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RESOURCES AND CAPABILITIES OF BUSINESS ECOSYSTEM CASE SUUR-SAVON SÄHKÖ

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Tämän pro gradu -tutkielman aiheena on tutkia liiketoimintaekosysteemin kyvykkyyksiä ja resursseja. Digitalisaatio ja jatkuvasti muuttuva liiketoimintaympäristö edellyttävät energia-alalla uudenlaisia kumppanuuksia ja toimintamalleja. Ekosysteemejä hyödyntäen voidaan vastata muuttuvaan liiketoimintaympäristöön, sillä ne ovat tehokas tapa kehittää uusia kyvykkyyksiä ja luoda uutta liiketoimintaa. Tämän tutkielman tarkoitus on tunnistaa energia-alalle perustetun liiketoimintaekosysteemin tarvitsemat resurssit ja kyvykkyydet. Kyvykkyysvaatimusten ohella tutkimus käsittelee ekosysteemiin kuuluvien toimijoiden resurssien ja kyvykkyyksien jakoa sekä pyrkii tunnistamaan ekosysteemille kilpailuetua tuovat kyvykkyydet. Tutkimus toteutettiin laadullisena tapaustutkimuksena ja tutkimusaineisto kerättiin puolistrukturoiduilla yksilöhaastatteluilla, kyselyllä sekä havainnoimalla. Haastateltavat koostuvat ekosysteemin jäsenorganisaatioiden asiantuntijoista ja toimitusjohtajista, yhteensä kolmesta eri energia-alan yrityksestä. Tutkimustulosten perusteella liiketoimintaekosysteemi tarvitsee kolmenlaisia kyvykkyyksiä menestyäkseen. Operatiiviset kyvykkyydet yhdessä resurssien kanssa ovat toiminnan perusedellytys. Dynaamisia kyvykkyyksiä taas tarvitaan nopeasti muuttuviin ympäristöihin sopeutumiseen, kun taas strategiset kyvykkyydet mahdollistavat erottumisen kilpailijoista. Tutkimustulokset osoittavat, että uusien tuotteiden kehittämisen kyvykkyys ja markkinoiden aistimisen kyvykkyys sekä operatiivisen yhteistyön kyvykkyydet vaikuttavat eniten liiketoimintaekosysteemin kilpailuetuun ekosysteemin markkinoilla. Johtopäätöksenä voidaan todeta, että jotta ekosysteemi pystyy tuottamaan arvoa, sen jäsenten on oltava valmiita jakamaan ekosysteemiin erilaisia toisiaan täydentäviä resursseja ja kyvykkyyksiä. Jaetut resurssit ja kyvykkyydet voivat yhdistettynä muodostaa kilpailuedun, joita kilpailevien yritysten on yksittäin vaikea muodostaa.

Asiasanat: liiketoimintaekosysteemi, resurssi, kyvykkyys, kilpailuetu

ABSTRACT

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The purpose of this master's thesis is to determine the resources and capabilities of a new business ecosystem. Digitalization and the continually changing business environment require new types of partnerships and operating models in the energy sector. To respond to the changes in the business environment, ecosystems have been identified as an effective way to create new business and develop new capabilities in the energy sector. This study aims to identify the required resources and capabilities for a new business ecosystem in the energy sector. In addition to identifying the requirements, the study focuses on resource and capability sharing and aims to identify the capabilities that provide a competitive advantage. The research was conducted as a qualitative case study, and the data was collected through semi-structured individual interviews, a questionnaire, and by active observation. The interviews were conducted by interviewing experts and chief executive officers from three different energy companies. The findings of the study contain the required resources and capability ties of intelligent maintenance business ecosystem. These suggest that the target business ecosystem requires additional operational capabilities and resources to conduct primary activities. Dynamic capabilities are needed to develop and adapt to rapidly changing environments, and strategic capabilities enable differentiation from competitors. Research findings suggest that new product development capability, market sensing capability and operational cooperation capability contribute most to the advantage of the business ecosystem`s respective market. In conclusion, ecosystem`s members need to share different complementary resources and capabilities to participate in value creation. These shared resources and capabilities can together create such competitive advantage that is difficult for competitors to replicate.

Keywords: business ecosystem, resource, capability, competitive advantage

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1 INTRODUCTION

This section provides an overview of the study background, structure, and key concept. The key concept section presents the main definitions and assumptions associated with approaches a summarised the theory of capabilities and ecosystems literature. In addition, this section introduces the structure of the study.

1.1 Background of the study

Digitalization in the energy sector creates pressures for companies to renew their business models and to innovate functionalities and new business possibilities to maintain their positions in the markets. Currently, evolving technology and consistently changing business environment in the energy sector requires new type of partnerships and ecosystem cooperation. (Immonen & Kalaoja, 2019) To leverage opportunities provided by digitalization, Suur-Savon Sähkö placed ecosystem development as one of its objectives to 2020-2025 for the organizational digitalization strategy. In its strategy, Suur-Savon Sähkö set the goal to actively find new ways to develop its business and keep up with technological developments by working together with partners. To achieve the goal, the development of a business ecosystem started in spring 2021.

Ecosystems have been identified as one of the strategies to achieve competitive capabilities (Immonen & Kalaoja, 2019). Existing research recognizes the critical role of capabilities in competitiveness, which leads to my research topic: identifying the capabilities of the new business ecosystem in the energy sector. Capabilities within the energy sector are an interesting topic to explore, as during the last decade energy markets have undergone significant transformation and are still influenced by global trends and challenges (Immonen & Kalaoja, 2019).

This business ecosystem will be the first in the Finnish energy sector to operate with the same business form where cooperation allows to offer whole chain of maintenance services. In the ecosystem, one actor cannot have all the

necessary resources and capabilities. In addition to resource and capability sharing, ecosystems enable dynamic cooperation, value co-creation, and trustworthy business relations (Immonen & Kalaoja, 2019). These ecosystem strengths will be harnessed together with existing partners, and the studied ecosystem will be built on top of existing operations where data adds value. As the new business ecosystem founders are partners, it is necessary to clarify the difference between traditional business networks and business ecosystems. Moore's (1993) findings indicates that business ecosystems include a more comprehensive range of companies where symbiotic relationships gain benefits, which is also the objective of the business ecosystem in this case. So far, this subsection focused on the study's business background, and the following subsection will discuss motivation.

1.2 Motivation of study

The theory of capabilities has been explored in the different fields of study. Previous researchers have explored capabilities in field of human resource, economics and strategic management, which may explain obstructiveness of the capability theories. In earlier studies, researchers have created concepts and academic terms, but have not empirically established framework or theory of ecosystem's capabilities. The reader should keep in mind that the field of research on ecosystem's capabilities is still relatively new, and much remains to be discovered.

Research on capabilities has become abundant, because ecosystems provide a dynamic context that requires an extension of current theories (Nambisan, Zahra & Luo, 2019). This study focuses mainly to study capabilities which have broader meaning than resources. However, preliminary interviewees discovered that the distinction of resources and capabilities was not clear, and the understanding of capabilities and their relationships differ among interviewees. As studied by Hart (1995), some interviewees understood capabilities to be bundles of resources. Therefore, both resources and capabilities will be examined, leaving the possibility to also gain insight into the resource needs of the business ecosystem. Throughout this study, the term 'resource' will be used to describe the organizations', tangible, intangible, and human resources (Wu, Melnyk & Flynn, 2011).

Existing research has focused on definitions of organisational capabilities and a minor on business capabilities. Studies over the last thirty years have described how organizational capabilities and resources are crucial for performance (Barney, 1991). This concept has been challenged by business ecosystem studies. An argued question is, what capabilities do a wider range of organizations included business ecosystem need? One major theoretical issue is that there are only few definitions of business capabilities. When comparing definition of business and organisational capabilities, similarities can be seen. Organizational capability represents the ability of a company to perform a proposed

task and reach a specific goal (O`regan & Ghobadian, 2004). While Offerman, Stettina and Plaat (2017) define business capability as a specific capability that companies could obtain in return for achieving a specific business objective. Another definition is given by TOGAF (2018), which proposed business capability to be the ability for a business to perform something.

To sum up, there are only few studies and empirical evidence that have investigated business capabilities. Previous research of Offerman et al. (2018) has established, that there are only two business capability frameworks available (Brits, Botha & Herselman, 2007; TOGAF, 2018) and limited empirical evidence on these frameworks. Therefore, this study examines capabilities through the earlier literature without specifying whether they are organizational or business capabilities.

To date, the strategic management researchers have tended to focus on capability theories rather than capability identifying. One major theoretical issue is that there are no frameworks available which define a clear difference between organizational and ecosystem business capabilities and how their identifying differs. Previous research of Day (1994) has established that capabilities can be recognized in the core processes for creating economic value for companies. Therefore, this study begins identifying the core processes and business functions of a business ecosystem and uses Porter`s (1985) value chain as a tool to identify required business ecosystem's resources and capabilities.

1.3 Structure of the research

This study was conducted as a qualitative single-case study with exploratory approach. Data was collected through semi-structured individual interviews and by a questionnaire and active observation. The business ecosystem mentioned in the following research questions, encompasses introduced the energy-based maintenance ecosystem and does not attempt to address all business ecosystems in general. In addition, markets in this study focus on markets in energy sector and specifically technology-oriented maintenance services. The research problem is to identify what resources and capabilities are needed in the business ecosystem? The research consists of a research problem and fifth research questions that are answered in the study. The research sub-questions are:

RQ1 What resources does the business ecosystem need in order to function?
RQ2 What operational and dynamic capabilities are needed in the business ecosystem?
RQ3 What strategic capabilities are needed in the business ecosystem to differentiate in the markets?
RQ4 What capabilities contribute most to business ecosystem's competitive advantage?

RQ5 What capabilities companies are willing to share in the business ecosystem?

Study is commissioned by Suur-Savon Sähkö. The company is responsible for energy procurement, production, and distribution in the eastern part of Finland (Suur-Savon Sähkö Oy, 2021). In addition to the first commissioner, this study will be carried out with two founding members of the business ecosystem. The researcher worked for the commissioner for ten months, which allowed observation and a systematic familiarisation with the phenomenon. For this study, the management and specialist of three different companies from the energy sector are interviewed.

The thesis is structured as follows. The first introduction section introduces the key concept of the study and aims to review and summarize the main definitions. The section also presents assumptions associated with the framework. At the same time, the second and third section introduces the literature review of capabilities and ecosystems. After the literature review, selected research methods and results will be introduced in the fourth and fifth sections. After the results are described, the sixth section presents empirical findings with subsections of theoretical contribution, practical relevance, and study limitations. Finally, the last seventh section answers the research question and suggests future research proposals.

1.4 Key concepts of the study

Due to theoretical constraints, this study provides a comprehensive review of current research, both in the field of capabilities and business ecosystems. For the convenience of the reader, these topics will be significantly introduced in the following chapters, which will present the selected theories and the research perspective. In addition, this subsection clarifies the reason to choose research operational, dynamic and strategic capabilities.

Most studies in the field of strategic management have focused on operational, dynamic, and strategic capabilities. This study assesses five conceptually distinct classification types of definition of capabilities. Previously published studies on capabilities have similarities on classifications. Such as “first-level” capabilities are responsible for daily activities, “second-level” capabilities respond to external factors and “highest level” ensure companies to action successfully. This study proposes that these three capabilities have own purposes in the target business ecosystem. In addition, the concentration of academic researchers and the similarity of types is a reason to examine these three capabilities in more detail in this study. To sum up, this research will further explore and identify resources and the following operational (first level), dynamic (second level) and strategic (high level) capabilities of the business ecosystem.

As mentioned above, some authors referred to operational capabilities in literature as “zero level”, “first order” or “functional capabilities”, which higher

order dynamic capabilities leads and strengthen. (Winter, 2003; Day, 1994) Karna, Richter and Riesenkampff (2016) present more recent arguments against this capability order, as they believe that dynamic capabilities do not lead operational capabilities and have different purpose and impact. While a variety of descriptions have been suggested, this study follows more common view that dynamic capabilities strengthen operational capabilities.

More than a few theories have proposed that ecosystem can be recognized from the symbiotic relationships that provides benefits for all members (Moore, 1993). The symbiotic relationship increases need to consider the diversity of interests of operators in traditional competition, expectations of value creation, and the distribution of benefits between the companies in the ecosystem. Literature about ecosystem proposed that ecosystem value proposition guides members to take the necessary steps to achieve the common goal. (Adner, 2017) Similarly to Frow, McColl-Kenned and Payne (2016), this research defines a value proposition to be as a dynamic mechanism for negotiating how resources and capabilities should be shared in the ecosystem.

In next figure (figure 1), Lenz (1980) proposes that business ecosystem can differentiate from its competitors by identifying strategic capabilities and adapting them to the business environment and by integrating them into the strategy. There is two reason to choose this view for the framework. This business ecosystem is being built alongside the existing operational activities and markets differ from founder members traditional business markets. Therefore, it can be assumed that it is possible for operators to identify the strategic capabilities that provide a competitive advantage.

Next chapters attempt to illustrate upon two strands of research into capabilities and ecosystems. Theoretical framework of study (figure 1) presents that once needs for business ecosystem`s resources, and capabilities have been identified, members contribute to the ecosystem's value proposition by sharing resources and different types of capabilities (Talmar et al., 2020; Jacobides, Cennamo & Gawer, 2018). Earlier research has a developed dominant theoretical framework that operational, dynamic, and strategic capabilities influence competitive advantage on organizations. Similarly, this study follows a theoretical framework that suggests that its members share different types of capabilities, which together leads to business ecosystems` competitive advantage.

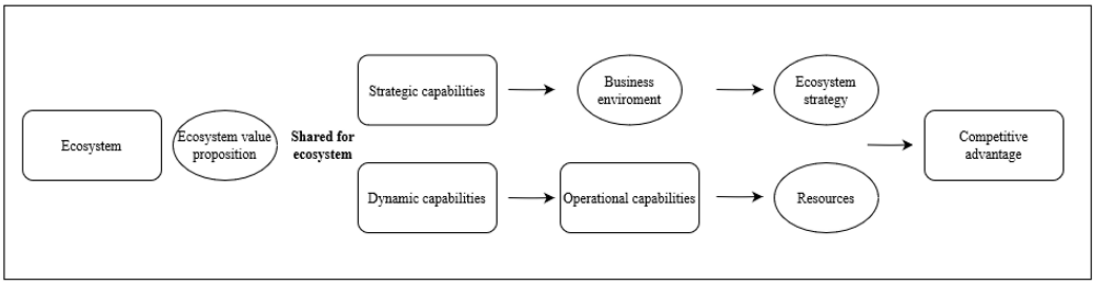

FIGURE 1 Theoretical framework of study

2 CAPABILITIES

The field of strategic management has created a capability approach to understand how companies are formed, organized, expanded and how the leaders manage (Teece & Linden, 2017). This section provides readers with an overview of the main capability and resource frameworks, definition, types, and classification. Chapters introduces capabilities to establish competitive advantage. This chapter also introduce the definitions, propositions and assumptions of operational, dynamic, and strategic capability literature. This chapter seeks to present the main definitions and assumptions associated with these approaches, as well as the distinct views offered by the literature. After the problem was formulated, the literature review process continued to use the following words to search articles from databases: capability, resource, capability type, operational capability, dynamic capability, and strategic capability.

2.1 Theoretical frameworks of resources and capabilities

The field of strategic management has created approach by applying economic principles (Teece, 2017). During recent times, the concept of capabilities has gained significant interest. The strategic management field have several publications related to organizational performance. The study of organizational performance has identified capabilities as a significant factor that affects performance of companies. Capabilities solidified their relevancy in the field of strategic management during 1980s. (Collis, 1994; Day, 1994; Grant, 1991;1995; Barreto, 2010) Researchers have argued, how unorganized and inimitable organizational capabilities and resources explain variations in companies' performance (Barney, 1991).

Several theories explain how resources and capabilities can create competitive advantage. To better understand capabilities, there are several frameworks that examine characteristics of companies' resources and capabilities and consider how these might create competitive advantage (Barney, 1991). The most known theoretical frameworks are resource-based view (RBV) and closely relat-

ed dynamic capability view (DCV). The framework complements each other, rather than being complete opposites.

The resource-based view is known from the research by Wernerfelt (1984), Barney (1986, 1991) and Hart, (1995). In this framework, capabilities are type of resources. Company can retain its internal competitive advantage only if the capabilities creation is supported by inimitable resources, that are not easily copied by competitors. (Barney, 1986) RBV focuses resource picking which affects profitability before resource acquisition, so it can have value whether resources are acquired (Makadok, 2001).

Later in the beginning of 2000s, theory of the dynamic capability view (DCV) was established. This view was introduced by authors from the field of strategic management (Teece, Pisano & Shuen, 1997; Helfat 1997; Eisenhardt & Martin, 2000; Liu & Shu, 2011; Pavlou & El Sawy, 2011; Barretto, 2010; Teece 2007, 2018, 2020a). According to the DCV theory, source of competitive advantage is on the companies' ability to renew their capabilities and resources to react to changes in the operating environment (Eisenhardt & Martin, 2000). DCV separate resources from capabilities. Framework focus on capability building, if a firm does not acquire a resource, the firm's capability cannot improve the productivity of that resource (Makadok, 2001).

2.2 Organizational resources and capabilities

One major issue in early research is the difference between organizational resources and capabilities. In the past academic literature, capabilities are sometimes used correspondently with the resources, assets, or competencies (Größler & Grübner, 2006). Capabilities link the organizational learning directly to its cognizance of intangible assets such as knowledge. This way, capabilities have broader meaning than the resources, assets, or competencies. (Helfat et al., 2007) Some previous strategic management researchers have classified organizational resources into tangible and intangible categories (Hall, 1992, 1991), and some authors have added categories as abilities (Fahy & Smithee, 1999) or human resources (Wu et al., 2011). Wu et al. (2011) divided resource categories with clear examples:

> Organizations` can have tangible resources (e.g., financial, and physical resources), intangible resources (e.g., technology, reputation, and culture), and human resources (e.g., specialized skills and knowledge, communication, and motivation. (Wu et al., 2011, pp. 724)

Many earlier studies have presented versatile definitions and this study assesses five conceptually distinct classification types of definition of capabilities. First, capability is competency to bring together resources to reach specific goals (Grant, 1995). Second, capability is to use a combination of processes and resources to achieve a specific goal (Amit & Schoemaker, 1993). This view is supported by framework of enterprise architecture TOGAF 9.2 (2018), which

refers to capability as a method where activity can be performed using a combination of roles, processes, information, and tools to achieve the goals. Third, the capabilities are associated with business processes by a goal that enables a specific result (Winter, 2003). Fourth, the capabilities are the ability of organizations to executive activity more effectively than competitors with similar resources (Collis, 1994; Bharadwaj, 2000; Ehiraj, Kale, Krisnan & Singh, 2015). Fifth, the capability is a way of using resources by utilizing routines, processes, and skills to get desired end result more efficiently and differently than competitors (Wójcik, 2015).

The relationship between resources and capabilities has not been standardized. Hall (1993) defines resources to the material to build capabilities, and the availability of resources defines the company's ability to develop capabilities (Sirmon, Hitt & Ireland, 2007). Whereas Hart (1995) describes capabilities as bundles of resources. In other words, resources are not what a company is capable to make, it is something that a company holds or has an access to (Größler & Grübner, 2006, Helfat et al., 2007). Only technological capabilities themselves do not guarantee success, but rather company needs effective information system as a resource to complement technological capabilities (Davenport & Short, 2003).

Previous research suggests that organizational capabilities emerge progressively over time and are company specific and tacit. Even capability creators may be unaware of their existence because they are influenced by company's history and actions of its decision makers. (Wu et al., 2011) Ethiraj et al. (2005) argues that capabilities replicate the development process of a company's investment and are part of tacit learning, which every company participate in.

Some factors that clearly distinguish capabilities from resources can be identified. A study by Teece (1997) claims that capabilities must be built, they cannot easily be bought as resources. This view is supported by Makadok (2001), who describe how a capability is company-specific and embedded in the organization and its processes. This leads to the fact that ownership of capabilities is more complicate to transfer than resource ownership (Makadok, 2001).

The capabilities can be an explanation for variations in companies' performance. The capabilities have many purposes in an organization, and they are used to achieve strategic flexibility and more efficient use of resources. In other words, capabilities are intermediate goods. (Amit & Schoemaker, 1993) Helfat (1997) suggests that organizational capabilities allow companies to respond to changing market circumstances by forming new processes and products. Bharadwaj (2000) presented a comparable definition by claiming that capabilities describe the collection, integration, and deployment of valued resources that provide a competitive advantage. However, due to varying internal and external factors, capabilities operate in different ways and lead to distinct results in competitive advantage and performance (Winter, 2012).

2.3 Capability types and identification

Organizational capability types have raised discussion in the strategic management field and have brought a variation to theories. This subsection proposes the widely known theories of capability types. Collis (1994) classifies capabilities into three categories. In the first category, capabilities persist how a firm performs its core functions. In the second category, capabilities express which dynamic improvements are made to companies' operations. In the third category, capabilities implement higher-level abilities and give attention to the value of other resources or develop new strategies ahead of competitors. (Collis, 1994)

Winter (2003) supported view of Collis (1994) and proposed that there are higher order capabilities that operate as first level capability. Winter (2003) suggests that hierarchy begins in resource base with operating capabilities or zero-level capabilities that let company to earn a living in the present. Second, first-order capabilities make it possible to change and modify zero-level capabilities (Winter, 2003). Lastly, Winter (2003) claims that higher level capabilities are the result of organizational learning, which is caused by producing or transforming a company's dynamic capabilities.

According to another view by Day (1994), capabilities can be separated into three categories: external (outside-in), internal (inside-out) and spanning capabilities. Internal capabilities are activities such as logistics, and they are implemented from the inside out. These capabilities are influenced by competitive situations, external opportunities, and requirements of business markets. (Day, 1994) On the other hand, external capabilities focus on factors outside the organization. These capabilities connect other organizational capabilities into the external environment and allow an organization to compete in the markets. Above these are the spanning capabilities that integrate these inside-out and outside-in capabilities into activities. Such critical activities as strategy, new service development, pricing, purchasing and both sides need to concern externally and internally to achieve the set of targets. (Day, 1994)

Teece (2007) claims that the first level contains operational and other ordinary capabilities, such as routine activities that allow any organization to pursue defined a set of activities. Second level are dynamic capabilities, which can be divided into microfoundations and higher-order capabilities. Microfoundations involve the development of new capabilities as well as the recombination of existing ordinary capabilities. High-order dynamic capabilities leads and help management to seize new opportunities, and determines the best combination based on its existing situation and future plans. (Teece, 2007)

Capabilities have been used for the organization's architecture. Furthermore, TOGAF 9.2 (2018) has been categorized into the following types of strategic, tactical, and operational capabilities. In the first level, the strategic capability is the ability to plan the obtain of resources such as materials and employees. In the second level, a tactical capability is the ability to make contracts and develop a plan that provides all the necessary resources to work in line with the

strategy. Third level, operational capability is the ability to obtain all necessary resources to operate corresponding to the settled plans and contracts. (TOGAF, 2018) Capabilities within these categories often have similarities with each other (Table 1), such as low-level capabilities that are responsible for daily activities and second-level capabilities that seek to respond to external factors. In addition, similarities can be seen also in the highest strategic capabilities. For these common factors, this study will further examine the following operational, dynamic, and strategic capabilities.

TABLE 1 Capability categories

Authors	Categories	Description
Collis, 1994	Core function performing Developments for operations Higher-level abilities	First level the basic functional activities. Second level shares the common theme of dynamic improvements, to the activities. Third level comprises strategic insights that enable recognize valuable resources.
Day, 1994	Internal (inside-out) External (outside-in) Spanning capabilities	Internal are activities implemented from the inside out. External are interest outside the organization. (Capabilities into the external environment). Spanning capabilities integrate inside-out and outside-in capabilities and meet the commitments.
Winter, 2003	Zero-level capabilities First level capability Higher level capabilities	Zero-level capabilities let company to earn a living in the present. First-order capabilities make possible to change and modify zero-level capabilities.
Teece, 2007	Operational capabilities Dynamic capabilities Microfoundations Higher-order capabilities	Operational capabilities organization to pursue activities. Dynamic capabilities can be divided into microfoundations which involve the adjustment and recombination of an existing ordinary capabilities and development of new ones. High-order dynamic capabilities guiding these and supported by processes seize new opportunities.
TOGAF 2016	Operational capabilities Tactical capabilities Strategic capabilities	Operational capability is the ability to obtain all necessary resources to operate corresponding to the plans and contracts. Tactical capability implements contracts and develop a plan that provides resources work in line with the strategy. While strategic capability obtaining resources.

This study aims to identify capabilities by using a most suitable method. Study by Day (1994) described how certain types of capabilities can be recognized in

all businesses. Capabilities correspond to the core processes for creating economic value. Some capabilities are more difficult to identify than others because capabilities are rooted within the organizational activities. (Hammer & Champy, 1993; Day, 1994; Beimborn, Martin, & Franke, 2008). One way to identify capabilities is to create a value chain as "comprehensive map". Typically, value chain and it`s described processes span several organizational levels and functions and require comprehensive communications between them (Peppard & Rylander, 2006). Next figure (Figure 2) represents primary activities, and the way value chain is used in this study.

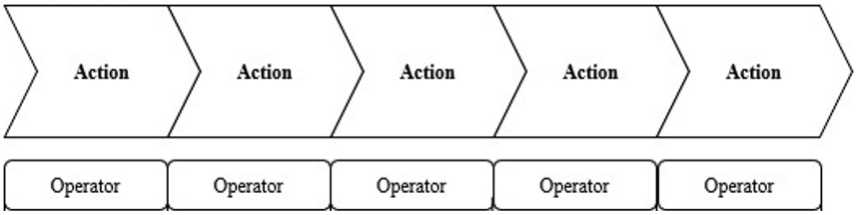

FIGURE 2 Primary activities of value chain

Value chain has been recognised to be very beneficial tool to define interconnections of activities that are linked together (Peppard & Rylander, 2006). These have been used as a tool and concept for understanding and analysing businesses for the last 30 years (Porter, 1985). Each company occupies a position in the value chain and provide inputs to each phase before giving them for next in the chain. The concept based on value generation which linked chain of activities and focus on controlling of chain through development strategies. Value is created together with companies and their effort in the network. (Porter, 1985)

2.4 Operational capabilities

Even though operational capabilities have been discussed in research, there is variance it`s definitions. Flynn, Wu, & Melnyk (2010) sees operational capabilities as processes, routines and sets of skills developed within managing company-specific operations. These operational capabilities configure the resources to meet the organization's individual needs and challenges and can be used in problem solving (Flynn et al., 2010). Unlike Flynn et al. (2010), Winter (2003) defines operational capability as a high-level routine or collection of routines. Along with the flow inputs, it provides to organizational management decision-making options that can be used to produce certain results (Winter, 2003). In this work, operational capabilities are categorised according to Flynn et al. (2010) and these are representing more detail in the results section.

Like other capabilities, there are also various views on how operational capabilities impact organizations. Operational capabilities allow the company to carry out its main operating activities (Newey & Zahra, 2009; Helfat & Winter, 2011). Operational capabilities are usually blend into the background and

are closely related to characteristics of the company uniqueness. The operational capabilities are important source of improvement and support business performance. (Ambrosini & Bowman, 2009; Peng, 2001) As a result, these improve the quality of a company's existing processes and products (Winter, 2003) and improve competitive advantage (Helfat & Winter 2011) and their distinct features to make replicating difficult (Wu et al., 2011).

The operational capabilities are embedded in the organizational structure (Helfat & Winter, 2011). The operational capabilities bring together, integrate, and provide direction to operational practices and activities by providing tacit and explicit elements. The explicit elements are resources and practices, whereas tacit elements are for example, knowledge, leadership, skills deal with various uncertainties and problems. (Flynn et al., 2010; Wu et al., 2011)

The resources and operational practices are critical for the businesses, but on their own they do not guarantee success (Flynn et al., 2010). The operational capabilities allow companies to operate in the short term (Winter, 2013). The operational capabilities indicate higher-level organizational and strategic abilities in a changing business environment. These operational capabilities create, bring together, and reconnect lower-level internal and external resources and capabilities to create value creation strategies. (Teece et al., 1997; Eisenhardt & Martin, 2000) Operational capabilities are a subset of organizational capabilities (Wu et al., 2011). There is evidence on what positive effects operational capabilities have on competitive performance, such as revenue increasing (Peng, 2001) and lowering costs while delivering and improving products (Lai et al., 2008). Therefore, much of the impact of operational capabilities is often related to resources or operational practices (Helfat, 2011).

2.5 Dynamic capabilities

The dynamic capability's view has gained increasing attention in recent years in the strategic management literature and other business areas, and similar definition can be recognized. Thus, study established by Madsen's (2010) classification dynamic capabilities have three main types of definitions: first, definitions which focusing on the results of dynamic capabilities. (Collis, 1994) Second, definitions concentrating of external conditions (Teece & Pisano, 1994; Teece et al., 1997; Eisenhardt & Martin, 2000) and third definitions concentrating on abilities or activities which get the company dynamic. (Zollo & Winter, 2002; Winter, 2003 Zahra et al., 2006)

Teece (2007; 2012) and Teece at al. (1997) are widely known for dynamic capabilities-based theories. The dynamic capabilities have a purpose in organisations. Thus, dynamic capability can be described as a company's ability to reorganize, integrate, and generate both external and internal resources and organizational skills into the state, where company can create or modify capabilities to match changing business environments and market possibilities. (Teece, et al. 1997; Eisenhardt & Martin, 2000) Dynamic capabilities have used

to understand the phenomenon of continuous changes in organization and business environments. The dynamic capabilities explain how companies survive in changing environments. (Barreto, 2010) Company's excellence in organising capabilities, resources, and other assets demonstrate strong dynamic capabilities. The dynamic capability's strength is ability to perform profitability over the long term by adjusting business models. (Teece, 2018) Dynamic capabilities allow management to notice and valuate changing markets and technology and then redirect competencies, skills, and resources to meet needed requirements (Teece, 2020a).

Dynamic capabilities are exceptionally important for the competitive survival of companies in today's globalized and dynamic markets (Mikalef & Pateli, 2017). These changing market conditions require the organization to reconfigure re-source bases and dynamic capabilities to allow a company to transform and adapt and, in the end, achieve an edge in the competition (Pavlou & El Sawy, 2011). Pavlou and El Sawy (2011) and Protogerou, Caloghirou and Lioukas (2012) claims that dynamic capabilities usually are included in organizational routines and processes.

Literature authors have particularly emphasized the elements of dynamic capabilities. According to Luo (2000) the dynamic capabilities have three critical elements: ownership, distribution, and development. Ownership element implies allocating distinctive resources and distribution element requires dynamic learning. Finally, capability development involves the creation of new capabilities in an organisation by learning to use existing skills in new circumstances or by creating new skills. (Luo, 2000) Similarly, Liu and Hsu (2011) proposed that dynamic capabilities consist of two elements which can bring competitive advantage: exploitation and development. Capability exploitation describes how a company exploit of existing capabilities and seize opportunities from its resources. The capability development could be described for instance as if company purchases technologies to upgrade company`s technological competence. (Liu & Hsu, 2011)

As can be seen from the previous term definitions, capabilities can be structured, multidimensional and complex (Winter, 2003). Previous studies have focused on the relationships between dynamic and operational capabilities. The line between operational and dynamic capabilities is ambiguous blurry, and there is diverse theories and versatile perception of capabilities relationship and purpose in organisations (Helfat & Winter 2011). In the other view, Palvlou and Sawy (2011) explain difference by example, in the new product development dynamic capabilities would focus on choosing the product to meet the changing environment, and operational capabilities focusing on implement the daily activities what required to develop the product. In other view of Nagy, Jaakkola and Koporcic (2019) proposes that dynamic capabilities which are responsible for the selection of products are anticipated to be positively related also to operational capability that developing new products and are responsible for the physical construction, management, and sales of new products. (Nagy et al., 2019)

According to a one set of authors, dynamic capabilities enable the companies to make possible to unit, expand, modify, and reconfigure their present operational capabilities into new ones that better respond a changing environment. (Teece, 2007; Winter, 2013) Some authors see dynamic capabilities being higher to operational capabilities. Dynamic capabilities impact competitive performance and create value indirectly and by strengthening and allowing changes in operational capabilities (Zahra et al., 2009; Protogerou et al., 2012; Mikalef, Krogstie, Pappas & Pavlou, 2020; Winter, 2013).

One study by Helfat (2011) assessed that operational and dynamic capabilities vary by purposes and expected outcomes. While some of the authors proposed that operational and dynamic capabilities could be used for both purposes and some of them could be more operational or dynamic oriented, but some capabilities work for both dynamic and operational purposes. (Winter, 2013; Helfat & Winter, 2011; Zahra, Sapienza, & Davidsson, 2006) Karna et al. (2016) assume that the different causes of these two forms of capabilities are overestimated and suggest that dynamic capabilities are not more upper to operational capabilities. Together these studies provide important insights into the theories of dynamic and operational capabilities.

2.6 Strategic capabilities

Effective strategies are essentially connected by established strategic capabilities (Spillan, Köseoglu, Parnell & Akdeve, 2018). Organization-specific strategic capabilities may explain why some businesses outperform others in the same strategic set (Hareebin, Aujirapongpan & Siengthai, 2018). Day (1994) defines those strategic capabilities as combination of diverse set of skills and accumulated knowledge that enable companies to coordinate their activities and control their resources. Day (1994) specified that depending on the country, experience and specific market, company develops its own set of strategic capabilities over time.

The companies which develop exceptional capabilities become more successful (Simon, Kumar, Schoeman, Moffat & Power, 2011). According to Lenz, (1980) strategic capability can be specified to be the ability of an organization to action successfully. Strategic capabilities can be described as a comprehensive capability. These capabilities consist of established combination of environment and strategy. (Lenz, 1980; Di Benedetto, Desarbo, & Song, 2008) The present study considers that strategic capabilities describe a result of a company's ability to combine strategic business processes and resources in a inimitable and valuable way (Huikkola & Kohtamäki, 2017).

Some studies have indicated that strategic capabilities have a direct, positive relationship with company's performance (Di Benedetto et al., 2008;Hao & Song, 2016). Hao & Song (2016) suggest that strategic capabilities are connected to each other and impact acting as a factor in connecting technology-oriented strategy to company performance. Strategic capabilities can be recognized from three distinct characteristics; they are valuable for the customer, unique and

hard to copy or replicate, and aim to be better than the competitors have. (Teece et al., 1997) Huikkola and Kohtamäki (2017) summarizes that those strategic capabilities are highly valuable to the company's stakeholders and occur from the efficient use of the company's own resources. An organizations' strategic capabilities refer to having resources associated companies to a network and the ability to stand out from other companies. The organization`s strategic capabilities are supporting factors in developing the required capabilities. (Hareebin et al., 2018)

Kimberly, Miles and Snow (1978) registered existence of relationships across company strategic capabilities and strategic types. They suggest that the companies choose from typical strategic types of prospectors, analysers, reactors, and defenders and then identify the type required capabilities. (Kimberly, Miles & Snow, 1978) Di Benedetto et al. (2008) re-examined relationship with strategic types and strategic capabilities with variables of strategic business unit`s capabilities, performance and environmental uncertainty. Conclusions were that a company may select a particular strategic type based on its capabilities and environmental circumstances. In sum, companies need to consider both environment and capability when creating strategy, as there is a clear relationship between these variables and performance. (Di Benedetto et al., 2008)

A more precise definition of this relationship could be an important contribution to the academic literature. Many kinds of strategic capabilities that are common for businesses can be identified (Di Benedetto et al., 2008;). By identifying strategic capabilities by adjusting them to the environment and integrating them into the strategy, an organization can stand out of its competitors (Lenz, 1980). Strategic orientation set direction and show how company acquire and deploy strategic capabilities (DeSarbo, Di Benedetto, Song & Sinha, 2005).

2.7 Capabilities as a source for competitive advantage

A considerable amount of literature has been focused on competitive advantage and highlighted the role of resources and capabilities. There are at least three types of frameworks that aim to explain competitive advantage: the knowledge-based (KBV) view, the resource-based (RBV) view and the dynamic-capability (DCV) view. A leading theory of RBV and DCV has focused on source of competitive advantage in different ways. In RBV view the main source of sustainable competitive advantage are resources that are valuable, (V) rare, (R) imperfectly, imitable, (I) and non-substitutability (N) (Barney, 1991). While the dynamic capability view (DCV) focuses on changing market conditions which require organizations to reconfigure resource bases and capabilities which leads to competitive advantage (Pavlou & El Sawy, 2011).

Capability exploitation is critical in gaining a competitive advantage and defining strategies to exploit these advantages. While capability development generates a new set of resources and ensure the growth of sustainable competitive advantage. (Levinthal & March, 1993) Capability development explains

heterogeneity at the firm level and the performance of individual companies (Luo, 2002). Focusing on the theory of capability development, several studies have been able to discover which developed capability types bring a competitive advantage for the companies.

Some authors have considered how the operational capabilities affect competitive advantage. Flynn et al. (2010) proposed that operational capabilities help understand and explain variability in companies' performance. Similarly, Peng (2001) argues that there is evidence on positive effects that operational capabilities have on competitive performance such as revenue increasing. Conditions of business environment uncertainty, market volatility, and frequent change have raised questions regarding to which operational capabilities provide a competitive advantage. Therefore, various other studies have discussed (Table 2) the capabilities which contribute the most to competitive advantage. Flynn et al. (2010) listed six key operational capabilities to success: innovation, customization, cooperation, responsiveness, reconfiguration, and operational improvement. Swink and Hegarty`s (1998) Whereas a study conducted by Drnevich and Kriauciunas (2011) concluded that crucial operational capabilities are technological capability and marketing capability.

Similarly, other authors have discovered which dynamic capabilities are crucial for companies' competitive advantage. Dynamic capabilities could create a competitive advantage by implementing or improving present operational capabilities are crucial for competitive advantage (Mikalef et al., 2020). Previous research suggests that another set of capabilities (Table 2), includes market orientation and learning orientation (Yiu & Lau, 2008), innovativeness (Teece, 2012;Yiu & Lau, 2008), sensing (Teece, 2007, 2014), research and development culture (Huang, Wu, Dyerson & Chen, 2012), alliance management (Schilke, 2014), strategic sensemaking and, timely decision-making or change implementation (Li & Liu 2014) are crucial for competitive advantage. The most recent study by Dyduch, Chudziński, Cyfert and Zastempowski (2021) suggests that certain activities in the dynamic capability development process are interrelated and, through interaction and connection, have a positive impact on a company's financial performance. These crucial capabilities were coordination, opportunity searching, knowledge and learning management, configuration and reconfiguration, and organizational adaptation (Dyduch et al., 2021).

Researchers have also identified crucial strategic capabilities. These (Table 2) strategic capabilities are technology, marketing, market-linking, and information technology. These capabilities are linked to competitive advantage and long-term success. (Hao & Song, 2016) Additionally, other identified strategic capabilities for organizations are market seizing, targeting, and positioning, customer relationship management, customer access, product management, ability to innovate and new product development (Day, 1994). Other identified strategic capabilities were quality of service, including customer service and the need to understand the customer, good leadership and vision, innovation and creativity, selection and retention of good staff, excellent differentiated products or services, adaptability, and flexibility. (Simon et al., 2011) However, Day (1994)

argues that it is not possible to list all feasible capabilities. Each company develops its own combination of capabilities that is ingrained between its competing market, expected requirements and previous commitments (Day, 1994). Simon et al. (2011) clarify that the operating environment and strategy will determine which capabilities are a source of competitive advantage.

TABLE 2 Competitive capabilities

Authors	**Competitive capability**	**Capability type**
Drnevich & Kriauciunas 2011	Technology Marketing	Operational capabilities
Flynn et al., 2010	Operational improvement Operational customization Operational cooperation Operational responsiveness Operational reconfiguration	
Swink & Hegarty, 1998	Operational innovation	
Huang et al., 2012.	Research and development culture	Dynamic capabilities
Li & Liu 2014	Strategic sensemaking Timely decision-making Change implementation	
Schilke, 2014	Alliance management	
Yiu & Lau, 2008	Market and learning orientation	
Teece, 2012; Yiu & Lau, 2008	Innovation	
Teece, 2007, 2014	Market sensing	
Dyduch et al., 2021	Opportunities searching Knowledge and learning management Configuration and reconfiguration Organizational adaptation	
Hao & Song, 2016	Technology and information technology Marketing and market-linking	
Day, 1994	Market senzing Market targeting and positioning Information technology Customer relationship management Customer access Product management Ability to innovate New product development	Strategic capabilities
Simon, et al., 2011	Quality of service including customer service and the need to understand the customer Good leadership and vision Innovation and creativity Selection and retention of good staff Well differentiated products or services Adaptability and flexibility	

3 ECOSYSTEM

This section provides an overview of the main definitions of ecosystems. The chapter explains how ecosystems are formed and provides insights of ecosystem capability sharing. In addition to those, this chapter seeks to present the main definitions and assumptions associated with leading theories of ecosystem approaches, as well as the distinct views offered by literature. After the problem was formulated, the literature review process continued to use the following words to search articles from databases: business ecosystem, ecosystem strategy, competitive advantage and value proposition of the ecosystem, and roles in the ecosystem.

3.1 Ecosystem theory

Several studies have focused on convergence between natural biological ecosystems and business ecosystems. Thus, from a biological point of view, similarities can be seen between organisms in the structure of acts and way to interacting with each other (Kim, Lee & Han, 2010). Iansiti and Levien (2004) proposed an example and created metaphors to make it easier to understand similarities. Alike biological ecosystems, business networks are characterized by many loosely interconnected participants, who depend on each other for their relative effectiveness and survival. Business networks' actors share fate with each other like species in nature. While natural ecosystems focus on survival, business ecosystems seek to provide innovations. (Iansiti & Levien 2004) Taking together, the mature networks and their ecological behaviours allow them to be described as a business ecosystem (Kim, Lee & Han, 2010).

Some authors have been interested in how business networks differ from business ecosystems. Similarities can be recognized in interaction, relationships, and in innovation and knowledge sharing (Adner & Kapoor, 2010). Despite the similarities, Wulf and Butel (2017) notes that business networks are a structural

part of broader business ecosystems, where informal and formal relationships between business networks allow information exchange.

To understand better the ecosystem dynamic, authors define that ecosystem is typically considered to contain more diverse actors than a network (Moore, 1998; Heikkilä & Kuivaniemi, 2012; Adner, 2017; Panda, 2020). The business networks consist of groups of companies that cooperate in planning, creating, and delivering products to customers. Whereas business ecosystems may contain different types of partners, even competitors, customers, potential partners, complementors, investors, public bodies, local incubators, and even research associations and universities may join to business ecosystems (Moore, 1998).

The ecosystem focuses on open access, roles, and transparency (Adner, 2017). An ecosystem is therefore a complex dynamic system that is more than the sum of its parts. Ecosystems cannot be understood except by considering the entirety of the ecosystem rather than a limited number of connections. (Weber, 2015) To conclude, the founding of the business ecosystem was driven by cross-industry operations which was comparable to the biological ecosystem in the nature (Moore, 1993; Valkokari, 2015).

3.2 Ecosystem types

By using a natural approach, Moore (1993) introduced a term "business ecosystem". The business ecosystem is defined as an economic community that involves several companies working together to gain advantages due to their symbiotic relationships. (Moore, 1993, Iansiti & Levien, 2004) The business ecosystem has several layers, which correspond to differing levels of commitment to the business. (Moore, 1993) Moore (1993) describes the ecosystem's essential business layers to consist of the business network actors as distributors, suppliers, a focal firm, and customers are making the core of the business.

In another significant study, Moore (1996) established the concept of business ecosystems and extended metaphor. Business ecosystems are an economic community supported by interacting organizations and individuals. Thus, the business ecosystem contains customers, lead producers, competitors, and other stakeholders. Leader companies are at the core of business ecosystems as keystone species that influence the cooperation processes. (Moore, 1996) This clarifies specific issues in business ecosystems and helps understand the phenomenon. After Moore (1998) describes business ecosystems as a structure that support organizations. Whereas Adner and Kapoor (2010) described that the business ecosystem consists of a supplier, a focal firm, a complementor, and a customer.

Many researchers have focused on business ecosystem development over decades (Järvi & Kortelainen, 2017). According to Iansiti and Levien (2004), a business ecosystem is characterized by several interconnected participants who depend on one another for survival and efficiency. While a business ecosystem

involves many loosely interconnected participants who are dependent on each other's (Iansiti & Levien, 2004a). Adner (2017) defined ecosystem as a community network where actors create and capture value. The Business ecosystem operate as an economic community that endorses of organizations, institutions, and individuals (Bosch-Sijtsema & Bosch, 2015).

After Moore (1993) introduced the business ecosystem, academics identified several concepts of ecosystems with different focus areas (Table 3), such as production, knowledge-creating, collaboration, financial purpose, digital networking, and use of data. In the field of technology and innovation management, the term ecosystem is used in various models, such as the business ecosystem and the digital ecosystem (Tsujimoto, Kajikawa, Tomita & Matsumoto, 2018). Besides, Valkokari (2015) recognized three different economic ecosystem types: business, innovation, and knowledge ecosystems. In addition, there is also identified data ecosystem (Heimstädt, Saunderson & Heath, 2014) and service ecosystem (Vargo & Lusch, 2017, Vargo, Wieland & Akaka, 2015).

In other words, the ecosystem concepts differ in terms of outcomes, interactions, action logic, and roles of actors. Literature recognized at least seven different economic ecosystem types (Table 3). First, in the service ecosystems, actors' resources are integrated to reach a common goal and focusing the company-oriented production of outputs to processes and activities (Vargo & Lusch, 2017). Second, the knowledge ecosystem goal and outcome in the creation of new knowledge through joint research work, collaboration, or the development of knowledge (Valkokari, 2015). Third, the innovation ecosystems focus on mechanisms and policies fostering the creation of innovative start-ups around so-called regional hubs or clusters (Vargo & Lusch, 2017, Vargo, Wieland & Akaka, 2015).

Fourth, the business ecosystems as the service and industrial the business relationships and financial outcomes between organizations have been emphasized. (Valkokari, 2015, Moore, 1993, Li, 2009). Fifth, a digital business ecosystem is a socio-technical network of individuals, organizations, and technologies which together create value (Senyo, Liu, & Effah, 2019). Sixths, a data ecosystems include individuals and organizations within their natural boundaries, which produce, share, and process-related datasets (Heimstädt et al., 2014). Seventh, Tsvetkova and Gustafsson (2012) analyzed an industrial ecosystem, that is composed of complex business constellations including a range of business actors operating within one system.

TABLE 3 Ecosystem types

Authors	**Ecosystem**	**Description**
Vargo & Lusch, 2017	Service ecosystem	Focus on production in activities and processes to achieve common goal.
Valkokari, 2015	Knowledge ecosystem	Focus on new knowledge creating.

(to be continued)

Table 3 (to be continued)

Valkokari, 2015, Adner & Kapoor, 2010, Adner 2006	Innovation ecosystem	Focus on mechanism and policies fostering the creation of innovations.
Valkokari, 2015, Moore, 1993, Li, 2009	Business ecosystem	Focus on financial outcomes.
Senyo, Liu, & Effah, 2019	Digital business ecosystem	Focus to create a value for socio-technical network.
Heimstädt, Saunderson & Heath, 2014	Data ecosystem	Focus to produce, share and process datasets.
Tsvetkova & Gustafsson 2012	Industrial ecosystem	Focus to have business actors to working within one system.

Several studies have been conducted on business ecosystems, which have influenced the emerging ecosystem theory (Moore, 1993). New collaborative value creation networks have created digital business ecosystems (DBE). DBE is a socio-technical network of individuals, organizations, and technologies that together create value. (Senyo, Liu, & Effah, 2019) The new ecosystem definition of DBE is a continuation of Moore's (1993) business ecosystem in which digital technology plays a dominant role. Such as, the ecosystem metaphor is often utilized without a clear definition with several concepts (Valkokari, 2015). The traditional business ecosystem type was chosen for this study to solve this dilemma. Since this new ecosystem's financial objectives and future goals and form the business relationships suit the description of the target business ecosystem. (Stanley & Briscoe, 2010)

3.3 Characteristics of ecosystem

The ecosystem can be recognized in two characteristics: symbiotic relationships and diverse actors (Moore, 1996). When creating an ecosystem, you need to consider the typical characteristics of the ecosystem operating. Literature defines an ecosystem in two ways perspectives. An ecosystem as a structure is built on a shared value proposition of actors. (Adner, 2017) While ecosystem-as-affiliation is characterized by keystone and several interconnected participants who depend on one another for survival and efficiency (Iansiti & Levien, 2004a). Panda (2020) argues that ecosystem actors are connected through a close network, and the network determines the ecosystem's hierarchy and structure.

The ecosystem's competitiveness operates at two different levels: within and across the ecosystems. Within the ecosystem, there can be tension with the positions, roles, and security which affects the distribution of value. Across the ecosystem, along with increasing competitiveness, tension might come between

actors with value creation benefits, in leading positions and whose percentage is growing or who may want to change roles or revenue capacity. (Adner, 2017) In the ecosystems, companies balance between symbiosis and power to operate innovative cooperation and a competitive complementary construction approach. Ecosystem challenges need to be addressed through ecosystem strategies. A sustainable business ecosystem works as a substance of competitiveness and is a convenient resource for gaining a competitive advantage (Bosch-Sijtsema & Boschs, 2015).

Consequently, symbiotic relationships as partners and consumers among others, provide benefits for related parties (Moore, 1993). Ecosystems can either expand or decline, depending on the decision-making and behavior of all the individual actors belonging to the ecosystem. The roles of each member are essential, interdependent, and interconnected to each other. (Lee, Moon & Yin, 2020). A recent study by Panda (2020) described how ecosystem actors' identities might change over time. In the ecosystem, identity is developed by role behavior into an act that makes a member different from others. Similarly, as the roles of ecosystem actors change, the structural relationships within an ecosystem can change over time. (Panda, 2020)

All members benefit from an idealistic ecosystem (Chen, Dahlgaard-Park & Yu, 2014). Business ecosystems allow company view new business opportunities. In ecosystems, companies work together to achieve a common goal. Through collaboration, ecosystem actors can continually generate new business benefits by pooling resources, skills, and ideas. (Valkokari, 2015) The value created by the ecosystem can be increased in different ways. Value differs for ecosystem members, and what may be valuable for actor in the ecosystem, is not essentially valuable to the ecosystem (Gueler & Schneider, 2021).

Ecosystem members can gain more value from the ecosystem by increasing the strategic impact of ecosystem engagement to businesses, improving the access and lower cost of skills, and expanding the scope of strategic business opportunities (Kaidalova, Sandkuhl & Seigerroth, 2021). In another significant study, Adner (2017) found that value for ecosystem actors depends on companies' interest in joining the ecosystem and if the companies have the wanted position or role. In the ecosystem, the role of partners has an impact on the objectives. For example, the position can be an opportunity to influence industry developments, share a common vision with the network, or strategically acquire a distinct new customer segment (Lansiti & Levien, 2004).

A study conducted by Graca and Camarinha-Matos (2017) presented that a healthy, collaborative business ecosystem creates economic and social value. Benefits can be measured in environmental, social, and economic dimensions, aligned with the strategic objectives of each partner. Benefits could obtain for example, by the social causes, regulation, shared costs and risks, market position, dependence, specialization, and by improved innovation agility and flexibility. (Camarinha-Matos & Abreu, 2007) A study by Graca and Camarinha-Matos (2017) concluded that an essential aspect of this is the ability to assess the performance of the ecosystem as a whole and the potential benefits it brings to

its members. Recent studies of Bosch-Sijtsema & Bosch (2015) have explored ecosystem business cases by focusing on various roles and engagement models. Bosch-Sijtsema & Bosch (2015) claims that companies regularly operate in several ecosystems, where they need to adapt dynamic engagement strategies. Taking together, companies need first to understand the impact of their position on the ecosystem. Then companies could develop strategies that support the whole ecosystem

3.4 Resource and capability sharing in the ecosystem

In the ecosystem, a value proposition cannot be delivered by a one actor (Talmar et al., 2020). Business ecosystems' main characteristic is that none of the actors have all the complementary capabilities or resources to deliver a value proposition alone. (Talmar et al., 2020). For this reason, the ecosystem allows companies to generate value that the companies could not achieve without the ecosystem (Adner, 2006). Actors can value the ecosystem by first providing valuable capabilities and resources to an ecosystem. If customers appraise the ecosystem's value proposition, the actor can get more value by achieving a common goal (Adner, 2017).

Ideally, organizations' capabilities complement each other's (Nagy et al., 2019). The ecosystem value proposition is based on sets of complementary resources and capabilities that are typically shared among various actors (Talmar et al., 2020; Jacobides et al., 2018, Teece, 2020b). According to Adner (2017) and Jacobides et al. (2018), to justify attendance to the ecosystem, actors need to contribute to the ecosystem's value proposition by providing resources or, and capabilities. The value proposition guides members to take the necessary steps to achieve the common goal (Adner, 2006). Usually, an orchestrator in the ecosystem coordinates the resource and capability flows (Dedehayir, Makinen & Roland, 2018; Hurmelinna-Laukkanen & Nätti, 2018).

Camisón (2018) introduced the concept of shared capabilities which captures the district's knowledge and skills and are embedded in its processes and actors. Therefore, shared capabilities in exploration involve various actors and are based on architectural knowledge, and be composed of the information flows, creation, and dissemination. Exploitation consists of knowledge from the specific sector, which is related to regularly used technological aspects, preferences of the consumer, and the norms and rules which work in a certain sector. (Camisón, 2018) When the ecosystem is built on a whole new sector or different from the companies' traditional business markets, strategy and market seizing capabilities are particularly critical for the business ecosystems (Joo & Shinb, 2018).

Complementarity between capabilities is crucial for the ecosystem (Dedehayir, Makinen & Roland, 2018; Hurmelinna-Laukkanen & Nätti, 2018). Gueler & Schneirer (2021) believes complementarity fit between resources and, or capabilities affects positively value creation and value appropriation of the

providers in the ecosystem. The latest business ecosystems literature streams have highlighted the importance of complementary resources and capabilities and their elements to work as a value to join in value creation in ecosystems (Dattée, Alexy & Autio, 2018; Jacobides et al., 2018).

3.5 Ecosystem strategy

Ecosystem challenges need to be addressed through ecosystem strategies. A sustainable business ecosystem works as a substance of competitiveness and is a convenient resource for gaining a competitive advantage. Strategy for the business ecosystem is extremely critical. (Joo & Shinb, 2018) Business ecosystem studies have largely focused strategies of ecosystems (Iansiti & Levien, 2004a, Iansiti & Levien, 2004b; Adner, 2006, 2016; Adner & Kapoor, 2010). By evolving the sustainable business ecosystem through the collaboration and development of ecosystem members, ecosystem-based strategy pursues to get a competitive advantage for the companies (Moore, 1993; Moore, 1996).

The need to create strategies that identify and manage implicit links, is one of the main differences between ecosystem strategy and traditional strategy (Adner, 2016). As an approach, this ecosystem-as-structure emphasizes the coordination of partners as a critical strategic challenge, bringing a new dimension to the traditional strategy. Thus, the characteristics of the ecosystem strategy approach suggest it is a distinct complement to established competitive strategy and corporate strategy. While the traditional strategy is driven by a concern for the competitiveness of individual firms, the ecosystem strategy is driven by a concern for the competitiveness of ecosystems and their members. (Adner, 2017)

Businesses need to adapt to environmental changes to remain successful. (Ambrosini & Bowman, 2009). The ecosystem could be established in new markets or around innovation and requires concern for critical factors which might affect the business environment. These critical factors are culture, processes, people, systems, and external and internal triggers in technology, in management, in company ownerships, competitive environment and changes in regularity and legislative requirement. These identifying factors and triggers allow companies to operate in changing business environments and adjust performance. (Kennerley, Neely & Adams, 2013).

Several researchers have proposed that ecosystems can be seen as a strategic approach in various business fields (Li, 2009). Actors have their own strategic reasons to be part of the ecosystem. Business ecosystems can work as a new strategy to get access to different benefits, resources, capabilities, and value. (Adner, 2006). The ecosystem strategy defines how the target company will approach the coordination of partners and ensure its position in a competitive ecosystem (Smith, 2013). The benefits of ecosystem partnership vary depending on the operation of the company. Consequently, the ecosystem management must consider the diversity of interests of operators in traditional competition,

expectations of value creation and the distribution of income between the parties (Adner, 2006)

For the organization, it is critical to consider roles and the whole business ecosystem before companies make deliberate strategic decisions and choices (Adner, 2006). Particular parts of business ecosystems can contain "bottlenecks" which might bring challenges for innovation, value-creation and management (Adner & Kapoor, 2010). When building the ecosystem, actors' access to data and information is a critical challenge to consider (Panda, 2020).

Ecosystem's actors seek to benefit from the ecosystem in several ways. Actors define a strategy for belonging to an ecosystem that includes structure, role and ecosystem risks. (Lansiti & Levien, 2004) The business ecosystem needs to assess the risks involved. A study by Smith (2013) presented that actors need to identify risks at before and after joining the business ecosystem. Ecosystem risks were divided into four categories: general, standard, keystone risks and risks from a location in the value chain. Early and continuous identification of risks associated with the business ecosystem is essential for the success of the company and for the ability to increase value. (Smith, 2013) In figure (figure 3), Smith (2013, 31) concluded that by pre-entry inspection and real-time resource management can identify daily action risks of involvement in the ecosystem.

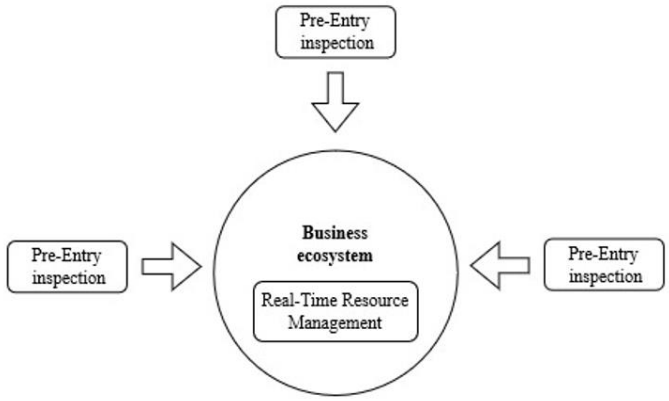

FIGURE 3 Ecosystem risk management

Companies can operate in several ecosystems in which they fulfill different roles (Bosch-Sijtsema & Bosch, 2015). Some authors believe that the business ecosystem has valued a keystone organization as the ecosystem orchestrator, who led and tight ecosystem actors and helps members to engage to common goals. (Iansiti & Levien 2004b). The strategy of the ecosystem might vary depending on the roles. Iansiti and Levien (2004b) classify firms in business ecosystems into keystone companies, niche players and dominators who own and shape the ecosystem by classifying roles they developed ecosystem strategy from the roles of companies' perspective. By understanding the niche pursing strategies appropriate to their role, firms can set realistic expectations for fitting into the ecosystem. (Iansiti & Levien, 2004)

4 RESEARCH METHODOLOGY

This section reviews the case research and data collection methods used in the study. The subsections first discuss parts of the literature on research, followed by a more detailed discussion of the solutions used in this study. In addition, chapter present the research method, data collection, interview structure and data analysis. Besides, chapters introduce in more detail the case of the study.

4.1 Methods

Below figure (figure 4) summarises the research methods and the structure used in this research. First step in the research process was to choose research method with exploratory and holistic approach that would fit for qualitative single case-study research. The second step was to choose data type and data collection method and group of interest. The data was collected using unstructured interviews, a short questionnaire and participant observation. The interviews were recorded and transcribed by using a "working" transcript. For data analysis, coding was used to describe similar themes and used conventional and thematic analysis. Finally, this study used abductive reasoning to draw conclusions.

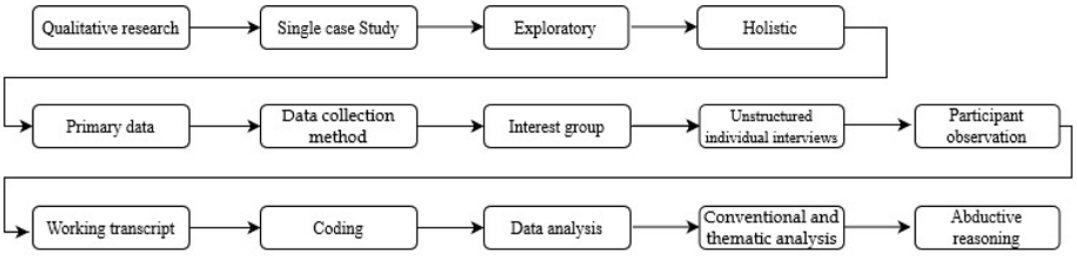

FIGURE 4 Methods and structure of research

This chapter describes the literature of methods used in the research. Chosen literature methods are qualitative research, single case-study, exploratory and holistic approach. Qualitative and quantitative research differ from each other, so the choice of research method is important while identifying the right relationships between causes and outcomes (Huang, 2016). Comparing the two different research methods, purpose of qualitative research is to understand, explain and describe different phenomena (Myers, 1997, 2019; Kaplan & Maxwell, 2005). In qualitative research the goal is to understand perspectives of the participants and explore phenomena in natural settings. Whereas the quantitative research often uses data in the form of words, and through pictures, artifacts, while quantitative data involves numbers and classes to develop hypotheses. (Kaplan & Maxwell, 2005) Different types of qualitative research include interpretive, phenomenological, humanistic, hermeneutic, ethnographic, action research or case studies (Wolcott, 2009).

The case study research is a valid research strategy within the field of information systems (IS) (Klein & Myers, 1999; Cavaye, 1996). The selected research type, case study, focuses on understanding the dynamics existing in specific phenomena (Eisenhardt, 1989). Case study research may be applied to provide descriptions of phenomena or create a theory and test it (Shanks, 2002). The existing literature has argued that there is no standard definition of the case study method (Benbasat Goldstein & Mead, 1987).

The case study research method has three clear advantages. First, researchers can study information systems in a natural environment, learn about recent ideas and methods and create theories from practice. Second, the method lets the researcher to answer "why" and "how" questions to understand complexity and the nature of the processes involved. Third, due to the rapid changes in the field of information systems, many new topics appear often, on which case studies can provide valuable insights. (Benbasat Goldstein & Mead, 1987)

Stake (2005) recognizes three distinct types of case studies. First, inherent cases which are unique and not representative. Second, instrumental cases which provide insights or improve on existing theory. Third, collective cases which seek generalisability based of their purpose and nature. (Stake, 2005) Yin (2009) divides cases studies to explanatory and descriptive studies. Exploratory case studies aim to investigate any phenomenon in the data that interests the researcher. Explanatory case studies also explore the data at many levels to explain the phenomena in the data. Descriptive case studies instead aim to define natural phenomena that appear in the data. Thesecase study types distinguish between single, multi-case and comprehensive case studies. (Yin, 2009)

Single case studies are generally useful in testing theories, especially during the early stages of building a theory and the final stages of testing a theory. A study of a single case may be followed by a multi-case research. (Benbasat Goldstein & Mead, 1987) When designing a case study, many decisions must be made. Researcher needs to decide whether to study one or several cases and what are the objectives of the study. Cavaye (1996) and Ebneyamini & Moghadam (2018) described different options to conduct a case study. Case

study (Figure 5) can contain single or multiple cases, (Ebneyamini & Moghadam, 2018) and those can be interpreted according to positivist or interpretive paradigm. To draw conclusions, either inductive or deductive reasoning can be applied. Holistic or embedded approach can be used and made along with literal or theoretical replication. The embedded case studies involve more than one unit, while in the holistic view the phenomenon is being studied as a whole (Cavaye, 1996). It is obvious that the choices made by the researcher play a key role in the research and guide the progress of the study.

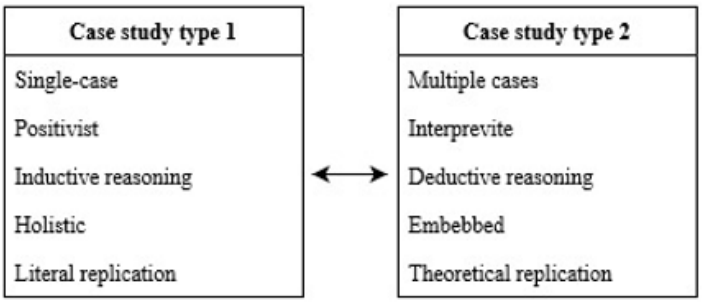

FIGURE 5 Elements of case study types

This study was conducted by following a qualitative method. The qualitative approach was chosen since the ecosystem in question was in its early stages of formation, and only few companies and participant were involved in founding the ecosystem. An advantage of qualitative data collecting methods made possible to founder members considerate strategies for the ecosystem. The qualitative method was useful in studying the capabilities of new business ecosystem.

As aim of the study was to understand a phenomenon, quantitative method was not applied. The scope and novelty of this study supported the qualitative approach, but it could have been carried out as a quantitative study as well. If this study had been quantitative, it would have been conducted with likert-scale variables with more interviewees. The quantitative study could have been conducted by examining variables relating to market orientation, operational development, and sustainability of competitive advantage. However, the choice of a qualitative study was justified by the fact that qualitative data collecting methods can be more beneficial for identifying and characterising industry specific capabilities. Furthermore, choice of methods was influenced by study topics that couldn't be easily separated into individual entities, so qualitative methods are more useful than quantitative ones (Kaplan & Maxwell, 2005).

The case study is a good way to study an area where little previous research has been done (Benbasat Goldstein & Mead, 1987). Single-case study was chosen with the holistic approach, as the study examines unique ecosystem, it fulfils the criteria to use case where is the unit of analysis (Benbasat, Goldstein & Mead 1987; Yin, 2009). Although this study is not a direct examination of systems, there are features of that reinforce the choice of approach. This study was

conducted with a single case study type 1 (Figure 6). In figure (figure 6) of Yin (1994, 39) it's interesting to see the difference between single case, multiple cases, holistic, and embedded analysis. In a holistic case single unit of analysis is selected, whereas in an embedded case, there are multiple units of analysis. (Yin, 1994, 39; Rusenon & Höst, 2009) Similarly, this study could be conducted as multiple case studies for identifying several business ecosystems. The choice of research method was influenced by objective to investigate the capabilities of a single ecosystem.

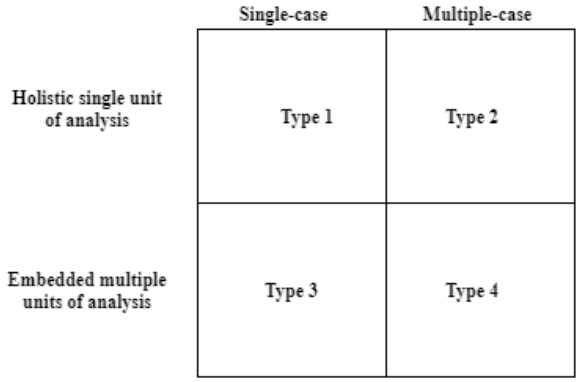

FIGURE 6 Basic design for case study types

This study was conducted as an exploratory case study, which allows gaining deeper insight of phenomena. Exploratory approach allows discovering and observing new phenomena in its natural settings. It also brings together aspects from the ethnography studies by using active observation as a data collection method. (Yin, 2009) The exploratory approach was chosen because it allows to observe ecosystem formation and informants in natural setting which helped define capabilities for unique business ecosystem. It has commonly been discovered that single case may be followed by a multi-case research (Benbasat Goldstein & Mead, 1987), which could be potential situation also with this study.

4.2 Case business ecosystem in energy sector

This study was commissioned by Finnish Energy Company, Suur-Savon Sähkö. The company is responsible for energy procurement, production, and distribution in the eastern part of Finland. Suur-Savon Sähkö is committed to delivering value to its customers within its operating area to ensure functionality of basic infrastructure. Suur-Savon Sähkö seeks to take part in the development of the area and much of the related activities are based on partnerships. In addition to the first commissioner, this study was carried out with two founding members of the ecosystem: Järvi-Suomen Energia Oy and Elvera Oy. Järvi-Suomen Energia Oy takes care of electricity distribution in its own distribution area. Elvera

Oy's core competence is the construction, maintenance and troubleshooting of electricity grids, substations and transformers. (Suur-Savon Sähkö Oy, 2021) Digitalization in the energy sector creates pressures for companies to renew their business models and to innovate functionalities and new business possibilities to maintain their positions in markets. (Immonen & Kalaoja, 2019)

In its strategy, Suur-Savon Sähkö sets the goal to actively find new ways to develop its business and keep up with technological developments by working together with partners. To leverage opportunities provided by digitalization, Suur-Savon Sähkö placed ecosystem and data networks development as one of its objectives for 2020-2025 for the organizational digitalization strategy. (Suur-Savon Sähkö Oy, 2021)

Currently, evolving technology and consistently changing business environment in energy-sector requires new ecosystem cooperation and new type of partnerships (Immonen & Kalaoja, 2019). Like some other companies, Suur-Savon Sähkö's goal is to operate in ecosystems where their members actively and safely share data and innovate new business possibilities. There are few key reasons to join or to create ecosystem. Members could benefit from the ecosystem by sharing technology and business risks or by complementing the specific expertise of other ecosystem members. Besides, the ecosystem could enable faster service deployment and product innovations and make it possible to scale up services to markets quickly or expand businesses through collaboration. (Suur-Savon Sähkö Oy, 2021) Besides, for example advanced of analytical capability can be seen as the key to digitalization (Ratia, 2022)

This study was started when the ecosystem was being established in the Spring of 2021. First, Suur-Savon Sähkö started a preliminary study on the ecosystem by interviewing employees and by conducting various ecosystem and business case workshops. The smart maintenance business ecosystem was created by Suur-Savon Sähkö Oy, Järvi-Suomen Energia Oy and Elvera Oy, Enerva Oy.

After the business idea and structure of the ecosystem was formed, it was decided to found a separate company Evision Oy. In the new company, data would play a major role in the new business, which will be built on top of existing operations. Operations of the new company will start in early 2022. Evision Oy provides data and analytics-based maintenance services. Evision Oy will create the conditions for an operating model, which is based on drone and artificial intelligence technologies. (Evision, 2022)

Those technologies will enable proactive and much more efficient maintenance of electricity grids. The goal is to shorten the power outages of customers and enable more cost-effective maintenance of electricity grids. At the core of the operating model is the efficient processing of multifaceted data, the use of analytics and the development of proactive maintenance of the electricity network. As the amount of data increases, more diverse services can be developed. For this reason, the business ecosystem needs more actors to develop services and acquire the necessary capabilities. In the future, the data can be collected

through drone imagery, network information systems, satellite imagery, network operation support systems and observations by installers. (Evision, 2022)

4.3 Data collection method

For this study, primary data was chosen as the study aims to gather unpublished information on the capabilities of new business ecosystem. Primary data implies unpublished data collected directly from the people or organization, by interviews and unpublished reports. Furthermore, studies have revealed that most used data collection methods in qualitative research are interviews. (Myers & Newman, 2007) Previously published articles and reports are secondary source (Church, 2002; Hirsijärvi, Remes & Sajavaara, 2010).

Case studies may combine many data collection methods, data can be collected via documents, interviews, ethnographies, questionnaires, and observations (Eisenhardt, 1989; Benbasat Goldstein & Mead, 1987; Eisenhardt & Graebner, 2007, Yin, 1994). This study used interview, short questionnaire, and observation as data collection methods. These three collection methods were chosen in order to get deep understanding of ecosystem formation and required capabilities. Short questionnaires make it possible to see how informants understood impact of competitive advantage. Interview and questionnaire were used to understand if informants could identify similar capabilities as other companies in different industries.

Planning a systematic and organised approach to the selection of research participants is beneficial for researcher (Asiamah, Mensah & Oteng-Abayie, 2017). Qualitative research focuses on participants who can describe their experiences and knowledge related to certain research questions or issues in phenomenon (Baškarada, 2014; Teherani et al., 2015). Asiamah et al. (2017) represent that most convenient sample is selected from large study population, which represents individuals with the ability to present the needed accurate data or information. For the target populations, hierarchical specification is an efficient technique of forming large study population suitable for qualitative sampling (Asiamah et al., 2017).

The target group was chosen from founder members of the business ecosystem. Target population consisted of ecosystem's members' employees with ability to provide accurate information about the subject. Aim was to focus on participants, who can describe their experiences of operational activities and share knowledge about strategic business management. This study was conducted with hierarchical specification (Table 4), by choosing 11 participants from upper management (chief executive officers) and specialists. Executive directors' officers were chosen to bring strategic perspective, while business developers and project managers can provide useful information of operational activities. Overall, selected interviewees have a lot of experience and knowledge from the energy sector, which is valuable when identifying strategic capabilities of ecosystem.

So far, this subsection has focused on data collection methods and introduce interviewees. Next subsection will introduce the unstructured interview used in the study.

TABLE 4 Interviewees position

Position	Codes 1-11	Length
Chief of executive officer	E	90 min
Chief of executive officer	E	75 min
Chief of executive officer	E	60 min
Chief of technology officer	E	55 min
Project manager	E	90 min
Maintenance manager	E	90 min
Development manager	E	65 min
Development manager	E	80 min
Business officer	E	60 min
Financial officer	E	55 min
Human resource officer	E	50 min

4.3.1 Semi-structured interview

This subsection will provide details on semi-structured interview method used in this study. Knowledge of the literature is vital when deciding the questions for the interview (McGrath, Palmgren & Liljedahl, 2019). Research interviews can be classified by the degree of structure (Fontana & Frey, 1998). Structured interviews have a script, and the interviews are not necessarily presented (e.g surveys). In contrast, unstructured interviews do not have script. In combination, semi-structured interviews may use script and the researcher can plan questions in advance. Interviewer could be one of a team or work as the external researcher and can be conduct by single or group interviews. (Myers, & Newman, 2007)

This study used a semi-structured individual interview which allowed to plan questions and script in advance. Interview's themes followed framework and aimed to answer the research problem. There were totally three themes (appendix 2) and 15 questions. Themes were following: (1) ecosystem capabilities and resources, (2) resource and capability sharing and ecosystem strategy, (3) business environment and competitive advantage.

Interviews' questions began with general ones and were followed by more specific questions of planned topic. Due to the challenging nature of the themes, the questions consisted of open questions that were supported by supporting questions and follow-up questions.

The chosen interview questions were tested with two employees from the Suur-Savon Sähkö. As can be seen in appendix 2, the interview questions started with rather simple opening questions. The opening questions could familiarise interviewees to the topic. After the test interviews, some of the questions

were reformulated, and supplementary questions were added to support the script. After the test, used terminology was also adjusted.

Semi-structured interviews were conducted with 11 experts. The interviewing started in October and lasted to November 2021. The interviews were recorded to support data analysis, recording was done by using the recording function of MS Teams. The interviews lasted approximately 60-90 minutes, including introduction to the topic. After the interviews, the interviewees got the instructions for questionnaire (appendix 3), and interviewees responded to the questionnaire. The intention of the questionnaire was to evaluate what capabilities contribute most to business ecosystem's competitive advantage in energy markets. The questionnaire utilized a response scale of 1 to 5.

4.3.2 Active observation

This study used active observation as one data collection method. An active observation provides researcher with overview of the research problem (Baxter & Jack, 2008). Almost all ethnographic research in IS has been based on the traditional model of ethnography. In the traditional model, ethnographer observes and participates, but does not actively seek to change the situation. (Klein & Myers, 1999) Participant observation can be described as a process, which allows researcher to observe targeted people and their activities in the natural setting (Dewalt & Dewalt, 2010). The purpose of the study and research problem set direction helping researcher to determine on what to observe (Merriam, 1998; Dewalt & Dewalt, 2010). While participating, researcher can learn and develop holistic understanding of participant perspectives and understand people and their behaviour (Dewalt & Dewalt, 2010).

Energy sector has long traditions and well-established practices, and active observation methods helped to acquire deep understanding of research problem. Main goal of observation was to investigate requirements for ecosystem capabilities and formation of new ecosystem. Active observation took place in ecosystem related meetings, trainings, discussions, and daily work from April to January 2021. Observations were recorded by making notes on a regular basis. This study used guidance of Ciesielska, Boström and Öhlander (2018), who suggested observing characteristics as social actors, interactions, routines and norms.

The use of participant observation in this study provided key insights, including a grounded understanding of social interactions that occur in everyday contexts. These insights provided useful information on how founders' partnerships work and how new ecosystem might affect cooperation and operational activities.

During the observation phase, ecosystem formation started with preliminary research (appendix 1) by interviewing six employees of two companies. The interview topics were ecosystem capabilities, potential ecosystem partners and data exploitation. Interviews were conducted with experts in information security, business, and IT-architecture, with some questions targeted to their

area of expertise. The questions (appendix 2) were generally directed at development specialists. These interviews allowed to evaluate interviewees impressions about founding a new ecosystems. Similarly, it provided information of cooperation, capability requirements and potential benefits of the ecosystem.

Themes of process effectiveness and partnerships emerged from the observation notes. Cooperation with key strategic partners is very tight and it involves many experts from the supply side. The founding of the ecosystem leaded to reflection on the foundations and future of cooperation, as well as on the evolution and relationship with partners. Similarly, an ecosystem has an impact on day-to-day processes and cooperation tactics. This observation implies that the ecosystem was seen changing day-to-day processes, and there was no certainty that the new technology would work any more effectively than previous human effort. This was viewed with caution. In the discussions the purpose of the ecosystem was raised as a problem. Interviewees did not understand what problem the new ecosystem is trying to solve. Individuals agreed that better electricity quality for customers and optimal network renovation are main goals of the ecosystem.

Observation notes indicate that building an ecosystem in an energy sector with a long tradition and well-established practices requires strong leadership. Daily reporting effects of data quality and employee acceptance of new technologies is significant. These findings provide helpful insights, when an ecosystem is built on top of an existing business, change and especially partnership management are vital capabilities.

Identifying and developing the necessary capabilities is important when building an ecosystem. Companies need to have specific capabilities to a certain level to operate in an ecosystem. Technology capabilities are needed, and for example data security capability must be mature enough for each member of the ecosystem to safely share data. Technology capability combined with customer-driven culture and data exploring were seen to bring new value for members. According to the notes, innovation capability it`s positive for members in ecosystem. Initial observations suggest that there may be a link between ecosystem and innovation capability. This ecosystem fostering members to innovate and for example, provide ideas on what companies can do with their data outside their own industry.

4.4 Data analysis

This part describes data analysis steps and methods used in this case study. The steps in the analysis process were transcription, content analysis, coding, and abductive reasoning. In the first step a general transcription was created. The transcription reorganises of recorded interviews into written form, which can be used in analysis to evaluate a specific phenomenon (Duranti, 2006). Bokhove and Downey (2018) state that before interviews, researcher needs to choose

most suitable structure of transcript. After researcher have conducted interviews and transcripted audio to text, second step in process is coding.

The researcher must match the content analysis approaches suitable to the research and purpose of study. There are three content analysis approaches: directed, conventional, and summative analysis. First, in directed analysis, codes are derived from theory or findings. Second, in conventional content analysis, codes are definite during the analysis of the data. Third, in summative content analysis, codes are defined from the researchers' interest or from a literature review. (Shien & Shannon, 2005) Coding works as a tool in the process of turning the raw qualitative data into an expansive story (Braun & Clarke, 2006). As a conclusion, the literature identifies the major differences among the methods with origins of codes and coding schemes.

The process of data analysis started with a standard language transcription. This general level was chosen as it would make it easier for the researcher to go back to the original data, if necessary. Collected data material was analysed by using summative analysis and paying close attention to what interviewees said. In the categorisation phase of the analysis, separate themes were derived from the data. The themes were based on the respondents' views and the main and sub-questions of the research. The methods suited the study well, because the capabilities of this business ecosystem were identified for the first time and requirements were difficult to estimate. As some of the questions were challenging and there was a lot of material to analyse, theoretical analysis made it easier to form themes.

After the interview, the data was reviewed, and the interview responses were colour-coded to clearly identify similarities. The data was presented openly in the report before the themes, which allowed the reliability of the study's conclusions to be assessed. The thematization included the responses of most respondents from the data. In the categorisation phase of the analysis, separate themes were derived from the data, based on the respondents' views and the main and sub-questions.

Last step is to choose such reasoning types that are convenient for the study. Several studies have revealed that there are three types of reasoning: inductive, deductive, and abductive. Inductive reasoning is a theory-making process, which starts from observations of individual cases and seeks to formulate a generalisation. Deductive reasoning instead has a purpose to identify rules, regularities, or generalisations. (Klauer & Phye, 2008) Lastly, abductive reasoning aims to formulate a credible or consistent solution (Van Maanen, Sørensen, & Mitchell, 2007). This study abductive reasoning was used because it fits well for ambiguous topic with active observing as data collection method. The type was particularly useful and convenient for identifying resources and capabilities from individual business ecosystem. Another suitable option could be inductive reasoning, especially if the goal of this study be to seek generalisation. Major advantage of abductive reasoning affect decision and leaves possibility for further research with inductive reasoning.

4.5 Evaluation of research

The quality of this study was ensured by focusing on ethical principles, triangulation, saturation, and trustworthiness. Researchers need to consider ethical confidentiality to ensure acknowledge and informants' privacy (Heilferty, 2011). Interviewees participating to the research were informed about the ethical principles of the study, such as the protection of privacy and data and the purpose of the study. In order to behave ethically, all participants received script and interview questions before the interviews and permission for recording were asked. Besides, this study protects the interviewees privacy by presenting the organisations and job titles anonymously. While saturation reached after the nine interviews, which work as an indicator of quality and sufficient sample size (Hennink, Kaiser & Marconi, 2016).

This study used triangulation choosing different data collection method to increase the validity. The methods chosen in triangulation, to test the validity and reliability of a study depend on the criterion of the research (Golafshani, 2015). Dewalt and Dewalt (2010) claim that participant observation can be used to increase the validity of the study, as observations could help the researcher have a better understanding of the context and phenomenon. This study used active observation to support findings and understand holistically phenomenon under study.

The trustworthiness corresponds to quantitative research term of "rigor" (Lincoln & Guba, 1985). Trustworthiness describes a degree which a qualitative study truly reflects participant perspectives and the context under examination through research planning and report (Denzin & Lincoln, 2018; Lincoln & Guba, 1985). For the assessment of trustworthiness for primary or a single or studies criteria are following; transferability, ethical validation, reliability, dependability, authenticity, credibility, confirmability, and validity (Hays & Kibben, 2021).

Therefore, in this study trustworthiness is evaluated by credibility, authenticity, transferability, dependability, confirmability, and validity. From perspective of establishing credibility, researchers should describe participants accurately (Elo et al., 2014).

First, this study establishes credibility by describing business case, companies, interviewees titles and fields of experience. The interviewees were purposively selected from the three companies and the informants were specialists in their fields of the energy sector.

Second, authenticity indicates to the level which researcher present accurately different realities (Lincoln & Guba, 1985). This study aims to present a wide range of arguments as openly as possible. Study tries to present capabilities and diverse quotations of interviews that reveal different opinions.

Transferability describes the interpretation presented for readers on whether study findings can be generalized or transferred to groups or other

settings. (Lincoln & Guba, 1985) This study focuses to transferability by providing broad description of the phenomenon.

The direct quotations and figures of the data have been selected to increase the transferability and dependability of the study. First, dependability implies to the persistence of gathered data overtime and in different situations (Elo et al., 2014). In this study, dependability is achieved by describing as clearly as possible the data obtained from the interviews and how the capabilities were constructed. This chapter described the methods for the increase trustworthiness. In this study, the researcher focuses to focus confirmability by leaving an `audit trail' (Hammersley, 1992). This audit trail helps to see how research was conducted, data was analysed, and capabilities were formed. In addition, quotations to the research questions and to described themes have been highlighted to illustrate the data from the interviews.

5 STUDY RESULTS

This section presents the findings from the data collected for this study. The data results are presented in sixth parts, addressing the sub-questions and theoretical framework of the study. Subsections also describe what categories emerged from a data classification and how capabilities emerged. The first subsection (5.1) describes what kind of resources does the business ecosystem requires. The second subsection (5.2) describes what kind of operational and dynamic capabilities does the business ecosystem needs. The third subsection (5.3) presents the strategic capabilities of the ecosystem. The subsection also provides insights of the ecosystem business environment and ecosystem relationships to organizational strategies. The fourth subsection (5.4) describes what capabilities contribute most to the business ecosystem's competitive advantage. The fifth subsection (5.5) describes how the interviewers understand the need of resources and capabilities and what the member could be ready to share for the ecosystem. The final subsection (5.6) summarizes the study results and combines in one figure the required resources and capabilities.

Direct quotations and figures have been created and selected to describe the data in this subsection. In addition, themes have been developed from theory or data, and the method is presented for each interview themes. The numbers on the figures and in the text near terms illustrate how many interviewers presented identical answers. If there are no numbers in the figures, they have been omitted to ensure the anonymity of the interviewees. Only relevant themes and quotations to the research questions have been highlighted to illustrate the data from the interviews. Names of interviewees or organizations have been removed to ensure anonymity. Interviewees are referred to by codes E1–E11, which are randomly assigned.

5.1 Resources

This subsection examines what resources and operational and dynamic capabilities the ecosystem needs to function and change. This chapter aims to respond to the first sub-question of the study, what resources does the business ecosystem needs. According to the interviews, companies need to invest resources and capabilities to operate effectively in the ecosystem and provide a new service. Resources were categorized by Wu et al. (2011), who classified (figure 5) resources into three distinct types of tangibles, intangible, and human.

Altogether, interviewees mentioned that the target ecosystem requires a wide range of resources, which determines a company's ability to perform an activity. Thus, according to interviewees and figure (figure 7), the following tangible resources are required to implement the service: a drone, data storage, transport equipment, platform, laptops, aggregates, and imaging equipment. While required intangible resources are algorithms, analytical model, software, system integrations, interfaces, data, legal permission to use airspace, and information security and platform. Interviewees E2 described needed resources as follows

> We need drones, storage, transport, and imaging equipment. Human pilot to fly the drone, information systems, data storage, and analysis model. E2

The results presented the role of operational skills and technology, and analytic skills were all seen as needed resources for the ecosystem. According to interviewees (figure 7), needed resources by humans are mainly based on operational skills such as technical skills, drone routing skills, a drone using skills, analysis and diagnosis skills, platform using skills and analytical skills and the skills of using analytical tools. Resource needs were influenced by how much work could be done by technology without humans. Interviewees perceived resources to consist of skills. Besides, the ecosystem requires whole chain management skills, product development skills, and selling skills. Interviewees E5 describes needed resources as follows

> We need a system or person doing the data analysis. In practice, we need a person who knows how to diagnose. Humans have to go through data, if the system does not do it automatically. E5

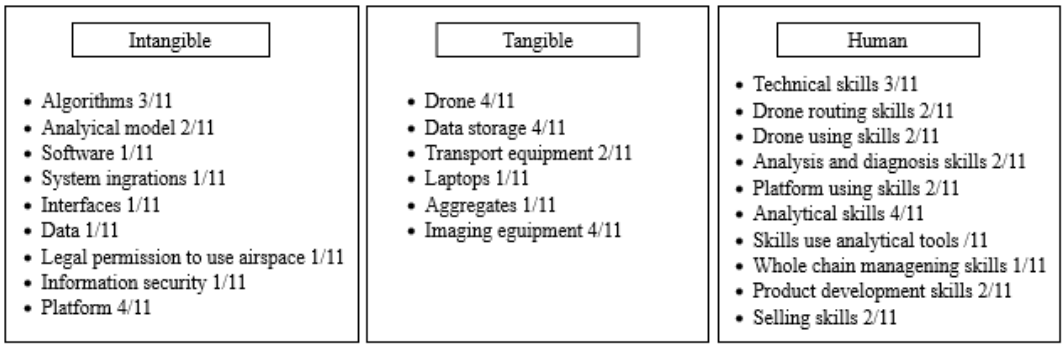

FIGURE 7 Required resources

5.2 Operational capabilities and dynamic capabilities

In the interviews, informants were asked what capabilities the ecosystem requires to enable daily operations. Operational capabilities are categorized into six units, according to Flynn et al. (2010). This categorization helps distinguish quite detailed characteristics of interviewees, and the result is thematized according to the researcher's knowledge of the topic. Interviewees indicated that skills and knowledge are an essential part of the ecosystem when an ecosystem business is linked to existing processes. The interviewees indicated certain aspects such as skills, processes, knowledge, routines, and information that are needed to enable the ecosystem's primary activities.

Many different characteristics of operational cooperation were mentioned in the interviews which are presented in figure (figure 8). There were similar aspects to Flynn et al. (2010), who describe operational cooperation refers to the ability to bring stakeholders together to share information and converge on a common understanding of what needs to be done. Fifth interviewees of eleven mentioned that competence to manage cooperation is required. Similarly, the ecosystem needs the competence to get ecosystem structure and ownerships support operational tasks. According to interviewees the operational cooperation capability contains skills to choose the right members for the ecosystem and processes to cooperate in the ecosystem. Interviewee E1 highlighted cooperation in the ecosystem in the target ecosystem.

> In other words, they were working in the ecosystem. But that's what those networks they have like other companies. You have to be able to manage the whole ecosystem cooperation. E1

Operational responsiveness contains processes and routines to respond rapidly to changes, for example, developing products for customers on time (Flynn et al., 2010). Interviewees indicated (figure 8) that as a new operational approach, competence allocates resources and roles in the chain and knowledge of legislative changes. In addition, processes to share information quickly between members are aspects of operational responsiveness. Altogether, interviewees highlighted competence in managing the whole chain.

> Sure, there are systems to support this activity. You can manage those partners to allocate those resources. Like control them. E1

Thus in these results, operational innovation (figure 8) contains process improvement and consists of skills, processes, and routines to improve existing or create new operational processes (Flynn et al., 2010). Altogether, interviewees mentioned operational improvement as competence to combinate resources, infrastructure knowledge, and customer needs and processes that support data-driven business. One interviewee describes its operational capabilities in the target ecosystem as follows

> Those practical activities support processes for the utilization, production, and enrichment of data. Sufficiently competent people to do that. When thinking about the ecosystem, we can use the data in a way in its entirety and then have the ability to use these new methods. E8

In the theory of Flynn et al. (2010), operational customization consists of skills, processes, and routines to create knowledge by extending and adapting existing operational processes and systems. According to interviewees (figure 8), analytical and technological knowledge and skills are needed to develop processes. Besides, the ecosystem needs a process to implement data into systems and competence to change data conversion to information. Interviewees mentioned skills in locating possible defects from the environment and prioritizing findings.

Flynn et al. (2010) state that operational improvement performance consists of skills, processes, and routines to improve and strengthen existing operational processes. Altogether, interviewees mentioned that operational improvement contains skills to use the new and proper equipment for the needs and skills to adopt a new way of working. Moreover, competence in using new methods and operational models to achieve the operational task and develop routines to provide service. E9 describes operational capabilities in the target ecosystem as follows

> It is knowing how to choose one's imaging equipment and what to identify, from undergrowth and snow to the rottenness of electric poles, i.e., when to replace a pole, to the knowledge of which imaging equipment to choose for which need. In the case of drones, do you always fly the same ones or are there different drones that carry out predictive maintenance checks. E9

Flynn et al. (2010) claims that operational reconfiguration contains processes, skills, and routines to conduct required changes to implement operational strategy and market environment. Interviewees describe that competence to change management and integrate new technologies into the operational model is essential. In addition, knowledge of the energy sector and development and practical implementation skills are needed for operational reconfiguration. This practical implementation and training of operational employees and processes to adopt a new way of working aim to adapt ecosystem operational strategy. The interviewee of E7 describes its operational capabilities as follows

> Of course, I think it is like broad operational employee training. Effective training and refinement of operating models are needed. It is like training and bringing the new operating model to operational activities. E7

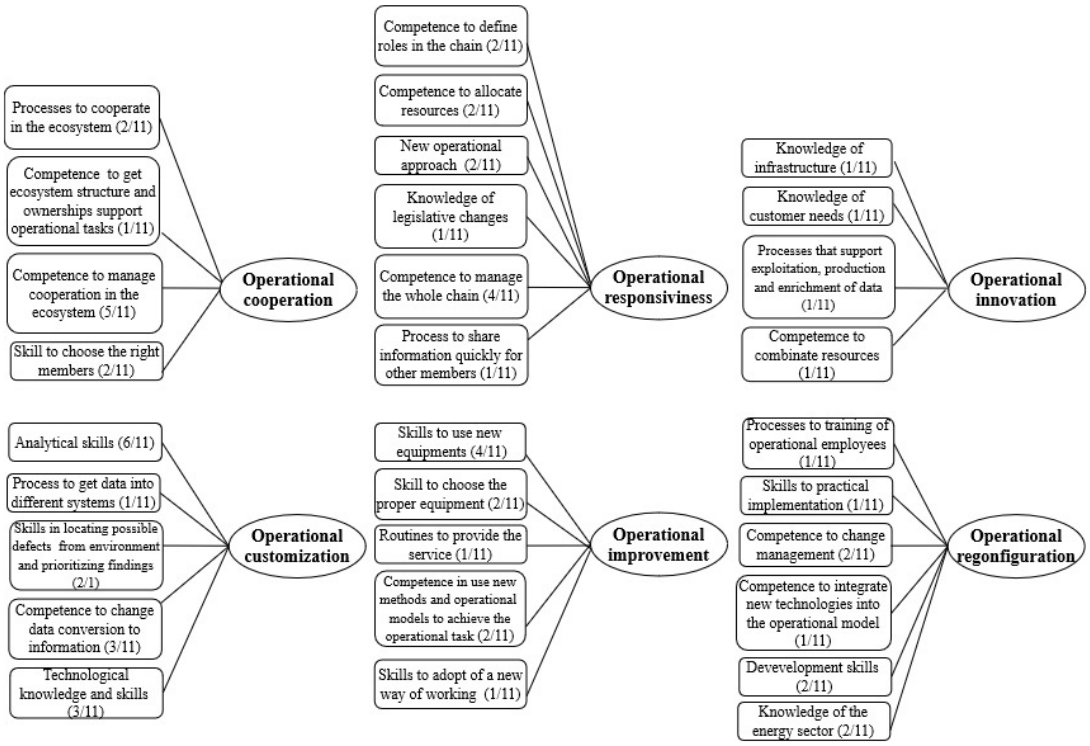

FIGURE 8 Operational capabilities

The dynamic capabilities describe how companies survive in changing environments (Barreto, 2010). Overall, interviewees mentioned a total of 11 different dynamic capabilities that the ecosystem would need to continuously evolve and survive in the market. Distinguishing to operational capabilities description, the interviewees directly mention the needed dynamic capabilities. Altogether, interviewees of eleven highlighted co-development and innovative capability. One interviewee describes dynamic capabilities its capabilities as follows

> We should understand the customer's need and should collect that information, whether that need changes or whether there are other needs that could be met by the drone. We need identification and innovation capabilities, which those new needs should be met. Can we use the old imaging equipment/drones, or should we use some completely new technology or equipment? There should be a person who is up to date on imaging equipment and actively looking to see if there are new devices better than the current ones. Besides, there should be collaborative innovation in the ecosystem. A single actor may not see the whole picture or something happening in the field. We need co-development and innovate together. E2

Some interviewees experienced that needed dynamic capabilities are leadership, cooperation, and the capability to create a specific culture. Therefore, the members described the ecosystem as consisting of companies, whereby leadership (3/11) and collaboration (2/11), would be the capabilities required for continuous development. Moreover, interviewees mentioned that the following capabilities were needed to develop ecosystem market seizing (4/11), the capability to create a culture for ongoing learning and change (3/11), and customer understanding (3/11). Third interviewees of eleven highlighted culture as a

needed dynamic capability. Interviewee E10 describes dynamic capabilities as follows

> Management and culture, the ability to be sufficiently open communication. If something is not working, or something should be improved. This is difficult without such open communication. E10

Some of the interviewees experienced new product development, marketing and sales, analytics, and technology needed dynamic capabilities. In summary, interviewees reviewed the following capabilities: technology (2/11), operational management (2/11), analytics (2/11), marketing and sales (3/11), new product development (2/11), co-development, and innovation (5/11). Fifth interviewees of eleven highlighted co-development and innovative capability. One of the interviewees described dynamic capabilities as follows

> It is then the networking, and we must understand what is happening in the industry. In a sense, the ability and where digitalization is going and how it is developing must be followed. E3

The dynamic capabilities are observed from a perspective that dynamic capabilities allow the ecosystem to develop continuously and produce new products by reconfiguring existing operational capabilities. (Adner, 2006) interviewees highlighted that the changing market conditions in the energy sector require transformation and adaptation to new conditions.

5.3 Strategic capabilities of the ecosystem

This subsection provides first insights of ecosystem's strategic capabilities and then to business environment. Based on the interviews, the ecosystem members had a coherent vision of the strategic capabilities. Strategic capabilities are viewed from the perspective where the strategic capabilities of ecosystems are seen as valuable to the customer, unique and challenging to replicate, and better than competitors have (Teece et al., 1997).

The interviewees were able to identify the ecosystem's strategic capabilities (figure 9), and the answers could be compiled into different themes. The interviewees' responses were seen to consist of the following strategic capabilities: the capability to data leveraging, capability to understand customers, capability to technology leveraging, capability to differentiate service, capability to improve operational activities and capability to change implementation. E8 and E11 described strategic capabilities as follows

> The main competitive advantage is speed. The most valuable aspect is what can be learned in the ecosystem. We can test and see how those processes work precisely if we have a good ecosystem. Our systems and algorithms can learn. Then we get feedback from there, so this practical factor is the strategic capability. E8

> They are leveraging data directly to get their picture. Quite a few companies probably describe the environment, but few take it as far as analysis. So, it is the exploitation of data. E1

As seen in (figure 9) above, capabilities consist of different characteristics. Capability technology leverage included competence in choosing the appropriate technology, leveraging technology across the chain, and strong technical skills. While the capability to understand a customer included abilities to understand customers and recognize needs and provided test environment applies to create service first for own needs and then for customers. At the same time, capability of leveraging data included data driven approach, skills to assets intellectual property, data exploitation and flow management, competence in data analytics and processes change data to information.

Interviewees believed that ecosystem could serve unique services that are challenging to replicate. The capability to differentiate service included parts of market seizing, ability to continuous development, competence to operate in the dark, algorithm, operating model, cost-effectiveness, and ability to deliver whole chain. 4E described as follows

> We manage this whole chain from start to end. If it were just a drone operator, it would not be able to do what we do. Together with the good parties in the ecosystem, we produce the service as an ecosystem. Competitors do not have the same entity, which is the most important thing. E4

Interviewees believed that the capability to improve operational activities could be also valuable to the customers. This capability included skills to identify unnecessary work, maintenance expertise, practical information on maintenance, and competence to manage and control the whole chain. Besides, interviewees described that capability to change implementation could be improved than competitors have. The capability to change implementation contained trustworthiness, flexibility, speed to react and act crisis preparedness, an adaption of exceptional circumstances.

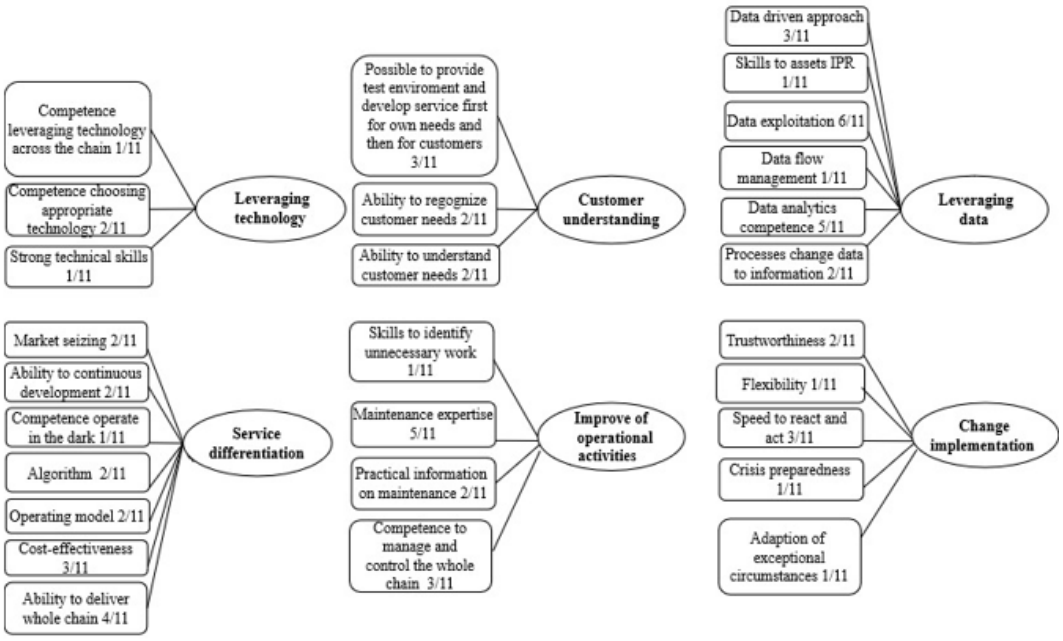

FIGURE 9 Strategic capabilities of the ecosystem

Next chapters represent ecosystem's business environment and markets. Overall, three different themes emerged from the data: the density and challenges in competition, complex markets, and other affecting energy sector-related factors. According to the interviews, the ecosystem sector has specific characteristics that should be considered in the ecosystem business strategy. Interviewees fifth of eleven describes the ecosystem to be created to markets where new competitors players repeatedly enter the markets. The interviewees of E9 describe the competition as followings

> In the business, the fact that it is very short term. The competition is growing. Businesses copying is usual. These providers come from all directions and sectors, and the knowledge is growing because they will use data. Technology is developing really fast. E9

Overall, it seems that competition in the market needs to be concerned in the ecosystem strategy. In addition, two interviewees described ecosystem business markets have an unstructured field of competitors. Two interviewees, however, highlighted that describes competitors arising from another sector. One interviewee describes how international competitors are evolving in the ecosystem business markets.

> In the competitive environment, technology changes with the market, and overhead lines change to underground wires that weaken the business.

To conclude, the ecosystem sector has specific characteristics that should be considered in the ecosystem business strategy. To sum up, four of eleven informants experienced energy sector specific factors to be changes in regulatory and legislative requirements. However, other specific factors came up from individual interviewees. These were climate change, critical infrastructure for society, energy transition, political decisions affecting the market, operational activities that need work in exceptional circumstances and the importance of information security. interviewees E2 describes key factors as follows

> We can never know about this kind of distribution in the market, that completely changes the playing field. There also could be those legislative changes. Changes might offer more opportunities and we must be able to seize and react. The competitor field is interesting. E2

These discussions seem to provide evidence that the markets of the ecosystem seem to be complex. When asked about other critical factors of the ecosystem business environment, fifth interviewees out of eleven described hard competition between companies. On the whole, four of eleven interviewees describe technological changes in the market. In general, three interviewees out of eleven saw markets change continually. While two of the eleven informants experienced markets may maintain distribution.

> The market is changing rapidly. This should be in that business and as a risk. You have to be pretty fast to get service commercialised and done and that you can get on with it. It happens easily, so that the initial meters after someone copy and passes in the development process. E9

> So of course, we must take these into account, if these requirements start to become more strict, we must be able to react. It will also affect the value chain of our ecosystem. Then we need to start thinking, how we can meet the demands from outside. Whether they be time-related demands, financial demands, whatever they may be. We need to discuss; how can we respond to them by making our operations more efficient. E1

To sum up, based on the experience of the interviewees the business ecosystem environment was seen as competitive, technology-dependent, and rapidly changing.

5.4 Capabilities to contribute competitive advantage

This subsection is based on the questionnaire where interviewees responded to the survey. The questionnaire was chosen to evaluate capabilities that contribute to the ecosystem's competitive advantage. The questionnaire (appendix 3) consisted of a scale of 1 to 5 to assess the impact of operational, dynamic, and strategic capabilities on the competitive advantage of the ecosystem. The results are divided into three tables, and the first table illustrates only operational capabilities. As presented in table (Table 5), the results imply the following: in the first row, operational cooperation average was 4,6 and standard deviation 0,7. In second row, operational improvement average was 4,4 and standard deviation 0,5. In third row, operational innovation average was 4,4 and standard deviation 0,5. In fourth row, operational responsiveness average was 4,1 and standard deviation 0,3. In fifth row, operational customization average was 4,1 and standard deviation 0,6. In sixth row, operational reconfiguration average was 3,9 and standard deviation 0,3. There was some standard deviation, with the lowest at 0.3 and the highest at 0.7, but the responses were relatively consistent. The largest variation may implicate that consensus between partners was not seen a prerequisite for the success of the action.

TABLE 5 Operational capabilities

Operational capabilities	Average	Standard deviation
Operational cooperation	4,6	0,7
Operational improvement	4,4	0,5
Operational innovation	4,4	0,5
Operational responsiviness	4,1	0,3
Operational customization	4,1	0,6
Operational regonfiguration	3,9	0,3

Next table (table 6) presents which dynamic capabilities contribute most of competitive advantage. Interviewers' responses to the questionnaire (table 6) and assessed dynamic capabilities as follows: In the first row, the average of

new product development was 4,9 and standard deviation 0,5. In second row, average of capabilities for exploiting technology was 4,6 and standard deviation 0,5. In third row, selection and retention of good staff average was 4,6 and standard deviation 0,5. In fourth row, good leadership and vision average was 4,4 and standard deviation 1,0. In fifth row, differentiated products or services average was 4,4 and standard deviation 0,5. While in sixth row, average of product management and the ability to innovate average was 4,2 and standard deviation 0,7. In seventh row, quality of service including customer service and need to listen to and understand the customer average was 4,2 and standard deviation 1,0. In eight row, average of sensing market opportunities was 4,1 and standard deviation 0,9. In ninth row, average of adaptability and flexibility was 4,0 and standard deviation 0,5. In tenth row average of marketing linking capabilities was 3,9 and standard deviation 0,8. In eleventh row, average of market positioning was 3,9 and standard deviation 0,6. In twelfth row, average customer relationship management was 3,7 and standard deviation 1.1 In thirteenth row, market targeting average was 3,7 and standard deviation 0,5.

The responses were relatively consistent, there was some standard deviation, with the lowest at 0.5 and the highest at 1.1. The largest variation in customer relationship management and quality of service may indicate that both individual and companies can be perceived as customers. End customer is not seen as having a major impact on competitive advantage. Variation in the good leadership and vision, may indicate that because operations are running good with partners already it does not affect competitive advantage significantly.

TABLE 6 Dynamic capabilities

Dynamic capabilities	**Average**	**Standard deviation**
New product development	4,9	0,3
Capabilities for exploiting technology	4,6	0,5
Selection and retention of good staff	4,6	0,5
Good leadership and vision	4,4	1,0
Differentiated products or services	4,4	0,5
Product management and the ability to innovate	4,2	0,7
Quality of service including customer service and need to listen to and understand the customer	4,2	1,0
Sensing market opportunities	4,1	0,9
Aptability and flexibility	4,0	0,5
Marketing linking capabilities	3,9	0,8
Market positioning	3,9	0,6
Customer relationship management	3,7	1,1
Market targeting	3,7	0,5

Respondents were requested to specify which strategic capabilities contribute to the most competitive advantage. As demonstrated in (table of 7), the results evaluated the impact of strategic capabilities. In first row, market seizing average was 4,7 and standard deviation 0,5. In second row, opportunities searching average was 4,6 and standard deviation 0,5. In third row, change implementation capacity average was 4,2 and standard deviation 0,8. In fourth row, innovativeness average was 4,2 and standard deviation 0,4. In fifth row, marketing sensing coordination average was 4,1 and standard deviation 0,8. In sixth row, capability configuration and reconfiguration average were 4,0 and standard deviation 0,7. While in seventh row, average of organizational adaption average was 4,0 and standard deviation 0,7. In eight row, average of timely decision-making capacity was 3,8 and standard deviation 1,1. In ninth last row, knowledge and learning management average was 3,7 and standard deviation 0,7.

Taken together, these survey results suggest that there is an association between also capabilities in the energy sector to other industries. It can be seen from the data that interviewees implied that operational cooperation, new product development and market seizing has contributed most to the competitive advantage. There was some standard deviation, with the lowest at 0.5 and the highest at 1.1, but the responses were relatively consistent. The largest variation 1,1 may implicate that the ecosystem members are dependent on the unanimity in decisions, so timely decision-making can be seen as a challenge.

TABLE 7. Strategic capabilities

Strategic capabilities	Average	Standard deviation
Market seizing	4,7	0,5
Opportunities searching	4,6	0,5
Change implementation capacity	4,2	0,8
Innovativeness	4,2	0,4
Marketing sensing coordination	4,1	0,8
Capabilities configuration and reconfiguration	4,0	0,7
Organizational adaption	4,0	0,7
Timely decision-making capacity	3,8	1,1
Knowledge and learning management	3,7	0,7

Next chapters will consider the capabilities that members could develop to improve the competitiveness of the ecosystem in the market. Capability upgrading ensures growth of sustainable competitive advantage. (Levinthal and March, 1993). Based on the interviews, all the companies in the ecosystem had their own areas of development which, by improving their capabilities, could also improve the ecosystem's competence in the market. In the figure (figure 10),

five different capabilities emerged from the interviews: market seizing, technology, analytic, collaboration in the ecosystem and operational improvement.

As can be seen in figure (figure 10) interviewees emphasized that the first capability market seizing contain commercial and selling skills, sensing tacit market signals and identifying market impulses and suppliers or potential customers, knowledge of the industry and potential changes, and customer understanding. At the same time, interviewees described aspect of improving of technology and analytics capabilities as follows. Interviewers believed technology capability could be improved by increasing knowledge of available technology and what it could bring to the value chain. Besides, interviewees mentioned skills as well to identify the most suitable technology, and skills to implement new technologies to operational model and information security skills. Interviewees described analytics capability to contain, data exploiting, skill to analyze and compare old data, data management, and skill to identify valuable data.

Interviewees described the aspect of capabilities related to collaboration and operational activities. According to interviewees, the capability to collaborate in the ecosystem included skills to work in the ecosystem, competence to value chain management in the ecosystem, process to react to changes in member's situation, assessment of economic conditions (as the ecosystem expands) and holistic thinking in the ecosystem. It can be seen from the data that operational improvement contained development process, skills in purchasing services, skills to define metrics, methods to identifications of unnecessary work and skills to speed up processes. A more detailed description of capability development is given in the following

> We could improve to sensing tacit market signals and identifying market impulses. Not only in the supplier market, also in the market of ecosystem. E3

On the other hand, some interviewers experienced information security and business design could be capabilities to upgrade. One interviewee E5 described upgraded capabilities as following

> Information security and business design. We could give that to the ecosystem and the service design. We could give those capabilities and develop these more. In some cases, we could develop and then move on to the next cases, and then be able to leverage it. E5

One interviewee E5 believed that their company could upgrade commercialism and sales skills and describes capabilities as follows

> Encourage a culture of commercialisation. We are not good salespeople. To succeed traditionally, as we pursue growing our business, we need to learn to sell simply. We need commercialism and selling skills. It's going to play a really important role, at the point where we have this package of technically processes. E8

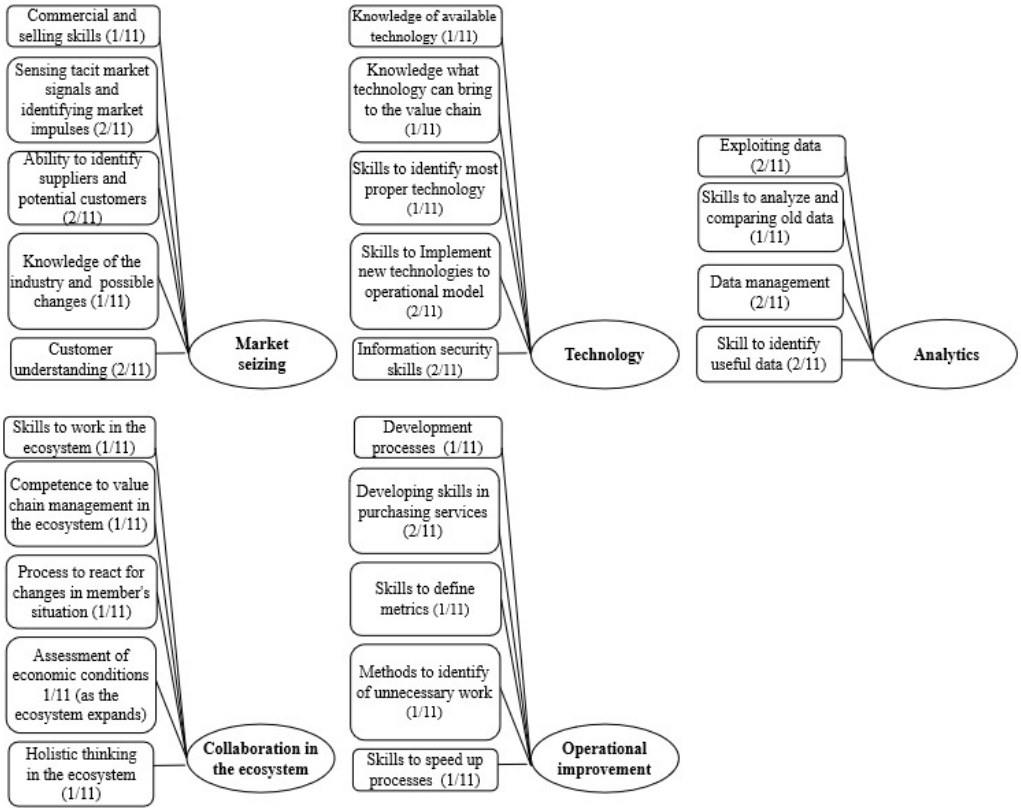

FIGURE 10 Capabilities to be developed

5.5 Shared capabilities in the ecosystem

This subsection provides insights of capability and resource sharing in the ecosystem. Interviewees were asked questions related to benefits, risks and shared goal. These issues can also be thought to impact the company's own strategy for being in the ecosystem and its commitment to it, as well as the allocation of resources and capabilities for the ecosystem. Interviewees described the value proposition of the ecosystem and addressed the need for a leading actor to set the ecosystem's common goal.

The interviews indicated that the experience of common goal varied among informants. The ecosystem actors clarify the goal in different ways. Several interviewees described different issues, which raised three themes: improved efficiency, making use of data, and customer centeredness. Interviewer E10 explained how a single actor could not deliver a chain in the ecosystem, and all partners have something to share to the ecosystem.

> Efficiency is probably it. The efficiency could be the goal. The whole chain will have something to share to ecosystem. As a whole, it will produce more efficient maintenance. E10

In general, fifth interviewees out of eleven thought the goal to be improved efficiency. While three out of eleven described could commit to the goal

be serve the customer and eager customer needs. The interviewers of E1 clarify goal to be quickly repair.

> If you want to know to the ultimate goal, that is fixing problems as quickly as possible. The end of the result should be visible to the customer. That's what we should aim for, so that it benefits the customer. The expertise of the partners and the advances in digitalisation that at least help this customer need to be met. E1

On the other hand, some interviewers see the optimal use of existing data and other data-related goals as the ecosystem's common goal. One of the informants clarifies the goal as follows

> Optimal use of existing data is essential to ensure that we make decisions and get the most out of what we can take from it. It requires that it could be analyzed and combined. We could make analyst solutions and see what could provide even more added value. E3

Interviewees described the benefits of the ecosystem for their companies. Five themes emerged in examining the interview data, and similarities in the responses were possible to observe. Interviews revealed benefits in the following themes: market position, social causes, skills in artificial intelligent developing, data customer retention and operational efficiency. Interviewees four of eleven described benefits to be linked to customer. Benefits were improved customer experience, satisfaction, and new customers. The interviewees of E5 describe the competition following

> Improved customer service experience, unpredictability, fewer disruptions and quick fixes, proactive measures more affordable, introducing a culture of working together. E5

However, most of the interviewees stressed that one of the key benefits was improved operational efficiency. Interviewees mentioned benefits in the form of increased customer satisfaction and efficiency but not capability sharing or capability developing. Individual interviewees describe benefits as speeded processes, optimization, less work duplication, improved maintenance processes, optimal use of resources and optimal decisions.

Other actors represent benefits of the ecosystem formed from social causes, by developed organization culture, encourages further development, reputation, brand image or general acceptability. Three interviewees describe artificial intelligence to be beneficial also other businesses. Interviewees explain how artificial intelligence could bring cost savings, help foresight, and help make optimal decisions by using data. Other interviewees described benefits formed from the market position, including access to new business, getting new services into production, and allow to get the experience of commercialization of services.

> For example, the value of this is when the ecosystem encourages us to continue to do in the future. This helps us to believe that we can develop new things and commercialize services in this organization. There is also significance in developing the organizational culture. E7

There was not a single benefit for all partners, but individual answers were given in relation to three different themes. These themes were improved market

position, business development, and operational efficiency. The interviewee of E9 describe references and business expansion as follow

> They could get good references and they could then expand their own business with others using this knowledge. E9

Interviewees believed that benefits for partners came mainly with the market position. Partners could have opportunity to expand operations in new markets, get new and increase number of customers, increased sales, and valuable references of working with the companies in the ecosystem. Other interviewees describe benefits to be related operational aspect such optimal operating, and an opportunity expands operations, improved resource planning and overall increased operational efficiency. The third theme, business development, emerged from the interviews. Interviewees noted benefits to become from new product development and new environment for testing innovations. The interviewees of E3 described the benefits of the value chain as follows

> Benefits for members of the value chain are opportunities for development, new customers and markets and new product development. E3

According to Adner (2006), for the organization is critical to consider its roles in the business ecosystem. Few interviewees presented direct names for the role, while some authors described more activities around the role in the ecosystem. Interviewee E5 described the need of the leading company to implement optimum solutions for the ecosystem as follows

> If it is an ecosystem, someone has to lead it. Partner companies cannot decide among themselves what to do and how to do it. The task is clearly to support the ecosystem formation. E3

Based on the interviewers in the target ecosystem, actors' roles were seen as a critical aspect of concern and been crucial in cooperation in the ecosystem. Interviewees experienced that the ecosystem must have one company that works as a leader and manage the ecosystem. Some interviewees describe their roles as a leader or orchestrators. At the same time, one interviewer describes their position in the ecosystem as a customer or enabler or business integrator. Interviewers E4 and E2 described roles as follows

> The leading role, that and then also the expert in a certain way is tried. We have cooperation between the network companies, and we work together to share good and bad experiences and to find the optimum solution for our region. If you were to think about this, you would see us in a certain way as orchestrators. E4

> I do not see our company in value chains. Initiating force business integrating role, packaging the service into a whole. E2

One of the interviewees revealed that they could be enabler of the ecosystem and share environment where service can be tested and piloted.

> We have an environment where this service can be tested and piloted. We also have some opportunities for financial investment and sharing our knowledge. I would say that we are the enabler of this ecosystem. E8

The ecosystem affects the business of members, and they need to concern risks of the ecosystem. Smith (2013) addressed that the business ecosystem may include various risks when companies operate and participate in the ecosystem. The risks of this study were divided into four categories of Smith (2013) general, keystone risks, and risks from a location in the value chain and standard. Overall, interview questions pay attention to the risks associated with the ecosystem not general business risks.

From this data, we can see that the ecosystem was seen to bring the following general risks of the ecosystem: competition between members 1/11, interdependence between ecosystem's members 1/11, relationships between core actors and new members 2/11, new members being forced into a subordinate role once certain conditions have been established with the original partners 2/11, new actors' roles in the ecosystem is not clearly defined, 1/11. Interviewees E7 and E5 described risks as follows:

> Risk is that someone wants to benefit more than others and the benefits are not evenly distributed. The ecosystem must be made that everyone wins. E5

> Data ownership and exploitation. If ecosystem roles are not clear, there might be loss of business for other ecosystem actors. E7

Other individual interviewees describe different keystone risks of Smith (2013) such orchestration is not strong enough (1/11), roles, responsibilities and obligations are not defined (1/11), communication breakdowns, and conflicts (1/11). Besides, two of eleven consider the risk that rules are not agreed upon early, which causes overlaps (2/11). While others presented risks from the location in the value chain (Smith, 2013), for example distribution of benefits to actors throughout the value chain (2/11) or the ecosystem being built too small (2/11). Standards risks were rapid change in imagine technology 1/11 and a commitment of partners 1/11. The interviewee defined orchestration risks as follows:

> Members have to define the role that they are going to play. If a company is going to orchestrate, it needs to understand that it takes resources. The whole ecosystem can collapse if the orchestrator does not act and take a leader position and if the orchestrator does not get anything out of it. E2

Talmar et al. (2020) clarify that actors contribute to the ecosystem's value creation by sharing different types of capabilities or, and resources. Interviewees describe what resources and capabilities they could potentially contribute to the ecosystem. According to interviews, companies are ready to share the following capabilities: leading capability, analytics capability, operational capability, technology capability, new product development capability and diverse resources.

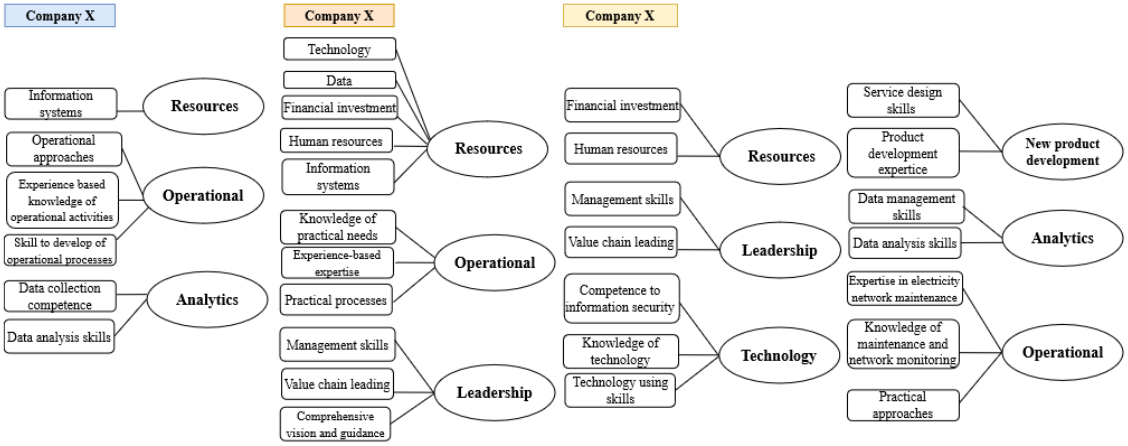

FIGURE 11 Shared resources and capabilities

In the target ecosystem, the resources and capabilities sharing were essential in the early stages of the ecosystem's creation. On the other hand, some interviewees believed that they have different roles in sharing

> We're doing operational side. It is a bit like a development phase and similarly operational, but a bit different role than others. We can`t promise, much financial funding. E5

Interviewees E8 and E11 describes information security and business design capabilities sharing as follows

> We can share to the ecosystem information security competence and business design capabilities. We could also develop these capabilities. In some cases, we could force them and move on to the next business cases in the ecosystem. E8

> Well, we have practical information and knowledge of needs. Possibly we could share some experience-based knowledge that goes with it financial characteristics. E11

Complementarity between capabilities is important in the ecosystem (Dedehayir et al., 2018). The ecosystem involves a wide range of companies with different expectations of benefits and resource and capability sharing. In order to deliver value to the ecosystem (figure 12), partners should share the following capabilities: leading capability, market seizing capability, operative capability, technology capability, and analytics and product development capability. Based on the interviews, the core ecosystem actors had a coherent vision of the needed capabilities of the ecosystem.

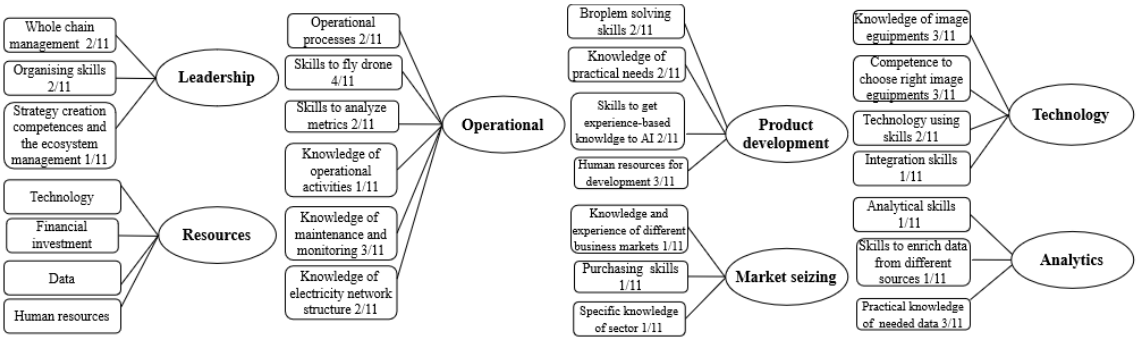

FIGURE 12 Required capabilities

Interviewees considered the capability sharing by thinking of technology and knowledge of the energy field. On the other hand, some interviewees felt that the ecosystem members need to share seizing capabilities in the form of increased market position in new markets. Interviewees of E4 and E1 describe their capability and resource sharing in the target ecosystem as follows

> In the future, if we are willing to expand and adapt this service for another industry, we should have experience in different markets. We also need leadership capabilities and strategy. Ecosystem management should also be considered. E4

> Specialized knowledge of the sector. Well, probably the data should be produced by partners. We need someone who works with it in the ecosystem as an analytics expert. E1

Interviewees agreed that the ecosystem supports their organizational strategies. Three themes emerged in examining the interview data: digitalization, market value, and customer. Interviewees three of eleven mentioned ecosystems fostering digitalization in the organizations. One of the interviewees describes the ecosystem to support strategy by improving the region's technological capacity and encouraging partners to try new things. The interviewees agreed that the ecosystem supports the organizational strategy and believe the ecosystem way to implement strategy and create value directly for the owners. Interviewers E9 and E6 describe ecosystem implement strategies as follows

> Fostering digitalization is a cornerstone of the strategy, and another is creating value for owners through more efficient operations. E9

> It confirms that we are moving forward in line with our strategy. The ecosystem makes us visible and tell our owners and other stakeholders that we are truly a company that uses digitalisation. In other words, it would support digitalisation strategy. E6

Other individual interviewees describe the ecosystem as supporting organizational strategies by improving customer experience, supporting the goal of providing a high quality of service to customers, and bringing new types of customers. Similarly, interviewees felt the ecosystem support strategy by improving customer acceptability. At the same time, some of the informants describe the ecosystem as implementing the strategy by growing market value. Interviewees two of eleven mentioned ecosystem impact on the company's per-

formance and affects productivity and effectiveness, which support their strategies.

Other Individual interviewees describe the following support their organizational strategy by creating new business initiatives and increasing skill levels. One of the interviewers describes the ecosystem for implementing strategy in the following way

> Goal is operationally efficient. We are looking for efficiency, cost savings in all processes. Efficiency of maintenance side and then especially when it comes to the repair side. E3

To conclude, identifying and anticipating benefits, roles and risks seemed to be important part of this business ecosystem.

5.6 Summary of results

This subsection summarises themes identified from the responses. This part describes created capabilities, not what the interviewees described as related to a particular capability. This subsection has been included for several reasons. A first reason is that a figure (figure 13), shows capabilities and resources together. A second reason is, that it sums up capability sharing for the ecosystem. The interviewees emphasized the need for certain types of resources and operational, dynamic, and strategic capabilities. The yellow colour in the figure (figure 13) demonstrates cooperation capabilities, market sensing, and new product development capabilities that bring the most competitive advantage. While the blue colour in the figure (figure 13) represents market sensing, collaboration in the ecosystem, analytics and technology capability, and operational improvement represent capabilities, what members should upgrade to improve the competitiveness of the ecosystem.

In the top row of the figure (figure 13) are the following strategic capabilities of the ecosystem: leveraging data and technology, customer understanding, service differentiation, improve of operational activities and change implementation capability. In the middle of the figure (figure 13) are the following dynamic capabilities: customer understanding, capability to create a culture of ongoing change, market sensing, marketing and sales, technology, analytics, operational management, new product development, leadership, and collaboration in the ecosystem. At the bottom of the figure (figure 13), are the following operational capabilities: reconfiguration, customization, innovation, improvement, responsiveness, and cooperation.

From the figure (figure 13), we can also see needed resources. Altogether the following tangible resources are required to implement the service: a drone, data storage, transport equipment, laptops, aggregates, and imaging equipment. While required intangible resources are algorithms, analytical model, software, system integrations, interfaces, data, legal permission to use airspace, and information security platform. Needed resources by humans are skills such as

technical, drone routing, a drone using, analysis and diagnosis, platform using and analytical and the skills of using analytical tools.

The study results give the impression that each member was willing to share resources and capabilities to the ecosystem. The ecosystem members are ready to share leading, technology, new product development, operational, and analytics capabilities. Shared resources were technology, data, financial investments, human resources, and information systems. To sum up, what stands out in the results, is the congruence of what members are willing and what partners be supposed to share in the ecosystem. Only marketing seizing capability and information system was not mentioned from the point of interviewees.

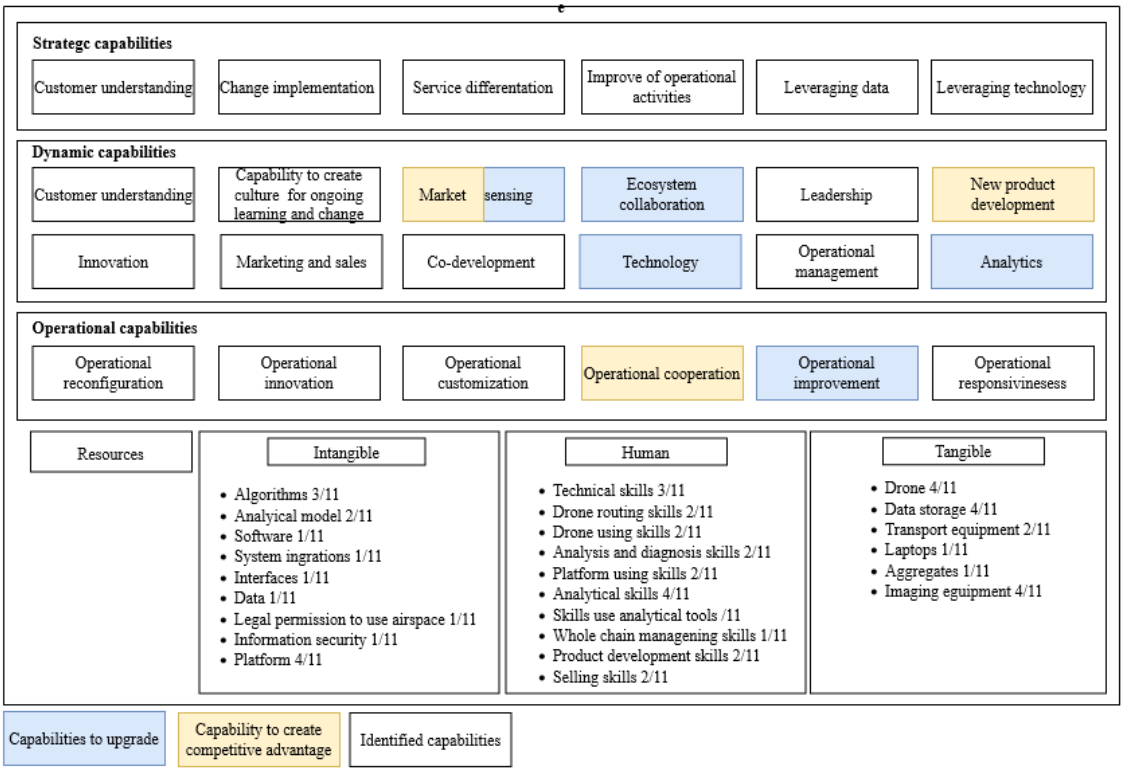

FIGURE 13 Summary of required resources and capabilities

6 DISCUSSION

The next section presents the principal findings of the research. A summary of the main findings, together with theoretical and practical contributions and limitations of the study is provided in this section. The study's main objective was to explore what capabilities the specific business ecosystem needs in the energy sector. In this case study, a research problem was followed by five supporting sub-questions, which will be introduced next.

6.1 Findings

In summary, this study has indicated that Porter`s (1985) value chain can be used as a tool to identify the business ecosystem's resources and capabilities. Porter`s (1985) value chain provided a holistic view of its operative activities and helped to identify needs for strategic management in this study. The next chapter describes the findings and evaluation of the sub-question

RQ1 What resources does the business ecosystem need order to function?

The study results suggest that the business ecosystem needs specific resources to operate. Identified resources can be classified into the following categories: intangible resources (e.g., technology), tangible resources (e.g., financial investment) and human resources (e.g., specialized skills of the energy sector). Interviewees did not mention resources to be associated with culture, reputation, communication, or motivation as was in the examples of Wu et al. (2011). The initial active observation indicated that many interviewees felt that resources consisted of skills. This perspective may be a result of today's business, where outsourcing and buying expertise is part of a company's business strategies. Management might see expertise as a resource that they either need to have inside the company or they need to buy it. This would support the view that resources can be bought, and capabilities must be built. (Teece et al., 1997) However, resource sharing in an ecosystem challenges this theory and supports

the view that resources are something that company holds or has access to (Größler & Grübner, 2006, Helfat et al., 2007).

As mentioned in the literature review, Sirmon, Hitt and Ireland (2007) claim that at resources are raw materials to build capabilities and that resource availability determines a firm's ability to develop capabilities. This study results support view of Davenport and Short (2003) which claims that resources are necessary for capability existence and identified resources can be linked to capabilities. According to Rumelt (1984) resources need to raise barriers to imitation. Interestingly, only some of the interviewees mentioned resources (e.g., data, algorithm, analytical model, diagnose skills, whole chain management skills, or drone) fulfilled these criterions. Possible explanations for this result might be that there are basic resources (e.g., laptops) that are needed for conduct activity and resources that raise imitation. (e.g., algorithm).

> RQ2 What operational and dynamic capabilities are needed in the business ecosystem?

This study focuses specifically on identifying the business ecosystems' operational and dynamic capabilities. The operational capabilities of the ecosystem have a clear role in the value creation process and are an important part of improving, carrying, and developing daily activities. Taken together, results suggest that all six operational cooperation, responsiveness, innovation, customization, improvement, and reconfiguration are important capabilities for the ecosystem. Findings indicate that when the ecosystem business idea is linked to member existing operational processes and activities, mentioned operational capabilities are needed for this business ecosystem. The skills, competences, knowledge, and processes by interviewees are strongly linked to the ecosystem's basic activities. These findings are consistent with Flynn et al. (2010), who describes operational capabilities as processes, routines, and sets of skills developed while managing company-specific operations. Unexpected was that interviewees described competences, skills or knowledge and processes, not directly individual capabilities.

There is one possible explanation for this result. These study results consisted with researchers Amit and Schoemaker (1993), and Ambrosini and Bowman (2009), who claims that operational capabilities can be thought as intermediate goods by conducting daily activities and are usually blend into the background. These factors may explain why operational capabilities are more challenging to identify than dynamic capabilities. Therefore, this ecosystem seems to need to make attention the identified operational capabilities and focus on developing required processes, competences, skills, and knowledge.

Day (1994) states that company develops its own combination of capabilities from its competing market and expected requirements. When interviewees defined the capabilities in the interviews, described views appear to support the assumption that certain dynamic capabilities can be identified in versatile industries. In accordance with the results, previous studies have demonstrated

that these capabilities were: market sensing (Teece, 2007), new product development and innovation (Teece, 2012) technology, and marketing linking capabilities (Hao & Song, 2016). Similar results can also be seen within this study. In this study following capabilities were identified that are also recognized in literature: alliance management capability by Schilke (2014) resembled leadership capability and capability of development and research culture by Dyduch et al. (2021) resembled capability to create a culture for ongoing learning and change.

Results of this study suggest that specific dynamic capabilities for this business ecosystem are customer understanding, co-development, operational management, collaboration in the ecosystem, and analytics capability. These findings propose that business ecosystem structure influences needed dynamic capabilities as collaboration in the business ecosystem requires new processes and skills. Moore (1996) claims that a sustainable business ecosystem builds through collaboration. Similarly, this study confirms that operating and developing services together in a business ecosystem requires new approaches in the ecosystem where members are dependent and interrelated with each other's. (Yeon, Wenyan & Moon, 2020). Taken together, these findings indicate that the business ecosystem may have a need for different dynamic capabilities than individual organizations.

> RQ3 What strategic capabilities are needed in the business ecosystem to differentiate in the markets?

Next chapters introduce the strategic capabilities of the ecosystem and the specific factors of the business environment. A prior study by Day (1994) has defined strategic capabilities as a combination of a diverse set of skills and accumulated knowledge that enable companies to coordinate their activities and control their resources. Similarly, the results of this study indicate that strategic capabilities consist of skills, approaches and processes that coordinate activities. A possible explanation for this versatile description might be that ecosystem needs to develop a versatile set of strategic capabilities to stand out from competitors.

Another important finding was that interviewees could recognize similar strategic capabilities as Simon et al. (2011). These capabilities included customer understanding, service differentiation, technology leveraging, and change implementation, which were similar to those in other industries. Besides, distinctive capabilities were identified. Those were capabilities to improve operational activities and to capability leveraging data. A possible explanation for these results may be that digitalization has brought strategic capabilities together from different industries, as these are such capabilities that can bring advantages in many business markets.

Another interesting finding is that the business ecosystem's strategic capabilities have similar characteristics than in the theory of Teece et al. (1997). For example, many individual operators could contribute components to offer maintenance services as an ecosystem. In a business, the ecosystem can offer a

prediction, maintenance, and repair services, as companies with different areas of expertise are involved. Competitors have difficulties copying the operational model of the business ecosystem, while individual competitors would provide only parts of maintenance services. The strategic capabilities identified in this study included unique elements. It can thus be suggested that strategic capabilities are hard to copy, unique, valuable to the customer and aim to be better than competitors. (Teece et al., 1997).

This research identified partly similar changes of business environment factors than Kennerley, Neely, and Adams (2013). The business ecosystem will be established in the energy sector, which is under continuous changes due to climate policy, emerging technology, changes in laws and regulations, high competition and the continuous evolution of the industry (Kennerley, Neely & Adams, 2013). However, some specific characteristics were highlighted. The highlighted characteristics were climate change, critical infrastructure for society, energy transition, exceptional circumstances, the importance of information security, political decisions affecting the market, market disruption, and competitors coming from another sector.

These results found the relationship between business environment and strategic capabilities. The capabilities described to support the assumptions of Lenz (1980). Lenz (1980) claims that by identifying strategic capabilities by adjusting them to the business environment and integrating them into the strategy, an organization can stand out from its competitors. For example, change implementation capability helps the ecosystem to react to continuous evolution and transform circumstances within the industry. Similarly, with the capability to leveraging technology, the business ecosystem is better prepared for emerging technology in markets. To summarise seems that the business ecosystem needs develop capabilities to respond to market specificities.

> RQ4 What capabilities contribute most to business ecosystem's competitive advantage?

Capabilities explain variance at the business level and the performance of individual companies (Luo, 2002). Previous studies have identified a range of operational, dynamic, and strategic capabilities which had the most impact on competitiveness. The studies have been carried out in different industries, and similarities have been found in the capabilities of this study. These results suggest that operational cooperation, new product development and market seizing capabilities have the most impact on competitive advantage in the market of the ecosystem. This finding broadly supports the work of other studies in this area linking business ecosystem capabilities. When an ecosystem is built on a whole new sector or different from the companies' traditional business markets, strategy and market seizing capabilities are particularly critical for the business ecosystems (Joo & Shinb, 2018). In addition, Palvlou & Sawy (2011) claims that new product development as a dynamic capability focuses on choosing the product to meet the changing environment and is, this way, important for the

business ecosystem. Surprising was that interviewees felt most impactful to be operational cooperation (Simon et al., 2011), although active observation supports this view.

There are few possible explanations for this result. The business ecosystem will be established in complex markets where new technologies are emerging, and new competitors are entering the markets. This study confirms that business ecosystem´s need to develop to skills to choose right technology and the ability to sense changes in the market. Operational capability can be thought of as related to fare cooperation in an ecosystem. These results are consistent with capabilities that identified from the open conversations with the interviewees. This finding reinforces the use of different methods. The results are likely to be related to fact that digitalization is reforming capability needs and competitive capabilities are common across many industries. However, other possible explanations might be that there is a need for specific capabilities while establishing a new business to markets.

In general, capability developing ensure growth of sustainable competitive advantage (Luo, 2002). This study also discovered what capabilities members could develop to influence the competitiveness of the whole ecosystem. These results suggest that the members could upgrade capabilities such as market seizing, analytics and technology, collaboration, and operational improvement.

There are several possible explanations for these results. As discussed earlier, the market is full of competitors and the industry is moving ahead rapidly, which may explain the need of upgrade the market seizing capability. In addition, the business of an ecosystem is dependent on technology and analytics when the goal is to improve operational activities efficiently. A sustainable business ecosystem works as an ingredient of competitiveness and is a convenient resource for gaining a competitive advantage (Joo & Shinb, 2018). One possible reason to improve collaboration is that cooperation ensures a sustainable ecosystem in which members commit. To sum up, one of the issues that emerge from the interviewees and active observation is that companies need to have specific capabilities to a certain level to operate in an ecosystem. It could therefore be argued that ecosystem actors could also contribute positively to the competitiveness of the ecosystem by strengthening the capabilities.

> RQ5 What capabilities companies are willing share in the business ecosystem?

In the first part of the framework, findings from the study confirmed results of the previous research that ecosystem's members share capabilities and, or resources with the ecosystem (Talmar et al., 2020; Jacobides et al., 2018). Results indicate that interviewees understand capability sharing to contain skills, approaches, knowledge, and processes. One possible explanation for this result may be that companies do not have every aspect of the capabilities. When actors share and combine resources and, or capabilities as one, capabilities may

become more unique. This phenomenon was present in the study. One actor is ready to share the operational model and knowledge of operational activities and processes. The second actor is ready to share knowledge of practical needs, experience-based expertise, and practical processes. In addition to previously mentioned, third actors is ready to share expertise in electricity network maintenance, testing and development of practical approaches, knowledge, and the pilot environment.

These capabilities have similar aspects as strategic capabilities. Some of the combined capabilities are unique, difficult to copy and felt to be better than the competitors have (Teece et al., 1997). However, these results therefore should be interpreted with caution because this did not emerge in all mentioned capabilities and resources. This also suited with earlier findings, which revealed that some capabilities are improved and strengthened as they enter the ecosystem. While some capabilities can only be given over by a specific actor. This study supports theory that complementarity between capabilities is crucial, and it increases value creation within the ecosystem (Dedehayir et al., 2018; Hurmelinna-Laukkanen & Nätti, 2018).

The results of the study indicated that the companies which believed they will benefit from the ecosystem mainly socially and economically. It was interesting that the interviewees emphasized their benefits and role in the ecosystem, and not the value proposition. Theory of Talmar et al., (2020) suggests that ecosystems 'actors share capabilities or resources to deliver a value proposition. In this study, one actor described itself as customer and felt gaining less value from the ecosystem as others, which affects resource sharing (e.g., financial input). The difference in perceived value may indicate that companies define resource and capability allocation as related to their role, strategy, and allocated benefits. One reason for results may be that the examined ecosystem was early phase of formation. There might be challenged to reflect ecosystem as a whole and forecast potential benefits what it could bring to members.

Purpose of the interviewees was also to get members to reflect on their own role, the distribution of benefits and the risks of joining the ecosystem. According to results, companies partly share a common view on what resources and capabilities partners need to share and what they are ready share. A one explanation for this might be, that ecosystem business idea is related to traditional operations of members. Seems that companies know what resources and capabilities they need to share that they can offer new maintenance services effectively.

6.2 Theoretical contribution

Whetten (1989) suggests that it is possible to make a theoretical contribution by offering new insights into previous theories. It can therefore be assumed that this study provided theoretical contribution by providing new views into earlier theories by answering the research questions. A theoretical contribution may

also be an identified need to explore a phenomenon further. Prior research has revealed that organizations need capabilities to operate, develop to adapt changing business environments and to stand out in the markets. This study has pointed out that there are still unanswered questions about how organizational capabilities identifying differ from business ecosystem capabilities. Perhaps the business ecosystem needs to have business capabilities to conduct specific tasks, and that's way differs from the traditional organizational capability theories.

This study also contributes a capability-based view by identifying three different capabilities in the business ecosystem. The study indicates that the operational, dynamic, and strategic capabilities of the business ecosystem differ by purpose and can explain the ecosystem's competitive advantage. The framework established for this study allowed for a new way of thinking and provided information of the value proposition's role in the allocation of capabilities and resources. The framework has also provided a deeper insight about relationships between strategic capabilities, business environment, strategy, and its effects on competitive advantage. Another theoretical contribution has been researching a case where a business ecosystem is in an energy field with its own specific capability needs.

The contribution of qualitative research studies can be the development of concepts, specific implication, or rich insights (Walsham, 1995). The blurry line between resources and capabilities forced this study to research both. This study indicated that resource identifying alone was not seen as sufficient and did not provide much valuable information. Capabilities are thought to be broader than resources, so focusing on the of capabilities could allow for a more holistic view. In summary, the theoretical contribution is the view that the identification of capabilities in a business ecosystem should start with the identification of capabilities, which can later be fragmented down into minor parts and identify the resources. In general, this study strengthens the view that Porter`s (1985) theoretical model can be used to identify business ecosystem capabilities. Both researchers and practitioners could benefit from the results.

6.3 Practical relevance

The purpose of this study was to determine the needed capabilities of the business ecosystem and similarly to increase the understanding of the interviewees of the topic. Practical relevance of this study is identified collection of capabilities for management of the ecosystem. In addition to Suur-Savon Sähkö, other companies in the energy sector can also benefit from the identification of specific capabilities. After this study, strategic orientation will set direction, which capabilities the ecosystem plan to acquire or develop (Di Benedetto et al., 2005).

Glass (2001) claims that practical revelation is an attribute of how research is the potential to be useful to practice. From a practical view, this study recognized the value chain of a business ecosystem, which makes it easier for mem-

bers to see what parts of the process are required to deliver a service. In addition, the interviews also helped to outline the members' own views on ecosystems and their expectations of cooperation. From a practical view, these study results were also used to plan a workshop for the board of ecosystem.

Glass (2001) claims that practical revelation is an attribute of a how research is potential of being useful to practice. From practical view, this ecosystem is built on top of existing operations where analytics, data and new technology add value for business. The aim of the ecosystem is to attract more players to join in to complement the necessary capabilities. According to results and expert's views, benefit distribution, cooperation, commitment, and defined roles in an ecosystem are important and affects the distribution of value. Perhaps these findings may help ecosystem members to determine benefits, discuss distributed value and determine resource and capability sharing.

These results will be useful in the ecosystem building phase and will help to create a strategy for the ecosystem. This new knowledge should help commissioner to determine what capabilities should be added, for example in the form of new ecosystem members. This study identified also strategic capabilities and capabilities that members could develop themselves. Next, the ecosystem members should plan how to manage and using of existing capabilities in a new way, or how to develop of entirely new capabilities. Taken together, identified strategic capabilities may require a focus on their development and possibly a significant upgrading of skills and knowledge in an identified area.

6.4 Limitations of the study

This chapter discusses first about limitations of methods. This research was completed with a qualitative method with a single case study approach. A limitation of this study is that active observation is an objective experience rather than a single truth about an issue. Another limitation of this study was that interviewees' understanding of capabilities varied, which may affect the study's results. Some of the needed capabilities from own perspectives and focused mainly own area part of expertise. In addition, resource identifying in was seen to be complicate. This would support the finding that the researcher should focus mainly on defining capabilities with the management and then concentrate on the needed resources later with a range of operational expertise's. Critically, semi-structured questions may have also influenced the themes that emerged from the responses of the study.

This subsection presents the limitation of the study and describes weaknesses in dependability, transferability, confirmability, and authenticity (Lincoln & Guba, 1985). This study aims to understand one business ecosystem in the energy sector, does not seek to generalize the results to all business ecosystems. The capability is company-specific (Wu et al., 2011), similarly the business ecosystem capability needs differ. Although, identified competitive capabilities in markets could be transferred to other settings for example individual com-

panies in the same markets. However, to enhance the transferability, the research could provide more detailed information on energy sector-specific capabilities and surrounded business environment of the ecosystem. Besides, the survey could have been conducted with more people, which would provide deeper insights of competitive capabilities in the markets.

Limitations of dependability can be considered. Such the need for certain capabilities changes over time and capability need is influenced by strategic direction and changes in the markets. This study has not conducted with another researcher, so anyone has not confirmed that they ended with the same conclusions. This study used abductive reasoning and aims to at a reasonable solution. Researcher used best knowledge and observation of understand the complex topic to formulate the capabilities. Another researcher without observation, could come up set of different capabilities. As mentioned before, authenticity indicates to the level which researcher present accurately and different realities. (Elo et al., 2014). Research target population consist of three companies and describe different views. However, not all members companies had the same number of interviewees, so it may be questioned whether the study brought out all sides accurately.

To summarise the literature review, it can be said that the aim was to use the source material high quality as possible. Most of the publishers have been reviewed in content markup JUFO in levels of 1-3. Literature searched from databases of JYKDOK's International e-resources as Digital Library, AIS Electronic Library, ProQuest, IEEE Xplore and from Google scholar. Even though, most of the literature of this study is gathered used articles from widely known publishers: Strategic Management Journal, Journal of Management, Technology Innovation Management Review, Journal of Business Research and Management Journal. However, one limitation of the study may be that some of the academic literatures are not widely known and from a well-recognized publisher.

7 CONCLUSIONS

The study summarized the main capability theories and combined them with the ecosystem literature. The choice of the topic was influenced to reason that a new phenomenon needed further examination. I worked for the commissioner for ten months, which allowed observation and a systematic familiarisation with the phenomenon. This study was conducted as a qualitative single-case study, interviewing chief executive officers and specialists of three different companies in the energy sector. The data was collected in semi-structured individual interviews, surveys, and active observation.

The study aimed to identify the required capabilities of the business ecosystem in the energy sector. The research questions were drawn from the commission company's interest in capability planning for the new ecosystem needs. To conclude, the ecosystem needs its members to share diverse resources and capabilities while contributing to value creation. The ecosystem requires specific operational capabilities to conduct and improve operational activities and dynamic capabilities to focus on rapidly changing environments. At the same time, the ecosystem requires strategic capabilities to stand out from its competitors and resources to build these capabilities. In addition, to capability identification, the case study confirms the importance of capability compatibility and provides information on members' capability sharing.

This research has both practical and theoretical relevance. Practical relevance comes from identifying the collection of capabilities for a business ecosystem management. The study provided Suur-Savon Sähkö with information on what the company can practically apply to creating the strategy. Additionally, the results of this research will obtain new insights about capabilities that are specific to the energy sector, which has some unique characteristics compared to other markets. As a theoretical contribution, identifying the business ecosystem's capabilities provides new insights into previous organizational capability theories. This study simultaneously challenges the previous theoretical debate and lack of business ecosystem capability studies. The findings from the study suggest that capabilities can influence competitive advantage. Theoretical contribution indicates that identifying the business ecosystem's capabilities should

start with identifying capabilities and later proceed to resources. Based on my research, companies can share not only capabilities but also resources that, when combined with resources shared by others, can form a unique capability. Therefore, the importance of resources in the study should not be dismissed entirely, even though capability encompasses a more significant part of business management and competitive advantage execution.

This study did not attempt to generalize the results to other business ecosystems. The studied ecosystem is built on top of existing operations where data adds value, which might bring some unique characteristics to the study. This single case study was beneficial because it increased understanding of business ecosystem capabilities and made it possible to identify areas for further research.

7.1 Areas for further research

This research results created questions that need further investigation. This study could be conducted with other business ecosystem cases. For further research, it would be essential to identify capabilities from various similar cases. Several cases would provide a deeper understanding of capabilities identification of the business ecosystem on a regular basis and introduce industry-specific capabilities. The following study could focus on generalizing, and the research could be applied either to business ecosystems in other sectors or other ecosystems in the energy field.

Capabilities theory is focused mainly on examining the capabilities of organizations, and there are no explicit models or frameworks for examining business ecosystem capabilities. Capability theory primarily analyzes individual capability types or categorizations such as dynamic, operational, or strategic capabilities. However, more critical than the categorization of capabilities is understanding the capabilities that the ecosystem needs to operate, evolve, and survive in a changing business environment. A possible area of future research would be to examine different models to identify needed capabilities of business ecosystem or other cases with a similar value chain model of Porter (1985) as used in this study.

This study does not contain discourse on the synergies between identified capabilities and their effect on competitive advantage. Further research could be a valuable way to tackle this limitation. Similarly, previous research has lacked an understanding of how organizational capabilities identify differ from business ecosystem capabilities identifying. The distinction is blurry, and there would be a definite need for versatile literature research on the topic. Another possible area of future research would be to explore how capability compatibility and competitiveness are related in the business ecosystem. In other words, the business ecosystem does not necessarily need all the capabilities that organizations are willing to share, thus these need to be compatible. Therefore, a new study could provide indications of how members can ensure the compatibility of capabilities.

APPENDIX 1 PRELIMINARY INTERVIEW QUESTIONS

Theme ecosystem

- What opportunities do you see in ecosystems? What do you think about data sharing in ecosystems in general?
- What do you think are the current challenges for partners in using and developing data? Do you think an ecosystem could address these challenges?
- Do you feel that partners are making sufficient use of the opportunities offered by data?
- What do you see as the challenges in building an ecosystem?

Theme value and capabilities

- What do you see as the key capabilities of the partners? Do you see that the ecosystem could strengthen these?
- What capabilities do you think partners need when joining the ecosystem?
- Which ecosystem/data network activities would particularly benefit partners?
- In what ways do you see the data network/ecosystem creating value for the partnership?
- What effort do you think the formation of an ecosystem and the agreement on the modalities of the data network could bring to the companies?
- How could we best facilitate partners' understanding of the benefits of data sharing?

Theme system and integrations

- What common APIs and other interfaces have been defined between partners?
- What specific requirements or technology solutions might the ecosystem require?
- How would you expect the ecosystem data and information sharing to affect system development?
- What do you find most challenging architecturally when modelling the ecosystem/data network?
- Can you assess what data-related skills and capabilities/technologies are needed from the data network and its members?
- What effort do you think the "formation" of the ecosystem and the implementation of the data network might bring to the partners?

APPENDIX 2 INTERVIEW QUESTIONS

Theme 1 Ecosystem capabilities and resources

- What could be the goal of an intelligent maintenance ecosystem?
- What resources are needed to implement the basic tasks/processes and services of an intelligent maintenance ecosystem?
- What are the capabilities of the maintenance ecosystem that enable day-to-day operations?
- What capabilities does the ecosystem need to evolve and develop products and services to respond to the changing business environment and market?

Theme 2 Shared capabilities in the ecosystem

- What value/business benefits could an intelligent maintenance ecosystem bring to your organisation? To other partners in the ecosystem?
- What resources and/or capabilities could your organisation potentially share with the ecosystem?
- What could be your company's role in the ecosystem? Can you describe the possible role/position of your company?
- What resources and/or capabilities do you think ecosystem partners should share in the maintenance ecosystem in order for the ecosystem to deliver value to ecosystem members?

Theme 3 Business environment, strategy, and competitiveness of the ecosystem

- How does the smart maintenance ecosystem support the implementation of the strategy in your organisation?
- What risks do you identify in the maintenance ecosystem in general? What about joining it?

- What characteristics of the ecosystem's business environment should be considered when defining the ecosystem's strategy?

- What could be the strategic capabilities of an intelligent maintenance ecosystem?

- What capabilities could be developed in your organisation to improve the competitiveness of the intelligent maintenance ecosystem in the market?

APPENDIX 3 SURVEY

Älykkään kunnossapidon ekosysteemin kyvykkyydet

Pakolliset kysymykset merkitty tähdellä (*)

Tutkimushaastatteluissa keskustelimme älykkään kunnossapidon ekosysteemin liiketoimintaympäristöstä ja siihen liittyvistä erityispiirteistä. Seuraavalla kyselyllä pyrin kartoittamaan, mitkä kyvykkyydet parantavat kilpailuetua älykkään kunnossapidon ekosysteemin liiketoimintaympäristössä.

Arvioi asteikolla 1-5 kyvykkyyksien vaikutusta kilpailuedun saavuttamiseen älykkään kunnossapidon ekosysteemissä.

(1) Ei vaikuta ollenkaan
(2) Vaikuttaa vain vähän
(3) Vaikuttaa jonkin verran
(4) Vaikuttaa paljon
(5) Vaikuttaa erittäin paljon

Oma rooli organisaatiossa *

Ylin johto

Keskijohto

Arvioi dynaamisten kyvykkyyksien vaikutusta älykkään kunnossapidon ekosysteemin kilpailuetuun

	Ei vaikuta ollenkaan	Vaikuttaa vain vähän	Vaikuttaa jonkin verran	Vaikuttaa paljon	Vaikuttaa erittäin paljon
Kyky etsiä mahdollisuuksia (Opportunities searching) *					
Kyky tarttua mahdollisuuksiin (Market seizing) *					
Kyky kaupallistaa palveluja (Marketing sensing coordination) *					
Kyky sopeutua muutoksiin (Organizational adaption) *					
Kyky oikea-aikaiseen päätöksentekoon (Timely decision-making capacity) *					

	Ei vaikuta ollenkaan	Vaikuttaa vain vähän	Vaikuttaa jonkin verran	Vaikuttaa paljon	Vaikuttaa erittäin paljon
Kyvykkyyksien kokoaminen ja uudelleen järjestely (Configuration and reconfiguration) *					
Muutosten toteuttamiskyky (Change implementation capacity) *					
Tietämyksen ja oppimisen hallinta (Knowledge and learning management) *					
Innovatiivisuus (Innovativeness) *					
Kumppanuuksien johtaminen (Alliance management capability) *					

Arvioi seuraavien strategisten kyvykkyyksien vaikutusta älykkään kunnossapidon ekosysteemin kilpailuetuun

	Ei vaikuta ollenkaan	Vaikuttaa vähän	Vaikuttaa jonkin verran	Vaikuttaa paljon	Vaikuttaa erittäin paljon
Markkinan mahdollisuuksien tunnistaminen (Sensing market opportunities) *					
Palveluiden kohdentaminen (Market targeting) *					
Markkina-asema (Market positioning) *					
Uusien tuotteiden kehittäminen (New product development) *					
Tuotehallinta ja innovaatiokyky (Product management and the ability to innovate) *					
Palvelun laatu, mukaan lukien asiakaspalvelu sekä tarve kuunnella ja ymmärtää asiakasta (Guality of service including customer service and the need to listen to and understand the customer) *					
Asiakassuhteiden hallinta (Customer relationship management) *					
Hyvä johtajuus ja visio (Good leadership and vision) *					
Sopeutumiskyky ja joustavuus (Adaptability and flexibility) *					
Hyvän henkilöstön valinta ja säilyttäminen (Selection and retention of good staff) *					
Kyky teknologian hyödyntämiseen (Capabilities for exploiting technology) *					
Erottuvat tuotteet tai palvelut (Differentiated products or services) *					
Markkinointiin liittyvät kyvykkyydet (Marketing linking capabilities) *					

Arvioi seuraavien toiminnallisten kyvykkyyksien vaikutusta älykkään kunnossapidon ekosysteemin kilpailuetuun

	Ei vaikuta ollenkaan	Vaikuttaa vain vähän	Vaikuttaa jonkin verran	Vaikuttaa paljon	Vaikuttaa erittäin paljon
Operatiivisen toiminnan parantaminen (Operational improvement) *					
Operatiivisen toiminnan uudelleen järjestely (Operational regonfiguration) *					
Operatiivinen yhteistyö (Operational cooperation) *					
Operatiivisen toiminnan räätälöinti (Operational customization) *					
Operatiivisen toiminnan muutoksiin reagoiminen (Operational responsiviness) *					
Operatiivisen toiminnan Innovointi (Operational innovation) *					

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