIBS-related attributes of *Knowledge-Intensity* and *Customer Collaboration*, play an integral part in determining the success or failure of product innovations. This was indicated by their reinforcing nature towards the aforementioned barriers, as well as

their inherent connection to the barriers of knowledge and customer, respectively. Thus, this study suggests that these two distinguished key characteristics of KIBS play a critical role as a facilitator of challenges for the deployment of product innovations. This is in line with previous research regarding the difficulty of productizing highly complex knowledge; however, provides additional insights regarding the effect on the final deployment as well as the interconnection to the detrimental effects of previous customer collaboration.

In sum, the research implies that the deployment of product innovations is challenged by the inherent characteristics of KIBS firms, *Knowledge-Intensity*, and *Customer Collaboration*, alongside five barriers. Thus, this could suggest that KIBS firms with a heavy reliance on these two attributes that are a key asset in the pursuit of competitive advantage (Lafuente et al., 2019), may not be optimally positioned to deploy product innovations.

Accordingly, this study's contribution includes a more thorough understanding of challenges that affect the deployment of product innovations within KIBS firms. Thus, this research furthers existing literature specifically regarding the productization process by providing insights into how the challenges affect the deployment process. Moreover, this study contributes to KIBS-specific literature by adding findings broadening the perspectives of KIBS-specific attributes in the context of product innovations. Thereby, it adds insights into the role of the customer during the innovation process, as called for by Cainelli, De Marchi, and Grandinetti (2020). Additionally, in line with the call for investigating further factors affecting the productization and innovation process in KIBS firms by Valtakovski and Järvi (2016), this study contributes with an in-depth case study on critical challenges on the deployment of the respective innovations, thereby opening up multiple avenues for future research.

6.2 Managerial Implications

Highlighting how the deployment of product innovations within KIBS firms is challenged, two main recommendations for managerial practice are implicated.

Firstly, with the identification of five barriers to the deployment of product innovations within KIBS firms, an attentiveness is raised, recommending the critical attention towards these. Moreover, their consideration should be given thought throughout the entire product innovation process as challenges have been found to affect different stages.

Secondly, with the derived implication of the contradictory relationship between a KIBS firm's key attributes, Knowledge-Intensity, and Customer Collaboration, regarding deploying product

innovations, an awareness of this encounter is proposed. Hence, this study implies the critical attention and consideration with the respective.

Notwithstanding, the abovementioned challenges, the ability to innovate and thus deploy product innovations, has been attributed as a critical success factor for the economic growth and competitive advantage of KIBS firms. Hence, in combination with this research investigating what might hinder the successful deployment of product innovations, important considerations are provided.

Concluding, concerning managerial practice, this study can thus be used as an initial line of thought considering challenges that could arise as possible effects on the deployment of a product innovation.

6.3 Limitations and Future Research

In hindsight, this study finds several limitations regarding its generalizability and replicability, drawing critical reflections concerning the applied research strategy and design as well as on contextual conflicts. Furthermore, possible avenues for future research have been identified.

In light of generalizing this study's outcome, limitations need to be considered. As reasoned, the generalizability of qualitative studies is challenged by the arguments of not being able to generalize from small sample sizes and the reliance on the subjective analysis of empirical data, connected to the respective (Bryman & Bell, 2011). Although the researchers aimed to not generalize to the population but theory, a limitation is that the findings of this study relate to one specific case, a T-KIBS, being connected to one specific environment, the construction industry. Hence, considering this study's findings, these aspects need to be reflected upon. In line with the general critique of qualitative research as being difficult to replicate, this study, therefore, also considers limitations in this regard. With the investigators being social actors in of themselves, participant responses are acknowledged as possibly being influenced by the individual researcher's characteristics (Bryman & Bell, 2011). Additionally, as the interviews were held digitally due to political, environmental, and organizational circumstances, expressions and body language could not be observed to the extent that personal interviews could. Alongside the subjectivity of interpretation regarding the data, the replicability is limited to the extent that is inherent to qualitative research (Bryman & Bell, 2011).

Taking the discussed limitations into account and reflecting upon this study's aim to research challenges to the deployment of product innovation in KIBS firms, the present investigation builds the ground for further studies on product deployment in KIBS firms. Not specifically considering the investigation of the single process steps in the context of productization, further research could elaborate on the specific steps and their effect on the deployment of product innovation to gain a deeper understanding of what might hinder successful product innovations. Furthermore, concerning the purpose of this study in the context of its application, another consideration could be to take the discussed key elements of knowledge-intensity and customer collaboration as the foundation on which to build in-depth studies regarding the suggested ambiguity. These could be both qualitative and quantitative, with the respective goals of gaining deeper insights into this study's finding, and the impact of these attributes on the success of product innovations. Moreover, cross-case analyses could be applied to test this study's findings on the example of other types of KIBS firms, as well as different industries, to enhance the finding's general application.

Lastly, building on this study's finding that an interrelationship between the barriers of mindset, process, and resource management exists, this indication could be enriched with further case study analysis investigating their relationship. This could raise further insights into specific aspects hindering the product innovation process, imperative for successful exploitation of product innovations in KIBS firms.

Concluding, while reflecting on this study's limitations and future research avenues, the researchers acknowledge the outcome of this investigation as building a starting point for further investigation.

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V. Appendix

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Appendix 1: Interview guide used for semi-structure interviews

Following, the detailed questions used for the data collection through the conduct of the semi-structured interviews within this study's empirical investigation, is displayed. Moreover, the aim of each section (*A, B, 1, 2, C*) has been defined and elaborated on in *Table 2*.

<i>Interview Guide for Semi-Structured Interviews</i>
(A) General Topics
<ul style="list-style-type: none"> - Brief personal introduction - Purpose of the interview - Question whether interview recording, transcription and coding is acceptable - Ability to share transcripts and final report - Information about anonymity such as company- and interviewee names - Possibility to refuse a question - Outline of topics to be covered
(B) Interviewee Information
<ul style="list-style-type: none"> - What is your current role at your company? <i>(Introductory question (Bryman & Bell, 2011, p.477))</i> - What is your relationship to the innovation projects at the company? <i>(Follow-up question (Bryman & Bell, 2011, p.477))</i>
(1) Topic: Product Innovations in KIBS firms?
<p><i>Initially, explain the concept of knowledge and what we mean by it in the concept of KIBS (Miles, 2005).</i></p> <ul style="list-style-type: none"> - How does a product innovation originate at your company (how, where)? <i>(Valminen & Toivonen, 2012; Valtakoski & Järvi, 2016)</i> <i>(Introductory question (Bryman & Bell, 2011, p.477))</i> - What stakeholders are part of the product innovation process? <i>(Cainelli, De Marchi & Grandinetti, 2020; Valminen & Toivonen, 2012)</i> <i>(Follow-up question (Bryman & Bell, 2011, p.477))</i> <ul style="list-style-type: none"> o Possible follow-up: How do you feel that your customers play a role in the product innovation process (productization)? <i>(Miles et al., 1995; Valtakoski & Järvi, 2016)</i> <i>(Follow-Up Question (Bryman & Bell, 2011, p.477))</i> o Possible probing- and follow-up questions (positive and negative aspects of the customer involvement): How do customers contribute to or hinder the product innovation? <i>(Valminen & Toivonen, 2012; Valtakoski & Järvi, 2016)</i> <i>(Follow-Up- and Probing Question (Bryman & Bell, 2011, p.477))</i> - What role do you feel does knowledge play in the product innovation process (productization)? <i>(Kuula, Haapasalo & Tolonen, 2018; Miles et al., 1995)</i>

(Follow-up question (Bryman & Bell, 2011, p.477))

- Possible probing- and follow-up questions (positive and negative aspects of the knowledge-intensity)
How do you feel is the company's use of knowledge hindering or furthering the product innovation process (productization)?
(Valminen & Toivonen, 2012; Valtakoski & Järvi, 2016)

(2) Topic: Deployment of Product Innovations

Initially, explain the concept of deployment of innovation. Where is it within the innovation process and what should be understood by it (Datta, Mukherjee & Jessup, 2015; John & Storey, 1998; Pisano & Teece, 2007).

Deployment of Product Innovations

- **How was deployment done in the innovation project(s) you were part of?**
(Datta, Mukherjee & Jessup, 2015)
(Introductory question (Bryman & Bell, 2011, p.477))
 - **What do you feel is important for the deployment of innovations within in your company?**
(Datta, Mukherjee & Jessup, 2015)
(Direct question (Bryman & Bell, 2011, p.477))
 - Possible probing- and follow-up questions
(Bryman & Bell, 2011, p.477)

Challenges of Deployment of Product Innovations

- **Is there anything that you feel is hindering the deployment of innovations?**
(Aarikka-Stenroos & Lehtimäki, 2014; Valtakoski & Järvi, 2016)
(Direct question (Bryman & Bell, 2011, p.477))
 - Possible probing- and follow-up questions
(Bryman & Bell, 2011, p.477)
 - Topics based on literature in CH2:
 - Pricing (Valminen & Toivonen, 2012)
 - Customization (Valminen & Toivonen, 2012)
 - New roles and resources (Mattila, 2017)
 - Knowledge and Codification (Valtakoski & Järvi, 2016)
 - Standardization (Gallouj & Weinstein, 1997)
 - Marketing (Chiesa & Frattini, 2011)
 - Appropriability (Aarikka-Stenroos & Lehtimäki, 2014; Chiesa & Frattini, 2011)
- **What role do you feel do customers and knowledge play in the deployment of product innovations within in your company?**
(Aarikka-Stenroos & Jaakkola, 2012; Santos-Vijande, González-Mieres & López-Sánchez, 2013; Valminen & Toivonen, 2012; Valtakoski & Järvi, 2016)
(Direct question (Bryman & Bell, 2011, p.477))
 - **Customers as barriers?**
(Indirect/Probing question (Bryman & Bell, 2011, pp.477, 478))
 - Possible probing- and follow-up questions
(Bryman & Bell, 2011, p.477)

<ul style="list-style-type: none"> ○ Knowledge as a barrier? (<i>Follow-up question (Bryman & Bell, 2011, p.477)</i>) ○ Possible probing- and follow-up questions (<i>Bryman & Bell, 2011, p.477</i>)
(C) Conclusion
<ul style="list-style-type: none"> - <i>Snowball sampling (Bryman & Bell, 2011, p.491)</i> - Conclude the interview - Thanking the interviewee

Appendix 1: Interview guide used for semi-structure interviews

Appendix 2: Overall data structure of the empirical findings

<i>Int.</i>	<i>Int.</i>	<i>1st-Order Concept</i>	<i>Representative Quotes</i>	<i>2nd-Order Themes</i>	<i>Aggregate Dimension</i>
Int. 10	MM1	Too difficult to get the planned value with the current business model	"In our case it is too difficult to get the planned value with this business model."	Business tradition	Mindset as a Deployment Barrier
Int. 2	Em2	Culture	"So because we are [...] used to work in traditionally as consultancies, our main focus, I've always been doing projects by selling ours."		
Int. 6	MM4	Importance but challenge of moving away from selling hours	"Is there scale scalable, we sort of come up with we sort of move away from selling hours to sell him world products and but at the same time, that creates stress, it creates a lot of tension in our organisation, which is based and built on the logic of selling hours."		
Int. 6	MM4	Creating conflict between new business and the core business	"And at the moment, I don't know actually, because everyone can create the conflict in between the core business and the new business is quite tough."		
Int. 7	MM5	Traditional assumptions are made	"It kind of shows you that you if you want to succeed with the product, you need to be aware of that there are different assumptions to succeed, then within with the traditional method."		
Int. 7	MM5	Need to evolve the business model	"I think it's about trying to evolve the traditional business model."		
Int. 2	Em2	Thinking the customers will throw themselves at the innovations	"[...] we think that yeah if we have a great idea people will just throw themselves at the chance of using this new tool or whatever."		
Int. 9	TM2	Underestimating what it takes to deploy an innovation	"So we truly I think, [we] underestimate what it takes."		
Int. 9	TM2	Really hard to make profits and strong operational focus	"I think the fact that we work in projects also makes it difficult and low margins make it like [hard to] make a profit in this industry, like as a consultant, [it] requires a really strong operational focus."		
Int. 10	MM1	Selling innovations with a consultancy business model is challenging	"We are trying to, to sell our innovation all the time according to the business model of [...] a consultant"		
Int. 10	MM1	Not having the commercial or trade license to deploy such solutions to the customer	"We don't have the commercial or the trade licence as a consultant to permit us to deploy such kind of systems or solutions to the customer."		
Int. 2	Em2	Company not used to the amount of resources needed	"We as a company are not used to the amount of resources you have to put [into] the research [...] project."		
Int. 2	Em2	Extreme differences in the resources spent	"[...] the scale of resources spent on employee implementation of the product is like yeah it is [an] extreme difference."		
Int. 5	MM3	A very high percentage of revenue is selling hours	"As you know, [a] very high percentage of revenue [...] is selling hours."		
Int. 2	Em2	Biggest challenge is getting paid by the hour	"[...] a traditional way of getting paid by the hour. That's the number one [challenge], I would say!"		

Int. 4	Em4	Company focused on seeing how many hours were sold	"Because all they see is how many [hours per] week are we charging a customer."	
Int. 3	Em3	Its hard to have to sell hours	"It's hard, you have that you [...] have to sell our hours"	
Int. 3	Em3	The biggest issue is that no value is created when not selling hours	"That's the biggest issue if you don't create value if you don't sell hours."	
Int. 4	Em4	Hours as the main income	"The projects that we have today, earning money from consultant hours. That has to be our main idea for a couple of years."	
Int. 7	MM5	Main revenue income is through selling hours	"[...] most of the revenue is created by billing hours."	
Int. 3	Em3	Innovation and normal work are two different worlds	"Working [with innovation] part time and then working as a normal employee on the other side is really is a huge gap between those two and it's like two different worlds."	
Int. 3	Em3	Innovation is another world	"And you, you feel like that's another world. I think a lot of people think like that. They're not connecting them."	
Int. 6	MM4	Its the conflict between different logics or businesses	"So once again, it's the conflict in between different logics or businesses."	
Int. 8	TM1	Some people will not get along when deploying and drop off	"Because the people they are I mean that, of course, there will always be a few that will not get along and or just want to drop off."	
Int. 11	MM2	Willingness and putting a budget on things are two different realities	"If willingness and then putting a budget on things are two different realities. You know, desire to do something without actually doing it."	
Int. 9	TM2	Having to prove validity internally	"And then also proving internally that we at one have done the work and two that we have, like some kind of market."	
Int. 4	Em4	If you don't believe in it you won't sell it	"Because if you don't believe in it, it's very difficult to sell."	
Int. 11	MM2	Strong solution orientation of the internal technical consultants	"But I've I feel that one of the strongest things is that we are a company of technical people and the educational systems and [...] everything that these technical consultants come from is all about solution orientation. So, when the customer comes at you with a problem, you think right away, how do I solve that as a consultant for our customer?"	
Int. 6	MM4	Talking about business with another kind of logic	"Because now we're talking scalable businesses with another kind of logic."	
Int. 9	TM2	History within the industry defining them	"I think we are. I think we've come from a history within the industry [...]"	
Int. 5	MM3	Its a very traditional line of business	"It's a very traditional line of business."	
Int. 5	MM3	The entire company culture and all systems are based on selling hours	"If you if you have that in the in your backbone structure of company, all systems all company culture is based on selling hours."	
Int. 6	MM4	Deployment of innovation too far away from what they are used to	"Is it too far away from what they used to do?"	
Int. 8	TM1	Have worked with this management and structures forever and thats how it will be done	"And you have been working with this management, the style and the structure forever so that that's the way you're handling it"	
Int. 9	TM2	Having to move to the logic of building systematic knowledge bases	"But if you don't believe that anymore, if you think that value will be created by scalable services by knowledge bases, which is systemic, systematically collected and scaled, where you can start to disentangle your productivity and, and production from customer facing activities, etc, then then you sort of fall away from that logic to some degree, and that's where I think we need to move as a community."	
Int. 9	TM2	Very strong focus on running a consultancy business as efficiently as possible	"We have a there's a logic that we think I mean, we must think we must have thought that our employees and managers within the organisation were able to do that. Otherwise, otherwise, it's like a complete failure. And that I think that's that's incorrect assumption they are and should focus on delivering a consulting business as efficiently as possible."	
Int. 8	TM1	Service company history	"We coming from, like you said a service, we are a service company."	
Int. 2	Em2	Spending resources on a product that will never reach the market	"That's worse for the company. If we take, take resources that could create great value and spend it on something that will end up in a product that will never reach the market."	Risk aversity
Int. 2	Em2	Spending the money on the "wrong horse"	"[...] the worst consequence is that we spend our money on the wrong horse."	

Int. 10	MM1	Investing in something today might hinder you in the future	"[...] because maybe you are going to fund a project with a certain value today, but in two years, this project value will be diminished. So, you will lose the opportunity to fund other valuable projects as well."		
Int. 2	Em2	Need to take more risks	"We need to take more risks."		
Int. 6	MM4	Too afraid of the risk to take	"Are [we] maybe too afraid of the risk to take?"		
Int. 4	Em4	Afraid of risk	"[...] what kind of risk do we have if something goes wrong?"		
Int. 3	Em3	Fear of the unknown	"[...] we're not sure; We're a bit scared!"		
Int. 9	TM2	Employees and managers see the boundaries and decide to stop then	"Employees and managers perhaps in particular, they see the boundaries of the industry and sort of then stop or think this isn't for us."		
Int. 6	MM4	Not knowing what will come of the innovation	"[...] as you're working with innovation, you don't know what will come out from it fully."		
Int. 2	Em2	Too high investment into implementing innovations in consultancies	"[...] amount of money for a consultancy firm I would say you can't just say that they are we going to spend 10 million on this innovation to get it."		
Int. 2	Em2	High investment not common for a consultancy company	"So 10 million for a consultancy company, for example, [...] but in a software development company, that's not a lot of money."		
Int. 6	MM4	Deployment is seen as an overhead cost	"I think because investing in these kind of resources is seen as an overhead cost."		
Int. 6	MM4	Digitization changes the condition for business	"[...] digitization actually changes the conditions for business [within the company]."		
Int. 8	TM1	Difficulty boils down to the slow cultural transgression from one company to another	"And I think that really, at the end, boils down to this slow cultural transgression from one company to another that is necessary, especially when you have a more radical shift in how your business really works, is very interesting."	Required change	
Int. 2	Em2	Change is needed in how the co-workers live the projects	"We need to change the way that our co-workers are living their projects."		
Int. 8	TM1	Deployment is a huge mindshift	"So for me, it's the, it's a huge mindshift and something we need to do."		
Int. 8	TM1	Failing fast and failing forward will only work if they all understand what that means	"Fail fast and fail forward and they will probably agree but they don't understand it so so you will never it will not really happen in the way we know it needs to happen."		
Int. 9	TM2	Not pushing the boundaries due the majority of employees being mostly engineers	"[...] perhaps, the fact that we are engineers, that means that we sort of are not very business driven, perhaps not so sexy. Like, we don't, we don't push the boundaries that much."		
Int. 5	MM3	Personality and driving forces to actually do something new	"It's more something you have in your let's say, personality or your driving forces to actually do something new."		
Int. 10	MM1	Managing the innovation culture	"This is this is the important thing that you should manage the innovation culture in our organisation."		
Int. 8	TM1	The right culture not in place	"But now, I think I think what I see is that if you put the right kind of culture in place, I mean, it starts from the top."		
Int. 11	MM2	Mindset needs to shift in order to have successful project outcomes	"And the reason I'm telling you this story is just as kind of to point out if their mindsets don't fall into the right place, I don't think that projects [are] going to succeed from a business standpoint."		
Int. 1	Em1	Lacking experience	"Were lacking of experience."		Product conceptualization
Int. 6	MM4	Lacking experience in all the managers	"But then of course, we have the business side, because we really lack expertise in all of the managers"		
Int. 10	MM1	Employees have marvellous ideas but missing the knowledge to deploy	"They have marvellous ideas, but they don't have the have the knowledge [about deploying innovation]"		
Int. 1	Em1	Lacking knowledge	"We don't have this knowledge."		
Int. 8	TM1	No understanding what a product is	"[...] what do we mean with a product? Is it like a platform? Is it like internal tools and on the business models that are so different, depending on what you would like to achieve [...]?"		
Int. 8	TM1	No understanding what it means to work with products	"You have to understand what, what it means to to become to work with products."		
Int. 7	MM5	Unclearity of where the products should end up	"Where should these products actually end up in the in the long run?"		
Int. 8	TM1	The understanding is key	"So I think it's back to this understanding [of why to transform]."		
Int. 8	TM1	Unsure of where the company wants to be in the future	"Where are we? Where do we want to be?"		

Int. 6	MM4	Who and where are we as a company	"But I think I mentioned it before one thing is, okay, our identity, actually, where are we as a company who are we?"	Product realization
Int. 10	MM1	Not knowing how to sell the complete solution to the customer	"But we don't know the way and the channels to sell the innovation as a solution, as a complete solution, as integrated solution to the customer."	
Int. 1	Em1	Inefficient selling activities	"[...] for now I am selling this mouth to mouth."	
Int. 3	Em3	Reliance on cross selling innovations	"[...] we we rely too much on this cross selling part."	
Int. 2	Em2	Unclear what to do with the innovation	"What do we do after the development project? How do we support actual innovation? because that is where I think we failed today"	
Int. 7	MM5	Completely different approach to deployment	"It's not, whereas the new products will be more about traditional product sale, which is a completely different approach in in an organisation and skill sets that you need."	
Int. 2	Em2	The biggest job is the implementation	"[...] biggest job is implementing it in the company or at the market"	
Int. 8	TM1	Not understanding how to package services	"[...] you have to understand if a package service is something different from an ordinary service and what happens in terms of your marketing material."	
Int. 7	MM5	Creating the vision for the innovation is essential	"You have to be very good at understanding to describe the vision."	
Int. 11	MM2	Not knowing the steps that need to be taken to deploy	"And we don't know what [are] the actual actions we need to take the whole thing from a business standpoint, okay. "	
Int. 11	MM2	Constructing the business strategy	"So so I think that that's hugely important, just the strategy behind the business and constructing that business model. "	
Int. 4	Em4	Responsibilities are unclear	"Who's responsible for what [...]"	
Int. 8	TM1	Need to understand and define the business model	"But then also around the commercial side, of course, the business model. And trying to also to define, which will not, which we're not doing today at all define what's what's in it for us?"	
Int. 8	TM1	Unsure of the value proposition of innovations	"But you have to define what is this? Is this even worth doing for? For us? What's our part in the value chain?"	
Int. 9	TM2	Missing the marketing, pricing and communication strategies	"They are not able to scan a product to do strategic marketing, to do strategic pricing to get the right communication out to get the right service and support organisation to get it in the right database set up etc, etc."	
Int. 5	MM3	Lacking approach to lifecycle-management	"Since then you have to look at the lifecycle of maybe 20 years. That's that's a challenge."	
Int. 5	MM3	An innovation is not an innovation if it is not utilised on the market	"[...] the innovation, if it's not utilised in the market or creates customer value or separate: Well, it's basically up to us to actually put it into a model or a building or system."	
Int. 2	Em2	Challenge due to not being prepared to make money on products	"[...] challenge in the business on how to make money on actual products because the business is not prepared for that."	
Int. 4	Em4	No time and money for the innovation business	"[...] because somewhere we need to make money and then we need to make some money we need to have a real business."	
Int. 2	Em2	Risk of using a fixed priced model	"We will of course, be able to earn a lot of money on the actual fixed price but then we take a risk we see that this project will take another hundred hours then we will of course, lose money on the on the project and that is a reason that we sell a monster."	
Int. 7	MM5	Lacking approach to products	"[...] there has to be a completely new kind of approach to these kind of products."	
Int. 1	Em1	Not forming the business in an early enough phase	"We need we need to form the business at an earlier stage."	
Int. 1	Em1	Questions need to be addressed earlier	"Making sure that these things and and the questions are being addressed earlier..."	
Int. 3	Em3	Employees need to do what they are supposed to do in each step of the process	"I think that's the biggest challenge to make sure that people that they do what they're supposed to each step and not like get stuck anywhere."	
Int. 5	MM3	Not combining aspects of the innovation process	"But in order to get that to fly really is that you need normally you need to combine the building or the say the [...] project phase, the building phase and the maintenance phase over time."	
Int. 4	Em4	Investigate the pricing of the innovation	"[...] we need to investigate how much it costs, what kind of licence - what do we charge the customer or what do we sell it for [...]"	

Int. 3	Em3	Not being able to handle new kind of contracts with customers	"... we are not used to, like handling new types of contracts with customers."	
Int. 3	Em3	Not good at pricing business innovations	"Maybe it's worth 500,000. I don't know. Like, it's really we're not that good at business like that"	
Int. 1	Em1	Selling this efficiently with also making money	"[...] selling this to a more efficiency and higher quality and to lower price but at the same time, we are like making money [...]"	
Int. 3	Em3	Hard to ask the customer what to pay for the innovation	"[...] trying to ask the customers what to how to what they would be able to pay for this because [these] questions [are] really hard."	
Int. 4	Em4	Need of different pricing plans	"We need to have different: How much do we need to charge?"	
Int. 2	Em2	More risks need to be taken in pricing	"I would say we need to work with fixed prices for example, and we are not brave enough to take risks."	
Int. 10	MM1	Customer being a key player in the deployment	"So the customer is a key player for the process [...] The customer should, you should even pushing all the time, the customers to go with you for your innovation and pulling the customer as well."	
Int. 8	TM1	There is no customer and no one to finance the innovations	"We have no customers, and we have no one who could actually finance it going forward."	
Int. 10	MM1	Deploying innovations through partners	"We can we can have the deployment through, we can make the deployments through our partners."	
Int. 9	TM2	Getting financing out of partners	"[...] financing, typically, we'd like to try to get some financing out of [partners]."	
Int. 7	MM5	Lacking client orientation in the early steps of the innovation process	"So the client needs so the client values are explored really early in the process to assure that it's in an interesting enough idea to continue developing."	
Int. 9	TM2	Struggling to see the early stage customer involvement in the product innovations	"So I struggled with finding the tangible evidence that they that we have proper interaction with customers in early stages"	
Int. 6	MM4	With deployment validation is everything	"[...] you see validation [with the customer] is everything."	
Int. 11	MM2	Need of strong relationship to customers	"What you need to have is good relationships with the customer good ability to write tenders and win bids. "	
Int. 10	MM1	Importance of creating the receptor of the customer	"The most important thing is to create the the receptor of the customer."	
Int. 3	Em3	Finding out how the customer will pay for this	"We have to really try to understand how the customer will pay for this."	
Int. 10	MM1	Developing and making product innovations for the needs of the customer	"Developing or making innovations should meet some requirement or needs of the customer and meanwhile solving a problem and by which they can we can add value."	
Int. 8	TM1	Need to understand the value proposition and the customers	"[...] understand what's the value proposition for the rest of the, for the customers."	
Int. 8	TM1	Needing to shift to better understand the customer	"We need to shift the focus to actually work with the customer to help them to define their needs!"	
Int. 11	MM2	A lot of people don't know what it takes to fully understand the customer	"And I think a lot of people don't, don't have that knowledge, actually, to really dig into "Okay!" the jobs to be done, for example, and to have those thoughts in your mind, how can I dig a little deeper with this customer to understand what they're really trying to accomplish? "	
Int. 11	MM2	First step is to ensure the customer centricity	"So even if they come in and they're not customer centric, we, the first step is to go and talk to customers, and figure it out. "	
Int. 11	MM2	It needs to be trained that the focus should be on the customer	"I think you have to think about the customer. It takes [training], it takes education, you have to know that you're supposed to be doing that. "	
Int. 11	MM2	Its a slow process of training the company in better understanding the customer	"And so it's a slow process of educating and training the company to be better at [understanding the customer]. "	
Int. 1	Em1	Business model is not made for products and services	"Not like made for product products and services."	Product organization
Int. 1	Em1	Lacking of a product organization	"[...] lacking of like a product organisation."	
Int. 1	Em1	Lacking organization to take care of services and products	"So we were lacking like finish organisation to take care of this services and these products."	
Int. 9	TM2	Missing a proper home for the product innovations	"I think it's extremely missing a proper home."	

Int. 4	Em4	Need of an organization for innovation projects	"We need to have a sort of organisation for these, this whole dim services."		
Int. 8	TM1	No organization within the company that can shield the innovation and deploy it	"And then it requires an organisation on the inside to take care, have it, and maintain it, and further develop it, no matter if it's a product or service"		
Int. 1	Em1	Product organization for selling faster, better and with better quality	"[...] product organisation is the key element to, to a get this full effect to making sure that we are selling faster, better and then with better quality."		
Int. 1	Em1	Structure with development and marketing support	"[...] structure within this company with the support, service development, selling, marketing [...]"		
Int. 3	Em3	The structure is not good enough	"I don't think we have a good enough [...] structure for it [the deployment]"		
Int. 1	Em1	Need of a product organization	"Product organisation, that [is] built for handling products and services and without that, we are not coming anywhere."		
Int. 7	MM5	Business model has to be enhanced	"Also business models, I think that is really something that needs to be enhanced."		
Int. 1	Em1	Business model support for services	"We need some like business models to support this kind of services."		
Int. 1	Em1	Company is not built for handling products and services	"It's not built for handling services and products."		
Int. 6	MM4	Finding a place for product innovations within the company	"We needed to have a shelf we needed to find a place for this business."		
Int. 6	MM4	How should the company organize itself	"[...] how should we organise ourselves?"		
Int. 8	TM1	No idea what it takes to become a product company	"But we have no idea I will say what it really takes to become a product oriented company."		
Int. 10	MM1	Not in the position to realize the idea	"But we are not in the position today to realise this idea."		
Int. 3	Em3	Needing to develop business and tech at the same time	"Is it I think it's, they get stuck in the tech order, like their mind in the tech part, or if we call it tech like the, the, for in this example, the traffic, the traffic knowledge of traffic planning, and they think a lot about the needs for the customers but they don't know how to."	Technical knowledge	Knowledge as a Barrier to Deployment
Int. 11	MM2	Dumbing down innovations for the more immediate deployment	"But at the same time back in horizon one and two, we might be able to dumb down our knowledge and skill, something up there. And that, believe it or not, that is very interesting to me. "		
Int. 11	MM2	Team is limited to their strong technical capabilities	"The team there is so incredibly good and technical, but they are limited to their technical capabilities. "		
Int. 11	MM2	The technical teams don't know what business development is	"But their mentality is very, very, very much more of No, we just want to do the technical platform not do any sort of business development here, their mindsets there because they don't really know what business development is. "		
Int. 3	Em3	Hard to sell something outside of the current scope	"[...] it's hard for someone who's really into structural engineering to me to sell something that's off track."		
Int. 11	MM2	Taking a drop in knowledge in order to scale up innovations	"Actually, it's better to take a drop in your knowledge so that you can scale it up. "		
Int. 11	MM2	The complexity of knowledge has been a historic KPI	"[...] the level of how complex your innovations are, has been a historic KPI to our innovation portfolio."		
Int. 11	MM2	Sometimes complexity is a hinderance	"I think sometimes, sometimes [complexity] is a hinderance, but I think you need to have it is a part of being ambidextrous, as well."		
Int. 11	MM2	Sometimes the complexity of the innovations is less important	"So sometimes the level of complexity in your innovation is, is less important. "		
Int. 11	MM2	Pressure of being on the forefront of the field	"So it's about being the forefront of the field. "		
Int. 2	Em2	Difficulty for someone to identify the good ideas from the bad ones	"Quite difficult for someone to identify the good ideas from the bad since we will get a lot of ideas from a lot of different disciplines within the company."	Scaling knowledge	
Int. 11	MM2	Idea giver is the most important and biggest hinderance	"I don't know if this is the right answer, but what I would say maybe is that the idea giver is the most important And the most and the most the biggest hinderance "		
Int. 4	Em4	Too high risk if something happens to the champion	"[...] we've been doing a lot of hours and it's it's a wonderful person's idea and when it's a that's a very big risk because what if something happens to him."		

Int. 9	TM2	Not good at packaging, structuring and reusing knowledge	"So we're not very good at like packaging, structuring, reusing knowledge."	
Int. 9	TM2	Not systematic about the knowledge	"We're not systematic about our knowledge."	
Int. 5	MM3	One cannot lock the innovation and knowledge inside people	"I mean, you can, you cannot lock in knowledge in individual people for how long it's, it's eventually it's spreading around"	
Int. 11	MM2	Reliance on people is a hindrance	"So reliance on on people is, is a hindrance."	
Int. 5	MM3	Challenge when the knowledge just sits inside ones head	"That's obviously a challenge when it sits in people's head"	
Int. 9	TM2	No systematic way of spreading knowledge in the company	"But that's not a systematic way of spreading knowledge in a company that's just [a] scattered, ad hoc way"	
Int. 4	Em4	Overreliance on the champion	"[...] who had this idea if he's having a cold or being sick for a month, who's running it them and all the energy that he has the passion for this product."	
Int. 9	TM2	Lacking ability to scale innovation	"[...] we have these innovations that cannot be scaled within the current organisation."	
Int. 9	TM2	No proper scaling due to only scaling to one customer	"And so then we don't scale properly, obviously, because then we only scale to the customers we have in that little unit."	
Int. 6	MM4	Scalability is a key issue in order to survive	"Scalability is a key issue for us in order to survive!"	
Int. 1	Em1	Scaling the product is too late	"[...] take this product and to and to scale this up it is too late."	
Int. 6	MM4	Department has difficulty in scaling product innovation	"But if we should have it in the [X] department, where it originated, I'm not sure if they could manage to fully scale that up"	
Int. 6	MM4	Handling products and scalable solutions within the organization	"[...] but when we go into products and scalable solutions, how should we handle that within our organisation."	
Int. 9	TM2	Non-efficient scaling process	"We have these innovations that cannot be scaled within the current organisation, then you need to create some level some part of the organisation on a central level that is responsible for setting up these types of competencies with pricing strategy, go to market customer inciting services support it development, probably, so you can pull it because then you also become much more efficient."	
Int. 4	Em4	Unclear how to sell products	"But marketing, how do we sell it?"	
Int. 11	MM2	Its about recognizing scalable solutions	"So then it's about recognising scalable opportunities, okay? "	
Int. 9	TM2	Project environment making the packaging much harder	"I also think that we're operating in like a project space makes it difficult. I think if we had like a more like companies that have products, they are forced to more package their knowledge, obviously."	
Int. 9	TM2	No clear understanding of which types of innovations can and which cant be scaled	"So first would come like an understanding of what it takes a clear definition of which types of innovations that can be scaled and should be scaled within the current business based on a number of criteria, and then which ones shouldn't"	
Int. 9	TM2	Not good at scaling knowledge	"We're not very good actually scaling our knowledge."	
Int. 11	MM2	Its very hard to scale the forefront of knowledge	"It's very hard to scale, the forefront of knowledge. "	
Int. 11	MM2	Competitive advantage based on the knowledge within the company	"But the thought here is that knowledge is what we sell at the company. And it has historically been the most important strategic advantage for any technical consultant that you have the best people in structural engineering and geotechnical engineering, etc, etc. "	
Int. 5	MM3	Intercommunication as important factor to establish for the innovations	"[...] some departments have no communication at all somehow good primarily on an individual basis. So not necessarily linked to the fact that they have different departments or so. So, if you can trigger some sort of interaction in work assignments, then it will come automatically"	Knowledge Diffusion
Int. 3	Em3	Not making people understand what the innovations can be used for	"[...] make people understand what we could use it for and like sell it within projects that we already have."	
Int. 3	Em3	Not being transparent about innovations	"Because if we can share everything and be very transparent, and it's easier for people who meet customers to actually talk about what [innovations] we have [...]"	
Int. 3	Em3	Difficulty in describing the innovation ideas	"But still, if there's a lot of new things coming up, it's hard for people to maybe describe what it is"	
Int. 4	Em4	Need to involve more people	"I need to involve more people. So we get a wider spread."	

Int. 2	Em2	Need of more specific tasks to prepare before pitch	"[...] maybe a few more specific tasks to prepare before this pitch."	Knowledge appropriability	
Int. 2	Em2	Spreading the innovation among the internal employees	"I think that when we have 10 or 20 co workers being able to use this product using it in all the projects, then it will spread organically within the company."		
Int. 2	Em2	Need co-workers to use the product	"[...] getting our co workers to actually use the product."		
Int. 11	MM2	Selling through the internal diffusion of the innovation has not worked well in the past	"So therefore, we'll go around the company and share this information with as many people as we can and then they will in turn sell it to our to their customers. That has not worked so well. Historically. "		
Int. 3	Em3	No existing system to share all innovations	"We don't have a system for the rest of the company attached to see all their ideas coming in. And we're working on that. Because if we can share everything and be very transparent, and it's easier for people who meet customers to actually talk about what we have the old innovations and so but what we're trying to do"		
Int. 6	MM4	Not mature when it comes to IP strategies	"But when it comes to sort of have IP strategies to what to protect, not to protect, etc, we are not mature, we have not much knowledge about that actually"		
Int. 6	MM4	No IP skills and no experience	"When it comes to IP, same there, we're not we don't have a history or doing business through it."		
Int. 4	Em4	Pressure of being first to the market	"We need to be first or it's very easy for someone else to take the same idea to develop their own software service"		
Int. 11	MM2	Having the key employees leaving with the knowledge	"[...] but then the thing is the team like with this failed spin out company, the team, the team quit, and we didn't have, we didn't have contracts in place. We didn't have no, it's called non compete clauses and employment contracts. So we did not have that. So guess what happened? They went to a customer, which, which I mean, in any legal terms, I believe would have been a competitor to this specific technology that we were building. They left. "		
Int. 3	Em3	Giving oneself time to work on the innovation	"[...] it's still very hard to make sure to give yourself time to actually work with it."		
Int. 3	Em3	The most senior person was given the project as a lead	"She's like the most senior person in her department. And she's the project leader of this project, but she never has, she doesn't have any time to work on it."		
Int. 4	Em4	Innovation does not make any money	"And if everyone is trying to be a innovator, we won't make any money."		
Int. 3	Em3	Normal work being in the way of innovation	"I feel like it's sometimes hard for him to prioritise because of the other normal work."		
Int. 5	MM3	It could be more that are included in the innovation process	"In my personal view is it's a bit too few, I think more employees could be more [involved]"		
Int. 1	Em1	Need of time for the project	"[...] we need the time!"		
Int. 1	Em1	Need to focus	"[...] we're seeing now that to [...] get this full effect with this product we need the time and [...] we need to focus [...]"	Management control	
Int. 5	MM3	You need to allocate time and a way to innovate within customer projects	" And so you need both to allocate time, but you also need to find a way [to] innovate within the customer projects [...]"		
Int. 3	Em3	Not being able to shift responsibilities	"She is still leader on the paper but then she doesn't have time so you should probably just pass it to me or somewhere else someone else and just be like an expert instead of the actual man."		
Int. 5	MM3	No clear reward system for participating in innovation	"I mean, as you said, you you're not punished, but maybe not so much rewarded either for participating."		
Int. 7	MM5	Having to report to someone who is measured on their budget	"And not have us report to somebody that is measured on their budget..."		
Int. 3	Em3	Empowerment of people to work with innovation	"It's just been a bit confusing for everyone to know how to work with ideas. I think the tendency is, a lot of people there have ideas and they want to share and want to develop them but it's it depends on what department you're in and where you're what office you're in, like if your boss would let you do it."		
Int. 3	Em3	It depends on the leader if you get to work on your idea or not	"[...] a lot of people there have ideas and they want to share and want to develop them but it's it depends on what department you're in and where you're what office you're in, like if your boss would let you do it."		
Int. 11	MM2	Difficulty of shifting priorities with regard to the project focus	"It's hard to actually say tell the manager, okay, I need time to focus on this when especially in a crisis like where we are right now. So the manager is a very important stakeholder. "		
Int. 11	MM2	Managers have to give the consultants time to work	"Well, managers, I would like to start with so just the department heads, for example, they have to give time to		

		on the product innovations	<i>their consultants in order to be able to focus on the innovation programme. "</i>	
Int. 7	MM5	Needing space in order to succeed	<i>"If they want this product to succeed, they need to give us space."</i>	
Int. 2	Em2	our co-workers do not have the time to start using new techniques	<i>"Our actual co-workers do not have the time to learn and start using new techniques."</i>	
Int. 7	MM5	Being controlled during the product deployment	<i>"If we are going to evolve this product into what we believe it can be evolved to we do not want somebody else to control what we do."</i>	
Int. 3	Em3	Need to make sure that people have time to work with the innovation projects	<i>"Biggest challenge is to make sure that people have time and prioritise it to work with it."</i>	
Int. 3	Em3	Not having the mandate to make decisions as the responsible for innovations	<i>"I'm a project manager-"ish", but not really have all the mandates I should make decisions"</i>	
Int. 11	MM2	Idea owner and the team are the most critical stakeholders	<i>"And so therefore, I think the stakeholder of the idea owners and the team is by far the most critical and if you don't have the right people there, well, everything will fall apart. "</i>	Team management
Int. 11	MM2	Challenges come down to the team	<i>"I think it comes down to the team, but the team hasn't really been given the right setup. "</i>	
Int. 11	MM2	No expectations have been placed on the team	<i>"One would be that you have a great team but expectations have not been placed on them. "</i>	
Int. 8	TM1	Deployment context missing for the experts	<i>"Those experts need to be a part of a context."</i>	
Int. 11	MM2	A serious issue is when the expectation is not set in the beginning of the innovation	<i>"And I think that's that's, that's a pretty serious issue is that if you don't set the expectations clearly in the beginning, that your goal and this is what I do every single project that I'm involved in now, I send the first, however long necessary to get everybody on the same page as to what the Goal is at the end of the project. "</i>	
Int. 11	MM1	Missing expectations is a hindrance for teams	<i>"I think [missing] expectations is a hindrance. "</i>	Financial resources
Int. 10	MM1	Spending a lot of money	<i>"We suffer a lot, we spend a lot of money."</i>	
Int. 10	MM1	Not spending resources efficiently	<i>"[...] you should care about the value, where to spend your assets and resources and to spend it more efficiently to get or to extract more value out of these resources."</i>	
Int. 2	Em2	Not spending resources	<i>"[...] we need to spend resources."</i>	
Int. 1	Em1	Lack of support from business people	<i>"[...] but I feeling like the lack of of a of a help from individuals that are that are more like a business minded."</i>	
Int. 3	Em3	No time to work on the innovation project	<i>"the project leader of this project, but she never has, she doesn't have any time to work on it"</i>	
Int. 2	Em2	Need to improve the way co-workers work and get paid	<i>"But when it comes to implementing and change the way that our co-workers work and the way that they get paid in their projects, and that is the main task that we ought to spend time and money on."</i>	
Int. 6	MM4	Having to reduce the cost burden	<i>"[...] then we have to also try to reduce the cost burden."</i>	
Int. 2	Em2	Spending a massive amount on the implementation	<i>"[...] spend a massive amount of resources on the actual implementation."</i>	
Int. 7	MM5	Missing money and the evidence that it will work	<i>"We are already creating this but it's costing too much money and it doesn't really there isn't any evidence that it actually creates value."</i>	
Int. 4	Em4	Innovation becomes a financial question	<i>"And then you come to the [...] challenge of who's paying for [these] iterations. So it becomes more of a financial question."</i>	
Int. 10	MM1	Not having communication and budget will be a nightmare for the deployment	<i>"If you don't have all of these, if you don't have a budget for all of this, this will be a nightmare."</i>	
Int. 1	Em1	Seek more funds	<i>"[...] seek for for more funds!"</i>	
Int. 5	MM3	There is no budget to add the new stuff	<i>"So there's sort of no room in the budget to to add the new stuff"</i>	
Int. 7	MM5	You need money to develop something	<i>"Whereas the key resources then is like investments that you need money to actually develop something."</i>	
Int. 11	MM2	Financing is a massive issue	<i>"So financing is a massive issue as well. "</i>	
Int. 8	TM1	Lack of budget for customer related development of innovation	<i>"[...] maintaining, having a budget for further development working close to the customers support functions [...]"</i>	
Int. 11	MM2	Financing need to increase at every stage of the innovation process	<i>"Financing I think needs to increase at every stage in the innovation process, and it does until post build, and then all the sudden we're like, oh, where are we gonna get the</i>	

			<i>money for the next 10 million kronor investment we need? "</i>		
Int. 7	MM5	Cannot ask for the required resources	<i>"But what happened was that this cannot we cannot ask for those kind of resources."</i>	Personnel resources	
Int. 10	MM1	Problem when selling the innovation	<i>"[...] but for selling innovation, we have a problem."</i>		
Int. 10	MM1	Difficulty in marketing	<i>"[...] marketing or going to the market with with the innovations or making it commercialised."</i>		
Int. 8	TM1	Experts are not the right persons to have control over the whole process	<i>"I'm convinced that the experts that we have are so needed, but you can't let the whole process to them."</i>		
Int. 5	MM3	Engineers kept so busy that there is no time in thinking of new things	<i>"So a lot of the same a lot of the skilled engineers are often so busy stuck in in selling projects that they there's no room to sort of think New"</i>		
Int. 10	MM1	Marketing channels and the business development is lacking	<i>"The marketing channels or the business development to these innovations [is missing]"</i>		
Int. 7	MM5	Missing the skills	<i>"I think the skill the skill set about having you how you actually what you actually do in a professional product organisation is missing"</i>		
Int. 4	Em4	Need marketing	<i>"We need some marketing."</i>		
Int. 1	Em1	Need of a marketing selling support	<i>"Need a like a marketing selling support."</i>		
Int. 1	Em1	Need of marketing	<i>"We need to take care of this marketing!"</i>		
Int. 4	Em4	Need to contact clients and sell a product	<i>"[...] contacting the clients and trying to sell this product, you need to have something like that"</i>		
Int. 1	Em1	Taking care of marketing and business coaching	<i>"Taking care of this marketing selling business coaching."</i>		
Int. 3	Em3	We need more marketing and sales skills	<i>"We would need more marketing skills and sales skills."</i>		
Int. 6	MM4	Need to invest in marketing and sales	<i>"[...] we need to invest in marketing and sales"</i>		
Int. 1	Em1	Finding talents	<i>"[...] trying to find [...] the [...] talents."</i>		
Int. 1	Em1	Finding the right people internally	<i>"Finding the right people internally"</i>		
Int. 6	MM4	Lacking skills to develop scalable products	<i>"And we lack knowledge within IT: skills, programming, databases [...] all that. We don't have much resources in that field which is very much related to [...] creating a scalable product."</i>		
Int. 8	TM1	Lacking the product management	<i>"I would say my perception is that we're lacking the product management part and and other parts as well."</i>		
Int. 3	Em3	More resources in form of personnel	<i>"We would need more resources for like, full time resources with the right background."</i>		
Int. 3	Em3	Need more people to help	<i>"[...] we really need more people to help us."</i>		
Int. 3	Em3	No marketing team	<i>"We don't have any real proper marketing team."</i>		
Int. 4	Em4	No team of developers	<i>"But now telling us no don't have a team of developers or if the contract with the client is very difficult."</i>		
Int. 1	Em1	we need someone for selling and marketing	<i>"So we need someone who's who's in charge of selling, marketing"</i>		
Int. 3	Em3	Need people to actually sell the product	<i>"[...] we would need that more like actually people selling it for real."</i>		
Int. 4	Em4	Need to include more people	<i>"We need to include even more people."</i>		
Int. 10	MM1	Position as engineering consultants making it difficult to market the innovations	<i>"I think maybe our positioning as engineering consultants, somehow [...] difficult for us to market our innovations."</i>	Organizational image	Customer as a deployment barrier
Int. 6	MM4	Challenge of how the customer perceives the company	<i>"So there are challenges on how they look on us."</i>		
Int. 10	MM1	Customers placing the company as a consultancy	<i>"The problem that we have already customers, but the customer [position] our company as, as a consultant, engineering consultant"</i>		
Int. 6	MM4	Customers see the company as only a consultancy	<i>"[...] because the clients see us as a consultant company, they see us as consultants selling hours [...]"</i>		
Int. 2	Em2	Long time connection with the consultancy as a fear	<i>"[...] they [the customer] are afraid of that they will be connected to [us] if they go for the solution."</i>		
Int. 11	MM2	Hard to explain as a consultancy that investing in innovation should be paid back by customers	<i>"Now when we're able to standardise the problem that our customers have, and standardise the deliverable that they're asking for, so that it only takes us half the time. Is it what it used to be right? Then the customers think that we should only charge half the time it used to. "</i>		
Int. 2	Em2	Evaluated on the price per hour	<i>"When we get the tender from a client, we are all always evaluated on number of hours and the price for an hour and the client Yeah, we can't really offer a product on</i>		

			<i>that, because that is not how we will be evaluated and it's not portable then."</i>	
Int. 11	MM2	Enable and not require the industry to change with the innovations	<i>"Or if they want to change, then we will enable them to change. But we're not going to require them to change in order to accept our innovation. "</i>	
Int. 5	MM3	Large interest to transform, but the market is not moving	<i>"There is a large common interests to transform but it's not the fast moving markets."</i>	
Int. 11	MM2	Not wanting to serve a market that is not in the forefront of the industry	<i>"You have all these things, but nobody at the forefront of structural engineering wants to serve that market. Because it's not the forefront of knowledge in the structural world. "</i>	
Int. 2	Em2	Clients are unused to invest in products from consultants	<i>"So, and also the clients are very unused to invest in products from consultant company."</i>	
Int. 2	Em2	Lack of trust from customers	<i>"They [the customers] don't trust [the product]."</i>	
Int. 3	Em3	Need to build a relationship with the customers	<i>"They don't like you coming there and selling stuff like yeah, we have to build a relationship."</i>	
Int. 11	MM2	Hard to explain to customers that innovations are about justifying investments	<i>"You know, so it's hard to explain that we're not trying to rip them off. We were not trying to make exceptionally large amounts of money. We're just trying to justify investments. "</i>	
Int. 10	MM1	The number one point is to be connected to the customer, their needs and problems	<i>"I think number one, number one, up to number 10 is to be connected to the customer to identify the customer needs and customer problems"</i>	Customer Expectations
Int. 10	MM1	Without the customer there is no vision	<i>"So without the customer, we have no vision and this is, I think the answer of success."</i>	
Int. 2	Em2	Clients are disappointed if the product is delivered late	<i>"Clients are screaming at us if we are late so and we are yeah all our consultants are also very keen on keeping the client happy."</i>	
Int. 2	Em2	Having to deliver on the trust of the early adopters	<i>"We have to be there as well to to deliver on the trust that the early adopters have shown us."</i>	
Int. 11	MM2	Customer thinks that the innovation is for them	<i>"Our customers just think they think we're innovating for them. "</i>	
Int. 11	MM2	Expectations to do the best for the customer without additional rewards for product innovations	<i>"Why would we give you the reward? Hmm. We expect you to do the best for us and you. Otherwise, you're not being the best consultants and we'll go to your competitors. "</i>	
Int. 2	Em2	The market is not used to products	<i>"[...] the market is not used to product [...]"</i>	
Int. 7	MM5	Difficulty in getting the industry to understand the value	<i>„But I think the challenge here is for them to get the industry to understand that the deliverables are the actual value."</i>	
Int. 11	MM2	The industry does not work with digital deliverables	<i>"I would say that the challenge there is for people to there is a that the industry in general doesn't work with digital deliverables as part of the contract."</i>	

Appendix 2: Overall data structure of the empirical findings

In line with: Gioia, D. A., Corley, K. G. & Hamilton, A. I. (2013). *Seeking Qualitative Rigor in Inductive Research: Notes on the Gioia Methodology, Organizational Research Method*, vol. 16, no. 1, pp. 15-31.