Rethinking Innovation Capability in Energy Utilities

A Case Study of Vattenfall

Master's thesis in Management and Economics of Innovation

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ABSTRACT
The energy sector is currently undergoing a transformation driven by decarbonization, electrification, decentralization and geopolitical tensions. As a result, incumbent energy utilities face increasing pressure to renew their innovation capabilities and develop new ways of working with innovation. While much research has been devoted to examining different determinants of innovation capability, the concept has largely been treated as homogeneous across an organization, overlooking that significant variations may exist within the same organization. Through a case study of the Swedish energy utility Vattenfall, this thesis explores how innovation capability varies across organizational units and how cross-unit collaboration and learning can contribute to strengthening firm-level innovation capability.

The findings show that innovation capability is unevenly distributed across Vattenfall and that knowledge, resources and innovation experiences often remain localized within individual units. Furthermore, the results show that large established firms such as Vattenfall can improve their firm-wide innovation capability through cross-unit collaboration and by creating conditions for knowledge sharing. However, this requires coordination mechanisms, formal responsibilities and incentives, as cross-unit collaboration needs to be supported by clear structures. Overall, the thesis contributes to research by emphasizing firm-internal variations in innovation capability and by highlighting the importance of incumbent organizations' ability to identify, interpret and adapt knowledge across unit boundaries.

Keywords: Innovation capability, Incumbent firms, Incumbent inertia, Cross-unit collaboration, Energy utilities, Interorganizational collaboration.

Contents

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1
Introduction

The energy sector is undergoing a transformation driven by decarbonization targets, rapid technological developments, increasing decentralization of electricity production and consumption (Bruvoll, 2025; SOU 2025:47). As part of this transformation, clean energy technologies are expanding and the energy system is becoming increasingly electrified (IEA, 2024a). At the same time, electricity generation is becoming more distributed, particularly through rising rooftop solar PV installations and increasing levels of self-consumption (IEA, 2024b). Together, these developments signal a shift away from solely centralized production toward more decentralized generation patterns, influencing how energy is produced and managed. Simultaneously, energy security is gaining strategic importance as geopolitical tensions create new vulnerabilities related to energy infrastructure, technology supply chains and critical resources (IEA, 2025). As a result, incumbent utilities face growing pressure to move beyond established ways of operating and adapt their organizational approaches to an energy system in transition (Prontera et al., 2025).

Incumbent energy utilities have traditionally developed strong competencies in managing large-scale, centralized generation assets within established regulatory frameworks (Kiesling, 2024). However, these deeply embedded organizational practices can create structural inertia, making it difficult for firms to adapt when environmental conditions change (Hannan & Freeman, 1984). In the energy sector, this challenge is further reinforced by path dependence, as established routines, capabilities, mindsets, and strategic commitments lock firms into existing trajectories and hinder strategic change (Kungl & Geels, 2018). As the energy transition progresses, many of the existing capabilities of energy incumbents become obsolete (Hermundsdottir et al., 2024). Thus, energy companies must continuously develop and renew their capabilities to remain successful (Hermundsdottir et al., 2024). The new capabilities that organizations need to develop must support innovation (Shuen et al., 2014), and a critical aspect of developing these capabilities is learning through internal knowledge transfer, previous efforts, and collaboration with external firms (Börjesson & Elmquist, 2011). Consequently, the renewal of capabilities requires exposure to knowledge and practices that challenge established routines rather than reinforce them.

The capability gap between existing competencies and new system demands implies a need for incumbent utilities to seek complementary competencies beyond their established capability base. In practice, companies involved in the energy transition have increasingly adopted joint R&D, partnerships, alliances, venturing, and

co-development arrangements, reflecting a broader movement toward more open and collaborative innovation (Dall-Orsoletta et al., 2022). In this context, small and medium-sized enterprises (SMEs) are often considered valuable collaboration partners, as their greater flexibility compared to large firms allows them to respond more quickly to changing market conditions and emerging opportunities (Enaifoghe & Vezi-Magigaba, 2023). However, while collaborations provide access to external knowledge and technologies, access alone does not guarantee that firms are able to successfully apply or develop new ideas. Börjesson and Elmquist (2011) argue that the ability to successfully exploit new ideas requires innovation capability.

Innovation capability can be viewed as the application of competence and knowledge embedded within a firm's routines and processes to perform innovation activities (Ngo & O'Cass, 2013). Through an extensive review of previous innovation capability literature, Mendoza-Silva (2021) defines innovation capability as "*the potential to produce or adopt innovations that can be managed by applying internal abilities and allowing a continuous transformation with the aim of producing value*" (Mendoza-Silva, 2021, p. 709). The author argues that innovation capabilities are influenced by managerial, intraorganizational and interorganizational determinants. The managerial determinant consists of the categories management style and leadership, as well as corporate strategy. The intraorganizational determinant contains internal factors that affect a firm's performance, including the factors resources, work climate, ideation and organizational structure, technology, know-how development and individual activity. The interorganizational determinant is divided into the two factors external relations and network characteristics, referring to collaborative arrangements with actors outside the firm and to how these relationships are structured and developed over time.

Existing literature often conceptualizes a firm's innovation capability as a homogeneous organizational capability. Limited attention has been given to how innovation capability varies across organizational units. This gap is particularly relevant in the context of incumbent firms, which are often large companies in terms of employees (Kungl, 2025) and consist of multiple organizational units assigned to different business areas. In such organizations, units may operate under different conditions, making it reasonable to assume that innovation capability may vary across the organization. A lack of understanding about how innovation capability differs across organizational units represents a missed opportunity for organizational learning, as insights from different units could strengthen the organization's overall innovation capability.

1.1 Aim & Research Questions

Against this background, the aim of this thesis is to explore how innovation capability varies across organizational units in a large incumbent energy utility, and how cross-unit collaboration and learning can contribute to strengthening the firm's overall innovation capability.

To address this aim, the study is guided by the following two research questions:

RQ1: How do factors of innovation capability vary across business units?

RQ2: How can cross-unit collaboration and learning improve overall innovation capability?

1.2 Delimitations

The study uses Vattenfall, representing an incumbent energy utility, as a single case study. Thus, the analysis solely focuses on the organizational units, innovation processes and innovation capabilities within Vattenfall. While the study provides a broad overview of the organization by including its business areas (BAs) and support functions, BA Distribution is excluded from the empirical scope. Electricity grid operations are monopoly-based and regulated separately from the rest of Vattenfall, which restricts BA Distribution's ability to collaborate and share information with other parts of the organization. Its inclusion would therefore be of limited relevance to the study's focus on knowledge sharing, cross-unit collaboration and innovation capability across organizational units.

The study focuses on innovation capability within Vattenfall in relation to external innovation collaborations with small and medium-sized enterprises (SMEs). Accordingly, it examines both internal factors within Vattenfall and factors related to these collaborations. The decision to focus exclusively on collaborations with SMEs is based on the fact that large incumbents often collaborate with these types of partners, as their greater flexibility allows them to respond more quickly to changing market conditions and emerging opportunities. Thus, the selection reflects the aim of studying collaboration types that are particularly relevant to innovation activities at Vattenfall.

The thesis only examines innovation collaboration projects related to product and service innovation, as these types of innovations often emerge through collaborations with SMEs at Vattenfall. The innovations themselves are not examined. Instead, the study focuses on the projects through which innovations are developed and on the organizational aspects of innovation.

2

The Case Company

In the following sections, relevant information about the case company, Vattenfall, is presented. The purpose is to provide insight into the case context and explain how Vattenfall operates.

2.1 Background of Vattenfall

Vattenfall is a state-owned European energy utility with operations in Sweden, Denmark, Germany, the Netherlands, and the United Kingdom (Vattenfall, 2025). Established in 1909, the company has historically operated as an integrated utility, managing electricity generation, distribution, and retail activities, particularly in Sweden. Today, Vattenfall is one of Europe's largest producers and resellers of electricity and heat (Vattenfall, 2025).

As an incumbent utility, Vattenfall has traditionally been embedded in centralized electricity generation and grid-based infrastructure. In recent years, however, the company has undergone significant transformation, including a substantial reduction in fossil-based generation and a strategic shift toward fossil-free energy production (Vattenfall, 2025).

2.2 Vattenfall's Organizational Structure

Vattenfall's organizational structure, presented in figure 1, is designed to strengthen performance focus while enabling coordination across its different markets (Vattenfall, 2024). The company operates through four main operating segments: Customer & Solutions, Wind, Power Generation, and Distribution, supported by centralized staff functions. These operating segments are further organized into five business areas: Customer & Solutions, Wind, Generation, Markets, and Distribution. Within each business area, there are also several business units (BUs) that may focus on specific businesses or markets. In addition to the business areas, Vattenfall has support functions, such as IT and R&D, which operate across business areas and support different parts of the organization.

Describing the organizational configuration is relevant for the study, as it provides an overview of the different business areas and functions within which innovation activities and collaborations may take place.

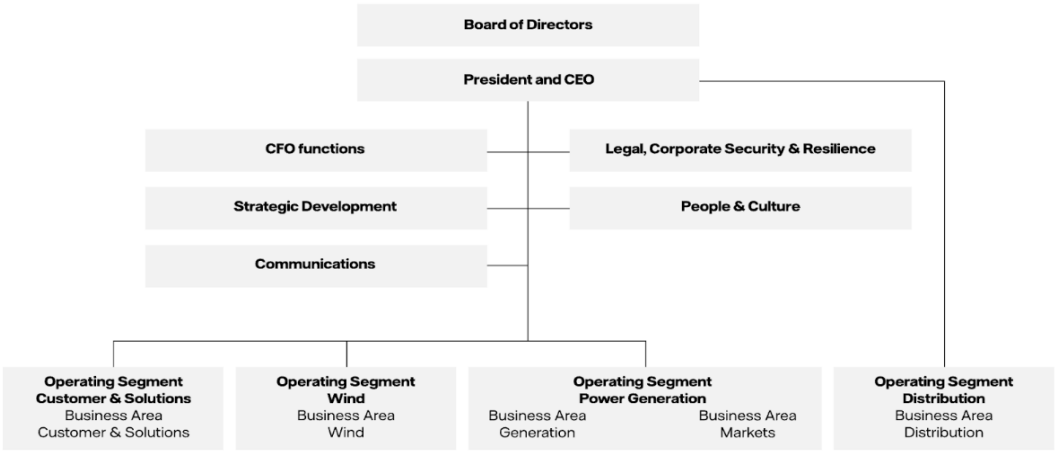

Figure 1: *Vattenfall's organizational structure (Vattenfall, n.d.).*

2.3 Vattenfall's Business Model

Vattenfall operates across the entire energy value chain, illustrated in figure 2, encompassing electricity and heat generation, distribution, sales, trading, and energy services (Vattenfall, 2024). This integrated utility model allows the company to coordinate activities across multiple stages of the value chain and capture synergies between generation, flexibility, and customer-facing operations.

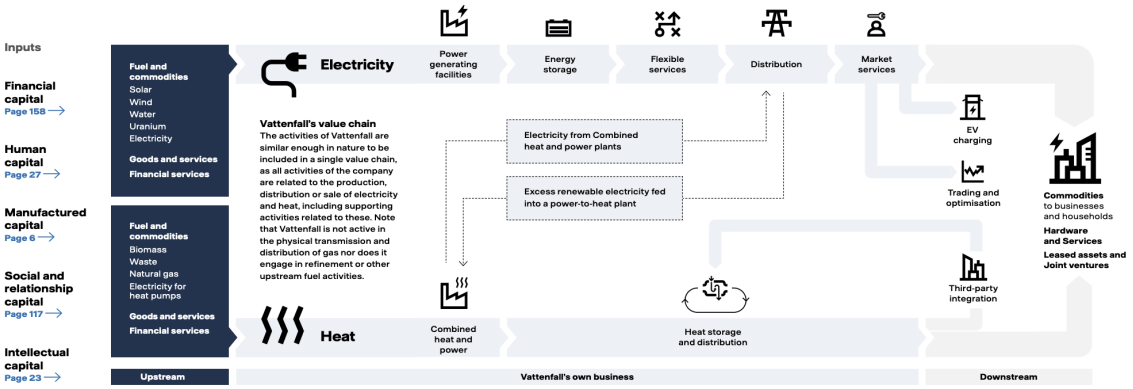

Figure 2: *Vattenfall's integrated value chain and business model (Vattenfall, 2024a).*

The company's operations across generation, distribution, and market functions reflect a vertically integrated organizational model. This integration is analytically relevant for the present study, as collaborative initiatives may affect different parts of the value chain and therefore require coordination across multiple business areas.

3

Literature Review

This chapter reviews the literature relevant to the study and establishes the theoretical foundation for analyzing innovation capability within incumbent firms, as well as their interorganizational collaborations.

3.1 Innovation Capability

Innovation capability is described as a factor that has a significant effect on firms' innovative behavior, representing a key source of competitive advantage for firms (Daronco et al., 2023). The concept is a key theme in innovation management literature, but a large variety of perspectives on innovation management have led to differing views and definitions of innovation capability (Moreira et al., 2024; Mendoza-Silva, 2021).

Through conducting an extensive review of innovation capability literature and definitions, Mendoza-Silva (2021) defines innovation capability as "*the potential to produce or adopt innovations that can be managed by applying internal abilities and allowing a continuous transformation with the aim of producing value*" (Mendoza-Silva, 2021, p. 709). Further, the author suggests that innovation capability comprises several underlying dimensions, and that it is determined by managerial, intraorganizational and interorganizational determinants. Additionally, three different knowledge characteristics have an impact on the innovation capability of an organization. These are discussed in the following sections. figure 3 provides an overview of the factors influencing or determining an organization's innovation capability, as suggested by Mendoza-Silva (2021).

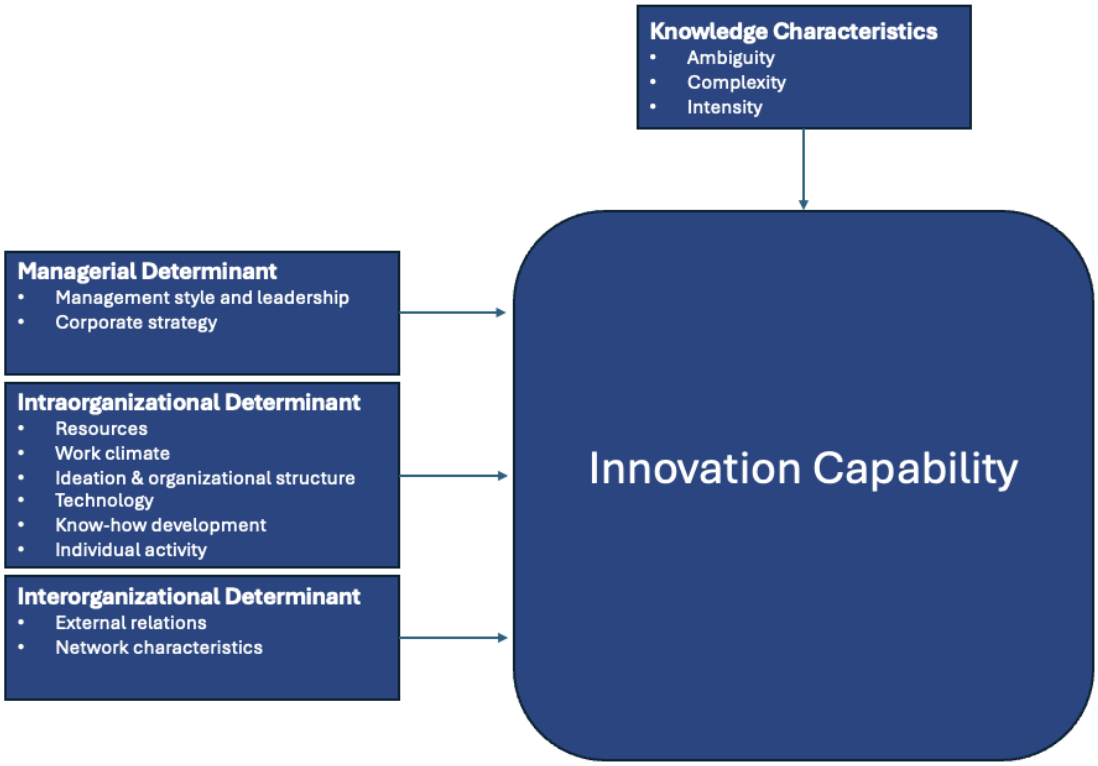

Figure 3: *Subset of the Mendoza-Silva (2021) framework: factors influencing a firm's innovation capability.*

3.1.1 Dimensions of Innovation Capability

Mendoza-Silva (2021) argues that innovation capability is comprised of several dimensions. Saunila and Ukko (2013) explain that some of the capabilities that comprise the overall innovation capability are learning capability, R&D capability, manufacturing capability, marketing capability, resource exploitation capability, organizational capability and strategic capability. These seven capabilities are what Guan and Ma (2003) refer to as dimensions of innovation capability. To evaluate whether a firm possesses a certain dimension of innovation capability, the authors have outlined a number of indicators for each capability. Learning capability refers to the ability to identify, assimilate, and exploit the new knowledge that is crucial for the competitive success of a firm (Guan & Ma, 2003). Some of the indicators of having learning capability are that the firm possesses the ability to absorb knowledge and learn from past experiences, and that it invests in learning. R&D capability encompasses the ability to embrace technologies and approaches to develop new solutions. Having cross-functional project teamwork, enabling communication between R&D employees, and connecting the R&D strategy to the

corporate strategy and technology competencies are some of the indicators of having R&D capability. Having manufacturing capability means that a firm is able to transform the results from R&D into products in an efficient way. The capability is indicated by having advanced manufacturing technology and working with total quality management (Guan & Ma, 2003). Marketing capability is demonstrated through the identification of new market opportunities (Mendoza-Silva, 2021), but also the capability to sell products through understanding the customers (Guan & Ma, 2003). If a firm has long-term customer relationships, monitors market situations, and ensures a reliable delivery time, it is implied that it has marketing capability. The resource exploitation capability refers to the capacity to deploy and allocate resources, and is implied if the firm continuously invests in innovation activity, makes use of external technologies and predicts new technology trends. Organizational capability represents the ability to coordinate work toward shared goals, having established organizational structures and improving processes through the created structure for innovation projects (Guan & Ma, 2003). Mendoza-Silva describes the organizational capability as complex patterns of knowledge and competencies that become embedded as routines in an organization. If a firm is able to adjust its organizational structure flexibly for new innovation projects, centralize resources for innovation activity quickly and have high autonomy of low-level managers, it implies it has organizational capability (Guan & Ma, 2003). Strategic capability is the capacity to adapt company strategies to external changes to gain a competitive advantage. Some of the indicators of having strategic capability are support from top management, an entrepreneurial and innovative environment and an understanding of how external factors affect the company (Guan & Ma, 2003).

3.1.2 Determinants of Innovation Capability

Through an examination of factors that may influence a firm's innovation capability, Mendoza-Silva (2021) proposes three building blocks of innovation capability determinants, which are managerial, intraorganizational and interorganizational.

3.1.2.1 Managerial Determinant

The managerial determinant consists of the two categories management style and leadership, and corporate strategy (Mendoza-Silva, 2021). Management style and leadership refer to how leaders guide and manage the organization's daily activities. For effective innovation management, top managers must support innovation initiatives but also show positive attitudes and commitment (Mendoza-Silva, 2021). Management plays a key role in enabling successful product and process innovation (Akman & Yilmaz, 2008) as managers decide how organizational resources are allocated and determine the strategic direction of the firm (Frishammar et al., 2012). The skills and mindsets of top managers can therefore influence whether firms achieve competitive advantages from innovation. In addition, positive relationships between management and operational staff are important, as mutual understanding, shared values and effective communication facilitate successful innovation efforts within the organization (Frishammar et al., 2012). By encouraging knowledge sharing practices and collaboration among employees, management can foster an

environment in which innovation is more likely to emerge and develop, thereby strengthening the firm's innovation capability (Yeşil et al., 2013).

Corporate strategy refers to the existence of a clearly outlined and shared strategic vision that links the firm's activities to its broader strategic objectives (Mendoza-Silva, 2021). Strategic decision-making at the firm level plays an important role in shaping innovation activities, as firms' capabilities for innovation are closely linked to their overall strategy (Frishammar et al., 2012). The strategy determines how firms configure resources, products, processes and systems to respond to uncertainty in their environment, and requires firms to make decisions about what businesses and functions they should perform and in which markets they should operate (Lawson & Samson, 2001). Innovation initiatives should therefore align with the firm's strategic direction and be integrated with other innovation activities within the organization to ensure coherence between strategic objectives and innovation efforts (Frishammar et al., 2012). Akman and Yilmaz (2008) state that successful innovation requires a clear strategic orientation. Accordingly, Lawson and Samson (2001) describe that innovation capability and the success of innovations are not possible without an innovation strategy as organizational interest and attention may become fragmented, which reduces the effectiveness of innovation efforts.

3.1.2.2 Intraorganizational Determinant

The intraorganizational determinant concerns the internal factors that affect a firm's performance, and includes six groups of factors: resources, work climate, ideation and organizational structure, technology, know-how development and individual activity (Mendoza-Silva, 2021). The resource factor refers to a firm's ability to utilize, plan and combine their resources in terms of human, financial and physical resources, in order to manage innovation (Smith et al., 2008). Effective resource management, which means exploiting the firm's knowledge resources and investing in human capital, is crucial for innovativeness (Smith et al., 2008; Wan et al., 2005). Work climate is related to organizational culture, which encompasses corporate values and beliefs (Mendoza-Silva, 2021). Work climate, by being related to corporate beliefs, may also be affected by the common vision that a company has. If a firm has a clearly articulated vision for being innovative, employees' interest and attention toward innovation increase, which increases the firm's innovativeness (Lawson & Samson, 2001). The ideation and organizational structure refers to a firm's organization of tasks, including generation, development and implementation of innovations, as well as how different parts of a firm are structured (Saunila & Ukko, 2013). Lawson and Samson (2001) describe that an organization must have an optimal formal business structure in place to innovate successfully. The authors further explain that permeable boundaries between functions, business and product groups within a company help break down barriers, which enables innovative behavior. The ideation and organizational structure factor also encompasses a firm's reward system for encouraging ideation (Saunila & Ukko, 2013). A reward system that provides employees with monetary or nonmonetary incentives to encourage knowledge sharing improves the innovation capability of the firm (Lin, 2007).

The technology factor refers to technical skills a firm possesses, but also how it utilizes its technology to facilitate innovative behavior (Smith et al., 2008). Technology, in particular information and communication technologies, can also be used to transfer knowledge but also to facilitate collaboration (Smith et al., 2008; Yeşil et al., 2013). Know-how development encompasses a firm's employees' accumulation of experiences and learning, contributing to improvements (Lawson & Samson, 2001; Mendoza-Silva, 2021). The competencies and expertise of employees significantly affect a firm's development of innovation capabilities (Smith et al., 2008). Mendoza-Silva (2021) includes knowledge management processes in the know-how development category. Knowledge management processes include all activities that an organization performs to apply knowledge for a specific objective (Mendoza-Silva, 2021). To develop know-how and improve employees' skills, they must have the opportunity for education and be supported in their learning (Saunila & Ukko, 2013). Individual activity comprises employees' individual innovation capability and activity, which includes both personal characteristics and motivation (Smith et al., 2008). Some of the characteristics that must be taken into consideration are employees' values, skills and attitude toward a firm's innovation process (Costa et al., 2014). To form an organization's overall innovation capability, individual innovation capability and activity among employees are required (Mendoza-Silva, 2021).

3.1.2.3 Interorganizational Determinant

The interorganizational determinant is divided into the two factors external relations and network characteristics (Mendoza-Silva, 2021). External relations involve collaboration with suppliers, customers, competitors, universities and research institutes that enable firms to identify, access and apply knowledge beyond their organizational boundaries. These types of relationships not only contribute to the inflow of new ideas, but also to the firm's capacity to interpret and exploit external information in ways that support innovation development. External relations are particularly important in complex and technology-intensive industries, where no single organization generally possesses all the knowledge required for innovation (Olsson et al., 2010). Thus, to maintain a competitive position, firms must establish external partnerships to ensure allocation of scarce resources (Zheng et al., 2019; Lawson & Samson, 2001). In addition to the existence of collaborations, the characteristics of the interorganizational network influence a firm's innovation capability. Mendoza-Silva (2021) argues that network characteristics influence how effectively knowledge is shared and utilized between firms. Rather than focusing solely on whether collaborations exist or not, this perspective highlights that the structure and quality of relationships shape the outcomes of external engagement. Network characteristics can be understood along three interrelated dimensions. The structural dimension refers to patterns of interactions and the frequency with which actors exchange information. The relational dimension concerns the quality of relationships, including trust and long-term commitment. The cognitive dimension relates to shared representations, common goals and mutual understanding that facilitate coordinated actions (Mendoza-Silva, 2021). According to Lawson and Samson (2001), firms must be able to absorb the knowledge that they gain from

their participation in external networks to successfully innovate. This statement aligns with Olsson et al. (2010), who emphasize the need for an organization to have the ability to learn and to transfer knowledge in order to develop innovation capability.

3.1.3 Knowledge Processes and Characteristics

Knowledge is described as an essential element of innovation capability across the literature. It is a valuable strategic resource, but must be efficiently managed in order to extract its value in the form of increased innovativeness (Mendoza-Silva, 2021; Lawson & Samson, 2001). Knowledge can also be seen as a process from constructing an idea to implementing it in a value-adding way (Andreeva & Kianto, 2011). Knowledge processes include creation, sharing, capturing and application of knowledge and expertise (Mendoza-Silva, 2021). All of these processes are critical to enhance the innovation capability of a firm (Saenz et al., 2009), but knowledge creation is the process that has the largest impact (Andreeva & Kianto, 2011). Knowledge creation is the ability to develop new ideas that are useful to the organization, while knowledge sharing refers to the transfer of existing knowledge within or between organizational departments and hierarchical levels. Knowledge sharing leads to efficient resource use but can also contribute to new knowledge being created. The sharing process can be divided into two phases: the socialization phase and the combination phase. The former includes sharing of tacit knowledge among closer colleagues, while the latter concerns the sharing of explicit knowledge across the whole organization. Knowledge capturing encompasses identifying and acquiring external knowledge that is useful to the organization. Through capturing external knowledge, the firm increases the richness and variety of its knowledge base, and consequently also its innovativeness. Application of knowledge for commercialization is crucial for the successful exploitation of knowledge (Andreeva & Kianto, 2011).

Mendoza-Silva (2021) argues that there are different kinds of knowledge and that each type will impact the innovation capability in different ways. The three proposed knowledge characteristics are ambiguity, complexity and intensity (Mendoza-Silva, 2021). It is therefore important that firms consider the type of knowledge involved, as different knowledge types may influence innovation processes and thereby affect innovation capability (Saenz et al., 2009). Knowledge ambiguity is associated with causal ambiguity, referring to uncertainty regarding the factors that build up knowledge (Ciabuschi & Martín, 2012). It consists of tacitness, complexity and specificity, which together may inhibit knowledge sharing and capturing processes. Tacitness refers to knowledge gained through experience, making it difficult and time-consuming to acquire and share.

Complexity means that several competencies, routines, individuals and resources are linked to a specific type of knowledge. As a result, complex knowledge can be difficult to understand, articulate and transfer, often requiring higher resource commitments (Ciabuschi & Martín, 2012; Pérez-Luño et al., 2011). Complexity is also related to tacitness and stickiness, which further complicates knowledge sharing. In addition, complex knowledge may involve originality, as newness can

create uncertainty (Pérez-Luño et al., 2011). Specificity refers to knowledge that is only appropriate in the particular setting where it has been developed, and not in other settings (Ciabuschi & Martín, 2012). Since innovations based on complex knowledge are more difficult to transfer and share, human relations become particularly important. This is especially relevant when innovations are transferred between organizations, where trust is needed to prevent firms from limiting the innovation and its related knowledge to their own organization (Pérez-Luño et al., 2011).

Knowledge intensity refers to the extent to which a firm depends on knowledge embedded in its activities and outputs as a source of competitive advantage. In knowledge-intensive firms, where the main activities revolve around the use of knowledge, knowledge processes become more present and more critical for value creation and performance (Andreeva & Kianto, 2011).

3.2 Innovation in Incumbent Firms

Incumbents are generally described as established, large firms with a strong interest in preserving the status quo (Kungl, 2025). Typically, their strength lies in sustaining innovation (Christensen, 1997), which stems from the fact that incumbents generally aim to solidify their market positions through incremental innovations (Chandy & Tellis, 2000).

In the energy sector, incumbent firms play a key role in addressing climate change and other environmental challenges (Kungl, 2025). Their considerable economic and political influence gives them significant capacity to drive change. In addition, their extensive resources, historically accumulated knowledge and established competencies enable them to make substantial commitments to the sustainability transition (Kungl, 2025). At the same time, the organizational structures that incumbents develop over time tend to create strong inertial forces (Hannan & Freeman, 1984). Several factors may therefore limit their ability to respond and adapt to change, including established organizational routines and standards, internal political dynamics and stable exchange relations with other organizations. Such routines and standards emerge as organizations formalize their structures, roles, authorities and communication processes to ensure stable performance. However, highly standardized routines can increase the effort required to create change, thereby reinforcing inertia (Hannan & Freeman, 1984). Internal political dynamics may also create strong inertial pressures as all departments within an organization that do not benefit from a decision may resist change (Rumelt, 1995). Similarly, stable exchange relations with other organizations can create inertia, as these relationships are time-consuming to develop and may be strained by larger changes in the firm's strategy or structure (Hannan & Freeman, 1984). Due to such strong inertial forces, incumbents may be inhibited from being innovative (Huang et al., 2013).

3.2.1 Interorganizational Collaboration in Incumbent Firms

Interfirm collaboration is one possible approach to address incumbents' challenge of responding to technological changes (Cozzolino & Rothaermel, 2018). This aligns with the broader development that innovation increasingly occurs through collaborations between different types of firms rather than solely within single organizations (OECD, 2019). Within such collaborative settings, relationships with external partners can be viewed as a valuable resource for the firm, as resources constitute an important dimension of an organization's capabilities (Börjesson & Elmquist, 2011). Through collaboration, firms can leverage and complement their own competencies and skills (Greco et al., 2020), which may strengthen their ability to innovate. Moreover, if firms are successful in pursuing several external innovation projects simultaneously, they position themselves more favorably to sustain innovation over time (Greco et al., 2020).

For incumbent firms, collaborations with SMEs have become an important mechanism for accessing external knowledge and supporting innovation activities. An increasing number of large firms establish collaborations with smaller firms such as SMEs to create successful innovations (Vanhaverbeke, 2017). This development can be explained by increased competition and growing technological complexity, which make it more difficult for firms to possess all necessary knowledge internally (Vanhaverbeke, 2017; Spithoven et al., 2013). As the complexity of innovation processes increases, it becomes more difficult for firms to possess all the necessary knowledge internally. As a result, firms increasingly rely on external partners to source expertise and knowledge that can complement their internal innovation activities (Spithoven et al., 2013). SMEs play an important role in these systems due to their contributions to innovation and knowledge diffusion (OECD, 2019).

Although interorganizational collaboration can support innovation, it may also give rise to challenges. In particular, working across organizational boundaries where each firm has different interests and perspectives, as well as differing power and size, comes with difficulties (Schruijer, 2020). Partnerships in which the firms differ significantly in power and size are called asymmetric partnerships (Minshall et al., 2010). These types of collaborative relations often encounter challenges, arising from lack of trust, diverging expectations and differing organizational procedures (Minshall et al., 2010).

3.3 Cross-Unit Learning

In multiunit organizations, innovation-related knowledge is often unevenly distributed across units, meaning it resides in different parts of the organization rather than within a single unit (Tsai, 2001). Organizational units develop specialized knowledge, practices and capabilities based on their specific activities and experiences. Consequently, organizational units differ in their internal knowledge, capacities and practices, which influences their ability to access and benefit from knowledge developed by other units within the organization (Tsai, 2001).

3.3.1 Knowledge Transfer

Organizational units can learn from each other and benefit from knowledge developed elsewhere in the firm. Knowledge transfer among units provides opportunities for mutual learning and interunit cooperation, and can contribute to innovation by allowing organizational units to benefit from knowledge developed in other parts of the organization (Tsai, 2001).

In large organizations with multiple units, the internal networks and relationships between those units can strongly affect how well knowledge moves and spreads across the organization (Tsai, 2001). Organizational units are embedded in intraorganizational networks through which knowledge and resources are shared. Units that maintain stronger internal connections and interactions with other units are often better positioned to access knowledge and resources from other parts of the organization. In particular, units with more central positions within these intraorganizational networks are more likely to gain access to valuable knowledge developed by other units. As a result, these units may benefit from greater opportunities to learn from internal partners and improve their own innovation performance (Tsai, 2001). At the same time, the impact of such knowledge access depends on the absorptive capacity of the receiving unit, which refers to its ability to recognize the value of new knowledge, assimilate it, replicate it, and exploit it by applying it in various organizational activities (Tsai, 2001; Cohen & Levinthal, 1990).

Absorptive capacity can be divided into potential absorptive capacity, referring to the ability to acquire and assimilate knowledge, and realized absorptive capacity, referring to the ability to transform and exploit that knowledge (Jansen et al., 2005). These two dimensions are supported by different types of organizational mechanisms, coordination mechanisms and socialization mechanisms. Coordination mechanisms, such as cross-functional interfaces, participation in decision-making and job rotation, enhance potential absorptive capacity by supporting the acquisition and assimilation of knowledge within organizational units. In contrast, socialization mechanisms, including connectedness, shared values and informal interactions, strengthen realized absorptive capacity by supporting the transformation and exploitation of knowledge within organizational units (Jansen et al., 2005).

Knowledge transfer across organizational units does not always occur effectively solely through individual interactions. Zhao and Anand (2013) explain that when knowledge is complex and embedded in organizational practices, it is often distributed across multiple individuals rather than within a single actor. In such cases, knowledge transfer requires multiple connections across units instead of relying on a single link, allowing individuals to interact across boundaries and transfer and apply knowledge. This is especially important for complex and experience-based knowledge, as this type of knowledge is difficult to clearly explain and cannot easily be transferred through simple exchanges. Effective transfer therefore depends on direct interaction between individuals who understand how the knowledge is coordinated and used in practice. As a result, cross-unit learning depends not only on individual connections, but also on having several direct links across units,

which enables more complex knowledge to be transferred and applied within the organization (Zhao & Anand, 2013).

3.3.2 Barriers to Cross-Unit Learning

Knowledge does not automatically flow between organizational units within large firms. Tsai (2001) describes that knowledge is often sticky, meaning it can be difficult to transfer from one part of the organization to another. Szulanski (1996) describes internal stickiness as the degree of difficulty involved in transferring knowledge within a firm. Research on internal knowledge transfer shows that stickiness can arise from several factors, one of which is a lack of absorptive capacity in the receiving unit (Szulanski, 1996).

Szulanski (1996) explains that the major barriers to internal knowledge transfer are primarily due to causal ambiguity and arduous relationships between the source and the recipient, together with a limited absorptive capacity. Causal ambiguity refers to situations where it is unclear why a practice works, meaning that the factors behind a success and the way they interact are not fully understood. As a consequence, it becomes difficult for another unit to understand what exactly should be transferred and how it should be applied. An arduous relationship, in turn, refers to a situation where the relationship between the source unit and the receiving unit makes communication and interaction difficult. Transferring knowledge often requires numerous exchanges between the involved units, and the success of this depends on the ease of communication and the overall closeness of the relationship between the source and the recipient (Szulanski, 1996).

A challenge that arises in collaborative relations is integrating the innovations within the organization (West & Bogers, 2014). When innovations originate from external sources, the receiving organization may develop a "Not Invented Here" (NIH) attitude. The NIH syndrome is commonly encountered and mentioned in the literature as a syndrome that inhibits knowledge transfer (Kathoefer & Leker, 2010). In an innovation setting, it is described as a negative attitude toward innovations that do not originate from the organization itself (Kathoefer & Leker, 2010). To overcome these barriers and enable successful collaboration, organizations need to encourage cultural changes that support openness toward external knowledge and encourage greater tolerance for experimentation and risk-taking (West & Bogers, 2014).

3.4 Analytical Framework

The analytical framework is based on Mendoza-Silva's (2021) framework of innovation capability, in which innovation capability is influenced by managerial, intraorganizational and interorganizational determinants, as well as by knowledge characteristics. While Mendoza-Silva's original framework is relevant for analyzing factors that shape a firm's ability to innovate, it does not explicitly capture the organizational complexity of large incumbent firms. In incumbents, different

business units may operate with separate strategies, routines, resources and knowledge bases. As a result, innovation capability cannot be understood as a homogeneous firm-level capability, but must be analyzed in relation to how it differs across the organization. Mendoza-Silva's framework does not explicitly consider how innovation capability may differ across organizational units within a firm, nor how cross-unit collaboration may be needed to transform unit-level innovation capability into firm-level innovation capability.

Based on this, cross-unit collaboration is added as a new determinant in the framework. Cross-unit learning theory suggests that innovation-related knowledge is often unevenly distributed across organizational units, as units develop different knowledge, practices and capabilities based on their specific activities and experiences (Tsai, 2001). The added cross-unit collaboration determinant therefore captures the firm's ability to connect units, coordinate related innovation activities and make local knowledge available to other parts of the firm.

In the analytical framework, company size is added as a moderator influencing the cross-unit collaboration determinant. In the case of incumbent energy utilities, larger organizational size may be associated with greater organizational complexity, as organizational units may be responsible for different parts of the value chain, technologies or customer segments. This suggests that innovation capability does not only depend on the capabilities within individual units, but also on the firm's ability to enable collaboration and knowledge transfer across unit boundaries. Company size may therefore influence how important and challenging cross-unit collaboration becomes for developing innovation capability at the firm level.

The framework is also extended by adding partnership configuration as a moderator influencing the interorganizational determinant. Mendoza-Silva's (2021) interorganizational determinant includes external relations and network characteristics, which explain the importance of external collaboration, as well as the quality and structure of relationships between firms. However, the framework does not explicitly capture that different types of collaboration partners may create different conditions for collaboration. Partnership configuration refers to the characteristics of the collaborating actors, such as differences in size, power, resources and ways of working. The moderator is particularly important in collaborations between incumbents and SMEs, as such partnerships may provide access to complementary knowledge and capabilities, while also creating challenges related to power asymmetry, trust, diverging expectations and differing organizational procedures (Minshall et al., 2010). These differences may affect whether collaboration is established, how easily it can be coordinated and whether the relationship becomes supportive of innovation. Thus, partnership configuration is added to show that the type of partner affects the collaborative relationship, which in turn may influence how effectively the interorganizational determinant supports innovation capability in practice. The analytical framework is presented in Figure 4. In the figure, the dark blue elements represent components retained from Mendoza-Silva's (2021) framework, while the light blue elements represent additions made in this study, namely the cross-unit collaboration determinant and

the moderators company size and partnership configuration.

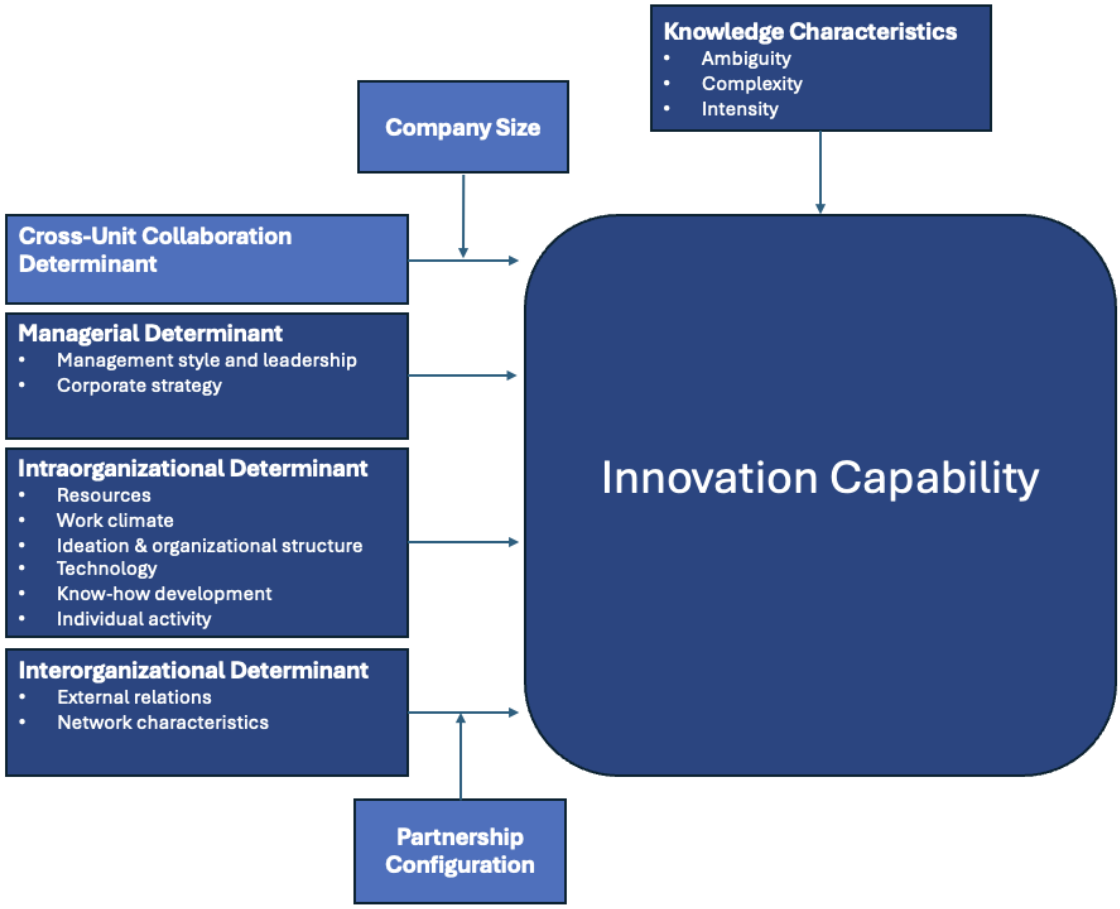

Figure 4: *Extended analytical framework for analyzing innovation capability in large incumbent firms, based on Mendoza-Silva (2021).*

4
Method

This chapter explains how the study was designed and conducted in order to answer the research questions. It presents the overall research approach and procedure for the case study. Further, it describes the data collection methods, covering both primary data from semi-structured interviews and secondary data. Finally, the chapter addresses the limitations of the chosen methods, discusses the study's trustworthiness and outlines relevant societal, ethical and ecological considerations.

4.1 Research Design

For this thesis, a qualitative research approach was adopted. Qualitative research provides contextually rich data and is effective in obtaining data related to behaviors, experiences and relationships (Mack et al., 2005). The approach is appropriate when the purpose of a study is to explore complex organizational processes and phenomena that require an understanding of individuals' interpretations and experiences (Creswell & Poth, 2018). Since the thesis studied innovation capabilities within Vattenfall's organization, including aspects such as structure, culture, processes, and collaboration, a qualitative approach enabled an in-depth understanding of employees' experiences and organizational dynamics relevant to the research questions.

Further, this study adopted a single case study design, where Vattenfall served as the empirical case of an incumbent energy utility operating in the Swedish energy market. Conducting a case study enabled an examination of how factors of innovation capability vary across an organization's business units, and how cross-unit collaboration and learning can improve overall innovation capability. The case study design is a widely used approach for organizational research (Bell et al., 2022). It focuses on understanding the dynamics within a certain setting, and enables theory building through the findings (Eisenhardt, 1989). Dubois and Gadde (2002) explain that case studies are particularly useful when the aim is to develop theory from empirical observations. The authors also suggest an abductive case study approach called systematic combining. In contrast to the typical linear case study process, this is an approach in which the researchers develop a deeper understanding of the topic through continuous movement between theory and empirical observations (Dubois & Gadde, 2002). The systematic combining approach was applied through continuous iteration between data collection, data analysis and the development of the analytical framework.

The case was selected through a form of what Eisenhardt (1989) describes as theoretical sampling. The case company was deliberately chosen because it was considered highly relevant to the research topic and because the researchers had established access to the Vattenfall organization. As a large incumbent firm in the energy utility industry, Vattenfall provides access to well-developed organizational structures and established processes, making it a suitable context for studying innovation and collaboration practices. Furthermore, Vattenfall is theoretically relevant to the research context due to its strategic emphasis on innovation through external collaborations.

4.2 Data Collection Methods

This study is based on both primary and secondary qualitative data. Primary data were gathered through qualitative interviews while secondary data were collected through web pages and reports. Together, these data sources form the empirical and theoretical foundation of the study.

4.2.1 Primary Data Collection

Interviews were selected as the primary data collection method, as they enabled detailed exploration of perspectives, reasoning and experiences. The interviews were conducted in a semi-structured format. Following Saunders et al. (2023), an interview guide was used to outline the key topics to be covered, rather than relying on a fixed list of predetermined questions that had to be answered. The key topics that were covered during the interviews were external collaborations at Vattenfall, organizational conditions that relate to determinants of innovation capability and cross-unit collaborations. The themes from the analytical framework were used as a foundation for the topics and questions covered in the interviews. The theoretical foundation can be seen in appendix A. The semi-structured approach allowed the interviews to follow a common structure, ensuring that the same topics were addressed for respondents in comparable roles, while remaining flexible enough to reflect the expertise and experience of each respondent.

Hox and Boeije (2005) suggest that interview questions should be carefully designed, evaluated and tested in order to support the quality and validity of the interview responses. Thus, before conducting interviews with the respondents, the interview questions were tested with a supervisor from Vattenfall. After the initial interview test, all questions were reviewed, leading to adjustments and the removal of some items that were deemed less relevant given the time constraints of the interviews.

To gain a broad understanding of Vattenfall's organization and obtain perspectives from different parts of the company, potential respondents from various business areas and support functions who had participated in innovation projects with external companies were contacted. The respondents have different roles and responsibilities which enabled a comprehensive understanding, involving several perspectives of the studied subject. The initial respondents were selected in consultation with the supervisor at Vattenfall to ensure the inclusion of individuals

with relevant knowledge and involvement in processes related to the research questions. All respondents were contacted virtually via email or Microsoft Teams. Further, more respondents were gradually identified and interviewed by employing a snowball sampling approach, through which interviewed individuals were invited to recommend colleagues who they thought could offer valuable insights related to the research topic. Snowball sampling is used in qualitative research methods to identify knowledgeable individuals within organizations, especially in cases where relevant expertise is distributed across roles and not easily identified in advance (Atkinson & Flint, 2001). In total, 16 individuals were interviewed, distributed across four business areas and two support functions. The business areas are Customer & Solutions, Wind, Generation and Markets, and the support functions are IT and R&D.

Prior to each interview, respondents received written information describing the purpose of the study and how the collected data would be used and stored. An interview guide, which is provided in Appendix B, was sent to the participants together with the interview invitation, giving them time to reflect on the topics that would be covered during the interview.

All interviews began with a general and open-ended question regarding the respondent's role and organizational context, followed by more specific questions related to the research focus. Depending on the respondent's answer, additional questions were asked to either clarify or deepen the understanding of the answer. Each interview was conducted by two researchers simultaneously, with one researcher leading the interview and asking the majority of the questions, while the other was observing the discussion and asking follow-up questions. This approach was adopted to reduce the risk of individual interviewer bias and to support a more robust interpretation of the responses.

With the participants' consent, all interviews were audio-recorded and subsequently transcribed using the AI transcription tool TurboScribe. After transcription, the interviewer reviewed the AI-generated transcripts against the audio recordings to ensure their accuracy. The transcribed material was then compiled into a summary of the interview findings. Respondents were also given the opportunity to review their statements and provide clarifications or corrections if necessary. This process, often referred to as respondent validation or member checking, was applied to enhance the credibility and accuracy of the empirical material (Creswell & Poth, 2018).

All interviews were conducted digitally, via Microsoft Teams or Google Meet, and ranged from 43 to 67 minutes, depending on the respondent's role, experiences and the depth of the discussion. An overview of the interviewed participants and interview duration is presented in table 1.

Table 1: *Overview of interview respondents, their organizational roles, interview dates and interview durations.*

Interviewee Role	**Unit**	**Interview Date**	**Interview Duration**
Portfolio Manager	R&D	26.03.2026	67 min
Machinery Engineer	Generation	31.03.2026	49 min
Manager of Business Development and Innovation	Customer & Solutions	01.04.2026	50 min
Program Manager A	R&D	02.04.2026	43 min
Product Owner	IT	07.04.2026	50 min
Program Manager B	R&D	08.04.2026	61 min
Innovation Lead within Business Development and Innovation	Customer & Solutions	14.04.2026	62 min
Digitalization Lead	Generation	17.04.2026	52 min
Digital Innovation Lead	Generation	17.04.2026	57 min
Solution Architect	IT	17.04.2026	58 min
Business Developer	Generation	22.04.2026	57 min
Director of Innovation	Wind	23.04.2026	64 min
Portfolio Manager	Generation	23.04.2026	51 min
Product Owner	Markets	06.05.2026	51 min
Manager of Strategy and Business Development	Markets	08.05.2026	50 min
Lead of LCOE Office	Wind	12.05.2026	55 min

4.2.2 Secondary Data Collection

Secondary data were collected to provide contextual understanding of the case company and the industry in which it operates. An initial review of secondary sources was conducted before the primary data collection, in order to support the development of the interview guide and identify relevant concepts for the study. The data were collected between January and March 2026 and obtained from Vattenfall's website, other websites providing information on relevant topics, such as that of Svenska kraftnät, and Vattenfall's annual and sustainability reports. The selection of search terms was guided by the research questions and focused on concepts related to the research topic. Keywords used to find data included *innovation, innovation capability, external collaboration, incumbent, Vattenfall, energy utilities* and *energy markets*. This research facilitated the development and formulation of the interview guide, but also contributed to the identification of key theoretical perspectives and concepts.

4.2.3 Data Analysis

During the primary data collection, data from each interview was structured in an interview compilation matrix, where each row represented an interview question or theme and each column represented an interview respondent. Each researcher

first worked with a separate matrix, entering data from the interview transcripts independently. The two matrices were then compared to reduce the risk of biased interpretation, avoid overinterpreting the responses and identify any relevant data that may have been overlooked. After this comparison, the data were consolidated into one interview matrix, which was then used as the foundation for the data analysis.

While the overall research approach follows an abductive approach through systematic combining, the data analysis of the primary data resembles the systematic inductive approach framework developed by Gioia et al. (2013). The approach divides the data analysis into first-order and second-order analysis. During the first-order analysis, data were collected and thematized into first-order concepts. These data consisted of terms and concepts that the respondents mentioned in their own words. Thus, after the interviews had been transcribed, all relevant concepts and terms that the respondents had mentioned were identified. In line with the Gioia et al. (2013) methodology, little attention was initially paid to structuring or separating this data into different categories. However, as the interviews progressed and more data were collected, it became easier to identify similarities and differences among the emerging terms, which formed the basis for categorizing them into so-called first-order concepts. Thereafter, more general theoretical themes that related to the first-order concepts were identified. When observing the emerging first-order concepts as well as the second-order themes, it was also possible to identify new interview questions needed to fill the possible gaps. These questions were then asked in the subsequent interviews. In the next step, which is called the second-order analysis, an examination was made regarding whether the emerging themes helped answer the research questions. Once it was confirmed that they did, the themes were further categorized into so-called aggregate dimensions, which formed the basis for answering the research questions. After this, the data structure had been formed, laying the foundation for the simultaneous development of new data, themes, concepts and relevant literature. The data structure, including the first-order concepts, the second-order themes and the aggregate dimensions, is visualized in figure 5.

4.3 Methodological Reflection

Qualitative approaches to research have been criticized for being subjective, difficult to replicate, lacking transparency, and having limited generalizability (Bell et al., 2022). Critics argue that qualitative research may lack systematic procedures for selecting relevant themes and that the openness of the research process can increase the risk of researcher subjectivity (Bell et al., 2022). To address these challenges, this study was guided by Mendoza-Silva's (2021) extensive review in the development of both the literature review and the interview questions. Nevertheless, qualitative research involves interpretation by the researchers, meaning that complete objectivity cannot be achieved.

Another limitation concerns the study's generalizability. As a single-case study, the

findings are closely linked to the specific context of Vattenfall and cannot be assumed to apply directly to all organizations. However, the purpose of the study is to provide an in-depth understanding of innovation capability within a large incumbent firm. By providing a detailed description of the case context, the findings may still offer relevant insights for similar organizations facing comparable challenges.

The study included 16 interviews, with two to five respondents from each business area or support function, depending on its size. The experiences of these individuals cannot be assumed to represent Vattenfall as a whole. Furthermore, the sampling process involved a risk of selection bias, as the supervisor initially assisted in identifying potential interviewees and additional respondents were recruited through snowball sampling. Managers may recommend colleagues with similar views and experiences, which could limit the diversity of perspectives. To mitigate this risk, respondents were selected from different business areas and organizational roles, and additional interview candidates were chosen based on their potential to contribute perspectives relevant to the research questions.

4.3.1 Trustworthiness of the Study

The quality of qualitative research is commonly assessed using the concept of trustworthiness, which consists of four key criteria: credibility, dependability, confirmability, and transferability (Lincoln & Guba, 2013). Together, these criteria provide a way to evaluate whether a study has been conducted in a transparent way, and if the findings have been based on empirical material. In this study, several choices were made to address each of the criteria of the framework, as outlined below.

Credibility refers to how well the findings accurately reflect the perspectives and experiences of the participants (Lincoln & Guba, 2013). In this study, credibility was addressed through the use of semi-structured interviews, which allowed respondents to describe their experiences, reasoning and perceptions in their own words. They were also allowed to elaborate freely on the topic of the interview. To ensure a nuanced understanding of innovation practices within Vattenfall, respondents were selected to represent different organizational roles and responsibilities. This helped reduce the risk of the empirical material being skewed by shared assumptions or similar viewpoints that may arise when respondents work closely together. Furthermore, this allowed multiple perspectives to be captured in relation to the same themes and questions, as different business areas and functions often emphasize different priorities, constraints, and focus areas when engaging with innovation.

Dependability refers to the consistency of the research process and whether the study is carried out in a clear and logical way. This means that the research process should be well documented and possible to follow, so that the procedures used in the study can be well understood and evaluated (Lincoln & Guba, 2013). This criterion was addressed by clearly documenting the research design and data collection procedures.

Confirmability refers to the extent to which the findings are shaped by the empirical material rather than the researchers' own perceptions, values, expectations or prior

knowledge (Lincoln & Guba, 2013). In order to reduce the risk of subjectivity, two researchers were involved in both data collection and analysis, which enabled continuous discussions and comparisons of interpretations with the purpose of reducing the risk of individual bias influencing the findings. As this thesis is written in collaboration with Vattenfall, maintaining objectivity is of high importance. To mitigate potential bias, a clear distinction between empirical findings and analytical interpretations was made throughout the report.

Transferability refers to whether the findings from a study may be relevant in other settings beyond the specific case studied (Lincoln & Guba, 2013). In this study, the criterion was addressed by providing a thorough description of the case company and its organizational context, allowing the reader to assess whether the findings may be applicable to similar organizations or settings.

4.3.2 Societal, Ethical and Ecological Aspects

Societal, ethical and ecological aspects must be taken into consideration when conducting research to ensure that the research is conducted responsibly.

The thesis relates to ecological considerations because the energy transition forms an important part of both the study context and Vattenfall's operations. Although the thesis does not directly contribute to ecology research, it is concerned with the topic of sustainability, which is also relevant for ecology. Vattenfall's mission, to become net-zero by 2040, will result in reduced carbon emissions. By focusing on Vattenfall's innovation capabilities, the study is situated within a broader organizational context that is indirectly related to this ambition.

Societal aspects were also considered in the thesis as Vattenfall's transition to renewable energy affects society. Society is a factor that can both affect and be affected by Vattenfall's transition and innovation speed, because society as a whole is still heavily dependent on fossil fuels.

Upholding ethics relates to all parts of the thesis, including topic selection, research methodology, results, discussion, reference citation and publication (Khan Rony, 2021). To guarantee that the thesis is conducted ethically and in compliance with legal agreements, confidentiality agreements signed between the authors and Vattenfall were strictly upheld. Furthermore, interviewees were given the choice to participate anonymously. There was also an ongoing dialogue with the thesis partner, Vattenfall, to ensure that the report did not include any information that could potentially harm the organization. Another way to uphold ethics while conducting the thesis work is to make sure the research methodology is consistent and transparent, and that the results stated are accurate (Khan Rony, 2021).

5

Findings

The following chapter presents the main findings from the interviews. The findings are divided into the determinants of innovation capability, knowledge processes and cross-unit collaboration, according to the analytical framework presented in section 3.4. Each section describes the main themes that emerged from the interviews. Figure 5 shows the first-order concepts and second-order themes identified from the interviews, mapped to the aggregate dimensions as explained in section 4.2.3.

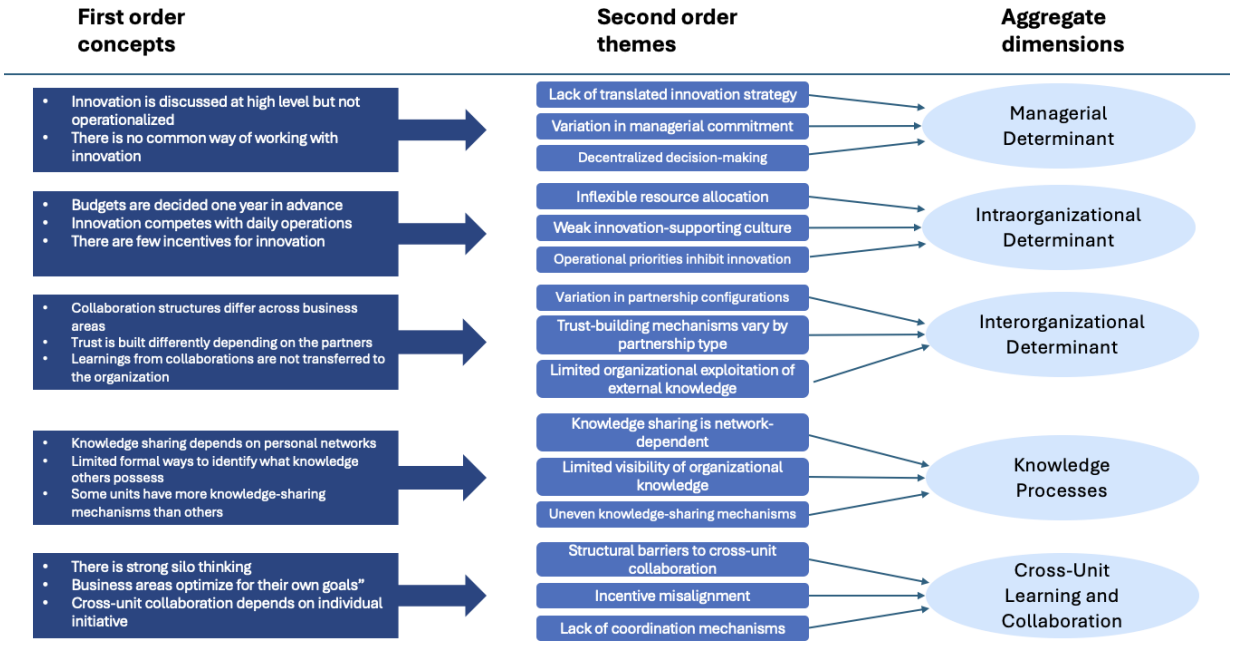

Figure 5: *Findings divided into first-order concepts, second-order themes and aggregate dimensions, inspired by Gioia et al. (2013)*

5.1 Determinants of Innovation Capability

The findings indicate that conditions related to management, internal organization and external collaboration differ significantly across Vattenfall's organizational units. In the following sections, the results for the managerial, intraorganizational and interorganizational determinants are presented. The managerial determinant

consists of management style and leadership, as well as corporate strategy. The intraorganizational determinant includes resources, work climate, ideation and organizational structure, technology, know-how development and individual activity. Finally, the interorganizational determinant entails external relations and network characteristics.

5.1.1 Managerial Determinant

Two main patterns were identified in relation to the managerial determinant. The first concerns the link between the corporate strategy and innovation strategy, and the second relates to variation in management style.

5.1.1.1 High-level Strategies are Not Translated into Innovation Strategies

The findings show that several business areas are guided by strategies or visions at a higher level, but that these are not translated into explicit innovation strategies that guide the daily work. Several respondents state that high-level strategic ambitions exist, but that these do not translate into a clear innovation strategy, a systematic innovation process or a shared understanding of how innovation should be initiated, prioritized and followed up in daily work.

This is visible in how some respondents describe the relationship between Vattenfall's overall strategy and their own work. A machinery engineer in BA Generation explains that Vattenfall has an overall strategy, but that it is difficult to understand exactly what this strategy means in the respondent's own work context, especially related to innovation. The respondent describes that when the strategy is broken down, it "*quickly becomes difficult to grasp*". The machinery engineer further explains that understanding how one fits into the broader strategy is important, both for motivation and for knowing what type of resources can be requested. A similar pattern is visible within R&D, where program manager A states that there is no explicit innovation strategy for the respondent's portfolio, while program manager B, who works within a different portfolio, does not know whether an innovation strategy exists. However, program manager A within R&D describes that they have strategic portfolio plans, delivery plans and quarterly objectives. This indicates that R&D has established structures for its work, but that these are not understood by all respondents as an explicit innovation strategy, or that they have not been clearly communicated to all employees.

The absence of an innovation strategy is also described in other parts of the organization. An innovation lead within BA Customer & Solutions states that there is no known systematic innovation work or innovation strategy, and that innovation instead depends on individuals who work innovatively because of individual motivation. Similarly, an innovation director within BA Wind explains that there is no explicit innovation strategy for the business unit, stating that "*I would like to have one*". However, the respondent describes that they have a technology vision that functions as a guiding document for which technical areas

should be developed, and that this is the closest the business unit comes to an innovation strategy. Within the same BA, a lead of the LCOE office describes that innovation activities are connected to business unit targets, scorecards and gate-based decision-making processes. However, the respondent also explains that there is no formal strategy for innovation, even though the respondent reflects that this probably should exist. The respondent also highlights a broader challenge in translating innovation strategy across organizational levels.

In BA Markets, a product owner does not describe the unit as having a specific innovation strategy, but instead highlights the team's vision statement and agile way of working as supporting innovation in practice. A manager within the same BA, working with strategy and business development, similarly explains that innovation-related work is partly handled through portfolio prioritization rather than through a separate innovation strategy.

Within BA Generation, there are different views on whether an innovation strategy exists or not. A business developer describes a strategic direction for asset management and business development, expressed through business plans. However, other respondents within the BA describe the absence of an operationalized innovation strategy. A digital innovation lead states that there is no known systematic innovation work or innovation strategy, while a digitalization lead within BA Generation explains that strategies, goals and a vision exist, but that these remain more of a "*paper product*" because they have not been translated into organizational structures that make them work in practice.

Overall, these findings indicate that Vattenfall does not lack strategic direction, but that explicit innovation strategies are often missing or not clearly understood at business unit level. In some units, innovation work is guided by portfolio plans, technology visions, agile methods or business development plans. However, the overall findings suggest that Vattenfall's high-level strategy is not translated into an innovation strategy that employees can use to understand how innovation should be carried out in practice.

5.1.1.2 Decentralized Decision-Making Creates Variation in Management Support

Several respondents describe management in positive terms, particularly in relation to their closest managers. However, respondents explain that decision-making is decentralized and that managers have autonomy to decide and steer development work within their own units. As a result, managerial support is experienced differently across the organization.

This variation becomes visible when comparing respondents from different parts of the organization. A product owner within BA Markets describes an agile team context where managers give employees room to experiment, test ideas and fail. In this case, management creates conditions that support innovation. In other cases, innovation work is described as partly separated from management. Within R&D, program manager A explains that high-level managers are not very involved in their

innovation-related work.

Other respondents describe more constraining managerial contexts. A digital innovation lead within BA Generation describes a tension between innovation and a management style that is shaped by operational stability. Further, the respondent explains that employees have many ideas, but these ideas may be stopped by several managerial layers. According to the respondent, many managers have historically been promoted because they were good at preserving and managing existing operations, rather than because they challenged established ways of working. The respondent also describes that innovation requires a different type of leadership, where questioning, testing and learning from failure are more central than maintaining existing routines. A digitalization lead within the same BA describes that management and employees are positive toward innovation and see its potential, but that ideas tend to get stuck in the middle-management layer. The respondent describes that this occurs where mandates begin to overlap between managerial roles and senior roles with decision-making authority, and where the focus on innovation disappears. The respondent suggests that this could be connected to managers in these layers being closer to operational reality and therefore more likely to focus on obstacles, risks and earlier failed attempts rather than the potential outcome of new initiatives. A related but different pattern is visible within IT, where a product owner describes that innovation is supported by managers, but treated more as a "*nice-to-have*" rather than a "*must-have*". Further, the respondent describes that management does not always see the value of innovation.

Overall, these findings indicate that managerial support for innovation is not experienced uniformly across Vattenfall, but instead varies depending on the organizational context in which a respondent is located. Due to this, innovation may be supported, prioritized, or slowed down depending on the individual manager involved.

5.1.2 Intraorganizational Determinant

The main findings for the intraorganizational determinant relate to a variation in resource allocation, as well as varying support and culture for innovation across the organization.

5.1.2.1 Perceptions of Resource Allocation Vary Across the Organization

A majority of the respondents emphasize that access to resources is one of the most important factors for enabling successful innovation. The findings show that respondents perceive the allocation of resources for innovation differently. These different views do not appear to be strongly connected to specific business areas, although the respondents who describe resource allocation most positively are located within R&D. Three different perceptions were identified: resources are sufficient; resources are primarily allocated to daily operations rather than innovation; or resources exist but are allocated inflexibly.

A portfolio manager within R&D explains that it is not difficult to obtain resources for further development of an already tested solution, once there is a clear organizational pull for it. Program manager B, from the same function, explains that portfolio managers allocate resources freely within their areas, and that budgets are approved as long as they create value.

However, a majority of the respondents describe that resources are mainly prioritized toward daily business and existing operations, rather than exploratory innovation. A business developer within BA Generation explains that resources and investments are often prioritized for existing operations since "*the existing business is central*", and that innovation becomes an add-on rather than the core of the business. A digital innovation lead within the same BA also points to a lack of competence-related resources, and that employees need more support in learning how to think and work in new ways. This is supported by an innovation lead within Customer & Solutions, who explains that there is no systematic competence development related to innovation.

A third perception is that resources exist, but that they are inflexible or unevenly distributed. Program manager A, within R&D, explains that budgets are often set one year in advance, which may cause more exploratory innovation activities to be deprioritized. Further, a solution architect within IT explains that Vattenfall has many physical resources that could support innovation activities, but that these resources often belong to specific units and are therefore not always accessible to employees from other parts of the organization. Another example of resource imbalance is provided by a lead of LCOE office within BA Wind, who explains that there is a staffing-related issue, as some units within the BA are understaffed while others are overstaffed.

5.1.2.2 Innovation is Weakly Supported by Organizational Culture and Incentives

The findings indicate that Vattenfall's culture for innovation is not perceived as consistently supportive across the organization. Several respondents describe that there are individuals and teams with a strong interest in innovation, but that there is a lack of a broader organizational culture that encourages innovation, experimentation and risk-taking.

A manager within BA Customer & Solutions describes a general hesitation toward innovation. An innovation lead within the same BA describes the cultural support for innovation as "*very, very low*", explaining that many employees come from a "*business as usual*" culture and that there is a limited sense of urgency higher up in the organization. The pattern is also visible within BA Generation, where respondents describe a risk-averse culture.

The findings also show that Vattenfall lacks a systematic incentive structure for innovation, and encouragement and rewards are instead described as depending on individual managers. This is also reflected in Vattenfall's yearly innovation competition, where a previous monetary reward has been removed and replaced

by a vaguer possibility of implementing the winning solution. Overall, this result suggests that innovation is driven more by motivated individuals than by an organization-wide culture or incentive structures.

5.1.3 Interorganizational Determinant

The main findings from the interviews relate to variations in how interorganizational collaboration projects are structured and the extent to which knowledge is transferred through these projects.

5.1.3.1 Interorganizational Collaboration Structures Vary Across Business Areas

The findings show that business areas differ in how they structure their interorganizational collaboration projects. These differences are apparent in both the types of companies they collaborate with and the types of partnerships they form.

One pattern seen in the interviews is that BA Customer & Solutions, as well as R&D, typically collaborate with new and small companies such as startups and scaleups. These departments seem to have a more exploratory and flexible approach to collaborations. Meanwhile, BA Generation primarily works with larger companies, and often in long-term partnerships. A machinery engineer and a digital innovation lead, both within BA Generation, explain that the hydro and nuclear businesses are conservative, with a lower willingness to change existing ways of working. The innovation lead explains that "*it is a conservative industry ... This makes people averse to new things*". The respondent adds that "*when you have worked for so long with certain companies, you have also built up relationships that make it difficult to change*", giving another reason as to why recurring partnerships may take place to a larger extent within BA Generation than within other business areas. BA Markets and BA Wind seem to be positioned between the exploratory collaboration approach found in R&D and BA Customer & Solutions, and the more long-term collaboration approach found in BA Generation.

The differences in collaboration structures are also reflected in how respondents describe trust. Respondents across all business areas identify trust-building as an important aspect of interorganizational collaboration projects. However, because collaborations differ in type and purpose across business areas, trust is established in different ways depending on the nature of the collaboration. The collaboration projects carried out by R&D and Customer & Solutions are of a more exploratory form, and therefore trust does not have to be built through long-term or recurring projects with the same partner. Instead, it may be created through meeting the people they will work with, making sure that formal documents such as NDAs are in place and clarifying how information and Vattenfall's brand may be used. In contrast, respondents from BA Generation explain that trust in their collaboration partners is built up over time through long-term collaborations, showing that promises are kept and that there is an understanding of the Vattenfall culture and

people. A similar view is expressed within BA Markets, where trust is described as something that is built over time through regular meetings and transparency. Together, this shows that while trust is important in all types of collaborations, the way trust is built differs between exploratory collaborations and collaborations that are closer to existing operations.

5.1.3.2 Learning from Interorganizational Collaborations Is Limited

The findings show that interorganizational collaborations do not automatically lead to organizational learning. While several respondents describe that knowledge to some extent is exchanged in collaboration projects, the knowledge is mainly related to technical solutions, data or the specific product or service that is being developed. Knowledge about innovation-related methods, processes or ways of working is described as rarely being absorbed by Vattenfall.

This pattern is visible across several business areas. An innovation director within BA Wind and a machinery engineer within BA Generation explain that the knowledge that is exchanged with collaboration partners mostly concerns technical specifications of the innovation, rather than any knowledge behind it. A product owner within BA Markets explains that some form of knowledge exchange generally occurs with external partners, although it is often limited and varies depending on the collaboration partner and the type of knowledge involved. However, the general perception is that while technical knowledge is shared, the absorption of knowledge regarding innovation processes and methods is limited. Program manager A within R&D states that Vattenfall is not very good at bringing knowledge about innovation work methods, gained from collaboration projects, into the organization. A digitalization lead within BA Generation similarly explains that collaboration projects have not influenced how the respondent's business unit works with innovation methods. According to the respondent, this may be because employees do not always reflect on what they can learn from collaboration partners' ways of working.

Overall, the findings suggest that Vattenfall gains value from external collaborations, but mainly through access to technical knowledge, data or specific solutions. The absorption of broader knowledge regarding innovation-related methods or processes appears to be limited, meaning that Vattenfall does not always utilize the full learning potential of external collaborations.

5.2 Knowledge Processes

Two main patterns emerged in relation to knowledge processes. They concern the extent of formal mechanisms for knowledge sharing, as well as the variation in knowledge-sharing practices.

5.2.1 Knowledge Sharing is Network Dependent Rather than Formalized

The interviews show that the culture for knowledge sharing is generally perceived as open, with colleagues being helpful and willing to share information. However, knowledge sharing appears to depend largely on informal mechanisms rather than formalized structures or clear processes. There are limited formal ways to identify what knowledge others possess, what knowledge may be valuable for one's own work, or how knowledge should be shared across the organization. As a result, access to knowledge often depends on personal networks and knowing who to contact.

The network dependency is reflected in several interviews. The head of business development and innovation within BA Customer & Solutions explains that it is not easy to understand how the organization works internally or where to turn in order to get access to the right knowledge, especially for employees who are new or work in parts of the organization that are further away from the central network. Although the respondent emphasizes that people are generally helpful, and that employees are often redirected to the right person by colleagues, the respondent also stresses that "*the internal network is very, very important*". This suggests that knowledge sharing appears to be supported by a helpful culture, but that access to knowledge is shaped by whether employees know who to contact in order to obtain that knowledge.

This pattern is also visible within BA Generation, where several respondents describe knowledge sharing as dependent on informal navigation rather than formal channels. A digital innovation lead within the BA explains that employees often do not know how to pass on knowledge or new ideas upwards in the organization. When management has not created structures for this, employees are left to identify on their own who they need to contact, learn from or involve in order to proceed. This indicates that the responsibility for moving knowledge forward often falls on the individual employee rather than being supported by clear organizational mechanisms. A machinery engineer within BA Generation similarly explains that knowledge sharing mainly takes place during coffee breaks, and that employees' overview of ongoing work becomes weaker as the distance to other departments increases, both physically and organizationally. This makes it more difficult to know what knowledge may exist beyond one's immediate network.

The same dependence on personal networks is visible in BA Markets and IT. A product owner within BA Markets describes that identifying relevant expertise outside the team largely depends on asking around and using the internal network. Similarly, a product owner from IT explains that employees often need to ask around in several steps when looking for specific knowledge, since there are few formal ways of identifying who to contact. The respondent also argues that knowledge sharing often depends on individuals who take responsibility for connecting people and making knowledge visible. Further, the respondent points out that Vattenfall needs to become better at sharing selected insights and knowledge in a more structured way, so that relevant knowledge does not disappear in a broader flow of information. This supports the finding that knowledge sharing at Vattenfall is not primarily

limited by an unwillingness to share, but by the lack of formal structures that make knowledge and expertise visible across the organization.

5.2.2 Knowledge-Sharing Mechanisms Differ Across Organizational Units

Although network dependency emerges as the clearest pattern across the interviews, the findings also show that the ways in which knowledge is shared differ between organizational units. R&D stands out as having more recurring and formalized practices for internal knowledge sharing. Several respondents within R&D describe that the department has weekly seminars, where teams or programs present completed projects or ongoing work. Further, project reports are made available to all of R&D, and demonstrations are used to share knowledge both within R&D and with other parts of the organization.

In BA Customer & Solutions, knowledge sharing appears to be organized more around specific forums. An innovation lead describes a group named Customer Based Flexibility Expert Group, where champions from different units within the BA, together with representatives from BA Markets and R&D, discuss and share knowledge, roadmaps and challenges. This suggests that knowledge sharing within Customer & Solutions is supported by dedicated forums in specific subject areas, rather than by a broad, general structure for knowledge sharing across the whole business area.

Within BA Generation, the findings show greater internal variation. A business developer within the BA describes knowledge sharing through department meetings and project-based interactions. However, this view differs from other respondents within BA Generation, who instead describe knowledge sharing as informal and dependent on individual initiatives. This variation suggests that knowledge sharing within the BA is shaped by the respondent's organizational position and/or which specific business unit they operate in. BA Wind shows a different pattern, as an innovation director explains that knowledge exchange between onshore and offshore wind is supported by shared services and common functions, such as engineering and control center functions. However, a lead of LCOE office within the same business area describes a more structured approach to knowledge sharing within the respondent's business unit, including weekly knowledge-sharing sessions, recurring meetings with different functions, communication pieces and newsletter updates.

Within BA Markets, knowledge sharing appears to be more integrated into the team's agile way of working. A product owner within BA Markets describes how they work in cross-functional teams consisting of both software developers and employees with business expertise. The respondent describes that knowledge sharing is largely organized by the team itself, rather than being driven by managers or structures, as the team meets daily and uses Scrum practices. The respondent also explains that the team has recurring meetings, where knowledge sharing takes place. In addition, the team's work and changes are documented continuously, making it easier for team members to look up what others have worked on and to share knowledge within

the team. According to the respondent, this functions as a means of knowledge sharing, since team members learn from each other's work. The respondent also describes additional knowledge-sharing sessions, where one person presents a topic to the rest of the team. However, the respondent also notes that documentation and knowledge-sharing activities require discipline, as they are often among the first to be deprioritized when workload is high.

5.3 Cross-unit Collaboration

The two main themes that the findings present relate to the extent to which cross-unit collaborations take place, as well as the mechanisms that inhibit collaborations from taking place.

5.3.1 Cross-Unit Collaboration Takes Place to a Limited Extent

The findings demonstrate that cross-unit collaboration takes place to a limited extent at Vattenfall, between both business areas and business units. An innovation lead within BA Customer & Solutions describes that each business unit and business area is autonomous and that responsibilities are organized in silos, meaning that knowledge, solutions and initiatives are not naturally shared across units. The respondent explains that this is connected to Vattenfall's decentralized structure, where each business unit has its own profit-and-loss responsibility, and therefore focuses on the solutions needed to run its own business. The respondent adds that "*there is no system that promotes collaboration across business units*", and that there is not a culture of collaborating across units. This indicates that silo thinking is not only a structural issue, but also affects the organizational thinking of individual employees and how business areas operate. This view is supported by several other respondents in different business areas, including a product owner within IT, who adds that the silo structure affects the possibilities of sharing knowledge with colleagues across business units and areas. Respondents describe that the silo structure causes people to keep their ideas and solutions within their own business area, rather than sharing them across the organization.

Furthermore, a clear majority of respondents do not experience that there are many formal mechanisms to identify and facilitate learning and collaboration across business areas and units. A digitalization lead within BA Generation states that "*It is not easy to identify knowledge possessed by other business areas, that could be of use for you... There are no forums for knowledge sharing across business areas*". Therefore, it is difficult for employees to know what knowledge colleagues in other business areas possess, what knowledge may be valuable for other business areas, and what knowledge they may be interested in receiving from others.

5.3.2 Several Mechanisms Inhibit Cross-Unit Collaboration

Although cross-unit collaboration currently takes place to a limited extent, the interviews provide a unified view that employees across different business areas would like to collaborate more across units and believe that this would be beneficial for Vattenfall. A manager of strategy and business development within BA Markets emphasizes that changes in the energy market come with an increased need for collaborations across BAs. The respondent claims that the energy transition requires multidisciplinary solutions and "*then we need to be able to work more across units. I think it is the market that is driving a greater need for cooperation*". An R&D portfolio manager adds that Vattenfall has a unique opportunity due to its integrated value chain, as the company has business areas operating across several parts of the energy system. However, the respondent argues that this potential is not fully exploited, since the business areas do not collaborate sufficiently across the value chain. By collaborating across business areas, the respondent believes Vattenfall could exploit its integrated value chain more, thereby creating added value for the company. However, the interviews identify several mechanisms that hinder cross-unit collaboration.

5.3.2.1 Incentive Misalignment

The silo thinking enhances a certain competitiveness within the organization. The competitiveness stems from the fact that all business areas have different objectives that they need to deliver on. A manager for business development and innovation within Customer & Solutions also describes that "*incentives lie in showing that one's own unit has succeeded in some way, and that units can get some form of glory if they come up with their own fantastic idea and are able to push it through*". This aligns with the fact that several respondents experience that there are variants of not-invented-here (NIH) syndrome within the organization, which makes business areas less prone to collaborate with each other as they would rather develop things themselves. The manager within Customer & Solutions describes it as a built-in resistance to bringing in solutions that other business areas have developed to their own unit.

Furthermore, respondents describe that each business area and business unit is evaluated based on its individual profit-and-loss performance. As a consequence, if a BA develops a solution that requires an investment, they do not want to share it with others unless they are paid for it. Otherwise, the benefits may be distributed across multiple business areas, while the associated costs remain within a single BA, potentially making that BA appear to perform worse than others. It is also described by several interview respondents that there are no KPIs that promote cross-unit collaboration. An innovation lead in Customer & Solutions explains that each region has its own KPIs to meet, which sometimes conflicts with the openness with other business areas in the organization.

5.3.2.2 Economic Misalignment

The decentralized organizational structure inhibits investments across business areas. Many collaborations require making some kind of investment, and "*investments across BAs are a mess*", as stated by an innovation director in BA Wind. The respondent explains that investments need to have one clear business area owner in order to function effectively. A digital innovation lead within BA Generation exemplifies the issue by describing that "*if we are sitting at three different units and my unit could do something, that costs me two million to do, that could save the two other units three million each. Then, even if the net savings are positive four million, I can not take the two million from my budget, because the savings do not end up in my unit*". The respondent adds that there is a lack of understanding within the organization that it is necessary that units work together and that this requires adaptation to other units, in order to create something good for the company as a whole. As a consequence, collaborations across business areas rarely take place unless they are necessary.

5.3.2.3 Governance Models

An innovation director within BA Wind explains that, due to the vastly different assets that the business areas manage, "*We don't, in Vattenfall, have synchronized governance cycles and governance principles*". Due to the lack of synchronized governance models, cross-unit collaborations become more complex. Furthermore, a digitalization lead in Generation explains that even though two nuclear sites must follow the same regulations, differences in their respective governance models cause them to make different choices and have different ways of working. This is also perceived as one reason why it is difficult to learn from each other.

5.3.2.4 Perceived Complexity and Loss of Control

A manager for business development and innovation within Customer & Solutions describes that another factor that may inhibit cross-unit collaborations is the perception that it is more difficult to drive initiatives forward when more people are involved. This is both due to the added complexity, but also because units may need to compromise to ensure that their priorities are reflected in the final outcome. The innovation director within BA Wind further explains that "*each BA is big enough to fund its own technology development and form its own innovation processes*". The innovation manager adds that "*the confusion and the complexity of co-developing simply makes it more difficult without being necessary*". Other respondents add that collaborating cross-unit is complicated as it increases overhead, more stakeholders are involved and the final solution has to meet everyone's needs, thus implying a loss of control.

In fact, a manager within BA Customer & Solutions describes that it may sometimes feel less complicated to collaborate with external companies than with other business areas within the same organization. The respondent explains that the reason for this is that "*we have a little more control and can steer in some way based on the fact that we still have a negotiating role. If we end up in a discussion with another*

department internally, it can be much more difficult to know whose priorities will prevail".

5.3.2.5 Coordination Mechanisms

Several respondents describe that different parts of the organization often try to solve similar problems, but that these efforts are not coordinated. Instead of collaborating or aligning their work, units tend to address the same types of issues separately within their own organizational boundaries. A digital innovation lead within BA Generation argues that the shared functions, such as R&D and IT, should have a greater responsibility to coordinate business units to facilitate collaboration. The respondent explains that if these functions get the same question or assignment from two or more units, they could connect these units and enable them to work together. Respondents from the R&D and IT departments show an awareness that they, as employees in overarching functions, have greater potential of identifying coordination possibilities. A product owner in the IT department states that these functions "*play a key role in knowledge sharing because they are group-wide, so they break the boundaries by nature*". However, respondents from R&D and IT also explain that it is not part of their role description to facilitate collaboration between other units. An innovation director within BA Wind mentions that the shared functions already do "*collect the thinking of the different business areas and then push ideas down toward us*", but argues that they should have a formal role of "*seeking collaborative potential and pushing that into the business areas*".

5.3.3 Efforts to Increase Cross-Unit Collaboration Vary Across the Organization

A manager of strategy and business development in BA Markets explains that a new leadership model, called Lead, has been rolled out. This model includes "lead yourself, enable teams, enable others, align teams and drive performance". The respondent explains that, with this new model, the importance of collaborations is now explicitly emphasized across the organization. A product owner within the same business area states that "*In the past it was very often that I saw decisions were made which optimize locally. Now I can see that people also raise the question: okay, what is the best now for Vattenfall?*".

BA Markets has an explicitly stated strategy for driving strategic initiatives and business development in close cooperation with other BAs. However, only BA Markets has mentioned this strategy or any increased efforts to facilitate cross-unit collaboration. This shows that there is an inconsistency across the organization around how clearly articulated the ambition to collaborate across business areas is. A strategy and business development manager within BA Markets suggests that there may still be a lack of structure to facilitate collaborations. The respondent argues that management should take greater responsibility for informing employees about Vattenfall's strategic focus areas and ensuring that there are structures in place to bring together the right expertise for these areas and projects. This aligns with how previous respondents have claimed that there is a lack of coordination

mechanisms.

6
Analysis

This chapter discusses the empirical findings in relation to the analytical framework in order to answer the research questions of this thesis. The chapter first uses the framework to analyze how the factors influencing innovation capability are expressed differently across Vattenfall's organizational units. It then discusses how cross-unit collaboration and learning can strengthen overall innovation capability by connecting local knowledge, resources and collaboration experiences across the organization. Finally, the analytical framework is evaluated based on the empirical findings, with the purpose of identifying which parts of the framework are supported and which parts should be refined.

6.1 Variation in Factors of Innovation Capability across Organizational Units

The following sections describe how the factors within the managerial, intraorganizational and interorganizational determinants, as well as knowledge processes, differ across the organizational units of Vattenfall.

6.1.1 Managerial Determinant

The empirical results show that business areas and units differ considerably in how they work with innovation, and what types of methods they use to both initiate and follow up on innovations. This is described by respondents as being the consequence of a decentralized structure in which managers have high autonomy within their own business area or unit. Having a decentralized structure means that individual managers have a strong influence on how they prioritize and manage the innovation work within their unit. As a result, managerial support for innovation becomes dependent on how individual managers prioritize and manage innovation work in their local context. Some managers have a greater focus on stability since their operations depend more on stability than on innovation, which makes them less prone to support innovation initiatives. In addition, managers' level of interest in and knowledge of innovation differ, which creates varying commitment to innovation. Some respondents experience that their managers give them room to experiment, test ideas and fail, but others experience that management may sometimes constrain innovation as their focus is on operational stability rather than exploration. This variation is particularly important in light of Mendoza-Silva's (2021) argument that managers play a central role in shaping innovation capability through their influence

on resource allocation and strategic priorities. Since managers determine which activities receive attention, time, and resources, differences in managerial priorities are likely to affect the extent to which employees can engage in innovation activities. Therefore, in Vattenfall's case, managerial autonomy can support innovation when managers create room for experimentation, testing and learning from failure, but it can also limit innovation when managers prioritize stability, existing routines and operational risk reduction. This is further supported by Frishammar et al. (2012), who describe management support, positive attitudes and commitment as crucial for building innovation capability. The findings show that this type of support is not experienced equally across Vattenfall. Although some respondents experience support from their closest manager, innovative ideas can still be stopped by several managerial layers, consisting of managers who do not want to challenge existing ways of working. It is also described that upper management sees innovation as a "nice-to-have", rather than a "must-have". Thus, managerial support concerns not only a generally positive attitude toward innovation, but also managers' ability to create conditions for innovation to be prioritized and implemented. Because management styles differ across the organization, different units have different conditions for developing innovation capability.

The managerial determinant also includes the corporate strategy of a firm. The findings demonstrate that while Vattenfall and its business areas have high-level strategies, these have not been translated into explicit and tangible innovation strategies at business unit level. Although a minority of units work with strategic portfolio plans, delivery plans and quarterly objectives, the majority of the respondents are not aware of their business area's strategy, and do not know how it connects to their daily work. This could be a consequence of management not translating strategic priorities into the business unit context sufficiently, making it difficult for employees to understand how their work fits into the larger strategy. The literature emphasizes the importance of linking the firm's activities to its broader strategic objectives, which includes having a clearly articulated strategy and disseminating the strategic vision across the firm (Mendoza-Silva, 2021). This is important because of the significant influence of a firm's strategy on its innovations (Frishammar et al., 2012). Vattenfall, in contrast to what the literature recommends, seems to lack strategies that are specifically linked to innovation, and its strategic ambitions have not been disseminated throughout the organization in a way that is tangible for employees at the business unit level. This shows that although Vattenfall has a corporate strategy, it is not certain that the strategy contributes to an improved innovation capability since it has not been specifically linked to innovation, nor been clearly translated and communicated across the organization. The development of innovation strategies that are clearly linked to employees' work could contribute to making it easier to set measurable objectives regarding innovation work which, in turn, could improve the individual motivation and drive that employees have.

6.1.2 Intraorganizational Determinant

In line with the variation in management styles and support for innovation, the findings show that perceptions of resource allocation differ across the organization. Respondents in some business areas perceive that they have sufficient access to resources to support innovation, which allows them to "*test and fail*", while others experience resource constraints. However, there are also business areas that describe that, although resources exist within the organization, it is difficult to obtain resources for innovation for two main reasons. Firstly, budgets for projects are often set one year in advance, which limits the possibility of allocating resources flexibly to new projects. Second, access to physical resources may be limited when they are owned by another team, as employees must then request permission to use them. Mendoza-Silva (2021) states that it is important that a firm has the necessary resources for innovation and manages them effectively, but does not mention that prioritization and flexibility of resource allocation also impact the innovation of a firm. Another aspect regarding resources, which the empirical findings present, is that the firm's knowledge resources are not exploited adequately. Many employees experience that innovative ideas are not brought forward, giving the view that employees' competencies when it comes to innovation are not being sufficiently utilized. It is also explained that employees are not given the resources to develop their own competencies, i.e., for know-how development. Without opportunities to develop their know-how, employees' ability and motivation to innovate may decrease.

Throughout Vattenfall's organization, the climate and culture for innovation are perceived as inconsistent. Instead of being systematically upheld by structures of routines, it is dependent on certain individuals within each area who are especially driven and motivated to be innovative. Mendoza-Silva (2021) explains that work climate can influence innovation capability by aligning employees' interests and attention toward, in this case, innovation. The organizational culture, which is related to the work climate, can enhance a positive attitude toward being innovative (Mendoza-Silva, 2021). Although there is a lack of culture for innovation in some parts of the organization, there are many individuals within Vattenfall that drive innovations within their teams, showing that the individual activity is strong and can have a large impact on the innovation capability in Vattenfall's case. However, this so-called individual activity should not be relied on because it can create dependency on specific individuals and may make innovativeness difficult to scale, meaning it is not embedded in the organization.

Another aspect that is demonstrated by the interview findings is that Vattenfall's organizational structure affects how innovation work is coordinated, owned and followed up. Lawson & Samson (2001) explain that a firm must have an optimal business structure in order to innovate successfully. According to the authors, having permeable boundaries between business units within a company can help break down barriers, which enables innovative behavior. The empirical findings suggest that employees do not perceive Vattenfall's organizational structure as optimal to be innovative. Rather, findings point toward a lack of coordination between units for innovations, implying that the boundaries between business units are not permeable.

Further, there is a lack of KPIs that measure innovativeness and systematic innovation work, but there are also no follow-ups on innovations. A particular structural challenge appears at the middle-management level, where innovation initiatives may involve several managers or senior roles. When responsibilities overlap, it can become unclear who has the authority to make decisions and move the idea forward. As a result, ideas may get stuck between organizational layers. Further, the findings indicate that there is confusion within the organization regarding who is responsible for innovation work. While some business areas claim that it lies in the responsibility of all employees, others argue that their business area should not be innovative, and that other functions such as R&D have this responsibility. This could indicate that there is a need for clarifying the roles of the different parts of the organization, as unclear organizational responsibility may create ambiguity around innovation responsibilities.

6.1.3 Interorganizational Determinant

The findings indicate that when pursuing interorganizational collaboration projects, there is not a unified way to structure collaborations across the organization. Some units showcase a more exploratory and flexible approach to collaborations in which trust is established through frequent interaction, informal communication, non-disclosure agreements and clearly defined collaboration boundaries. Others demonstrate collaborations through long-term partnerships with established companies, where trust-building relies more strongly on repeated interaction, previous positive experiences and stable relational structures. One possible explanation for this difference is that certain business areas operate in contexts where the approach to innovation is more conservative, due to focus on operational stability, reliability and risk minimization. As a result, these types of units may become more cautious regarding new collaboration partners. Another difference is the extent to which Vattenfall absorbs innovation-related knowledge from the external partner. Mendoza-Silva (2021) emphasizes that having external collaborations can improve a firm's innovation capability. However, the author also states that the characteristics of the so-called interorganizational network also have an impact. This includes the patterns of interaction, the quality of the partnerships, as well as shared goals and understanding. The author also explains that external relationships can improve a firm's capacity to exploit external information in ways that support its innovation development. The empirical findings show that the characteristics differ in collaboration projects depending on the business area, which implies that the effect on innovation capability will differ. Instead of having a unified way to work with collaborations, this determinant varies across the organization depending on local collaboration practices, partnership configurations and unit-specific approaches to innovation.

The interorganizational determinant is, however, not assessed to the same extent as the other factors influencing innovation capability, as external collaborations with SMEs constitute the scope of the thesis. Since all respondents were limited to discussing collaboration projects with SMEs, the findings cannot assess how important factors of the interorganizational determinant, e.g. external relations,

are for innovation capability compared to internal innovation activities. In addition, the study does not provide a general assessment of how well Vattenfall fulfills the interorganizational determinant across the organization, as it does not examine units or projects where external collaboration is absent. Hence, variations within this determinant cannot be measured to the same extent as factors within the other determinants can. Instead, the findings mainly show how interorganizational collaborations are structured, coordinated and used for learning when such collaborations take place. Therefore, the study provides insight into how the interorganizational determinant varies across business areas, but not into the overall extent to which Vattenfall as a whole engages in interorganizational collaboration.

6.1.4 Knowledge Processes and Characteristics

The empirical findings demonstrate that the mechanisms used to transfer knowledge differ between business areas. However, the most common response is that knowledge is shared informally with close colleagues or through personal networks, as formal structures or processes for knowledge sharing are limited. The lack of structures also creates a dependency on having a personal network of contacts to reach out to in order to transfer or obtain knowledge. Respondents also experience difficulties with identifying useful knowledge that other individuals possess. Besides the lack of structures that could facilitate this identification, this could be the result of knowledge characteristics limiting the extent to which employees seek or apply knowledge developed elsewhere in the organization. For example, Mendoza-Silva (2021) explains that ambiguous and complex knowledge is difficult and time-consuming to acquire and share. Ambiguous knowledge can be tacit knowledge, which is difficult to acquire unless there is an opportunity for "*learning by doing*", but it could also be specific knowledge that is only useful in the setting where it is developed. In Vattenfall's case, knowledge developed in other parts of the organization may be perceived as tacit and context-specific, which limits the extent to which individuals are interested in acquiring this type of knowledge. One way in which BA Markets addresses this problem is by having well-established rotation programs where employees have the chance to learn tacit and specific knowledge from a different unit. Through these types of opportunities, employees may also find knowledge that is applicable for their own team, although initially perceived context-specific. Furthermore, Pérez-Luño et al. (2011) explain that, when knowledge is complex, human interactions become important. As innovations often involve complex knowledge, especially when they expand over several business units, structures for enabling this type of knowledge-sharing through human interactions are crucial for the innovativeness of a firm.

Although there is an absence of organization-wide structures for knowledge sharing, some business units have set up structures for themselves. Within BA Markets, knowledge sharing appears to be integrated into the team's agile way of working. For example, the team continuously documents work and changes, which makes it easier for employees to look up what others have worked on and learn from each other's experiences. Recurring meetings and knowledge-sharing sessions also create

opportunities for employees to discuss ongoing work and share specific insights with the rest of the team. These measures all contribute to making knowledge more visible to others, allowing employees to learn from each other's experiences and know-how.

6.2 How Cross-unit Collaboration and Learning Can Improve Overall Innovation Capability

The following sections describe how cross-unit collaboration and learning can improve Vattenfall's overall innovation capability.

6.2.1 Making Local Knowledge Available for Firm-Level Innovation

The findings suggest that cross-unit collaboration and learning can strengthen Vattenfall's overall innovation capability by transforming knowledge that is currently local and unit-specific, into knowledge that can be used across the organization. The results show that Vattenfall does not lack knowledge, experience or initiatives among employees related to innovation. Rather, these resources appear to be unevenly distributed across different business areas, business units and support functions. This can be understood through Tsai's (2001) view of cross-unit learning, where organizational units can benefit from knowledge developed elsewhere in the firm, if they are connected through internal networks and have the absorptive capacity to recognize, assimilate and apply that knowledge. The findings indicate that this condition is only partly fulfilled at Vattenfall. Respondents describe difficulties in identifying what knowledge exists in other business areas, what knowledge could be valuable for their own unit, and what knowledge other units may be interested in receiving. That knowledge is difficult to recognize and interpret across organizational boundaries can be understood as a form of internal stickiness, as described by Szulanski (1996). This is particularly relevant in Vattenfall's case, since knowledge developed in one unit is often shaped by that unit's specific role in the organization, its responsibilities and the technologies it uses. Therefore, another unit may struggle not only to identify that the knowledge exists, but also to understand why it worked in its original context and how it could be adapted to its own conditions. Cross-unit learning is therefore not only a matter of making knowledge visible, but also of helping units interpret and translate knowledge across different organizational contexts.

The fact that cross-unit collaboration can strengthen overall innovation capability by reducing the distance between where knowledge is developed and where it could create value does not mean that knowledge from one business area can be transferred directly to another without adaptation. Since Vattenfall's units operate in different parts of the value chain and in different ways, knowledge and experiences may need to be interpreted and adapted before they can create value elsewhere. The role of cross-unit collaboration is therefore not to standardize innovation work across

all units, but to create opportunities for learning across units, where experiences, methods and approaches from one part of the organization can inspire and inform innovation work elsewhere. In this way, local experience can become a source of firm-level learning, even when the knowledge itself cannot be directly applied in another context.

This is especially relevant for an incumbent energy utility such as Vattenfall, where different business areas work with different parts of the value chain. The empirical findings show that respondents at Vattenfall perceive an increased need for cross-unit collaboration, as future energy solutions are expected to require cooperation across business areas. Vattenfall's integrated value chain is also described as a potential strength, but one that is not fully exploited when business areas work separately and knowledge remains confined within unit boundaries. Cross-unit collaboration can therefore help connect otherwise separated knowledge bases, enabling experiences and capabilities developed in one part of the value chain to support innovation work in other parts of the organization.

6.2.2 Enabling Cross-unit Learning Through Coordination Mechanisms

The findings suggest that cross-unit collaboration cannot rely only on individual initiative or a general willingness to collaborate. While these factors may enable collaboration in specific situations, they do not create the ability to learn across units. If cross-unit learning depends on individuals knowing who to contact, the organization's ability to transfer knowledge and to collaborate becomes vulnerable. Therefore, cross-unit collaboration is more likely to improve overall innovation capability if it is supported by structures that make relevant knowledge, initiatives and collaboration opportunities visible across business areas. In order to do this, well-functioning coordination mechanisms are needed. Jansen et al. (2005) argue that coordination mechanisms, such as cross-functional interfaces and participation in decision-making, support the acquisition and assimilation of knowledge. As of today, Vattenfall lacks such coordination mechanisms to a large extent. By introducing more effective coordination mechanisms, cross-unit collaboration can become less dependent on informal networks and individual initiatives. With these, it becomes easier to identify where similar problems are being addressed, where relevant knowledge already exists and where collaboration could create value beyond the individual unit.

Although some functions have an informal overview of several business areas, this is not sufficient to ensure systematic cross-unit collaboration and learning. Instead, the organization needs clear responsibility for identifying overlapping needs, similar initiatives and knowledge that could be valuable across units. Several respondents describe R&D and IT as functions that often become coordinating actors, since they operate across business areas and therefore can identify recurring questions, similar problems and possible synergies. However, as this role currently appears to be more informal than formalized, opportunities for learning and collaboration may be missed if no function has a clear mandate to connect units with similar needs. Formalizing

this responsibility could therefore strengthen cross-unit learning by making it clearer who is responsible for recognizing collaboration opportunities and helping knowledge move across business area boundaries. This is especially important since knowledge transfer often requires repeated exchange between the source and the receiving unit, rather than a one-time transfer of information (Szulanski, 1996). However, this coordinating role should not mean that functions, such as R&D or IT, transfer knowledge on behalf of the business areas. Rather, their role would be to identify where relevant knowledge and similar needs exist, and then create conditions for direct interaction between the units involved. This is in line with Zhao and Anand (2013), who argue that complex and practice-based knowledge often requires several direct links across units, rather than relying on a single boundary spanner.

6.2.3 Incentives and Economic Alignment as Conditions for Cross-unit Collaboration

Coordination mechanisms alone are unlikely to be sufficient if economic and incentive structures keep encouraging local optimization. Formal roles may help identify where collaboration could create value, but units also need incentives to act on these opportunities. For cross-unit collaboration to improve overall innovation capability, units must not only be able to share knowledge, but also have incentives to share, adapt and apply knowledge developed elsewhere in the organization. If business areas and business units are primarily evaluated by their own objectives, KPIs and profit-and-loss responsibility, collaboration that creates value for Vattenfall as a whole may remain difficult in practice.

Lin (2007) argues that reward systems can encourage employees to share knowledge and thereby strengthen innovation capability. In a large multi-unit firm, a similar logic can be assumed to apply between business areas. If units are expected to collaborate, share resources or adapt solutions developed elsewhere, the organization must also recognize and reward these cross-unit contributions. Otherwise, collaboration might require one unit to sacrifice time, budget or control for benefits that appear in another part of the organization. Incentives can therefore improve overall innovation capability by making cross-unit collaboration a part of how units create value. This could involve shared KPIs, KPIs that explicitly reward cross-unit collaborations, joint ownership of innovation initiatives, or non-monetary incentives such as managerial recognition. By introducing mechanisms like these, collaboration would be easier to justify. It would also strengthen innovation capability by enabling more effective use of existing resources, reducing duplicated work and allowing knowledge developed in one unit to support innovation work elsewhere.

6.3 Revised Analytical Framework

The findings provide support for the analytical framework, but they also suggest that some parts of the framework should be refined. The original framework by Mendoza-Silva (2021) was used to identify managerial, intraorganizational and

interorganizational determinants of innovation capability. However, the empirical findings show that these determinants do not exist uniformly across Vattenfall. Instead, they appear to be different depending on which business area, business unit or support function is studied. Managerial conditions, access to resources, collaboration practices and knowledge-sharing mechanisms are shaped by the local organizational context of each unit. This means that innovation capability cannot be understood as equally developed or organized across the firm, but rather as varying between different parts of the organization. This supports the argument that innovation capability in large incumbent firms should not be treated only as a homogeneous firm-level capability. The revised analytical framework is presented in Figure 6. In the figure, the oval elements represent revisions made based on the empirical findings, whereas the rectangular elements were retained from the previously developed analytical framework.

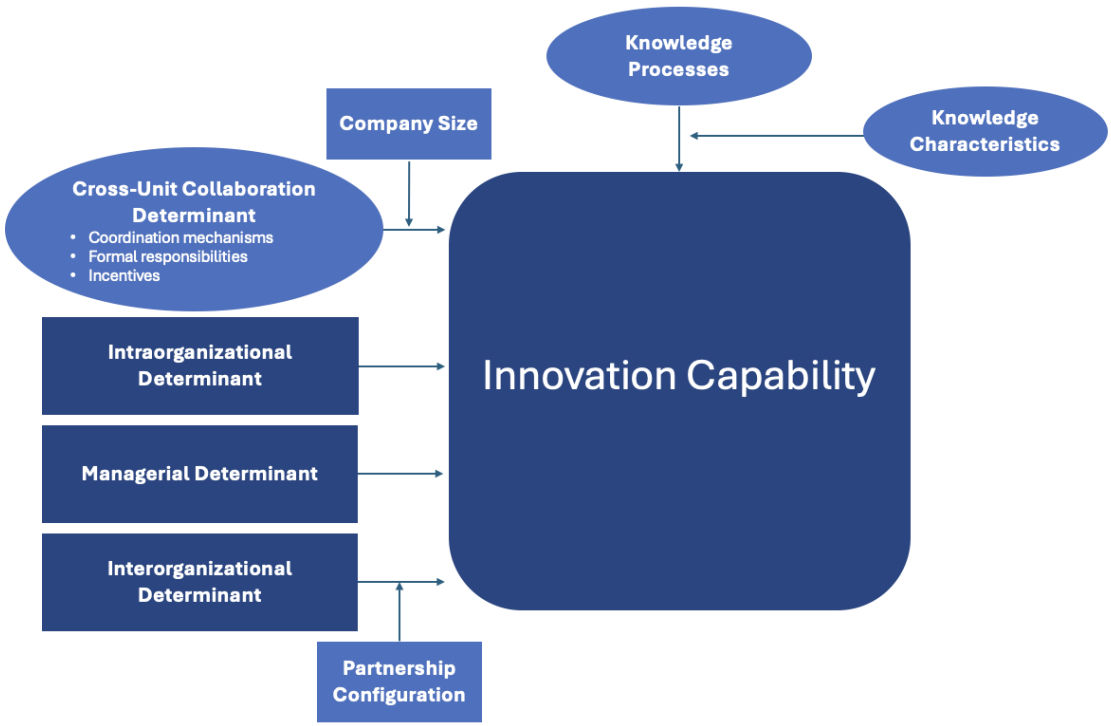

Figure 6: *Revised analytical framework for innovation capability, following the empirical findings.*

The fact that the determinants operate differently across units indicates that firm-level innovation capability cannot be explained only by analyzing each determinant within separate units, which is why a cross-unit perspective is needed as an addition to Mendoza-Silva's (2021) framework. According to the empirical data, Vattenfall as a whole does not lack knowledge, resources or initiatives related to innovation. However, these factors are unevenly distributed and often remain within the unit where they are developed. This means that the firm's overall

capability depends on whether knowledge, resources and competence can move across organizational boundaries. Cross-unit collaboration therefore appears to be an important determinant of innovation capability in large multi-unit firms. However, the findings also show that cross-unit collaboration, as added in the analytical framework, should not only be understood as increased interaction and exchange between units. Rather, interaction and exchange between units need to be supported by coordination mechanisms if they are to contribute to more systematic improvements in innovation capability. Such mechanisms can help make local knowledge, resources and competence more visible, interpretable and useful in other parts of the firm. This suggests that the added cross-unit collaboration determinant to the analytical framework should be refined to include coordination mechanisms, formal responsibilities and incentives for cross-unit collaboration. Without these mechanisms, cross-unit collaboration risks being dependent on personal networks and employees' individual activities rather than becoming an organizational capability.

Since this study only examines one large incumbent firm, the findings cannot be used to fully confirm or reject whether company size in itself is a moderator for the cross-unit collaboration determinant when comparing firms of different sizes. However, the findings show that company size is relevant in the case of Vattenfall, as Vattenfall's multi-unit structure creates organizational complexity. Different business areas have separate responsibilities, governance models, resources, routines and profit-and-loss accountability. Therefore, the findings suggest that company size matters for cross-unit collaboration in the case of Vattenfall, but further data from firms of different sizes would be needed to determine whether company size in itself moderates cross-unit collaboration more generally.

The findings also specify the relationship between knowledge processes and knowledge characteristics. Mendoza-Silva's (2021) framework emphasizes knowledge processes, consisting of knowledge creation, sharing, capturing and application, as important for innovation capability. The empirical findings are in line with this emphasis on knowledge processes, as several of the identified challenges concern how knowledge is identified, shared, interpreted and applied across organizational boundaries. However, the findings suggest that knowledge characteristics should be understood as conditions that affect how easily knowledge processes can take place, rather than as a separate factor directly influencing innovation capability. Therefore, knowledge characteristics appear to act as a moderator in the relationship between knowledge processes and innovation capability, as they influence how easily knowledge can be transferred and applied across units. For example, when knowledge is complex, tacit or strongly connected to a specific local context, it becomes more difficult for other units to recognize its relevance, understand how it was developed, and adapt it to their own conditions. The findings do not reject the importance of knowledge characteristics, but suggest that their role in the framework should be seen as a moderating factor that affects how effectively knowledge processes support innovation capability.

The addition of partnership configuration in the analytical framework is supported

by the findings. The results show that the way that collaborations are conducted differs depending on the type of partner involved and the business area conducting the collaboration. The findings show that business areas differ in how they work with external collaborations. Some units seem to use more exploratory and flexible approaches, while others work more cautiously and stay closer to established routines. These differences also affect how trust is built, the power dynamics between partners and how knowledge is exchanged. The added moderator partnership configuration therefore adds nuance to the interorganizational determinant by showing that external collaboration is not only shaped by external relations and network characteristics, but also by the setup of the collaboration.

The empirical findings support that the factors within the intraorganizational determinant are relevant for Vattenfall, although to a varying extent depending on the business area. The largest variations across the organization are seen regarding the factors resources and the organizational support and climate for innovation. The findings provide a basis for proposing an additional nuance to the resource factor of the intraorganizational determinant, which is flexibility. Having flexibility in resource allocation means that, in addition to having resources within a firm, they should be easily accessible and redistributed for innovation projects. The added explanation is necessary, as respondents claim that, even though the organization's resource pool is large, they may not always be able to get resources to innovate due to a lack of flexibility. Thus, flexibility has an impact on a firm's innovation capability.

7
Discussion

This chapter discusses the broader implications of the findings in relation to the research questions and the analytical framework. The discussion focuses on what the findings imply for incumbent firms operating in the energy utility sector, as well as for future research on innovation capability, cross-unit collaboration and organizational learning.

7.1 Implications for Incumbent Firms

The findings are relevant for other incumbent firms in the energy utility sector, as they often share several characteristics with Vattenfall. Similar to Vattenfall, many incumbent firms consist of several business areas, support functions and specialized units with different responsibilities, skills, routines and objectives. Incumbents often possess extensive resources, accumulated expertise and established relationships (Kungl, 2025), but these advantages do not automatically translate into innovation capability at a firm level. Rather, this study suggests that incumbents may have difficulty benefiting from these advantages at the firm level when they remain located within separate units.

Incumbents are often associated with incumbent inertia, due to their limited adaptive responsiveness and innovativeness. This partly stems from their development of organizational routines and standards as well as internal political dynamics (Hannan & Freeman, 1984). The findings from this study suggest that, although individual organizational units within an incumbent may develop capabilities that increase their adaptability, for example through collaborations with SMEs or allocating sufficient resources for exploratory innovation, such individual initiatives do not necessarily reduce inertia at the organizational level. Instead, the findings indicate that the strong separation between organizational units, together with rigid organizational structures and internal politics between units, such as conflicting unit-level incentives and priorities, may itself reinforce a form of incumbent inertia in which innovation efforts remain localized rather than contributing to broader organizational transformation. This implies that incumbents should not only focus on developing innovation capability within individual units, but also on how cross-unit learning can contribute to an increased innovation capability overall. In firms with several specialized units, local adaptation is necessary, as each unit's work is shaped by its specific context. However, when units become too separated from each other, the organization risks missing out on benefits from solutions, methods or experiences that have already been developed

elsewhere. The challenge is therefore not to make all units work in the same way, but to create conditions that allow units to learn from each other when locally developed knowledge or experiences may be useful in other parts of the organization.

This is particularly important in industries where future innovation involves working across internal organizational boundaries. As technological and market-related developments become more interconnected, innovation may become difficult to manage within isolated units. For incumbent firms, this means that specialization remains necessary, but specialized knowledge also needs to be combined when innovation challenges involve several parts of the firm. In the energy sector, this is especially relevant as the shift toward a more electrified and decentralized energy system can create innovation challenges that do not clearly fit within one unit, but require input from several parts of an organization. However, when innovation projects involve several units, it may become difficult to move forward if responsibilities, ownership and objectives are unclear. For similar incumbent firms, the implication is therefore that future innovation capability depends not only on having knowledge and resources within the organization, but also on being able to organize cross-unit initiatives in a way that makes responsibilities, priorities and value creation clear.

7.2 Future Research

Future research is required to examine how company size and organizational complexity affect the importance of cross-unit collaboration. In the analytical framework, company size was proposed as a moderator that influences the cross-unit collaboration determinant. However, since this study is based on one large incumbent firm, it cannot determine whether the observed challenges are mainly explained by size, or by other factors. Further comparative studies could therefore examine whether similar challenges also appear in smaller firms, or whether they are primarily associated with large incumbent firms.

Second, future research could investigate which conditions are required for cross-unit collaboration to improve overall innovation capability. This study suggests that cross-unit collaboration can strengthen innovation capability at firm level. However, it also shows that collaboration across units can create complexity when ownership, responsibilities and incentives are unclear. Further studies should therefore examine under what conditions cross-unit collaboration becomes more or less valuable. This would add nuance to the assumption that more collaboration is always beneficial.

Third, the relationship between external collaboration and internal learning could be examined further. While this thesis examines the extent to which Vattenfall absorbs knowledge from collaborations with SMEs, the study only captures the incumbent firm's perspective. Future studies could include both the incumbent firm and the SME to examine how knowledge is exchanged, interpreted and applied in the collaboration. This would make it possible to better understand how learning is shaped by the interaction between partners, rather than only by the incumbent's internal ability to learn from shared knowledge and experiences. Such a perspective

could also provide deeper insights into why the outcomes of some collaboration projects remain project-specific, and why others lead to broader organizational learning and change.

Finally, future research could further examine the role of knowledge characteristics in knowledge transfer. The findings from this study suggest that knowledge processes, such as knowledge sharing and application, appeared more visible in influencing innovation capability than the underlying knowledge characteristics themselves. However, this does not imply that knowledge characteristics are unimportant. Rather, the findings were not sufficient to fully determine how characteristics such as tacitness, complexity and specificity influence knowledge transfer and the development of innovation capability. Future studies could therefore examine this relationship in greater depth, particularly in relation to how different types of knowledge affect cross-unit learning and collaboration within incumbent firms.

8

Conclusion

The aim of this thesis was to explore how innovation capability varies across organizational units in a large incumbent energy utility and how cross-unit collaboration and learning can contribute to strengthening the firm's overall innovation capability. Based on a qualitative study of Vattenfall, the findings show that the factors that shape innovation capability differ between units, particularly in terms of innovation culture, managerial support, access to resources, knowledge-sharing mechanisms and collaboration practices. Therefore, the findings of the study suggest that innovation capability in large incumbent firms should be understood as unevenly distributed rather than as a homogeneous firm-level capability. Further, the study shows that cross-unit collaboration and learning can improve overall innovation capability by creating conditions for knowledge and experiences developed in one unit to be identified and adapted to other parts of the organization. However, this requires coordination mechanisms, clear responsibilities, incentives and economic alignment.

Overall, the findings point to a need for future research on how innovation capability in incumbent firms is shaped by variation across organizational units, company size and the value and limits of cross-unit collaboration. For incumbent firms, the study implies that resources and expertise are not sufficient to strengthen firm-level innovation capability if they remain separated across units. Incumbents therefore need to clarify responsibilities, align incentives and create coordination mechanisms that make it possible to identify, interpret, adapt and use knowledge beyond the unit where it was developed.

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Appendix A: Theoretical Foundation for Interview Questions

Table 2: Theoretical foundation for interview questions

Questions	**Theoretical foundation**
RQ1: How do factors of innovation capability vary across business units?	
Managerial Determinant	
How are managers involved in innovation activities?	Management support and leadership commitment are critical for innovation capability (Mendoza-Silva, 2021). Top managers allocate resources and shape strategic direction (Frishammar et al., 2012).
Is there an explicit innovation strategy within your specific unit?	A clear strategic vision is essential for effective innovation management (Lawson & Samson, 2001).
How would you describe the role of management in encouraging knowledge sharing?	Management support for knowledge sharing and collaboration fosters an environment that enhances innovation capability (Yeşil et al., 2013).
Intraorganizational Determinant	
How would you describe your access to the resources required for innovation activities? (e.g., skills, knowledge, capital)	Effective resource management is crucial for innovation capability (Smith et al., 2008).
How would you describe the culture in your unit in terms of supporting innovation?	Work climate and culture influence employees' engagement in innovation (Mendoza-Silva, 2021).
How are employees encouraged or rewarded for contributing with innovative ideas within your unit?	Reward systems encourage knowledge sharing and ideation (Lin, 2007).

Questions	**Theoretical foundation**
How are employees supported in developing skills and learning over time?	Know-how development includes learning, education, and experience accumulation (Mendoza-Silva, 2021).
How are innovation activities typically initiated in your unit?	Individual activity (motivation, skills, attitudes) contributes to innovation capability (Mendoza-Silva, 2021).
Interorganizational Determinant	
Can you describe how you interact and exchange information with your collaboration partners? What is the frequency of interactions?	Structural dimension of network characteristics refers to interaction patterns and information exchange (Mendoza-Silva, 2021).
Describe the importance of trust in your collaborations. What measures are taken to create trust?	Relational dimension of network characteristics includes trust and long-term commitment (Mendoza-Silva, 2021).
How are shared goals and mutual understanding developed between your unit and your external partners?	Cognitive dimension of network characteristics refers to shared understanding and goals (Mendoza-Silva, 2021).
To what extent are knowledge/experiences transferred from external collaborations to your unit?	Firms must absorb and exploit knowledge from networks (Lawson & Samson, 2001).
Knowledge Processes & Characteristics	
How is knowledge shared within your unit and across teams?	Knowledge sharing involves transfer of knowledge within the organization (Mendoza-Silva, 2021).
Do you experience any challenges in knowledge sharing within your business area?	Causal ambiguity hinders knowledge transfer and application (Ciabuschi & Martín, 2012).
RQ2: How can cross-unit collaboration and learning improve overall innovation capability?	
How does your unit identify and recognize what knowledge could be relevant and useful for you?	Absorptive capacity includes recognizing the value of new knowledge (Tsai, 2001). Absorptive capacity depends on prior knowledge base and competencies (Tsai, 2001).
What formal mechanisms exist to support knowledge sharing between units?	Coordination mechanisms, such as interfaces, participation and job rotation, support knowledge acquisition (Jansen et al., 2005).

Questions	**Theoretical foundation**
What factors influence how easy or difficult it is to access knowledge from other business areas?	Knowledge is sticky and difficult to transfer (Tsai, 2001; Szulanski, 1996). Permeable boundaries between functions, business and product groups within a company help break down barriers, which enables innovative behavior (Lawson & Samson, 2001).
How open is your unit to knowledge and ideas originating from other parts of the organization? What do you think can be done to encourage openness toward knowledge from other units?	NIH reflects negative attitudes toward external knowledge (Kathoefer & Leker, 2010). NIH syndrome refers to rejection of externally developed ideas (Kathoefer & Leker, 2010). Cultural changes and openness are needed to overcome knowledge transfer barriers (West & Bogers, 2014).

Appendix B: Interview Guide

Respondent Introduction

- Can you briefly describe your role and responsibilities within the organization?
- How long have you been working in this role or unit?

Collaboration Project

(When answering the following questions, please base your responses on a collaboration project between Vattenfall and an SME that you have participated in.)

- What value do you see in external collaborations?
- Can you describe how you interact and exchange information with your collaboration partners?
- What is the frequency of interactions?
- How are shared goals and mutual understanding developed between your unit and your external partners?
- Describe the importance of trust in your collaborations.
- What measures are taken to create trust?
- To what extent are knowledge/experiences transferred from external collaborations to your unit?

Within the Organization

- How are innovation activities typically initiated in your unit?
- What factors do you think are important for working with innovation successfully within your unit?
- How would you describe your access to the resources required for innovation activities? (e.g., skills, knowledge, capital)
- How would you describe the culture in your unit in terms of supporting innovation?
- How are employees supported in developing skills and learning over time?
- How are employees encouraged or rewarded for contributing with innovative ideas within your unit?

Managerial Involvement

- How are managers involved in innovation activities?
- Is there an outspoken innovation strategy within your specific unit?
- How would you describe the role of management in encouraging knowledge sharing?

Knowledge sharing

- How is knowledge shared within your unit and across teams?
- Do you experience any challenges in knowledge sharing within your business area?

Cross-unit Collaboration

- How does your unit identify and recognize what knowledge could be relevant and useful for you?
- What formal mechanisms exist to support knowledge sharing between units (e.g., meetings, roles, processes)?
- How open is your unit to knowledge and ideas originating from other parts of the organization?
- What do you think can be done to encourage openness toward knowledge from other units?
- What factors influence how easy or difficult it is to access knowledge from other business areas?

Wrap up

- Is there anything else related to our topic that we may have forgotten to ask about, but you think we should know?
- Is there anyone else you would recommend that we speak to who has been involved in an innovation collaboration project?
- Is it okay if we email you if we have something to clarify?

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