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Unleashing potential of Artificial Intelligence and Digital Servitization: Investigating the role of Dynamic Capabilities on Finnish Small and Medium Sized Enterprises.

School of Management

Master's thesis in strategic business development

Vaasa 2024

UNIVERSITY OF VAASA
School of Management

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Title of the Thesis: Unleashing potential of artificial intelligence and digital servitization: Investigating the role of dynamic capabilities on Finnish small and medium sized enterprises.

Degree: Master of science
Program: Strategic Business Development
Supervisor: Tuomas Huikkola
Year: 2024 **Sivumäärä:** 75

Abstract

A unique and interesting fact about small and medium-sized enterprises (SMEs) that adopt artificial intelligence (AI) and become fully servitized is that they can significantly shift from product-based revenue models to outcome-based ones. In this transition, rather than simply selling products or one-off services, SMEs using AI can offer continuous, predictive services that directly enhance customer outcomes. When there is this potential to move from transactional to relational and outcome-based services, SMEs can build long-term customer relationships as well as generate recurring revenues and leverage AI-driven insights to continuously improve their offerings. In Finland, where sustainability and innovation are key priorities, SMEs that adopt AI can integrate environmental monitoring and optimization services into their offerings. If, for instance, a company develops wearable devices that monitor patients' vital signs, such as heart rate, oxygen levels, and glucose levels, and then simply transmits this data to healthcare providers in real-time. However, instead of simply selling the wearable devices, this company uses AI-driven analytics to offer *"Health Efficiency as a Service."*

This thesis investigates the potential of AI on the digital servitization journey of Finnish SMEs within the healthcare industry. The findings reveal a disparity among three Finnish SMEs, which shows a spectrum of AI adoption. Some SMEs depend heavily on AI for their product offerings, while others are only starting to explore the capabilities of this new technology. Notably, none of the SMEs included AI in their administrative tasks. Drawing on dynamic capability theory (DCT), this thesis delineates three factors: sensing, seizing, and reconfiguring. Under these factors, specific steps are outlined for Finnish SMEs to achieve digital servitization. Additionally, the concept of AI maturity level is introduced. The interviewed companies were ranked according to Microsoft's AI maturity model. Level 4 is identified as the optimal level for SMEs to leverage AI effectively for digital servitization.

Given the scarcity of research on the impact of AI on digital servitization, this study employs a qualitative, multiple case study, mono-method approach, utilizing cross-sectional data from structured interviews. The observations indicate a general hesitation among Finnish SMEs regarding the full adoption of AI in their journey towards digital servitization.

KEYWORDS: AI, SME, Dynamic Capability theory, AI maturity model, digital servitization

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Abbreviations

SME: Small and Medium Size Enterprise

AI: Artificial Intelligence

DCT: Dynamic Capability Theory

TOEH: Technologies, Organizations, Environments, and Humans

PSS: Product Service Systems

RPA: Robotic Process Automation

1 Introduction

Artificial Intelligence (AI) represents the next generation and most advanced form of industrial digitalization and digital servitization (Parida et al., 2019; Kohtamäki et al., 2022). Its systems and technologies have become more pervasive and efficient (Iansiti and Lakhani, 2020), leading to a reduction in costs and an increase in effectiveness through reduction of re-work when addressing business, societal, and sustainability challenges (Phan et al., 2017; Chauhan et al., 2022). Moreover, the value of AI solutions can be significantly enhanced by incorporating novel ecosystem partners with diverse resources and applications (Kolagar et al., 2022).

According to Kohtamäki et al. (2019) and Bustinza et al. (2018), the shift towards a service-oriented business models through digital servitization contributes to enhanced profitability. Firms that have implemented digital service solutions report being better positioned in competitive markets (Coreynen et al., 2017; (Sjödin et al., 2020). Consequently, the result is lower operational costs and increased customer retention (Huikkola et al, 2022). Companies can also optimize product management and maintenance through digital technologies, which reduces downtime and enhances product life cycles, thereby contributing to profitability (Gebauer et al, 2022).

As reported in AI-TIE (2024), AI adoption in Finnish small and medium sized enterprises (SMEs) has led to direct cost savings through the automation of processes. For instance, AI implementation in production was noted in 17.5% of cases, while back-office functions utilize AI in 16.2% of cases. This automation reduces the need for manual input, thus decreasing operational costs (AI-TIE, 2024). According to Jafarzadeh et al. (2024) AI has gained attention in many SMEs, leading to improved operational efficiency and enhanced overall business performance. Specifically, AI has been integrated into production processes in approximately 17.5% of cases reported, while back-office functions also utilize AI in around 16.2% of cases. For instance, several SMEs have employed AI for automating production lines and enhancing logistics.

The result is significant efficiency gains. Furthermore, many SMEs have adopted AI-powered customer service solutions like intelligent chatbots leading to improved customer engagement and satisfaction (AI-TIE, 2024).

Today, the rapidly evolving landscape as well as the integration of AI with servitization are revolutionizing industries, especially within Finnish SMEs, which alters the value generated (Sjödin et al. 2020). The advancement of AI and machine learning (ML) technologies, as a part of AI, significantly transformed various sectors. In healthcare, AI-powered diagnostic tools such as deep learning algorithms have demonstrated remarkable performance in detecting diseases from medical images, thereby aiding physicians in making more accurate diagnoses (Rajpurkar et al., 2017). Similarly, ML techniques such as neural networks have been employed to analyze complex financial data and predict market trends with higher precision, enabling investors to make more informed decisions (Vanzara & Azevedo, 2023; Chen et al., 2015). In the same manner, prior studies confirmed that SMEs play an important role in the economic development of countries (Glonti, Manvelidze & Surmanidze, 2021; Yang, Chen, Visnjic, Parida, and Zhang, 2024). For this reason, Finland holds a positive view of SMEs (Finnish Ministry of Economic Affairs and Employment, 2017). Considering them a crucial driver of economic growth, innovation, and job creation. Noticeably, SMEs in Finland are increasingly implementing AI to enhance decision-making, optimize business operations, and become more competitive (Ministry of Economic Affairs and Employment of Finland, 2021).

However, according to (Holgersson et al., 2022) the influence of AI on service delivery remains relatively new, as enhancing a company's AI capabilities necessitates gradual investment in sophisticated technology. This process also demands a careful equilibrium between forces that encourages the integration of manufacturers' activities and those that drive the value proposition towards customer-driven market dynamics. Consequently, this evolution in the services ecosystem is still in progress.

On the same note, Gebauer et al. (2021) and Kohtamäki et al. (2020) indicated that the scholarly discourse regarding digital servitization is currently in its early stages of development. According to Wirtz et al. (2018), academic inquiry into the impact of AI on servitization remains in its early stages and lacks adequate empirical validation. This observation highlights the research gap identified by Chen, Visnjic, Parida, and Zhang (2021), who noted that the existing literature fails to provide a clear understanding of how companies can effectively leverage AI to generate value through digital servitization, a factor that is crucial for the sustainability of SMEs. Furthermore, as pointed out by Peillon and Dubruc (2019), the focus on the digital servitization journey of SMEs has been limited, often neglecting the perspectives and experiences of SMEs.

Quoting the thesis of Tikkanen et al. (2022, p.14): "*Even though Finland is generally technologically advanced, including in the deployment of AI, only 3,15 percent of Finnish companies with over 5 employees utilize AI on daily basis".* They further mentioned: "*Companies who do not utilize any AI are expected to face hard competition in the future, according to many sources"*. According to Tikkanen et al. (2022): most SMEs need to embrace digitalization and employ AI in a revolutionary manner. Hence, there is a need for new approaches to boost the integration of AI and other tools within the broader framework of digitalization in SMEs within the region. This study adds to the deficiency in research on AI and service delivery by empowering Finnish SMEs with a scientific/theoretical method to measure their position vis-à-vis the adoption of AI on their journey to achieve fully digital servitization.

As qualitative research, this study adopts a multiple-case approach utilizing a mono-method, with observations drawn from cross-sectional data. The purpose of this study is to determine the extent to which Finnish SMEs can be classified as digitally servitized entities through the integration of AI. Hence, answering the research question: *"How Finnish SMEs employ their dynamic capabilities when implementing AI-driven digital servitization?".* Drawing on Dynamic Capability Theory (DCT), the study examines three key elements: sensing, seizing, and reconfiguring. Each stage involves assessing the SME's current operational level.

The pre-established interview questions will enable a preliminary assessment of the company's current use of AI based on the responses provided by participants. Additionally, these interview questions aim to offer a comprehensive insight into how Finnish SMEs navigate the complexity of AI implementation and its results on the digital servitization journey.

Corley and Gioia (2011) advocate for a perspective on theory development that emphasizes theories with broader applicability in both scientific and practical contexts. They examine two aspects of theoretical contributions: originality and usefulness. The originality of theoretical contributions may vary from small advancements to significant breakthroughs, while usefulness can be assessed in terms of scientific value and practical applicability. Also, quoting the article of Abou-Foul, Ruiz-Alba and López-Tenorio (2023, p.09, p.11): *"… we are still in the first stages of understanding AI developments and their impact on business contexts"* and also: *"Studies that examine the relationship between AI capabilities and servitization are still scarce and inconclusive, and businesses still struggle to capture the value of digital transformation due to bad measures and untargeted technology investment"*. Therefore, the primary contribution of this paper lies in its original approach in understanding AI impact on business context. Whereby Finnish SMEs can support their adoption of AI within the framework of digital servitization via a methodological process rooted in established theory. Furthermore, its utility is underscored by the systematic delineation of steps that facilitate a coherent theoretical engagement with digital servitization considering contemporary technological advancements. The practical significance of these findings is evident in enabling CEOs of SMEs pinpoint areas for enhancement, thereby fortifying their strategic endeavors toward digital servitization.

This paper is structured as follows. The introduction established the context for the primary incentive that influenced the selection of the topic, alongside addressing the gap identified in the literature and providing a brief description of the methods. Subsequently, the following section presents the theoretical background, decoding the significance of the chosen theory and its relevance to the topic. It also examines the scale of Microsoft's Responsible Artificial Intelligence Maturity Model (RAI MM) utilized to assess the level of AI adoption among SMEs in Finland. Moving on to the third part, the methodology is clarified, with a focus on the significance of the research approach "Abduction" employed in this thesis. Finally, the last two parts, namely: the findings and discussion.

2 Theoretical background

In the context of this paper, it is imperative to first introduce key definitions to establish foundational parameters.

Artificial intelligence (AI) refers to how computers or robots can perform tasks typically associated with intelligent beings, such as reasoning, discovering meanings, generalizing, and learning from past experiences (Sheikh, Prins, & Schrijvers, 2023). Although there isn't a single definition that everyone agrees on, various interpretations of this concept can be found in literature. According to The High-Level Expert Group on Artificial Intelligence (AI HLEG) of the European Commission, AI is seen as "systems that display intelligent behavior by analyzing their environment and taking actions – with some degree of autonomy – to achieve specific goals" (Encyclopedia Britannica, n.d). This definition of AI HLEG is chosen because it emphasizes both environmental analysis and goal-oriented actions, providing a more comprehensive understanding of AI.

Small and Medium Enterprises (SME) in Finland are sorted out using specific rules described by the government, as explained by Finnvera (2022). According to the general definition, these companies must have fewer than 250 paid workers, make annual sales below EUR 50 million, or have a balance sheet total under EUR 43 million (Finnish Statistical Office, n.d.). Also, they need to meet the independence requirement, which means that they should operate independently from larger organizations (Finnish Statistical Office, n.d.). This rule states that SMEs should not have one entity holding 25% or more of their ownership or voting rights, which is in line with how SMEs are classified regardless of ownership structures (Finnvera, 2022; European Commission, 2020).

2.1 Digital servitization & AI

Digital servitization based on the views of Kolagar, Reim, Parida, and Sjödin (2022) involves the integration of digital services into traditional product offerings. Which allows SMEs to develop digital service offerings alongside physical products to enhance service maturity and create a process framework for digital-servitization-enabled model (Kolagar, Reim, Parida, & Sjödin, 2022). On the same note, Coreynen et al. (2017) examine how digital servitization transforms traditional business models by integrating advanced digital technologies, such as the Internet of Things (IoT), big data analytics, and AI, into product and service offerings. Digital servitization shifts businesses from merely selling products to delivering smart, connected services that add value through real-time data, automation, and predictive capabilities (Coreynen et al. 2017). Coreyman et al. (2017) argue that these digital tools enable companies to move from reactive service models, where firms respond to customer needs, to proactive data-driven models that anticipate customer requirements, such as automated service delivery. Thereby, firms can offer enhanced value propositions that impacts customer relationships and allows for longer-term commitment.

Following the fore-mentioned definition of digital servitization, it is important to make a distinction between AI and digital servitization: one specific enabler of digital servitization is AI (Ordoñez de Pablos, 2023). Studies by Kindström et al. (2013), Coreynen et al. (2020), and Huikkola et al. (2022) provide significant insights into how AI serves as a digital servitization enabler for manufacturing companies. Even though AI and digital servitization are distinct concepts, AI technologies can enhance services offered within digital servitization initiatives. For example: predictive maintenance and personalized user experiences (IABAC, 2024; Porter & Heppelmann, 2014). Also, AI can enhance data analytics and machine learning algorithms (Li et al., 2023). In addition to the delivery of more advanced, personalized, and value-added digital services to customers which constitutes some usages of AI in business (Data Science Dojo, 2023; Squirro, 2023; Porter & Heppelmann, 2014).

However, when it comes to SMEs, previous research has not sufficiently focused on digitalization (Coreynen et al., 2017; Kohtamäki et al., 2019), despite the significant potential offered by advanced digital tools and technologies (Porter & Heppelmann, 2015) such as IoT (Porter & Heppelmann, 2014), augmented reality (AR) (Porter & Heppelmann, 2017), and AI, which facilitate system connectivity (Huikkola et al. (2022).

In their study, Baines et al. (2017) emphasize that digital servitization empowers SMEs to offer tailored and individualized solutions that resonate with diverse customer segments. Through the utilization of advanced digital technologies such as IoT sensors, AI algorithms, and big data analytics, SMEs can gather real-time insights into customer preferences and behavior patterns, thereby they can adapt their offerings effectively to meet specific customer needs (Kumar, 2023; Baines et al., 2017). Tim Baines, additionally, categorizes services into three distinct tiers: base, intermediate, and advanced services (Baines et al., 2013). These classifications reflect the degree of value added and strategic complexity incorporated in service offerings. The classification of services into base, intermediate, and advanced categories, as established by Tim Baines in his paper: *"What is servitization of manufacturing? A quick introduction. (2024)"*, serves as a critical framework for understanding servitization. Each type of service aligns with specific examples and AI capabilities that enhance operational efficiency and customer value, as described next:

- *Base services* are the most fundamental service offerings, often it revolves around reactive customer support such as warranties and spare parts supply. Hence, AI enhances these services through predictive maintenance and the optimization of inventory management, which leads to improvement in customer satisfaction and reduction in operational costs.
- *Intermediate services* offer additional value that focuses on maintenance and operational support. Some examples include regular maintenance and helpdesks. Thus, AI through condition monitoring and chatbots, permits real-time diagnostics and efficient customer service, which reduces response times and enhances support.

- *Advanced services* are outcome-based. This type of services is extremely crucial because it refers to a fully servitized firm (Baines, Lightfoot, Peppé, & Braganza, 2009). As in the case of Outcome Base Contracts (van der Meer-Kooistra & Vosselman, 2012), which is a service model that prioritize the delivery of defined results or outcomes instead of merely providing fixed products or services. For instance, within the healthcare industry, a hospital may enter into an agreement with a medical technology provider where remuneration is contingent upon achieving enhanced patient outcomes, such as lower readmission rates, rather than being based on the purchase of specific medical equipment. Another example is the Product-as-a-Service (PaaS) model (Baines, Lightfoot, Peppé, & Braganza, 2009), which enables customers to utilize products without outright ownership, requiring them instead to pay based on their usage or the specific services provided, thereby transforming traditional consumption patterns into a service-oriented approach that emphasizes access over ownership. This category of services allows manufacturers to meet contractual outcomes, thus transforming customer engagement from product-based to performance-based models (Copperberg, 2023).

Peter Drucker (1954) once said: it is not possible to improve what you cannot measure. That is why it was essential to establish a clear classification of services in relation to AI capabilities and the processes involved in transitioning between them. Consequently, the concept of AI maturity is introduced. This model is valuable and serves as a “scale” that permits an organization measure where it stands in its AI adoption journey. Hence, it can move from one type of service to the other. The AI maturity model consists of four stages—Awareness, Developing, Aspirational, Mature, and Optimization—which provide a structured framework for organizations aiming to enhance their service offerings (Servitly, 2024). As companies progress from basic to more advanced services, they can utilize AI to automate tasks, improve customer interactions, and tailor their offerings:

- At the Awareness Level, organizations engage with basic services. They occasionally employ AI tools to aid in product maintenance, even if there are no structured applications or comprehensive strategies.
- Progressing to the Developing Level, companies can adopt intermediate services. They incorporate fundamental AI applications into their service operations. This is where they enhance areas like training and technical support. At the same time, they begin to experiment with dedicated AI strategies.
- Upon attaining the Aspirational Level, firms become more confident in their AI capabilities. That is where they advance toward sophisticated services that deliver significant value to customers. At this stage, companies may use AI tools to enhance customer insights and improve service delivery, which encourages a more extensive incorporation of AI into their core business strategies.
- At the Mature Level, organizations embed AI comprehensively across various functions. Which creates a foundational element of their service innovations and strategic decisions, that results in high-performance service outcomes.
- When firms reach the Optimization Level, they capitalize on already existing capabilities and leverage the use of AI.

2.1.1 Defining AI Maturity model

AI maturity model refers to an organization's capacity to effectively adopt and implement AI technologies (Sivek, 2024). It encompasses the extent to which a firm has incorporated AI into its operational frameworks, strategic planning, and organizational culture (Sivek, 2024). Firms at different stages of maturity demonstrate varying levels of capability, ranging from limited, random application of AI to full-scale integration across business processes. The recognition of this developmental continuum is essential for determining the firm's current position within its AI adoption journey.

2.1.2 AI maturity model in relation to Digital Servitization

To better comprehend the concept of AI maturity model, the below illustrative table is provided (see Table 1). It simulates the levels a firm goes through until fully adopting AI and it is inspired by ElementAI's model (Eggers et al., 2017):

Dimension	Awareness	Developing	Aspirational	Mature	Optimized
Strategy	No strategy	Limited inclusion of AI in the firm's strategy	Strategy is defined in alignment with AI	Strategy is integrated in the firm	The firm is AI-driven
Data management	Limited data available	In progress usage of data compiling	Data management is centralized	Data is well governed in the organization	Comprehensive data strategy in alignment with AI
Technology	Limited usage of AI	Only trials	There are some AI tools	AI tools integrated in most processes	Advanced technology and advanced systems using AI
Talent	No specific skills	Initiating talent building in the field	Recruiting personnel in the field	There are units/teams specialized in AI	AI talent is present across the firm
Culture	Firm not fully aware of AI usage	Open to accept AI	AI expertise is supported across the organization	The AI culture is absorbed correctly	AI mindset driven by continuous learning in the field

Table 1: Illustrative figure showing stages of AI maturity in a firm.

For this study, the evidence is derived from industry reports rather than peer-reviewed scientific literature. The term *AI maturity level* is used here to denote the degree of AI integration and adoption within an organization. Specifically, it refers to the extent to which AI technologies and methodologies are embedded in the organization's operational processes and strategic objectives (WeSoftYou, 2023; Maturity Model Guy, n.d.).

This progression through various stages of AI maturity is necessary for companies aiming to cultivate the full potential of artificial intelligence in enhancing decision-making processes, optimizing workflows, and fostering innovation (Deepchecks, 2023). Each stage represents a distinct level of AI utilization, ranging from mere awareness of AI's existence to its integration into every component of organizational operations (WeSoftYou, 2023; Maturity Model Guy, n.d.; Deepchecks, 2023):

At the initial level, organizations recognize the existence of AI but have not yet fully implemented its capabilities into their operations (WeSoftYou, 2023). Ideas regarding AI utilization may exist, but concrete strategies are lacking (WeSoftYou, 2023; Maturity Model Guy, n.d.). As companies progress to the following level they begin experimenting informally with AI technologies, exploring basic models and tools such as Jupyter notebooks (WeSoftYou, 2023; Maturity Model Guy, n.d.). However, AI adoption remains constrained, with limited integration into daily functions (WeSoftYou, 2023; Maturity Model Guy, n.d.; Deepchecks, 2023). Advancement to the following level represents a significant milestone, where organizations have integrated machine learning into their day-to-day functions: that is establishing data pipelines and managing Machine Learning models (WeSoftYou, 2023; Deepchecks, 2023). At this stage, AI assists in information processing tasks, which leads to operational efficiency (WeSoftYou, 2023; Deepchecks, 2023). In later levels, strategic deployment and transformational integration of AI within the organization are witnessed. That is when AI becomes a core element of business strategy and drives innovation and creates value (WeSoftYou, 2023; Maturity Model Guy, n.d.; Deepchecks, 2023).

There are various models of AI maturity level, each providing a unique framework to evaluate the level of maturity of AI adoption and integration inside a business. Several popular models of AI maturity exist, for example: Microsoft’s RAI MM by Microsoft (2023), The AI Maturity Model from Gartner, The AI maturity Model from WeSoftYou (2023), The Maturity Model of MITRE AI (n.d), Maturity Guy's Model of AI Maturity (n.d), The AI Maturity Model by Deepchecks(2023).

The phases and criteria for each of these models are different. However, they have the same goals and themes when it comes to helping firms in assessing their adoption level of AI.

For this thesis, Microsoft's Responsible AI Maturity Model (RAI MM) is employed. The RAI MM (Vorvoreanu et al., 2023) provides a structured approach for organizations to enhance their AI practices. It outlines the journey from basic to advanced maturity levels, the model helps organizations plan their development strategically. In essence, the RAI MM guides organizations in integrating AI principles into their operations and making positive changes in the AI field.

Figure 1 : Microsoft RAI MM (Vorvoreanu et al., 2023).

Microsoft's RAI MM (Figure 1) provides a vital framework for SMEs seeking to enhance their digital servitization initiatives. This evaluation process is crucial for refining service-focused business models and improving operational effectiveness. Additionally, the model promotes a culture of ongoing improvement. This leads to responsible AI integration and ethical considerations that are integral to achieving lasting success in digital transformation.

The implementation of RAI MM permits SMEs to acquire the essential tools to manage the challenges associated with AI technologies. Where technological progress aligns with their strategic goals. This alignment also allows them to innovate their product service systems and establish strategic partnerships, eventually achieving a competitive edge in the market. The framework not only aids in facilitating smoother transitions toward digital servitization, but also helps SMEs adapt to changing customer needs and encourages sustainable growth.

2.2 Literature review

Kohtamäki et al. (2019) elaborate on how digital servitization allows SMEs to provide personalized and responsive services, thereby enhancing customer satisfaction and loyalty. Using real-time data analysis, SMEs can anticipate customer needs and offer tailored solutions that enhance the overall customer experience. Additionally, the agility afforded by digital technologies enables SMEs to respond to market changes and evolving customer demands (Kohtamäki et al., 2019).

Similarly, Le-Dain, Benhayoun, Matthews, and Liard (2023) highlight the role of digital servitization in the development of smart Product-Service Systems (PSS) by SMEs. This approach integrates products and services to create innovative solutions that cater to the specific demands of customers. Consequently, competitiveness will be enhanced, and more revenue will be generated. Additionally, digital servitization enables SMEs to establish stronger relationships with customers by providing value-added services (Le-Dain et al., 2023). Moreover, Bakić (2024) underscores the multiple benefits of digital servitization for SMEs: in addition to reducing operational costs and increasing productivity, digital servitization leads to higher profits, a more satisfied workforce, and improved sustainability and flexibility. Embracing digital transformation can enhance SMEs' competitiveness, drive innovation, and create sustainable growth opportunities (Bakić, 2024). In conclusion, it can be affirmed that the leveraging of digital tools enables SMEs to create a sustainable competitive advantage through continuous improvement and the ability to offer unique, high-value services that are difficult for competitors to replicate (Kohtamäki et al., 2019).

Given the fact that it was not possible to find any research papers explicitly addressing a specific research gap in the adoption of AI in Finnish healthcare SMEs on their way to achieve digital servitization, alternatively, the following papers by Abou-Foul, Ruiz-Alba, and López-Tenorio (2023); Alnajjar, Muna (2023); Kolagar, Reim, Parida, and Sjödin (2022) discuss the relationship between AI and digital servitization from different perspectives.

In their paper, Abou-Foul, Ruiz-Alba, and López-Tenorio (2023) demonstrate that AI capabilities have a positive effect on servitization in manufacturing firms. The research investigates how AI capabilities influence the shift from a product-centric to a service-centric business model, known as servitization. It highlights the role of absorptive capacity: a firm's ability to recognize and apply new information, which enhances the positive impact of AI on servitization. Grounded in dynamic capabilities literature, the study suggests that AI capabilities are essential for firms to adapt and remain competitive in rapidly changing environments. The findings indicate that AI capabilities significantly boost servitization. The path to effective servitization involves advancing AI for optimizing internal processes as well as resource management. The study concludes with theoretical and practical implications that emphasize AI as a critical business capability beyond mere technological advancement.

In a remote but somehow similar manner, the article by Alnajjar (2023) discusses how SMEs are adopting AI to achieve servitization. He emphasized that many SMEs are integrating AI as a tool for data analysis, future solutions, or core products. Most of them are in the early stages of AI adoption. They experiment with AI’s potential benefits before making significant investments. He further adds that the integration of AI offers advantages such as increased speed, accuracy, and indispensability in operations, enhancing both competitiveness and outcomes. However, SMEs face several challenges, including legal, technical, and financial obstacles that slow down further advancement in AI utilization. The paper also discusses AI adoption within the context of servitization, highlighting how AI can transform products into services through enhanced data analysis and customer insights. It emphasizes the need for a regulatory framework that allows flexible AI integration while ensuring data privacy. His recommendations include developing talent, creating funding mechanisms, and establishing a platform to match SMEs with AI expertise. The paper suggests that while SMEs recognize AI's potential benefits, they are still navigating the early stages of adoption and must address various challenges to fully realize AI's capabilities in servitization. The research concludes by identifying gaps in AI adoption among SMEs.

Equivalently, Kolagar, Reim, Parida, and Sjödin (2022) highlight that AI capabilities can significantly enhance the development of digital service offerings and ecosystem partnerships. SMEs that can integrate digital servitization with ecosystem partnerships are likely to achieve significant growth. The study presents a detailed view of how SMEs can use digital servitization to expand globally. AI is viewed as a crucial tool in facilitating effective innovation and scaling of digital services.

In line with cited findings from the previous papers, the state of adoption of AI within Finnish SMEs can be outlined according to the study of Törnroth et al. (2020). The study investigates how Finnish SMEs are currently adopting AI and Robotic Process Automation (RPA). It was conducted with an organization aiming to advance the digital transformation of SMEs through a collaborative knowledge hub. The research covers the use and adoption of AI by identifying common trends found in research papers, other publicly available publications, surveys, expert interviews, and workshops. The research revealed that most Finnish SMEs are still in the early stages of using AI and RPA. Many SMEs do not yet see the benefits of these technologies but are interested in training to improve their knowledge and skills. The research sheds light on the state of AI and RPA adoption in Finnish SMEs and identifies the competencies needed for effective adoption. It adds to existing literature by providing detailed insights into the current and future trends of AI and RPA use in these businesses. This aligns with Finland's current AI strategy, which emphasizes promoting AI and digital technologies in SMEs to boost business competitiveness, improve public services, enhance public sector efficiency, and ensure societal well-being (Ministry of Economic Affairs and Employment of Finland, 2021).

In their article, Ruohonen, A. and Kallasvaara, H. (2022) offer a comprehensive overview of the opportunities and advancements in the AI and MedTech ecosystem in Finland. According to this study, Finland has been a pioneer in making AI available for SMEs, which make up 99% of all businesses in Europe. While larger organizations are the primary benefactors of AI technologies, SMEs also hold significant potential for incorporating AI into their operations. The health and MedTech sectors have been a focus, contributing nearly €14 billion to Finland's foreign trade over the past 20 years. In an industry-specific AI initiative, the AI-TIE accelerator launched in April 2022 exemplifies this effort. It brought together 16 Finnish SMEs from the health and MedTech sectors to explore AI-related business opportunities and develop solutions. The findings they presented offer a comprehensive overview into the current state of AI adoption within Finnish SMEs, along with the associated opportunities. They mention the necessity for additional support and resources to assist these organizations in fully capitalizing on AI's potential.

This thesis aims at providing a theoretical framework for assessing AI adoption levels within Finnish SMEs operating in the healthcare sector. Consequently, the acceleration of dynamic capabilities as well as the drivers of digital transformation, and the integration of AI into innovation strategies. The mentioned studies collectively illustrate an all-encompassing approach to leveraging AI in enhancing service-oriented business models. Drawing from prior research, dynamic capability theory (DCT) emerges as the most suitable framework for evaluating a company's digital servitization enabled by AI. Therefore, the subsequent section elaborates on this theory and delineates the elements applicable for assessing an organization's AI adoption.

2.3 Dynamic Capability Theory (DCT)

Dynamic capability theory (DCT) is a well-established concept in strategic management. It delves into how organizations can cultivate and adjust their abilities to succeed given the evolving technology (Teece, Pisano, & Shuen, 1997). It emerged in the late 1990s through the research of David Teece, Gary Pisano, and Amy Shuen and has since emerged as an important framework for understanding organizational adaptability and competitiveness (Teece, Pisano, & Shuen, 1997). It highlights the significance of an organization's capacity to detect, capitalize on, and adapt its resources and capabilities in the face of evolving market dynamics, technological advancement, and competitive challenges. According to this theory, organizations equipped with these dynamic capabilities are better positioned to drive innovation, generate value, and maintain a competitive edge over the long term (Denrell & Powell, 2016; Teece, Pisano, & Shuen, 1997).

Eisenhardt and Martin's (2000) dynamic capability theory highlights the critical role of an organization's ability to adapt and reconfigure its resources in response to fluctuating market conditions. They argue that dynamic capabilities consist of processes that help firms maintain competitiveness while continuously adjusting their strategies. This interpretation is particularly useful to help understand how organizations can keep a competitive advantage through the leveraging of both internal and external resources. They define it as follows: organizational processes that allow firms to modify and reconfigure their resource base to remain competitive in rapidly changing environments. These processes, that the above-mentioned transformation described, are crucial for firms operating in industries with frequent innovation and dynamic shifts. This view of dynamic capability highlights that success in volatile environments depends on a company's capacity to realign its resources in response to external pressures. Eisenhardt and Martin (2000) further identify key processes that form the foundation of dynamic capabilities. For instance, the ability to integrate new information, cultivate relationships, and learn from past experiences. Such processes enable organizations to successfully navigate risky markets and adjust their strategic assets accordingly.

In sum, the development of these capabilities enhances a firm's ability to sustain competitive advantage.

Additionally, Coreynen et al. (2017) make several important contributions to the understanding of how digital technologies, particularly in the context of digital servitization, affect firms' performance and capabilities. They emphasize that digital servitization is reshaping the way companies deliver value by enabling more connected, proactive, and personalized service. The authors argue that firms with strong dynamic capabilities are better positioned to capitalize on digital servitization. Without the ability to sense opportunities, seize them, and adapt continuously, companies risk falling behind in markets increasingly dominated by digital technologies and smart services. These dynamic capabilities are, thus, essential for success in the digital age.

Similarly, as discussed by Kindström et al. (2013), the concept of dynamic capabilities plays an important role in the servitization process. They refer those capabilities to an organization’s ability to integrate, build, and reconfigure its resources and competencies to adapt to a rapidly changing environment. In the context of servitization, firms must cultivate these capabilities to shift from traditional product-centric models to more service-oriented business frameworks. This transformation requires SMEs to sense market opportunities, align their service offerings with customer needs, and engage in continuous innovation. Eventually, the development of service-oriented competencies permits organizations to offer greater value to customers.

One unique fact about dynamic capabilities is mentioned in the paper of Huikkola et al. (2022). It discusses dynamic capabilities in the context of smart solution services with a particular focus on how organizations can effectively adapt to rapid technological and market changes in industrial ecosystems. The unique insight presented in the study is the emphasis on the co-alignment of processes, routines, and practices as a crucial element for enhancing dynamic capabilities within manufacturing firms. This co-alignment enables organizations to integrate product, service, and software development more seamlessly, which is vital for effective smart solution development (SSD).

Furthermore, the paper underscores that the development of dynamic capabilities is not solely about possessing resources but also about the ability to leverage these resources through collaborative efforts and continuous learning. This approach highlights the strategic importance of fostering a culture that promotes agility and innovation as organizations strive to remain competitive in an increasingly complex industrial environment. At the end, the study reveals that establishing dynamic capabilities through intentional design practices and robust management processes allows firms to respond proactively to unforeseen challenges. This dynamic responsiveness is framed as a vital organizational trait necessary for achieving sustained innovation and performance in the context of growing service models.

Employing dynamic capability theory in the analysis enabled a deeper understanding of how Finnish SMEs address AI adoption and its impact on the digital servitization process (Sjödin, Parida, & Kohtamäki, 2023). This theory facilitated the examination of both the immediate effects of AI technology and the organizational abilities needed to sense, seize, and reconfigure resources in response to technological changes (Sjödin, Parida, & Kohtamäki, 2023).

To break it down, the following components (Teece, Pisano, & Shuen, 1997) are essential to measure: first '*Sensing'*, here the ability of an organization to perceive changes and opportunities in its external environment is measured. It involves gathering information, trend watching, and understanding customer needs, as well as emerging technologies. Second '*Seizing'*, once changes and opportunities are identified, organizations must be able to act quickly and effectively to benefit from them. This stage involves making strategic decisions and allocating resources to exploit new opportunities or respond to threats. Third '*Reconfiguring'*, given the fact that the competitive landscape in a dynamic environment is constantly changing, which requires organizations to adapt and evolve their internal capabilities. Reconfiguring capabilities involves the ability to reallocate resources, redesign processes, and develop new competencies to maintain competitiveness.

In the next section “theoretical framework” many reflections exist. Among them: the *Resource-Based View (RBV)* (Barney, 1991)*, Service-Dominant Logic (SDL)* (Vargo & Lusch, 2004), and *Absorptive Capacity* (Cohen & Levinthal, 1990). They all provide essential insights into the role of AI in enhancing digital servitization and dynamic capabilities. For example, RBV emphasizes the significance of a firm’s internal resources (Barney, 1991). It regards AI as a rare, valuable, and inimitable asset that can contribute to competitive advantage by mixing both digital servitization and dynamic capabilities (Barney et al., 2021). SDL, on the other hand, shifts the focus from tangible products to intangible services (Bustinza, Vargo, & Kohtamäki, 2024). This will help in the correct alignment with digital servitization given that AI facilitates the co-creation of value with customers through smart services. Finally, Absorptive capacity, such as AI-driven insights that play an important role in strengthening both dynamic capabilities and digital servitization (Vigren, Kadefors, & Eriksson (2022). When reflecting on these frameworks, they all emphasize how firms can continuously adapt to changing environments and leverage emerging opportunities.

Nevertheless, Dynamic Capabilities Theory (DCT) is considered the most suitable framework for examining the phenomenon in this thesis. Since AI plays a crucial role in strengthening dynamic capabilities and enhancing an organization's ability to sense, seize, and transform. This eventually leads to a fully servitized firm.

2.4 Theoretical framework

Simply put digital servitization is the transformation of a business from selling products to offering integrated services. This journey involves digitalizing products, adding digital services, and eventually providing comprehensive solutions. AI enables this by analyzing data, predicting needs, and optimizing operations. Dynamic capabilities ensure firms can adapt, seize opportunities, and effectively use AI, driving the shift toward service-oriented models and enhanced customer value (Coreynen et al., 2017; Teece et al., 1997).

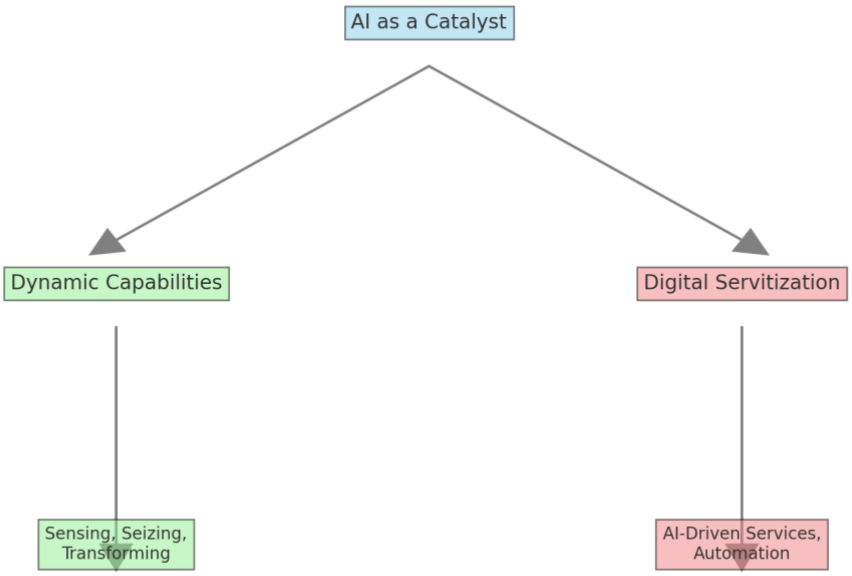

Figure 2*:* Representation of the framework of this thesis showing the link between Dynamic Capabilities, Digital Servitization, and AI.

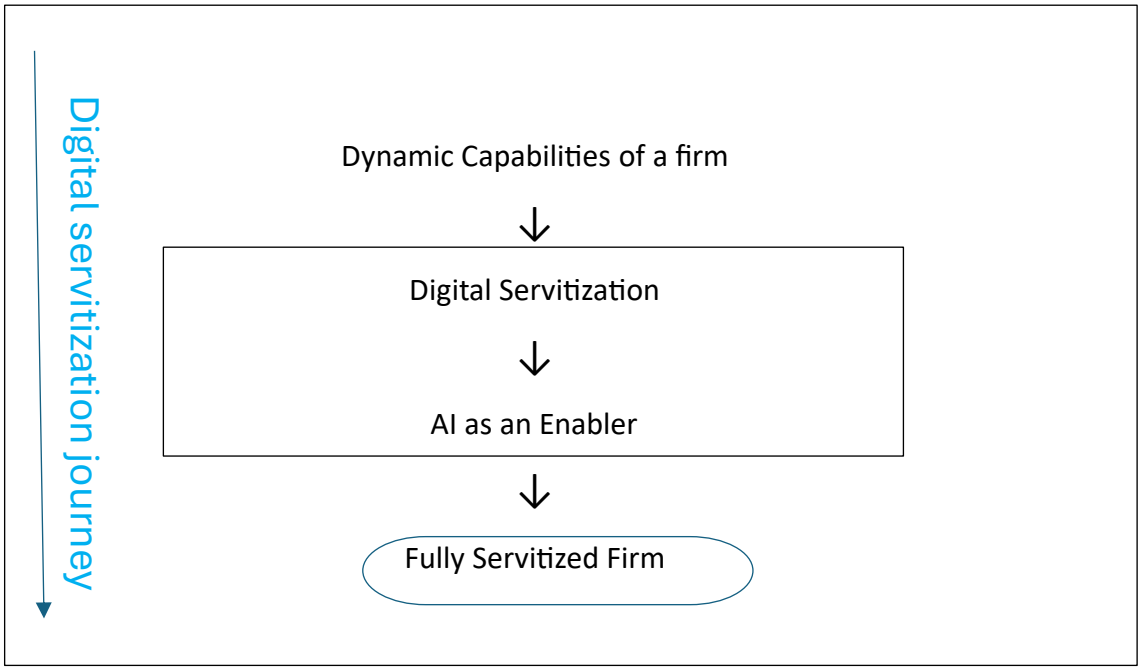

Figure 3: Transition to a fully servitized firm with AI as an enabler.

Figure 2 illustrates the link between Dynamic Capability, Digital Servitization, and AI. It highlights how AI acts as a catalyst for both, enhancing dynamic capabilities, while supporting a firm in its digital servitization journey through AI-driven services. AI acts as an incentive for firms, that want to enhance their dynamic capabilities and facilitate the process of digital servitization. Dynamic capabilities, as mentioned by Teece (2018), empower organizations to navigate rapidly changing environments. This empowerment can be achieved through sensing opportunities, seizing them, and transforming resources. For instance, AI-driven analytics enable firms to anticipate customer preferences and market trends with unprecedented speed and accuracy as confirmed by (A. I. Talwar, A. R. Talwar, & R. B. Sharma, 2023). This awareness equips organizations to seize emerging opportunities. Therefore, they can create innovative, AI-driven service offerings that are integral part of their digital servitization strategies (A. I. Talwar, A. R. Talwar, & R. B. Sharma, 2023).

As defined above, the shift towards digital servitization involves transitioning from traditional product offerings to a focus on providing digital services, with AI at the front line of this transformation (Paschou et al., 2020). The implementation of AI facilitates various service innovations, among them: predictive maintenance and autonomous operations. Which require firms to develop robust capabilities for gathering, processing, and utilizing data effectively. As depicted in the theoretical framework diagram above, AI is crucial not only in enhancing service capabilities but also in automating service delivery, which enables the generation of significant value for customers, eventually leading to a fully servitized firm. Figure 3 illustrates that digital servitization is viewed as a journey. Starting by dynamic capabilities of the firm, AI acts as an enabler of digital servitization, the firm can eventually reach a point of full servitization. Which leads to competitive advantage (Baines, Lightfoot, Peppé, & Johnson, 2009).

The interplay between dynamic capabilities and AI is essential for the successful execution of digital servitization strategies. As organizations leverage AI to refine their dynamic capabilities, they become capable of adapting their business models to the evolving digital transformation.

In the context of Finnish SMEs wanting to adopt a digital servitization strategy, dynamic capability theory suggests that the successful implementation of AI technologies can significantly influence their ability to innovate and transform their business models (Liu, Cui, Han, & Zhang, 2024).

Firstly, the adoption of AI technologies enables SMEs to enhance their operational efficiency and effectiveness by automating repetitive tasks, optimizing resource allocation, and improving decision-making processes (Jalil, Lynch, Awang Marikan, & Md Isa, 2024). These operational improvements contribute to the firm's dynamic capabilities by encouraging agility and responsiveness to market changes (Teece, 2007). Secondly, AI implementation can facilitate the development of new service offerings and business models within the digital servitization process (Kohtamäki et al., 2022).

When Finnish SMEs leverage AI-driven analytics and insights, they can better understand customer needs, preferences, and behaviors (Westenberger & Jafarzadeh, 2024). This would help in the creation of personalized and value-added services (Westenberger & Jafarzadeh, 2024). Moreover, AI-enabled predictive maintenance and remote monitoring capabilities can enhance the reliability and performance of products-as-a-service offerings, thereby customer satisfaction and loyalty increase (Mourtzis, Angelopoulos, & Panopoulos, 2020). Furthermore, dynamic capability theory suggests that the successful integration of AI technologies into the digital servitization process requires ongoing learning, experimentation, and adaptation (Abou-Foul, Ruiz-Alba, & Lópe-Tenorio, 2023). Finnish SMEs need to develop organizational routines and processes that enable them to continuously acquire and apply new knowledge and capabilities related to AI. This may involve investing in employee training and development, adopting a culture of innovation and experimentation, and forming strategic partnerships with technology providers and industry experts (Teece, D. J. 2018).

To address the research question "*How Finnish SMEs employ their dynamic capabilities when implementing AI-driven digital servitization?"*, Dynamic Capability Theory is employed to support in the journey of digital servitization of Finnish SMEs enabled by AI. Subsequently, the following table 2 delineates the components evaluated across various categories to ascertain the degree of servitization, facilitating its comparison with Microsoft's maturity model.

Sensing	Seizing	Reconfiguring
First, it is important to explore how Finnish SMEs perceive the opportunities and challenges presented by AI technologies in the context of digital servitization	First, analyse the strategic decision-making process of Finnish SMEs as they adopt and integrate AI technologies to improve their efforts in digital servitization.	First, it is crucial to explore how the implementation of AI technologies necessitates changes in the organizational structure, processes, and capabilities of Finnish SMEs.
Then, investigate how SMEs identify potential areas for AI integration within their existing service offerings and business models.	Then, investigate the processes through which SMEs allocate resources, invest in technology infrastructure, and develop partnerships to leverage AI capabilities.	Then, investigate how SMEs adapt their business models, service delivery mechanisms, and customer interactions in response to the introduction of AI-enabled services.
Lastly, assess the ability of SMEs to monitor market trends, customer preferences, and technological advancements related to AI and digital servitization.	Lastly, assess the agility and responsiveness of SMEs in seizing opportunities to innovate and differentiate their service offerings through AI integration.	Lastly, assess the ability of SMEs to continuously reconfigure their resources and capabilities to maintain competitiveness in the evolving landscape of digital servitization.

Table 2: Showing how DCT components can be incorporated to study the servitization of Finnish SMEs.

Table 2 represents a framework that allows the examination not only of the direct effects of AI technologies but also the organizational capabilities required to effectively sense, seize, and reconfigure resources in response to technological change.

To apply the Responsible AI Maturity Model (RAI MM) from Microsoft in understanding how dynamic capability theory relates to the servitization of Finnish SMEs, several steps can be taken. Firstly, measuring the level of AI adoption, which emphasizes AI implementation, with the fundamental principles of dynamic capability theory. This involves recognizing how aspects like AI usage correspond to the principles of dynamic capability theory. This alignment highlights an organization's capacity to sense, seize, and reconfigure resources for competitive advantage. Next, utilizing the RAI MM to evaluate the current level of AI integration and maturity within the chosen sample of Finnish SMEs undergoing servitization. Which provides insights into how effectively Finnish SMEs are adopting AI practices. Assessing whether these efforts align with the principles of dynamic capability theory can reveal areas of strength and areas needing improvement concerning AI integration and dynamic capabilities. Lastly, the findings from the RAI MM assessment simultaneously with the principles of dynamic capability theory are compared according to the perception of each interviewed SME. The aim is to identify a measured variable, that serves as a benchmark, for enhancing the servitization process of Finnish SMEs. Determining this measured variable of the implementation of AI can contribute to strengthening dynamic capabilities within the servitization context.

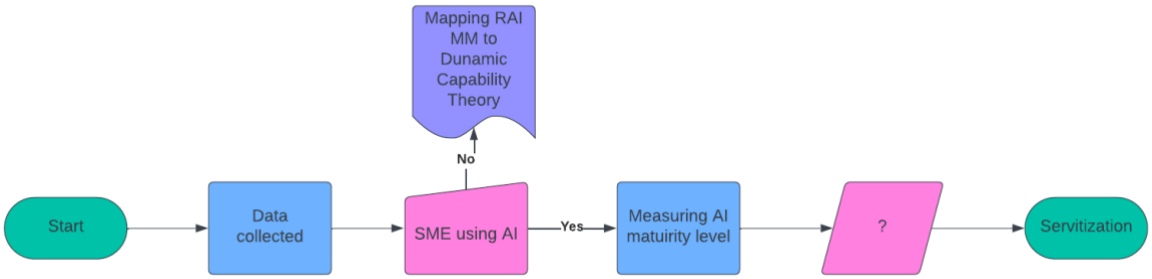

Figure 4*:* Showing Finnish SMEs' usage of AI measured against Microsoft's RAI MM in relation with DCT to determine the maturity level leading to servitization.

The flowchart above depicts the process to reach servitization. In a trial to show the importance of the strategic management of resources and capabilities in shaping the impact of AI technology measured against Microsoft's RAI MM and its implementation on the digital servitization process of Finnish SMEs. The focus on AI capabilities can enhance operational efficiency and drive innovation, hence SMEs can position themselves for long-term competitiveness and growth (Teece, D. J. 2018).

The proposed framework initially presents digital servitization as an independent journey designed to empower organizations aiming to attain a competitive advantage. Subsequently, it highlights AI as a digitalization enabler capable of enhancing an organization's capabilities, potentially leading to a fully servitized state over time. Table 2, shown above, presented each phase of the dynamic capability theory, detailing its connections to AI applications throughout the digital servitization process. Microsoft's suggested maturity model aids SMEs in progressing from one phase to the next, as described in the AI maturity model section. This model aims to support Finnish SMEs in evaluating their current position, thus enabling them to identify AI capability needs essential for achieving a fully servitized firm.

3 Methodology

3.1 Research approach

The figure below is the research onion, and it depicts the research approach employed during this thesis.

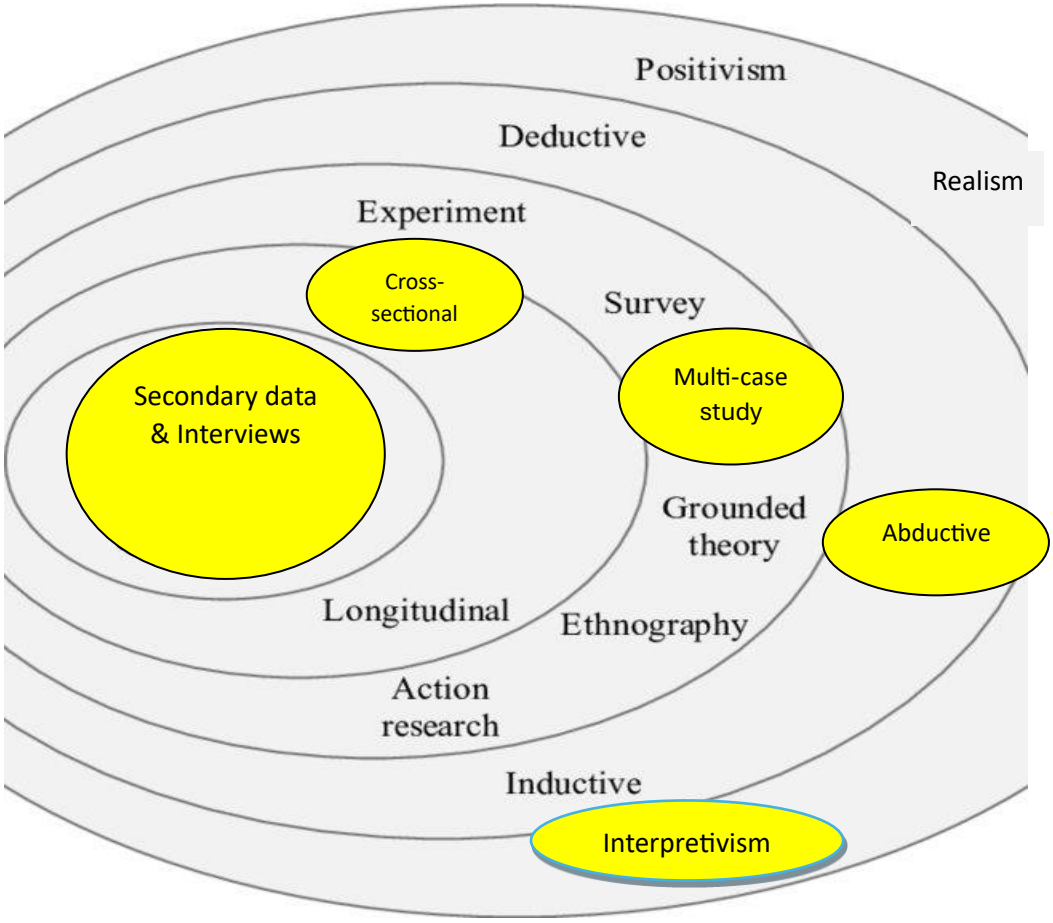

Figure 5: Research methodologies of the thesis (Saunders et al. 2003).

Figure 4 represents the research onion where the chosen approach to conduct this research is highlighted. Interviews and secondary data as a collection method, cross sectional pattern as a research design, multi-case study as a research strategy, abduction as a research approach, and interpretivism as a research philosophy. The analysis of the cases in this research paper is mono method. This representation of the research onion was important because it provided a systematic framework that enhanced the consistency and coherence of the research process (Saunders et al., 2003). Its value lied in its flexibility (Saunders et al., 2003). It comprehensively covered all aspects of the research process. This model helped in ensuring that each critical element is considered, from philosophical foundations to specific data collection and analysis techniques. This structured approach also helped improve the rigor and validity of the study (Saunders et al., 2003).

The research onion was developed by Saunders et al. (2003). It is a model that helps in structuring the methodologies effectively. The model consists of six layers, each layer representing different aspects of the research process. The outermost layer addresses research philosophies, which include positivism, realism, interpretivism, and pragmatism. These philosophies reflect the foundational belief systems that form the research approach (Saunders et al., 2003). Moving inward, the research approaches layer involves choosing between a deductive approach, which tests a hypothesis, and an inductive approach, which develops a theory from data, and an abductive approach, which is a combination between both but more resembling to inductive approach (Dubois & Gadde, 2002). The research strategies layer includes various methods such as experiments, surveys, case studies, grounded theory, ethnography, and action research, each offering a distinct way to collect and analyze data. Choices within the model refer to the selection of mono-method, mixed-method, or multi-method approaches for data collection and analysis. Time horizons can be either cross-sectional, studying phenomena at a specific time, or longitudinal, examining changes over time. The innermost layer focuses on the techniques and procedures for data collection and analysis, such as questionnaires, interviews, observations, and statistical or thematic analysis.

The reasoning behind the chosen research approach stems from the quote of Dubois and Gadde (2002, p.556):

"[..] abductive matching requires more, and has the potential to yield more, than inductive fit [..]"

Additionally, in their work on systematic combining and abductive approach to case research, they acknowledge the value of qualitative research methodologies (Dubois & Gadde, 2002). They emphasize the importance of qualitative methods in generating rich, context-specific insights and understanding complex phenomena in depth. They view qualitative research as essential for capturing the nuances, meanings, and complexities of an organizational phenomena, particularly in the context of case studies. Moreover, by advocating for a systematic combining approach, they suggest that qualitative research, when combined with other methods and theoretical perspectives, can enhance the rigor and comprehensiveness of research findings. Furthermore, Charmaz (2014); Creswell and Creswell (2017); as well as Tavory and Timmermans (2014) confirm that such an approach permits revealing the relationships, and potential explanations that emerge from the collected data. Therefore, an "Abductive", "Qualitative" research approach is the chosen approach for studying the impact of AI on the servitization of Finnish SMEs. As for the research philosophy "Interpretivism" asserts that each observer has a distinct perception and understanding of reality (Saunders, Lewis, & Thornhill, 2007). Accordingly, "interpretivism" was chosen as the research philosophy because the collected data is analyzed through the lens of personal views and past experiences.

3.2 Sampling

Many studies enumerated the pros of multiple case study research. For example, Eisenhardt (1989) determined that 4 to 10 cases are the optimal number of cases to look at when conducting multi case study research.

Yin (1994) suggests that utilizing multiple sources enables researchers to explore a wider array of historical and behavioral factors. Additionally, Dubois and Gadde (2002) reported on behalf of Yin (1994) that findings or conclusions drawn from case studies are more compelling and precise when supported by various sources of information, validating the results through corroboration.

“Purposive sampling” was the employed method for the selection of the cases. The participants were chosen according to specific criteria that aligned with the research question, such as particular experiences, expertise, demographic characteristics, and / or length of employment in that specific company.

Unlike random sampling methods, purposive sampling is non-random, and purpose driven. This way it was ensured that participants possess the relevant characteristics or experiences necessary to provide meaningful insights related to the research question (Etikan, Musa, & Alkassim, 2016). This method facilitated the collection of rich, detailed data from the targeted group. Consequently, it enhanced the depth and quality of the findings (Palinkas et al., 2015). Additionally, purposive sampling was found to be more efficient and practical compared to random sampling, especially for this research paper where in-depth understanding is prioritized over generalizability (Patton, 2002).

Given the researcher's keen interest in the healthcare industry, specific attention was directed towards three Finnish SMEs operating within this sector. Initially, emails were sent to 40 SMEs operating in Finland in the healthcare sector. Based on the responses received, a pool of 10 SMEs was selected. Due to time constraints and unforeseen circumstances with certain chosen SMEs, the last pool of cases remaining totaled three. These selected companies have demonstrated varying competence in adopting and effectively utilizing AI technologies to push their businesses forward, particularly in advancing towards digital servitization.

Notably, these SMEs have integrated AI into various aspects of their operations, such as disease diagnosis and infrared cameras for continuous health monitoring. Which demonstrated their commitment to innovation and leveraging technology within the Finnish healthcare system.

Their approaches not only improved patient outcomes but also enhanced the overall quality of service provided by healthcare SMEs (Reddy et al., 2022).

3.3 Data collection

Collected data was a combination of primary and secondary data using a qualitative approach based on cross-sectional observation. Primary data was collected through virtual interviews with representatives of Finnish SMEs in the healthcare sector. Using Microsoft Teams as a platform, the interviews were structured interviews (see appendix 1 for questions). The point of using structured interviews was to ensure consistency and reliability in data collection. The incorporation of a structured format, led to standardized responses gathering from all participants. This allowed an easier approach for comparison and analysis. In addition, structured interviews also helped in minimizing interviewer bias and ensured that all relevant topics were covered. Moreover, they helped to provide a clear framework for both the interviewer and the interviewee. Which enhanced the efficiency and accuracy of data collection. Interviews were held during the month of May 2024. The language used for the interviews was English, however, some interviews were a combination of English and Finnish to make it easier for the interviewee to express all their ideas in the native language. All interviews were not recorded, and the results are reported anonymously. Notes and important facts were documented during the interview manually. The notes were subsequently reviewed to extract the most relevant facts to answer the research question. The respondents were senior executives in their companies, possessing pertinent knowledge of new technologies and their applications for enhancing customer offerings.

It is equally important to mention that the respondents expressed a certain level of reluctance to provide in-depth information and to elaborate on certain technologies that they were using in their product offerings. Many of them were also interested in receiving the submitted version of this thesis. Which indicated the importance of the

researched subject. The hesitation expressed in the pre-interview imposed a considerable level of cautiousness while conducting the interview.

Next, the secondary data was based on online content from Finnish websites and news portals heavily discussing AI achievements and projects in business fields and in Finnish universities, specifically in the healthcare sector.

The collection of secondary data in the analysis optimized the utility of previously gathered data (Ruggiano & Perry, 2019). Thus, it confirmed primary data findings (Ruggiano & Perry, 2019). It also gave a comprehensive understanding and served as a way for validation and comparison. It also enhanced the reliability and validity of the research outcome.

3.4 Data analysis

Integrating various sources of evidence and transitioning between analysis and interpretation typically signifies triangulation (Yin, 1994; Denzin, 1978). Yin (1994) suggested that the primary benefit of triangulation is the emergence of converging lines of inquiry. Another assumed benefit suggests that incorporating interviews, observations, documents, and archival records as data sources can deepen and broaden the collected data. This enhances the validity of the findings (Quintão et al., 2020). In 1994, Huberman and Miles described this process as an attempt to gather and authenticate findings.

Triangulation is commonly advocated in textbooks on case study research methods (Dubois & Gadde, 2002). In systematic integration, the focus is not solely on verifying data accuracy, rather multiple sources have the potential to unveil aspects unknown to the researcher, thus revealing new dimensions of the research problem (Dubois & Gadde, 2002). While most data collection ventures were aligned with the existing framework, additional efforts were necessary to uncover new insights (Dubois & Gadde, 2002). That is why a recursive process was necessary: data and theory were iteratively alternated to ensure the theoretical framework closely aligned with the empirical evidence.

This approach aimed to improve the accuracy and reliability of the resulting theory (Eisenhardt & Graebner, 2007; Eisenhardt, 1989).

In summary, triangulation was used for the analysis and AI maturity level considered a unit of analysis. Then a rough estimation of the level of adoption of AI was concluded based on the interviews and based on the perception of the interviewees.

3.5 Assessment of the quality of the data

One significant issue in case-based research is the common lack of selectivity, as noted by Siggelkow (2007). To address this, it was crucial to provide readers with enough information to evaluate the appropriateness of the research methods and results, a point emphasized by Eisenhardt (1989). Also, addressing potential biases was essential to maintain the integrity of the research. Dubois and Gadde (2014) highlighted the importance of re-interviewing and re-observation, as well as triangulation with written documents, to cross-verify findings and reduce the influence of individual biases. This approach helped in obtaining a more objective and balanced perspective. Some setbacks occurred such as the cancellation of interviews by some managers from certain SMEs. Therefore, there was a need for re-observation and triangulation to mitigate the risk of missing important findings as well as potential biases.

To ensure the validity of the findings, the cases were clearly and thoroughly defined, following Yin's (2018) recommendations. A variety of data sources, including interviews, observations, documents, and archival records, were utilized. The findings were then cross verified using different data sources or methods to ensure resilience (Yin, 2018). During the research process, the interviewees did not always express their views explicitly, which required careful interpretation to uncover answers addressing the research question. The necessity of alternating between English and Finnish posed challenges, potentially compromising data efficiency. To overcome this, the researcher attended numerous conferences, online workshops, and other events to better understand AI utilization in the healthcare sector and its adoption among Finnish SMEs.

A structured approach to interviews and data collection, as advocated by Patton (2002), enhanced the clarity, and focus of the research. However, maintaining some flexibility allowed the researcher to explore unexpected insights that emerged during the process. This balance ensured that the research remained both systematic and adaptable. Also, the structured nature of the interviews proved to be the most effective approach for tackling the research question. This method provided a clear, predefined path, which enabled the researcher to navigate back and forth to confirm findings as needed. Additionally, a substantial number of articles and references were important in validating the collected data. The data was further verified by an interview with a scholar who had conducted extensive research and published papers on AI utilization within the healthcare industry. She held an important role in a big corporation specializing in medical imaging. She highlighted several challenges in the healthcare industry. She pointed out that AI is a big leap forward potentially capable of solving these problems. Her insights were invaluable as they helped in confirming the results of the interviews conducted. Surprisingly enough, in her current role as a researcher and lecturer, a paper investigating the employment of AI technology in healthcare was published to showcase the effectiveness of such technology in the industry. Which helped great deal clarify few sticking points and inspired in exploring other areas concerning specifically Finnish SMEs within the medical field.

Evidently, ethical considerations were paramount in the data collection process. This included obtaining informed consent from participants, ensuring confidentiality, and being transparent about the research objectives. That is why ethical research practices helped in building trust with participants and in gathering more candid and reliable data (Creswell & Creswell, 2018).

This comprehensive approach ensured that the research findings were both reliable and insightful. Eventually, contributing significantly to the understanding of AI adoption in Finnish SMEs within the healthcare sector. Overall, the data collected from the selected SMEs is highly pertinent and purposeful.

The reason being that they showed different levels of AI adoption. Some of them were strongly dependent on AI in their offering and others were in the discovery phase of AI potential.

4 Findings

It is important to note that not one of the interviewed companies has reached a high maturity level in AI adoption. SMEs often struggle with limited resources, making it difficult to implement AI effectively. Financial barriers also posed a problem, as substantial upfront investments were required, and the return on investment was often delayed. However, several strategies were hypothetically developed for healthcare SMEs to become digitally servitized by using AI. For instance, the use of AI-powered IoT devices enabled real-time monitoring of patients' health. This allowed for predictive maintenance that anticipated and addressed potential health issues before they become critical. This not only enhanced service offerings but also significantly improved patient care as advocated by the findings of this paper and Debnath et al. (2023). The targeted SMEs showed efficient use of machine learning models and IoT devices in the development of their product offerings. Additionally, there were no examples of AI applications in the automation of administrative tasks such as scheduling and billing among the selected SMEs. Despite the obvious fact that this can significantly reduce the administrative burden on healthcare providers. As found in this paper and seconded by Smith & Jones (2021), such AI application would allow them to dedicate more time and resources to direct patient care, thus improving efficiency and service quality. Ultimately become fully servitized.

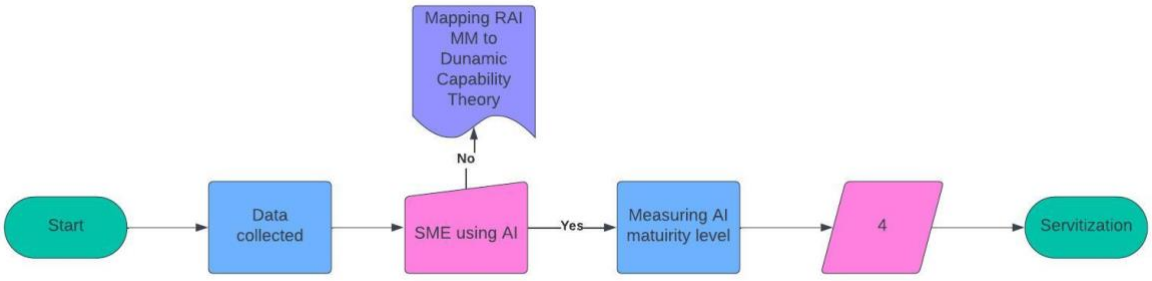

Figure 6*:* AI adoption level for a Finnish SME to digital servitization.

As illustrated in the Figure above, the recommended AI adoption level for a Finnish SME operating in the healthcare sector to achieve a level of digital servitization is 4 (see Figure 6). This estimation arises from the conducted research and indicates that this is the phase where the company is “adopting” AI to the fullest. It also stems from the insight that the interviewed companies were ranked: one for company 3 and three for both companies 2 and 3. Company 3 demonstrated limited strength in the talent and cultural dimensions, which were found to be essential for AI adoption. However, it could be positioned at a foundational level in other areas, even reaching an "aspirational" status due to its awareness of AI’s transformative potential. Companies 1 and 2 exhibited distinct strengths and weaknesses across different aspects, as each company emphasized unique AI capabilities and technologies. While neither displayed a robust AI-oriented talent base or culture, both companies showed a mature approach in the dimensions of strategy, data management, and technology. Consequently, this is a description of each company and how dynamic capabilities were manifested in their operations:

Company 3 provides specialized in-home healthcare services that matches the needs of various clients, particularly the elderly. It also emphasizes internal innovation but lacks the important factor of proactive customer engagement that is necessary to effectively tap into its dynamic capabilities. Their services include mobile health clinics and specialized medical support that is brought directly to the client’s location. Their mobile health clinic allows the access to a nurse and remote doctor consultations, which promotes convenience and immediate care. Additionally, the company emphasizes client-centered care, which reduces wait times, and ensures familiarity with each patient’s health history to improve quality of service and comfort. Company 3 senses technological shifts through an innovation readiness approach but focuses primarily on internal productivity gains rather than customer-driven advancements. To seize opportunities, they aim to apply for government funding. However, the lack of a concrete strategy for implementing technologies like cloud computing limits their market responsiveness. Their reconfiguring capabilities are underdeveloped compared to

competitors, as their internal improvements lack a customer-centric or flexible approach, that is important for the adaptation to evolving market needs.

Company 2 specializes in AI-driven solutions for monitoring incidents in healthcare and elderly care settings. Its core solution is based on video analytics and AI that detects potentially dangerous situations and alerts nursing staff through a nurse call system. This technology is widely used in hospitals, care facilities, and even home care settings to enhance patient safety and support staff efficiency. Since its establishment, company 2's solution has reduced healthcare incidents significantly across multiple healthcare facilities. Company 2 stands out with a strong dynamic capability framework that includes effective sensing, seizing, and reconfiguring, driven by a customer-centric approach. It has a highly developed sensing capability that keeps it closely aligned with customer needs and market trends. It utilizes AI to gather and analyze data for early identification of emerging demands. This capability supports its exceptional seizing approach. The AI-driven insights help it to rapidly lead to tailored solutions that meet market needs. Reconfiguring is a dynamic process for the company that is enabled by a flexible structure that allows easy adjustments to technologies and services.

Lastly, company 1 specializes in advanced automation solutions for medical device and diagnostics manufacturing. They provide a range of automation systems tailored to high-precision manufacturing needs, including platforms for lateral flow devices, microfluidics, and other medical devices. Company 1 exhibits a reactive capacity primarily focused on compliance and data privacy. This potentially limits its dynamic capabilities. The company demonstrated a cautious sensing capability, focusing on monitoring technological advancements that might impact current operations but lacking a proactive drive to leverage these for strategic advantage. While the firm's seizing capabilities are apparent in its ability to respond to changes with updates to systems, this response is often delayed. Their strong emphasis on data privacy reinforces their seizing approach by ensuring compliance and customer trust in new implementations. However, reconfiguring is limited, as the company prioritizes

compliance and data security over internal restructuring, thus often missing the potential to fully exploit emerging technologies.

4.1 Digital servitization journey limited by resources and skills gap yet high alignment, adaptability and market responsiveness for future integration

Company 3 commencement on a digital servitization journey was expressed by a strong interest in adopting new technologies to enhance productivity. However, its progress was slowed down by challenges, primarily stemming from a lack of available talent and financial resources. The company is aware that integrating AI is crucial for improving efficiency and transforming its business model from a purely product-centric approach to one that is service-enhanced through digital solutions. There is a clear focus on using AI to drive productivity improvements. This indicated an aspiration to develop tech-enabled services that will elevate their offerings. For instance, the company envisioned utilizing AI for automated diagnostics and remote monitoring, which could empower them to provide predictive insights and more efficient digital services to customers. In a strategic move to enhance its capabilities, the company actively pursued government funding to develop a mobile application, reflecting its commitment to advancing digital solutions. Yet, the ongoing skills gap in AI and dependency on external funding continue to slow their journey toward digital servitization. Recognizing the importance of cultivating in-house AI talent, the company's efforts highlighted their understanding of the need for sustained digital capabilities.

By overcoming these skills barriers, the company would be better positioned to shift towards a service-oriented model that fully leverages AI in customer service. This shift to digital servitization would allow it to provide continuous digital services in addition to its products. As the company built its internal AI capacity, it stood to transform from merely selling products into a provider of ongoing digital services that enrich the product lifecycle.

This evolution positioned it as a digitally enabled service provider. The journey of the company highlighted the interplay between technology adoption and the need for skill development and funding, laying the foundation for a more dynamic and service-oriented business model.

Company 2 was on a remarkable digital servitization journey. This was reflected through a high alignment with customer needs and a strong adaptability to market trends. It operated with a customer-centric strategy, leveraging AI as the core driver of its products. This responsiveness allowed the company to continuously innovate and introduce new, value-added services tailored to individual customer requirements, which solidified its position as a digital service provider rather than merely a traditional product seller. Although the company primarily focused its AI-driven solutions on customer-facing products, its lean SME structure enabled rapid adaptation to customer demands. This flexibility reinforced a service-oriented, digital-first model that prioritized innovation in response to evolving customer needs. The company's ability to monitor market trends closely ensured that it could adjust its offerings to include the latest AI-enabled solutions. Such agility was vital in a digital servitization context, as it enabled the company to consistently deliver high-value digital services that set it apart from competitors. Furthermore, this adaptability strengthened customer loyalty, as clients benefited from services that are designed to evolve with them. As a result, the company’s strategy positioned it well to fully leverage digital servitization and thrive in a competitive landscape. They have the potential to offer subscription-based, AI-enhanced services or other digital products that adapt continually to customer requirements. This shift transformed their business model from being solely a product provider to one that emphasizes ongoing service and support.

Company 1 was on a digital servitization journey, even though there were limitations that slowed its full potential. The company relied on cloud computing to support its servitization efforts, which laid a foundation for future integration of digital solutions. However, current offerings were not heavily driven by AI, and their focus remained largely on compliance and data security rather than leveraging data for advanced

services. This resulted in a reliance on manual processes that reflected a traditional operational approach, preventing them from fully embracing digital servitization. Instead of utilizing advanced AI, the company employed basic automation, restricting its capacity to deliver AI-driven services that could greatly enhance customer experiences. Their cautious, reactive approach to technological advancements indicated a careful servitization strategy. While this strategy could help mitigate risks, it also limits their ability to gain a competitive edge in a rapidly evolving market. Despite these challenges, the company's commitment to cloud computing reflected an underlying structure that could support future servitization efforts. The leveraging of their cloud capabilities and beginning to integrate AI for customer analytics and predictive services permitted them to transition towards more value-added digital offerings. However, without significant strategic adjustments, they risk missing out on opportunities for rapid growth through digital servitization.

4.2 AI integration in operations

Companies are increasingly recognizing the importance of integrating AI to enhance productivity and efficiency in their processes. The journey of AI within the interviewed companies revealed a combination of innovation, challenges, and adaptation. Together, they formed an example of how AI shapes industries, from ambitious aspirations to grounded realities, as they all tried to leverage technology for a competitive advantage:

Company 3 demonstrated a strong commitment to AI adoption to improve its operations. Despite its eagerness, the company faced significant challenges due to talent shortages and funding constraints, which slowed its ability to fully implement AI solutions. The company's ambition for productivity improvements remained steadfast, as it continues to explore various AI applications that could help streamline operations.

In contrast, Company 2 relied heavily on AI as the cornerstone of its product offerings. This company used AI to enhance customer experiences but did not integrate it into its internal operations. Due to its status as a SME, the complexity of administrative tasks did not warrant advanced AI tools. Instead, the company prioritized maintaining efficiency through conventional methods, allowing them to direct their resources toward innovative product development.

On the other hand, Company 1 integrated AI into its product lines but limited its application within its internal processes. It focused more on basic automation, which sufficed for the simplicity of its operational needs. By doing so, the company aimed to improve efficiency without getting into the complexities of advanced AI systems.

4.3 Customer centricity vs market approach

The distinction between customer-centric and market-responsive approaches has become increasingly significant in determining how companies thrive. The contrast among these three companies underscored a crucial point: a truly customer-centric approach was not just about being reactive or focusing solely on innovation. Instead, it required a delicate balance of understanding customer needs while remaining responsive to market movements. Company 2 showed this ideal, but Companies 1 and 3 showcased the challenges that could emerge when businesses prioritize one aspect over the other.

Company 3 exemplified a focus on innovation readiness and operational productivity, it placed a strong emphasis on improving efficiency and exploring new technologies. However, this ambition came at a cost; the company did not cultivate an explicit customer-centric or market-responsive approach. While it aimed to innovate, it tended to prioritize internal metrics for productivity over direct engagement with customer needs.

In contrast, Company 2 clearly stood out as a customer-centered firm. Its business model hinged on aligning its AI applications directly with customer requests and shifting market trends. By continuously adapting its offerings based on real-time feedback and insights, the company reflected a flexible, market-responsive strategy that resonated deeply with the evolving demands of its customers. This proactive stance enabled the company not only to enhance its service offerings but also to foster loyalty among its clientele. This ensured that they remained engaged and satisfied.

On the other hand, Company 1 navigated a middle ground. While it could be described as customer-driven, its strategy was predominantly reactive. The company focused on keeping an eye on technological advancements and responding as issues arise, rather than proactively innovating solutions to anticipate customer needs. This approach, while practical, could lead to missed opportunities and delays in meeting customer expectations. Furthermore, the company placed a strong emphasis on data privacy, recognizing that maintaining customer trust was paramount in achieving a loyal customer base. The prioritization of transparency and ethical data handling practices helped it build a foundation of trust.

4.4 Use of supporting technologies

In today's competitive business environment, the use of supporting technologies such as cloud computing and data privacy measures is pivotal for companies aiming to enhance their operations and service delivery.

The contrasting approaches among the interviewed companies highlighted the essential role of supporting technologies in today's business environment. Company 1's success in using cloud services alongside robust data privacy measures demonstrated a proactive stance that other companies might consider adopting. The way each company integrated these supporting technologies into its strategy was crucial to shape its future growth and market competitiveness. Companies that embraced a comprehensive technology

strategy, including cloud computing and data privacy, are better positioned to adapt to changing market demands while enhancing customer satisfaction and trust.

Company 3 seemed to be at a critical time in its development, as it planned to leverage new technologies to improve its services. It sought governmental funding to support this initiative while also focusing on building internal talent. However, it remained unclear whether the company actively utilized specific technologies, such as cloud computing, which could facilitate a smoother transition to digital solutions. This uncertainty left a gap in their technological strategy, as the lack of concrete tools could hinder their progress.

On the other hand, Company 2 was effectively using AI as the core driver of its product offerings. This company's focus on AI allowed it to innovate and adapt to market demands efficiently. However, notably absent from their strategy was any mention of supplementary technologies, such as cloud computing or other privacy measures that could enhance its operational framework. This lack of detail suggested that while the company was on the right path with AI, it might not be fully exploiting potential technological advancements that could further strengthen its position.

In contrast, Company 1 stood out for its heavy reliance on cloud computing to support its service delivery. The utilization of cloud technology enabled this company to improve flexibility and optimize cost efficiency. Additionally, the company placed a strong emphasis on data privacy through a strict policy designed to protect customer data. This commitment to data security not only fostered trust among customers but also helped the company comply with regulatory requirements regarding data protection.

4.5 Recommendations based on expert interview

An important, friendly interview took place with an expert on the mathematical approach of AI. She had published a few papers on the application of AI. She worked in a company specializing in medical imaging and constantly reviews new technological advancements in several fields. In her most recent publication, she emphasized areas where AI can be leveraged to drive digital servitization in a Finnish SME.

According to her:
Data privacy in healthcare is a multifaceted issue, especially under stringent regulations like the General Data Protection Regulation (GDPR) in Europe. The GDPR ensures that all personal data is handled with the highest level of security and privacy, which is particularly crucial in healthcare due to the sensitivity of medical records. These regulations apply to various settings, such as preventive care, emergency services, and home care. That creates a comprehensive protective umbrella over patients' data.

However, the complexity of healthcare data, which includes both patients with existing conditions and healthy individuals participating in preventive measures, presents unique challenges. Each data point, regardless of its origin, must be precisely safeguarded, necessitating advanced data management systems capable of adhering to GDPR standards while ensuring seamless healthcare delivery.

One significant obstacle in the healthcare industry is the reluctance of hospitals and healthcare institutions to share data. This hesitancy stems from concerns about patient privacy, data security, and potential misuse of information. As a result, collaborative efforts that could enhance patient care and drive medical innovation are often interrupted. The introduction of collaborative learning systems, designed to operate independently and safeguard against external breaches, offers a potential solution. These systems can manage and analyze medication data and other critical health information without exposing it to outside entities. Nevertheless, maintaining the balance between data utility and privacy remains a delicate act. That is why ensuring large-scale data anonymization is critical to protect patient identities.

Thus, permitting the possession of comprehensive health studies that can lead to breakthroughs in medical research and treatment strategies.

The integration of AI into healthcare further underscores the importance of effective data management and communication between specialties. Diseases like diabetes, which can cause a multitude of complications affecting various parts of the body, highlight the need for interdisciplinary collaboration. However, current practices often see a lack of communication between different healthcare providers, that alone leads to fragmented care. AI can bridge these gaps by synthesizing data from diverse medical fields, providing a holistic view of the patient's health. This technology can assist doctors in understanding the interplay between different conditions. Hence, the generation of more accurate and personalized treatment plans. Moreover, AI can translate complex medical vocabulary into patient-friendly language. This enables patients to have a better understanding of their health conditions and treatment options.

In cases where patients suffer from multiple diseases, AI's ability to offer targeted diagnoses and treatment recommendations is particularly valuable, ensuring that all aspects of a patient's health are addressed in a cohesive and informed manner.

In sum, the potential of AI in healthcare is vast. Concretely speaking, the leveraging of the extensive data held by insurance companies and integrating it with clinical information, allows AI to provide predictive insights that inform preventive care strategies and personalized treatment plans. This could lead to early detection of diseases and more effective management of chronic conditions. Moreover, AI-driven tools can assist physicians in their notetaking, ensuring that all relevant data is accurately recorded and easily accessible. In such manner, there will be better communication and decision-making across specialties. The ultimate goal is to create a more interconnected healthcare system, in which data flows seamlessly between providers, so the overall quality of care will be enhanced. As AI continues to evolve, its ability to process and analyze large datasets will be assisting in overcoming current challenges. This will offer a healthcare environment where data privacy is upheld, and patient care is continually improved.

5 Discussion

5.1 Theoretical contribution

Answering the research question: *"How Finnish SMEs employ their dynamic capabilities when implementing AI-driven digital servitization?"* is regarded a primary contribution of this study.

Consequently, when reviewing the introductory quotes by Gebauer et al. (2021), Kohtamäki et al. (2020), and Wirtz et al. (2018), it becomes more evident that the scholarly discourse regarding digital servitization is in its early stages of development. These authors emphasized that academic curiosity about the influence of AI on servitization was nascent and lacked empirical verification. This thesis contributed to this emerging field by presenting new insights into how Finnish SMEs perceived AI in their journey towards digital servitization. Most importantly, it answered the research question showing that dynamic capability theory played an important role in unveiling the potential of AI in driving a digital servitization journey. The research demonstrated the positive influence of AI on the implementation of digital servitization within Finnish healthcare SMEs and identifies the potential benefits of new technology in their operations.

As mentioned in a previous section, Corley and Gioia (2011) discuss two aspects to theoretical contribution: originality and usefulness. First, this thesis revealed a significant gap in the understanding of AI benefits among Finnish SMEs. Contrary to the initial assumption that Finnish SMEs were competent at integrating AI into their daily operations, the research showed a lack of clear understanding of the benefits of investing in AI for digital servitization within a couple of firms. This skepticism was particularly apparent in concerns about privacy and the ethical use of new technologies. Such apprehensions could originate from strict EU data privacy regulations or fears associated with long-term investments.

This finding opposed the views of some researchers and highlighted a critical barrier to AI adoption in the sector. Second, the thesis confirmed Holgersson et al. (2022)'s argument that the impact of AI on service delivery remained largely unexplored.
The observed reluctance of Finnish SMEs to employ new technologies within the healthcare sector underscored this point. That necessitated further empirical research to fully understand and leverage its potential in digital servitization. In other words, the cases of the interviewed companies both confirm and challenge existing literature findings on dynamic capabilities and digital servitization: On the one hand, one company exemplified the value of integrating dynamic capabilities with customer-focused strategies. This affirmed key theoretical frameworks. On the other hand, the other companies highlighted the limitations of reactive strategies and internally focused innovation without direct customer engagement. These findings added an important perspective to the literature by showing that the integration of dynamic capabilities with customer-focused strategies proved to be more effective than relying on reactive or internally focused approaches without customer engagement. In addition to the fact that effective application of digital servitization required a balanced approach that could integrate dynamic capabilities with proactive market engagement.

An interesting strong support for the dynamic capabilities framework was manifested. Accordingly, this further confirmed that sensing, seizing, and reconfiguring capabilities were critical for the successful digital servitization of SMEs. In fact, the customer-centric approach illustrated how effectively aligning to market demands could drive responsiveness and innovation. Which supports the literature that suggested that organizations proficient at sensing customer needs and monitoring market shifts were better positioned to adapt their offerings, as seen in Teece (2007). Apparent theoretical contribution from the observations showed an alignment with theories asserting that proactive firms gained a competitive edge by adapting to changing markets. Also, there was an alignment confirming the findings of Eisenhardt & Martin (2000) saying that firms with delayed responses often struggle to maintain a competitive advantage in dynamic environments. By contrast and despite possessing certain dynamic capabilities, there

were other observation that challenge what is already known in the literature, hence, a significant contribution can be drawn from the experience of the companies. This observation challenged the assumption that strong capabilities alone guaranteed success in digital servitization. The reactive approach of SME, further, highlighted a gap in the literature, which was often underestimating the limitations faced by SMEs who lacked proactive engagement to seize opportunities effectively. The SMEs illustrated that dynamic capabilities required a proactive mindset to drive successful servitization strategies contradicting Ambrosini and Bowman (2009). Similarly, the focus on internal innovation without a strong customer-centric orientation revealed potential limitations in current theoretical perspectives. Additionally, the internal innovation was often described as a driver of digital transformation, however the SMEs' experience suggested that this focus, if not aligned with customer needs, may affect the servitization of the firm. This eventually calls into question theories that advocated solely for internal innovation as a pathway to competitive advantage in service-oriented contexts, suggesting that customer engagement is equally essential as found in old literature like Pine & Gilmore (1999).

"It is essential to explore how firms can develop routines to leverage AI capabilities to create and deliver new AI-enabled solutions for circularity in collaboration with customers and various ecosystem actors" (D. Sjödin et al., 2023, p.43). Accordingly, and based on the findings from the interviews, and emphasizing the role of DCT theory in identifying steps towards digital servitization four contributions can be enumerated: First, the argument by Chen et al. (2021) that digital servitization process is complex, involving both continuous and discontinuous changes that can be challenging to manage concurrently does not hold entirely true. There is an obvious lack of skilled personnel in the Finnish market. A gap can be spotted between the programs of the universities and the needs of the Finnish market. Therefore, the question is not about the complexities of the digital servitization process, it is more the right implementation of strategies that lead to the accomplishment of digital servitization with the help of AI. Second, the integration of AI into digital servitization for Finnish healthcare SMEs marks a significant shift towards enhanced service delivery, innovation, and competitive advantage. Recent

literature outlined several critical factors for successfully achieving this integration. A key element identified in the findings relates to the quality and integrity of data, as emphasized by Merhi et al. (2023). High-quality data ensures the proper functioning of AI algorithms. Which is crucial for effective digital servitization. This finding is consistent with broader AI research, which underscores the foundational importance of robust data management for reliable AI outcomes (Russell & Norvig, 2021). Third, digital servitization strategies also play a vital role in this transformation. Kolagar et al. (2022) highlights the importance of digital service maturity and ecosystem involvement. As Finnish SMEs enhance their digital capabilities, AI can help optimize operations and service offerings, a perspective supported by Vial (2019) who points out the transformative potential of digital technologies in improving business processes and customer experiences. These strategies enable SMEs to explore the full benefits of AI. Thus, driving innovation and maintaining a competitive edge. This is closely linked to the finding that internal operations within Finnish SMEs does not include any use of new technological advancement. Fourth, a systematic review by Kitsios et al. (2023) provided a comprehensive understanding of AI advancements in healthcare. He showed AI's potential to revolutionize the sector through predictive analytics, personalized medicine, and operational efficiencies. This aligns with other research, such as Jiang et al. (2017), which highlights AI's capacity to enhance healthcare outcomes, improve patient experiences, and reduce costs.

"Technologies, Organizations, Environments, and Humans" (TOEH) framework further complements this discussion. The TOEH framework, a classic framework (1990), is a conceptual model used to analyze and understand complex systems, particularly in the context of information systems and technology management (Tornatzky & Fleischer, 1990). It is designed to provide a comprehensive perspective on how different factors interact and influence the implementation and use of technology within organizations factors (Tornatzky & Fleischer, 1990). Regardless of the maturity of this model, it can be used today to offer a remote comparison and a holistic approach to AI integration, considering the interplay between technology, organization, environment, and human

factors. By doing so, a sustainable and ethically sound AI implementation in Finnish healthcare SMEs can be achieved.

5.2 Managerial implication

While there are numerous benefits to the use of AI in enabling the digitalization process of an organization, caution must be a priority when using this technology. The outcome from the interviews suggests that there are several unexplored areas by Finnish SMEs operating in the healthcare sector, which is justified. Also, it is clear from the arguments and explanations of the participants that there are fears related to the long-term return on investments and the grey area around the limits and ethics of utilizing AI. Especially in the EU, data privacy issues are regarded seriously and can negatively influence the reputation of a company. Similarly, the unavailability of human talent that can effectively manage the right implementation of AI in accordance with a company's vision of becoming digitally servitized is slowing down companies that are aiming at altering their strategy. This human talent can efficiently help in the development of AI-driven diagnostic tools. Which subsequently can facilitate early detection and accurate diagnosis of medical conditions. These advanced tools add significant value to core healthcare services, helping to ensure timely and precise medical interventions (Brown et al., 2023). Therefore, the efforts towards digital servitization of Finnish SMEs will be significantly improved.

Further, the workshops and informative discussion that were held with researchers regarding the applications of AI in different industries indicated that a roadmap could be developed cooperatively between Finnish SMEs and the Finnish government. This roadmap will serve as an agreement between the SMEs and the government. It is highly recommended for Finnish SMEs in the healthcare sector to take minimal risk by employing foreign talents from other countries to test their potential in diving into digital servitization. Many platforms, similarly, provide guidance into the right implementation of AI technology towards a specific goal. Outsourcing a few of the managerial functions,

where AI can boost the performance of the company, can help in mitigating the risk of large investments of adopting an in-house operation.

5.3 Limitations / Future research

Comparably to any study, there are certain limitations that must be pointed out. This thesis focused only on one industry. Also, the sample size is small due to the sensitivity of the phenomenon studied according to the interviewed firms. In addition to the fact that instead of four companies as initially planned, the fourth company declined the interview at last notice. However, the interviewed SMEs had the implementation of AI only in the product offering, while disregarding the different applications of AI within the administrative departments of the firm. Additionally, as mentioned in previous research papers, there are several challenges faced by SMEs. In this paper, challenges were not explicitly discussed even though they form a major concern for SMEs.

Moreover, this study was heavily influenced by the research work of Kohtamäki et al., (2022) and Huikkola et al., (2022) from the University of Vaasa. Consequently, the findings reported cannot be generalized as different interpretations are possible, depending on the region, culture, and implementation of digital servitization strategies.

Future research can focus on the internal operations of Finnish SMEs. It was equally mentioned by most companies that ethics of AI usage and data privacy need to be studied. Given the fact that AI models are mainly based on large datasets. Future research is essential for the effective implementation of AI in the journey to digital servitization considering these concerns.

As aforementioned, challenges in the adoption of AI to improve dynamic capability and reach servitization are a crucial subject to be discussed in subsequent research. Also worth noting, quantitative research is needed (potentially around 50 companies) to find out the level of AI maturity required for the digital servitizaion of the firms. In this thesis, the estimation of the maturity level was based on discussion and the interviewees'

perception of their current absorption of the potential of AI. Quantitative research would allow this measure to be generalized in the future. It can also give a rough estimation of SMEs' level of AI maturity from other industries.

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Appendix 1: Interview questions

1. How does your company perceive the opportunities presented by AI technologies in the context of digital servitization, particularly in enhancing service offerings?

2. Is there a certain procedure followed by your company to include AI in your existing service offerings?

3. Do you monitor regularly technological advancement, especially AI? Do you use these findings to stay competitive?

4. Do you prioritize the adoption of AI to enhance servitization? What factors affect these decisions?

5. Is there a specific procedure to allocate resources and invest in technology?

6. How do you identify opportunities to use AI? Is there any specific initiative that you took recently in this regard?

7. How does the company see the restructuring of the firm to implement AI technologies? Are there any specific challenges?

8. Can you tell me how the company adjusted is procedure after the introduction of AI? Did this change your overall strategy and customer satisfaction?

9. Are there any specific procedures followed to continuously measure and respond to the evolving technological/digital advancements?

10. In your opinion, how would you classify the integration of AI technology in your operations and product offering?

11. Can you give a couple of examples of impediments that in your opinion are holding you behind before fully embracing AI technology in your journey towards digital servitization?

Appendix 2: Companies' description

Name	Position of the interviewee	Size of the company	Market (National/International)
Company 1	Director	Around 20-50 employees	International
Company 2	CEO	Around 6-20 employees	National
Company 3	Director	Around 23-35 employees	National