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Progression of Sustainable Servitization in Manufacturing Industry

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ABSTRACT:

The purpose of this study is to explore how the progression of sustainable servitization transition has been implemented in a Finnish manufacturing company based on its annual reports. More precisely, this thesis aims to understand how servitization evolves to integrate sustainability in the context of manufacturing industry. Environmental issues are one of the most threatening concerns in our global societies, and manufacturing companies are urged to develop their offering to answer the sustainable needs of their stakeholders. Commoditized manufacturing, and short product lifecycle have decreased competitive differentiation and took a toll on our planet's limited resources. Servitization refers to the strategic shift from selling physical products to selling intangible services and solutions. Instead of producing and selling physical goods, companies generate and add services to improve their offering. In recent years, scholars have taken interest in the sustainable benefits of servitization, sustainable servitization. A growing number of companies in various industries are employing sustainable practices in their service offering, some companies even offering sustainability-as-a-service. Theoretically this thesis builds on literature regarding sustainable servitization and its influence on manufacturing companies servitization progress and profits. An inductive, theory-building approach is employed in a single-case study examining annual reports of a Finnish manufacturing company from 2000 to 2024. The results of this study provide a conceptual framework modeling the sustainable servitization development of manufacturing companies. The findings highlight the importance of emphasizing sustainable practices in companies' service offering. The established framework of sustainable servitization can be further utilized to evaluate manufacturing companies' progression in their sustainable servitization development process.

KEYWORDS: Sustainable servitization, servitization, service, sustainability, manufacturing industry, annual reports

Contents

1	Introduction	6
1.1	Research aim, design, and questions	7
1.2	The structure of this thesis	9
2	Theoretical background	10
2.1	Service, services, solutions, and PSS: Understanding servitization in manufacturing	10
2.1.1	Service	10
2.1.2	Service types	11
2.1.3	Solution	12
2.1.4	Service agreement	13
2.1.5	Servitization	16
2.1.6	Product-Service Systems	20
2.2	Sustainability and sustainable development: Defining the key concepts	22
2.2.1	Corporate sustainability	23
2.2.2	Corporate social responsibility	24
2.2.3	ESG	24
2.3	Servitization and sustainability: Conceptualizing sustainable servitization	25
2.3.1	“Sustainability-As-a-Service” model	27
2.3.2	Sustainable servitization and financial performance	27
2.3.3	Sustainability paradox of servitization	28
2.4	Requirements, processes, and outcomes of sustainable servitization	29
2.4.1	Requirements	29
2.4.2	Processes and mechanisms	37
2.4.3	Outcomes	40
2.5	Summarizing sustainable servitization in manufacturing	41
2.6	Summarizing the conceptual underpinnings of the thesis	43
3	Methodology	47
3.1	Research strategy and method	47
3.2	Company case selection	48

3.3	Data collection	49
3.4	Data analysis	50
4	Findings	52
5	Discussion	64
5.1	Framework for sustainable servitization	64
5.1.1	Product-centered Sustainability	65
5.1.2	Add-on Sustainability	66
5.1.3	Sustainable Solutions	67
5.1.4	Sustainable Performance	69
5.2	Theoretical implications	69
5.3	Managerial implications	73
5.4	Limitations, suggestions, and avenues for future research	74
	References	76
	Appendices	102
	Appendix 1. Annual reports	102
	Appendix 2. Sustainable Servitization key themes of annual reports	102

Figures

Figure 1: Servitization Capability Model (Kinnunen & Turunen, 2012, p, 71)	44
Figure 2: Wärtsilä's service share of net sales in 2000-2024	52
Figure 3: Four Levels of Sustainable Servitization Development	65

Tables

Table 1: Definitions of servitization in alphabetical order	18
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Abbreviations

CE	Circular economy
CS	Corporate sustainability
CSR	Corporate social responsibility
CSRD	Corporate Sustainability Reporting Directive
ESG	Environmental, social, and governance
EU	European Union
KPI	Key performance indicator
LCA	Lifecycle assessment
LCT	Lifecycle thinking
NFRD	Non-financial reporting directive
PSS	Product-service systems

1 Introduction

Environmental issues are among the most threatening concerns in our current global societies (Centobelli et al., 2020, p. 2). Legislative pressure from governments and rising interest from NGOs and individuals (Ardito & Dangelico, 2018; Buysse & Verbeke, 2003; Michelino et al., 2019) urge manufacturing companies to answer their stakeholders' sustainable needs and requirements while maintaining and increasing their productivity. The commoditization of today's intense manufacturing and short product life cycle leads to decreasing competitive differentiation (Matthyssens & Vandenbempt, 2008, p. 317) while simultaneously taking a heavy toll on our planet's resources.

In recent years, manufacturers have shifted their strategic focus from selling products to offering services (Brady et al., 2005, p. 571; Matthyssens & Vandenbempt, 2008, p. 316). This strategy is called servitization (Vandermerwe & Rada, 1988, p. 314). Research has found that services tend to provide information to customers, lengthen the customer relationship, and assist new customers in finding the company. Heskett et al. (1997) found that services provide a viable source of competitive advantage due to their invisible, labor-dependent nature, making them difficult to imitate.

In the following years, servitization became, to some extent, interchangeable with companies evolving from selling products and basic services to selling product-service systems (PSS) (Kohtamäki et al., 2018). Rabetino et al. (2015, p. 56) note that PSS often contain advanced lifecycle services and require modifications in companies' business models. Evidence shows that several revered manufacturers from different industries, such as Caterpillar, IBM, and Rolls-Royce, have benefited from their strategic transition to servitization (Huikkola et al., 2016, p. 30).

This shift has sparked a growing interest in the research community and several publications to shed light on the subject and provide avenues for future research. Over time, academia realized that compared to traditional goods, PSS may be sustainable solutions that provide environmental, societal, and economic value (Mont, 2002; Roy, 2000;

Tukker & Tischner, 2006). The focus shifted to decreasing resource usage and ecological impact through product-service lifecycle optimization (Rabetino et al., 2015). This development led researchers to suggest new business logic based on offering functionality instead of goods (Alonso-Rasgado et al., 2004; Dobers & Wolff, 1999), emphasizing the possible benefits when approaching sustainability themes. This strategic decision is called sustainable servitization (Rabetino et al., 2024). For instance, dematerialization and selling solutions through outcome-based services. Sustainable servitization performs a compelling role in promoting efficient processes and practices that advance resource optimization and, therefore, advocates the transition towards sustainable product-service systems (Kohtamäki et al., 2024).

1.1 Research aim, design, and questions

The contextual emphasis of this study lies in the evolution of service development, specifically sustainable servitization development. Buchanan and Bryman (2009, p. 481) report a need for case studies reflecting, in a detailed manner, on the lessons learned from innovations in case design and implementation. This study aims to contribute to the research by examining a Finnish manufacturing company. This study aims to gain an overview of a Finnish manufacturing company's sustainable servitization development phases based on its annual and environmental reporting from 2000 to 2024. The transition from product-centered services towards solution-centered offerings is one of the central themes of the current research in servitization (Rabetino et al., 2024).

The methodology chosen for this paper is qualitative research, more precisely, a longitudinal single-case study. The data is collected from publicly available environmental and annual reports of a large Finnish manufacturing company. The author categorizes and analyzes these reports. The reports are collected from 2000 to 2024, covering twenty-four years. Understanding sustainable servitization's evolution makes expanding to other companies and/or industries possible.

Sustainability reporting has increased significantly over the past years. According to KPMG (2020), most companies in Finland report their sustainability objectives, aspirations, and initiatives yearly, either integrated with their annual reports or a separate sustainability report. The demand for sustainable business models and strategies has also been a rising trend in various industries, especially manufacturing. However, few studies focus on sustainable servitization in the Finnish manufacturing industry. This study fills this research gap.

Reinertz and Kumar (2000) state that articles seldom describe and discuss the cases of a few individual companies descriptively and intricately. On the contrary, they are more likely to focus on a larger sample size of companies and interview various company representatives. This study analyzes and provides a descriptive profile of one case company instead of describing the development from a wider perspective, such as from an industry level. Alas, this study focuses on one research questions. Considering the lack of detailed case studies depicting the development of sustainable servitization processes in Finnish manufacturing, the research question is formed as follows:

RQ1: How does servitization evolve to integrate sustainability in manufacturing companies?

The main objective of this study is to understand how sustainable servitization, a relatively distinctive concept under the umbrella term of servitization, progresses and develops. This requires a longitudinal perspective and information on the case company's previous, current, and potential future developments. Answering the research question demands a theoretical analysis of key terms and effects of sustainable servitization and descriptive case company depiction.

1.2 The structure of this thesis

This paper is divided into five main chapters, the first being this Introduction. The second chapter presents the theoretical background and framework utilized in the study. The third chapter explains qualitative research methodology and introduces the case company. Data collection and analysis methods are also covered. The fourth chapter explains the findings and analysis of the discovered themes. The fifth chapter covers the created framework. Theoretical and managerial implications of the study are also discussed. Limitations, suggestions and avenues for further research are also covered.

2 Theoretical background

This chapter is divided into three sections. The first section covers the theoretical background of current research regarding servitization. The second section presents the concept of sustainability, sustainability-centric processes, and current research on sustainability reporting. The third section combines previous themes and covers the concept of sustainable servitization and the role sustainability reporting plays in the theme. All these concepts have various dimensions within academia, consisting of other relevant themes. To fully comprehend the context of servitization, the most relevant concepts related to servitization and sustainability shall be covered.

2.1 Service, services, solutions, and PSS: Understanding servitization in manufacturing

This subsection covers the definitions of services, solutions, PSS, and servitization in manufacturing which are most prominent within the existing literature. This subsection covers the most relevant concepts regarding servitization that support understanding sustainable servitization.

2.1.1 Service

According to Grönroos (1988, p. 1), service has four fundamentally distinctive features, which include (1) their intangibility; (2) services are activities rather than things; (3) services are to some extent produced and consumed concurrently, and (4) customer has a level of involvement in the production process of the service. This 'process' nature of services is shared among many scholars (e.g., Solomon et al., 1985; Lovelock, 1991; Zeithaml and Bitner, 2003; Vargo and Lusch, 2004a), and they most often center around customers' needs that can be satisfied with services (Grönroos, 2000).

However, Vargo and Lusch (2004b, p. 2) highlight the company's "... specialized competencies ...," *such as knowledge and skills required to perform a service "... through deeds,*

processes, and performances for the benefit of another entity or the entity itself.” Either way, this definition accentuates a company's ability to understand its customers and perform beneficial activities. Given their customer-centric logic, services are most often observed from a subjective point of view, and they can be depicted through abstract experiences, such as trust, feeling, and security (Grönroos, 1988, p. 10).

2.1.2 Service types

Services differ from each other in terms of who they are offered to. Johnston and Clark (2008) list service types as business-to-business (B2B) services, business-to-consumer (B2C) services, internal services within organizations, public services (G2C), and not-for-profit services provided by charities and NGOs. The academic field acknowledges various service types. Kotler's (1994, p. 646-649) categorization of repair and maintenance services and business advisory services represents one of the most traditional classifications of services. The fundamental question regarding the nature of product services relates to whether the service is presented before, during, or after the sale (Lalonde and Zinzer, 1976). Also, Frambach et al. (1997) introduced the distinction of product services as transaction or relationship-related.

Wise and Baumgartner (1999, p. 137-139) proposed three categories of downstream service moves. The first is embedded services, which are built into the product. Second is comprehensive services, which complement the product and customer activities. Third is integrated solutions in which products and services are tied into a seamless offering, and the last is distribution control, through which the manufacturer extends its control in the value chain into the distribution activities (Wise and Baumgartner, 1999, p. 137-139).

Mathieu (2001a, p. 39) presented the division of product services into two categories: services supporting the manufacturer's product, for example, after-sales services, and services supporting the client's activities related to the bought product, for example, training customers to use the product. Additionally, Mathieu (2001b, p. 453) lists a third

category of services separate from the company's initial product, the so-called service as a product. In the latter case, customers can experience the service without consuming its products.

2.1.3 Solution

The solution implies that there is an issue that needs to be solved. Solutions have traditionally been determined as arrays of products, services, and software (Vandermerwe & Rada, 1988) that solve customer-specific issues (Miller et al., 2002; Tuli et al., 2007) and boost the comprehensive value to the customer amid the product life-cycle (Wise & Baumgartner, 1999). Industrial customer solutions represent a tailored and integrated mix of products and services that meet the customers' business needs (e.g., Davies et al., 2006; Sawhney, 2006). Solutions demand affinitive processes and joint learning among solution providers, customers, and suppliers (Barry and Teer, 2008; Jean et al., 2016; Tuli et al., 2007).

According to Tuli et al. (2007), customers perceive solutions as relational processes between customers consisting of defining the customer's needs, assimilating goods and services, and personalizing them, their deployment, and post-deployment customer aid. This process aims to satisfy customers' business needs and may help the supplier offer compelling solutions and gain revenue (Tuli et al., 2007).

Kindström et al. (2012) and Raddats (2011) suggest that providing solutions assists manufacturers in differentiating themselves from strategic competitors. Sawhney et al. (2004) note that solutions offer a lasting source of profits, while Tuli et al. (2007) inspected client loyalty and revenue growth. Traditional product manufacturers are transitioning their offering from products to solutions in order to gain a sustainable competitive advantage (Kindström et al., 2012; Kucza & Gebauer, 2011; Story et al., 2016; Windahl, 2015) through investigating and identifying business opportunities within their customers' value chains (Kucza & Gebauer, 2011; Wise & Baumgartner, 1999).

Prencipe et al. (2003) note that companies may struggle to transition into organizations that can design and deliver efficient solutions to meet the growing customer demand. In order to deliver integrated solutions profitably, companies must obtain or establish skills in fields such as key account management, risk management and risk analysis, financial acumen, legal skills, information administration, innovation management, and portfolio management (Brady et al., 2005). These capabilities are usually developed through the company's learning process over time (Brady & Davies, 2004).

2.1.4 Service agreement

When suppliers offer services, they most commonly discover the possibility of capitalizing on the installed base. Oliva and Kallenberg (2003) define the product's installed base as the comprehensive number of used products. Installed base services refer to the product- or process-related service offerings to operate it in the contexts of its functioning activities (Oliva & Kallenberg, 2003). For the supplier, the need to utilize the installed base rises once the core performance of the supplier has been completed and the supplier wishes to transform the customer focus from transaction-based to relationship-based (Oliva & Kallenberg, 2003). This type of contracting implies that the supplier expects some machinery deficiencies. Contracts with a relationship-based nature tend to be tailored into maintenance contracts to take better advantage of the installed service organization (Oliva & Kallenberg, 2003). Offering service contracts displays a profitable opportunity because once the service organization is fixed, it matures into a fixed cost, profiting merely from capacity utilization. Establishing service bonds decreases the instability and unreliability of the demand over the installed capacity and grants more efficient capacity utilization (Oliva & Kallenberg, 2003).

Huikkola and Kohtamäki (2017) highlight that manufacturing companies must recognize, evaluate, and cultivate their strategic capabilities to provide solutions over the years. Wise and Baumgartner (1999) mention engaging with the customer throughout the product life cycle. The higher capacity utilization (Oliva & Kallenberg, 2003) enables the refinement and growth of the installed base within diverse industries, thanks to the

previous acquisitions and longer product life spans (Wise & Baumgartner, 1999). This facilitates expanding opportunities for companies to offer broader service agreements supervising extensive installed base matters to their customers' activities (Wise & Baumgartner., 1999).

Regarding maintenance activities, customers can be tempted to seek assistance from a third party instead of the original service provider. Wang (2010) reports a few styles of contracts in maintenance outsourcing, including warranties and service contracts. These service contracts are usually between the service recipient (customer) and the agent (service provider). The service recipient and the agent comply with agreed rules and regulations in order to cater the maintenance service according to the paid compensation (Wang, 2010). The accord usually derives from a bundle sale if the agreed-upon maintenance activity is tied to a warranty. However, a service contract may arise from a bundle sale or other obligation to outsource maintenance services (Wang, 2010). In some cases, agreeing to a third-party service for maintenance activities is more profitable due to cost, efficiency, or other matters. In other cases, or industries, e.g., in military, energy, or marine, the number of maintenance service providers is limited, or the product's manufacturer is the only provider (Wang, 2010).

An established maintenance service agreement requires a refurbished pricing policy. Deprez et al. (2021, p. 530) state that maintenance services can be offered through on-call service, stating that *"each preventive or corrective intervention is charged to the equipment user based on materials used and time spent."* On the contrary, service may be offered through a full-service contract, including premonitory and remedial maintenance over an agreed period for a (series of) payment(s) or an established commission (Deprez et al., 2021). The full-service contracts usually cover downtime to ensure the service is delivered without favoring the on-call customers (Deprez et al., 2021). Conversely, on-call and full-service-based pricing policies

Guerreiro and Amaral (2018) found that the economic literature and the overall supply-demand balance often present pricing as a tool to boost profits. Myriad companies utilize exclusively cost-based pricing methods such as cost-plus pricing (Shipley & Jobber, 2001). However, several researchers (Guerreiro & Amaral, 2018; Kohtamäki et al., 2013) have proposed another pricing policy centered around the value created for the customer. Alas, the value-based pricing model is seen as complicated due to the heterogeneity of perceived customer value among various customers (Forbis & Mehta, 1981). In addition, this pricing method is challenging because it relies on the company's ability to anticipate the needed maintenance of the equipment accurately; Rapaccini (2015) reports the difficulties of capitalizing on the services due to insufficient pricing. Oliva and Kallenberg (2003) note that pricing for maintenance services demands new abilities from companies and that data must be developed and utilized to review hazards.

A service agreement is in demand for the service provider and the recipient for various reasons. Especially in the previously mentioned military and industrial context, the customer is not able to maintain products, nor does the product supplier offer traditional warranties (Wang, 2010). For example, the customer cannot perform necessary maintenance activities. Also, rapid digital and technical development requires trained professional personnel to respond to the safety and sustainable regulation during manufacturing, thus leading to higher maintenance expenses and heightened ministrations from the management (Wang, 2010). In addition, it is reasonable to expect manufacturing companies to have knowledge and resources for efficient maintenance operations, which the customer rarely obtains or wants to focus on.

Most manufacturers have the expertise and abilities to maintain the equipment they have produced (Wang, 2010). Especially with rapid technological development, systematic improvement is essential to maintain the product life cycle, and in many cases, the manufacturer is the best choice for the service. Therefore, maintenance services could be a substantial source of revenue for manufacturers; thus, providing them is a strategic decision. Speaking of strategic decisions, according to Wang (2010), service contracts

may expand customer's financial flexibility. In many cases, service contracts can be tailored according to the client's financial restrictions, such as *"taking over client technical systems, exchanging shares of ownership, payment of contractor services depending on the client's primary output, etc."* (Wang, 2010).

To summarise, the service agreement is a tool for providers and recipients to focus on their core competence. Service providers can focus on their product excellence, and service recipients can focus on profitability. The service agreement offers a tailored package fulfilling the comprehensive needs and requirements of the service recipient. An all-inclusive service offering saves trouble in the long run and is more digestible than the scattered selection of individual contracts. Service agreements are more straightforward to sell, can produce long-term profits, and provide chances to sell more products to customers.

2.1.5 Servitization

The strategic shift from offering products to customer solutions is called servitization (Brady et al., 2005; Matthyssens & Vandenbempt, 2008). The initial concept of servitization was first introduced by Levitt (e.g., 1976) but was first studied by Vandermerwe and Rada (Vandermerwe and Rada, 1988). Since then, various scholars have issued numerous studies regarding servitization (Lightfoot, Baines & Smart, 2013), and the topic of servitization has evolved into an extensive academic sphere with diverse subcategories (Koh-tamäki et al., 2018). Li et al. (2024) found a rising trend of research servitization literature in annual publications from the past 22 years, suggesting that servitization will grow even more popular in management literature. Even though the interest in servitization has been rising notably for over forty years, it is worth mentioning that there is no distinct definition depicting servitization, thus resulting in terms used interchangeably (e.g., El-oranta & Turunen, 2015). Table 1 presents a summary of the most notable definitions of servitization.

Author(s)	Definition of servitization
Baines, Lightfoot, Kay et al. (2009, p. 547)	<i>"Innovation of an organisation's capabilities and processes to shift from selling products to selling integrated products and services that deliver value in use."</i>
Baines, Lightfoot, Peppard et al. (2009b)	<i>"The process of creating value by adding services to products."</i>
Brax (2005, p. 146)	<i>"A process in which companies are adding more and more value to their core offering through services."</i>
Galbraith (2002, p. 194)	<i>"Create an organization that can package and deliver the solutions."</i>
Lusch and Vargo (2004b, p. 2)	<i>"The application of specialized competences (knowledge and skills), through deeds, processes and performances for the benefit of another entity, or the entity itself."</i>
Neely (2008, p. 104)	<i>"The movement in which manufacturing firms move beyond manufacturing and offer services and solutions, often delivered through their products, or at least in association with them."</i>
Oliva and Kallenberg (2003, p. 161)	<i>"Transitioning from products to services."</i>
Raddats et al. (2019, p. 207)	<i>"Servitization is the transformation of a firm from taking a product- to taking a service-centric approach."</i>
Vandermerwe and Rada (1988, p. 133)	<i>"The increased offering of fuller market packages or "bundles" of customer focused combinations of goods, services, support, self-service and knowledge in</i>

	<i>order to add value to core product offerings.”</i>
Wise and Baumgartner (1999, p. 133)	<i>[A transition from the business model towards a customer relationship orientation, results-driven solutions and customised value offerings” or alternatively] “going downstream into more lucrative product related services.”</i>

Table 1: Definitions of servitization in alphabetical order

Even though services have been provided with products for decades, Vandermerwe and Rada’s definition in 1988 is considered to be one of the first (Baines et al. 2009b) and, therefore, the premise for the servitization literature. Vandermerwe and Rada (1988) highlight the increased value created by adding ‘bundles’ of services to the core products to provide comprehensive value for customers. This emphasis is on the value-adding nature of servitization, and, therefore, it must be driven by customer relationships and the customizable aspects of the ‘bundle’. The shift to servitization is considered a total market strategy for companies and is a top priority for managers (Vandermerwe and Rada, 1988).

Some other definitions take a more straightforward approach, such as Raddats et al. (2019), Oliva and Kallenberg (2003), and Baines, Lightfoot, and Peppard (2009), which associate servitization with services added to the products. These descriptions focus mainly on the product-service relationship of the servitization process. However, Raddats et al. (2019) mention the transitional aspect of the servitization process. Baines, Lightfoot, and Peppard (2009) also define the value-adding benefits of servitization. The underlying assumptions behind these definitions rely on increasing services in existing products, thus creating servitization.

While some definitions focus on the traditional views of servitization, from offering products to offering services, others expand the concept into more solution-centric and highlight the level of organizational commitment in their definitions. For example, Baines, Lightfoot, Peppard, et al. (2009b) focus on the value services add to a company's initial products. This description does not regard the organizational nature or its capabilities in servitization and thus highlights the needed processes to provide services to customers. Like Baines, Lightfoot, Peppard, et al. (2009b), Brax (2005) mentions the process of adding value in terms of services to companies' offerings. In addition, the definition by Olivia and Kallenberg (2003) focuses on the transitional aspect of servitization but limits the offering of services. Raddats et al. (2019) take the service-centric approach into their definition. However, the description of service-centricity is somewhat broad and can be directed to the overall strategy or service development.

In contrast to the abovementioned definitions, Galbraith (2002) states that organizations must construct a production structure to provide customer solutions. The definition takes a more conceptual stance in servitization literature and calls for organizational commitment when defining servitization. The demand to 'package' and 'deliver' 'solutions' requires a more comprehensive perspective than just offering service-added products. Baines, Lightfoot, Kay, et al. (2009a), much like Galbraith (2002), highlight the organizational transformation required to sell products with integrated value and services to the customers. This view has undertones of the Resource-based View (RBV) and focuses on the level of commitment from the entire organization and its processes.

Lusch and Vargo (2004b) take an RBV stance similar to Baines, Lightfoot, and Kay (2009a) and Galbraith (2002) in their definition of servitization. The definition demands using a particular set of skills and knowledge to provide benefit (value) to other parties. This definition highlights the practice aspect of the servitization strategy more than others. Neely (2008) also defines servitization as the transition of manufacturing companies from products to offering solutions paired or integrated with a company's initial products. Again, the transitional aspect and the solution focus are emphasized. Wise and

Baumgartner (1999) take a similar approach to Vandermerwe and Rada's (1988) definition by utilizing customer-centric relationships, focusing on downstream knowledge, and personalized offerings.

To conclude, the earliest definitions of servitization revolve around adding value-enhancing services to physical products. Over the years, researchers have extended the definitions to be associated with the organization's structure and customer relationships. These definitions focus on services and the necessity of implementing them in companies' business offerings.

2.1.6 Product-Service Systems

The product-service system (PSS) is a concept tightly linked to the servitization literature, even though it can be considered a special case of servitization (Bandinelli & Gamberi, 2012). The term is often mixed in the literature and used interchangeably, thus creating confusion in the research field. It is worthwhile to mention that PSS has several definitions, and due to their common usage in the literature, it is possible that these definitions can be utilized interchangeably.

The concept of PSS arose consecutively from servitization to represent a managerial framework to manage the "*bundling*" of physical products and intangible services (Li et al., 2024). Originally, Goedkoop et al. (1999) depicted a PSS as a structure that combines products, services, a chain of associates, and a comprehensive infrastructure to fulfill customers' requirements. Simultaneously, this structure could lead to a more sustainable business due to the smaller environmental footprint, contrary to conventional business models. Li et al. (2024, p. 1) state that PSS represents "*a specific implementation and means of achieving servitization, representing a tangible manifestation of servitization.*" By this definition, servitization is the comprehensive concept describing the transition from product-centricity to service-centricity, while PSS refers to the physical manifestations done to achieve servitization. Expanding on this, PSS studies often focus on prototyping Neely (2008) from the viewpoint of product design (González Chávez, 2023),

whilst servitization is affiliated with a strategy aiming to separate the value of physical offerings from companies' prosperity (Kim & Lee, 2021).

Baines et al. (2007) state that PSS is a business model that broadens the fundamental purpose of a product by merging supplementary services into the offer, combining the themes of sustainability and the usage of natural resources with the transition into a service business. In addition, Annarelli et al. (2016) present that the PSS business model centers around the end-user's demands instead of the manufacturing activities. Researchers such as Tukker (2004) and Cavalieri and Pezzotta (2012) propose that PSS is a substantial reaction to the growing demand for environmental actions, differing from the fundamental doctrines of innovation strategy to satisfy customers' needs. This system satisfies requirements without taxing natural resources and creates environmental and common benefits (Reim et al., 2015). Rondini et al. (2020) suggest that the benefits of PSS are linked to the initial engineering process due to the early engineering phase's influence on the sustainability possibilities in the product's life-cycle phases. However, González Chávez (2023) states that even though PSS and servitization carry potential benefits, PSS is not "a circular business model."

Tukker (2015; 2004) depicts three dominant PSS models. The first category of PSS is product-oriented, referring to the business model that mainly offers physical products with some added services. Subcategories include product-related services (e.g., insurance or maintenance service contracts) and consultancy (Tukker, 2015). The second category is use-oriented services, which do not focus on selling products, even though they still play an essential part. Instead, the ownership of the product remains with the provider, but the usage is made accessible in a different fashion (Tukker, 2015).

In some cases, the product is shared by several users. Tukker (2015) reports subcategories, which include product leasing (utilized by a single user), product renting or sharing (utilized consecutively by various users), or product pooling (concurrent utilization of the product by many users, e.g., carpooling). The third and final category of PSS models is

result-oriented services. The customer and the provider agree in advance on a desired result without a predetermined product involved (Tukker, 2015). Subcategories include activity management/outsourcing (e.g., catering services), pay-per-service unit (e.g., payment per copy made in copying), or functional results. Tukker (2015; 2004) reported that the result-oriented PSS is the most promising in promoting a transition towards a resource-efficient economy since the revenue is from the result delivered rather than the products sold. All material products and resources once used to convey the result became cost factors, fabricating an incentive to minimize usage (Tukker, 2015).

2.2 Sustainability and sustainable development: Defining the key concepts

Sustainability is a broad concept that has several meanings in everyday language. However, one of the most notable definitions of sustainable development was established in 1987 in the United Nations Brundtland Commission report as *“meeting the needs of the present without compromising the ability of future generations to meet their own needs”* (United Nations, 2024a). This definition covers the global agenda and demands long-term solutions to sustain economic growth sustainably (Anolín-López & Ortiz-de-Mandojana, 2023). However, the first acknowledgment of sustainability in management literature was introduced in 1995 (Shrivastava, 1994; Starik and Rands, 1995). Anolín-López & Ortiz-de-Mandojana (2023) note that these managerial definitions proposed the term *“ecological sustainability”* and contradicted the environmental protection with economic development according to the guidelines of the Brundtland Commission report. On the other hand, Gladwin et al. (1995, p. 878) defined sustainable development as the *“process of achieving human development in an inclusive, connected, equitable, prudent, and secure manner,”* proposing a social dimension to sustainable development.

Portney (2015) states that at the core of the definition, sustainability revolves around our planet’s biophysical environment, especially considering consumption and decreasing natural resources. The key to modern sustainability definitions is the balance in supporting human life and economic growth without threatening the lives of ecosystems

(Portney, 2015). Milton Friedman famously stated, “*The business of business is business*” (Mukhopadhyay & Mukhopadhyay, 2021), noting that companies' obligations are directed only towards customers and owners, not anyone else.

Nowadays, companies answer to various stakeholders, and their business decisions may have global impacts throughout the supply and value chain. Indeed, companies significantly influence the lives of their stakeholders through their (global) supply chain, the products and services they offer, employment and working conditions, environmental decisions, and human rights (European Commission, 2024a). In terms of business and companies' influence on societies, various terms are often used interchangeably due to their similar concepts and objectives regarding sustainability. Recently, the most often used terms include corporate sustainability (CS), corporate social responsibility (CSR), and ESG.

2.2.1 Corporate sustainability

Corporate sustainability (CS) was first introduced in 2005 (Bansal, 2005) as a tridimensional structure based on the triple bottom line consisting of (1) economic growth generated through value creation, (2) social equity through CSR, and (4) environmental integrity through company's ecological management (Anolín-López & Ortiz-de-Mandojana, 2023; Bansal, 2005). Scholars and managers concur that CS is built on three pillars (Antólin-López et al., 2016). However, these pillars are defined differently in literature, whether they are known as economic, social, and environmental (predominantly), as the 3Ps (profit, people, planet), or triple bottom line (e.g., Elkington, 1997; Amini and Bienstock, 2014; Hart and Milstein, 2003). Even though the tri-dimensionality of CS is widely acknowledged, Antólin-López et al. (2016) found dissimilarities regarding the sub-categories of its dimensions.

2.2.2 Corporate social responsibility

Corporate social responsibility (CSR) refers to companies' duty to prevent and manage possible negative influences their activities may cause, "the responsibility of enterprises for their impact on society" (European Commission, 2024a). CSR has also been defined as a company's activities that benefit the interest of social stakeholders and simultaneously do not threaten the legitimate claims of another stakeholder (Antólin-López et al., 2016) with enterprises that could be concurrently socially responsible and socially irresponsible (Strike et al., 2006). Bansal and Song (2017) trace the provenance of CSR to the 1950s when concerns about companies' moral and social responsibility towards their local environment and workers were raised. Therefore, it is no wonder that CSR focuses on social responsibility, social well-being, and stakeholder relations (Barnett, 2007).

2.2.3 ESG

The term ESG has also risen in the financial field regarding sustainability (Antolín-López & Ortiz-de-Mandojana, 2023). Even though the concept of ESG lacks an explicit definition in academia (Eccless et al., 2020; Matos, 2020), it can be defined as the set of environmental, social, and governance elements that can materially influence companies and their value creation (Anolín-López & Ortiz-de-Mandojana, 2023). The earliest objectives of ESG factors, first presented in 2004 by the UNGC (Global Compact, 2004), were to advocate proactive risk management and opportunity analysis concerning environmental and social trends jointly with rising public pressure to improve liability and corporate governance (Anolín-López & Ortiz-de-Mandojana, 2023). ESG focuses mainly on factors influencing companies' business and market performance, while CS revolves around the idea that companies influence economic, social, and environmental conditions (Anolín-López & Ortiz-de-Mandojana, 2023).

Companies face legislative pressure from governments and rising interest from NGOs and individuals (Ardito & Dangelico, 2018; Buysse & Verbeke, 2003; Michelino et al., 2019), encouraging them to follow sustainability initiatives and sustainably develop their

operations. In addition, stakeholders expect companies to report their sustainability-related actions and activities (Silvola & Landau, 2019).

2.3 Servitization and sustainability: Conceptualizing sustainable servitization

In recent years, sustainable development has become an established goal for societies and businesses, and servitization is often presented as a facilitator of industrial transition towards environmental sustainability. Opazo-Basáez et al. (2018) note that servitization has many benefits from the viewpoint of a triple bottom line. According to Tukker (2004; 2015), servitization can be an instrument for administering an economy aiming for higher resource efficiency. Doni et al. (2019) and Mont (2004) expand servitization's impact-setting practice of better sustainability. The logic leading to this assumption lies within the perceived coherence between service-centered business models and the nature of the circular economy (Tukker, 2015).

Companies seek ways to enhance their opportunities to generate more profit, and an increasing number of manufacturing companies are contemplating expanding into services. The business model of service-centered companies relies on the profits gained from services that support companies extending product and service life cycles (Chávez González, 2023). Lexutt (2020) reports that servitization has a positive impact on customer-orientedness. In addition, Zhang et al. (2022) discovered that companies with higher customer awareness are more inclined to employ sustainability activities, such as utilizing sustainability standards within their value chains. Indeed, the increasing competitiveness can explain the rising interest in servitization and sustainability within almost every market, the aggressive demand for company responsiveness and information exchange, and the reduced profit margins of physical goods (Bustinza et al., 2015).

Chávez González (2023) suggests that service-centered offering creates ground for a stable and steady relationship with customers due to the distinctive value proposition and solution-oriented nature of the business model. In addition, Stoll et al. (2020) state that

servitization accentuates value co-creation with customers. This suggests that companies engaged in servitization or service-based business models seek to tighten their customer relationships by catering to their demands. From a social perspective, servitization encourages manufacturers to establish social sustainability practices, create positive relations with external stakeholders, and promote social performance (Zhang et al., 2022).

Abdelkafi et al. (2022) present the idea of “built-in-sustainability,” referring to the sustainable benefits derived directly from the servitization business model, noting that sustainability potential cannot be met without “means of adequate processes.” The researchers note that specific criteria must be met for sustainability to be sustainable. Reim et al. (2015) state that PSS business models benefit the environment and society (Blüher et al., 2020; Yang and Evans, 2019). Scholars have also reported positive aspects of servitization, including remanufacturing, extension of product life-cycle, and decreasing emissions (Yang & Evans, 2019; Reim et al., 2015). Kuo (2011) reports that maintenance management and product design drive the sustainability performance of servitization. Korkeamäki et al. (2021) state servitization’s possible benefits when approaching sustainability themes. Servitization performs a compelling role in promoting efficient processes and practices that advance resource optimization and, therefore, advocates the transition towards sustainable product-service systems (SPSS) (Kohtamäki et al., 2024).

In the early 2000s, the research community noticed the promising aspects of sustainable product-service systems in producing environmental, societal, and economic value (Mont, 2002; Roy, 2000), which led to the focus on decreasing resource usage and ecological impact through the product-service life-cycle optimization (Rabetino et al., 2015). Reim et al. (2015) note that only a fraction of publications report that servitization may negatively influence sustainability under certain circumstances.

2.3.1 “Sustainability-As-a-Service” model

There has been a growing trend of “as-a-service” models in recent decades. In the model, service-oriented architecture promotes the development and distribution of services (Duan et al., 2015), which can be extended to various value propositions (Ma, 2007). The most known version of an “as-a-service” business is probably Software-as-a-System (Saas). Rapid technological developments have resulted in companies employing digital tools, making space for an “as-a-service” type of offering in which platforms accompanying business networks and ecosystems are promoted (Banerjee & Puneekar, 2020). In recent years, the concept of “sustainability-as-a-service” has been raising interest. Wolfson et al. (2013) studied the relationship between companies providing sustainability values for their clients through products and services. In their research, Wolfson et al. (2013) promote that companies ought to saturate the core value of the supplied services with sustainability, thus recruiting “*the customer as a supplier of sustainability to future generations*” (Wolfson et al., 2013, p. 103). Therefore, the supplier is not only providing a service but also a performance emphasizing sustainable development.

2.3.2 Sustainable servitization and financial performance

Khül et al. (2019) suspect the environmental motives of PSS providers since strategic and commercial incentives most often guide servitization. Scholars (e.g., Walker et al., 2020) note that economic performance has been the object of attention regarding sustainability. However, it has been shown (Abdelkafi et al., 2022) that focusing on all three aspects of sustainability drives sustainable, long-term prosperity better than just focusing on one. Eccles et al. (2014) report that companies generating high sustainability efforts perform better financially compared to low sustainability companies. However, the balance in sustainability performance is challenging (e.g., Walker et al., 2020), given that their tradeoffs define the triple bottom line relationship (e.g., Gao and Bansal, 2013).

Research reports an imbalance between environmental and economic performance (Schulz, 2022) and economic and social objectives (Iivonen, 2018). Hence, maintaining a

balance between these tradeoffs is required to achieve sustainability. For this reason, Lindahl et al. (2014) found that servitization is an adequate tool to fulfill sustainability demands. According to Luiz Corrêa (2018, p. 358), servitization offers suppliers a financial incentive to make more sustainable decisions because, in general, there is no transfer of physical assets between companies concerning the design, activities, and *“disposal of the service-supporting physical products at the end of their life-cycle.”*

2.3.3 Sustainability paradox of servitization

The research proposes that servitization may assist companies in achieving their sustainability goals (Antikainen et al., 2018), and the fundamental definitions of PSS assume the same by involving dematerialization and establishing sustainability and competitiveness objectives (Annarelli et al., 2016). However, transitioning from one business model to another is rarely clear-cut, often carrying unexpected, unfavorable side effects that organizations fail to recognize. The service paradox is a broadly studied aspect of servitization that refers to the companies' inability to gain revenue from the transition to service-based business models. In the context of sustainability, Verboven and Vanherck (2016) present the possible paradox of sustainability.

During the transition towards new business models, the research suggests a definition underlining the conflicting relationship between the expected influence of a sustainable business model and the unnoticed negative external aspects that may influence revival actions on an organizational level as well as on the customers' side (Verboven and Vanherck, 2016). Studies define the sustainability paradox as the situation in which an organization's sustainability decays when adapting a sustainable servitization strategy unsuccessfully (Brax et al., 2021; Kohtamäki et al., 2018). Argento et al. (2022) call for a thorough study because of the impending risks in enriching the paradox generated by the lack of integrated sustainability thinking and proper consecutive monitoring in servitization transitions.

Blüher et al. (2020) propose that system boundaries affect servitization and its sustainability performance. The permanence of research suggesting a positive servitization-sustainability linkage may be influenced by the system chosen as a reference (Abdelkafi et al., 2022). For example, global supply chains extend companies' influence from one country or region to another. Kühl et al. (2019) note that different countries' laws, regulations, and infrastructure may affect the efficacy of sustainability initiatives. Abdelkafi et al. (2022) suggest that most of the literature overestimates the positive impacts of servitization on environmental performance, implying a belief that transforming into more service-oriented business models is generally assumed to correlate with better sustainability.

2.4 Requirements, processes, and outcomes of sustainable servitization

In order to understand the progression of sustainable servitization in the case company, it is necessary to gain a comprehensive overview of the requirements, processes, and outcomes of sustainable servitization. Hence, the following section covers the key aspects of this progression. A process standpoint view is taken to explain these factors related to sustainable servitization.

2.4.1 Requirements

Circular economy

Circular economy (CE) refers to the abridgment of closed-loop flow economy (Morseletto, 2020), which is a model of economic advancement including assets, goods, and renewable resources and continuous circulation of materials (Schroeder, Anggraeni & Weber, 2019). It is an umbrella concept depicting a regenerating economic structure in which raw material and energy input, waste, and pollution are substantially reduced while protecting constant economic growth (Geissdoefer et al., 2017; Kircherr et al., 2017). The end goal is to alter the standards of manufacturing and consumption with methods such

as repairing, reducing, reusing, remanufacturing, recycling, and preserving goods and materials (De Angelis et al., 2018; EC, 2022; Kirchherr et al., 2017).

According to Zhang, Niu, and Zhang (2022), CE is characterized by low exploitation, high resource employment, and reduced emissions. The circular aspect refers to the CE's code of conduct, consisting of the 3Rs: reduce, reuse, and recycle. These three principles represent the fundamental proposition of CE. The reduction refers to the input side of production, cutting down resource consumption and waste production during manufacturing, distribution, and consumption (Beccarelli & Di Foggia, 2018). Its objective is to save resources, boost the utilization rate of resources, and limit waste generation from the input side of the manufacturing process (Domenech & Bahn-Walkowiak, 2019) by employing technological improvements, enhancing manufacturing processes, and clean production methods (Mathews & Tan, 2016).

The principle of reuse demands standardized recycling methods (Amato, 2022), especially if manufacturing companies support and lead recycling. They may encourage and inspire customers to return the items they no longer need; therefore, they can easily create a new economic cycle (Morseletto, 2020). According to Ezeudu et al. (2022), there are two approaches to resource utilization: primary and secondary. Primary resource utilization refers to producing one product similar to the original one (Zhang, Niu, & Zhang, 2022). Secondary resource utilization refers to the waste being converted into raw materials for other products and then manufactured into a different product type (Giosuè et al., 2021).

Research highlights the benefits and opportunities of employing CE practices for manufacturing companies (Aloini et al., 2020; Kumar et al., 2019), yet most manufacturers are unfamiliar with CE and fail to translate CE principles into their organizational practices (Jaeger and Upadhyay, 2020; Lieder and Rashid, 2016). Studies suggest (Bertassini et al., 2021; Bocken et al., 2018; Frishammar and Parida, 2019) that in order to progress into

CE, organizations must focus on their sustainability approach by initiating a definitive vision and sustainability strategy for CE.

Legislation and the European Union

In recent years, sustainability disclosure has become obligatory in many countries, and international standard-setting for sustainability reporting is increasing promptly (Hummel & Jobst, 2024). The EU is at the frontline of this transformation by endorsing legislation that dictates reporting of (1) companies' sustainability efforts (Corporate Sustainability Reporting Directive, CSRD), (2) the sustainability of economic processes (Taxonomy Regulation), (3) the sustainability of financial products (Sustainable Finance Disclosure Regulation), and (4) the ESG risks of credit institutions (Hummel & Jobst, 2024).

The EU has had several notable regulatory milestones in recent decades. The European Commission established the Non-Financial Reporting Directive (NFRD) in 2014, dictating that large public-interest companies employing over 500 people, along with listed companies, banks, and insurance companies, are to disclose non-financial information to enhance the trust of investors, consumers, and society (Antolín-López & Ortiz-de-Mandojana, 2023). The 'non-financial' information refers to environmental and social matters, employees' treatment, respect for human rights, anti-corruption and bribery, and diversity in company boards.

The European Union has been crucial in strengthening the measurement and reporting of CS/ESG practices for decades (Antolín-López & Ortiz-de-Mandojana, 2023). In 2018, the European Commission established the "Action Plan on Financing Sustainable Growth" to ensure that the financial sector supports fulfilling the sustainability goals of the European Union (European Commission, 2018). The Action Plan is set to redirect capital towards sustainable investment, manage financial risks from climate change and other environmental and social problems, and promote transparency and long-lasting financial and economic activities (European Commission, 2018).

From July 2024, the European Union requires companies above a specific size to publish information on what they view as the hazards and opportunities arising from social and environmental issues and the influence of their actions on people and the environment (European Commission, 2025a). This regulation aims to assist financiers, civil society organizations, consumers, and other stakeholders in evaluating the sustainability performance of companies as part of the Green Deal (European Commission, 2025a). The Green Deal refers to the EU's objective of transforming itself into a modern, resource-efficient, competitive economy (European Commission, 2025b).

Life Cycle Assessment

Another popular tool for environmental management is the Life Cycle Assessment (LCA) (Mattson, 1999; Humbert et al., 2009; Clune and Lockrey, 2014). LCA refers to the overview of the entire value chain of products through their life cycle (European Environment Agency, 2025). LCA is an ISO-standardized analytical method (Suomen ympäristökeskus, 2025) that can be utilized to examine the environmental influence of the product or service instead of examining only one part of the value chain. According to the European Environment Agency (2025), LCA's essential features are that (1) the environmental burden generated is recognized and calibrated, e.g., the energy and materials employed; (2) assessing the ecological influence of these burdens; and (3) estimate the possible solutions to decrease these environmental impacts.

Life cycle thinking

Life cycle thinking (LCT) is "about going beyond the traditional focus on production site and manufacturing processes to include environmental, social, and economic impacts of a product over its entire life cycle" (UNEP / SETAC, 2017). LCT is the essence of various administrative action plans, such as eco-labels and eco-innovation strategies (European Commission, 2010). LCT is the fundamental basis for sustainability initiatives and the

driving force toward environmental objectives. It presents a holistic and general viewpoint into the comprehensive life cycle without being as strict as LCA (Suomen ympäristökeskus, 2025).

In addition to its sustainable impacts, LCT has benefits in terms of financial performance. According to Oliva and Kallenberg (2003), the installed base and its comprehensive utilization should be provided with services throughout its entire life cycle. Antico et al. (2008) also state that long-lasting assembled products demand complementary services throughout their life cycle. These sustainable and financial benefits encourage companies to extend their processes throughout the life cycle of their products.

Value creation

Value and the ability to generate it are fundamental themes in the strategy and marketing literature (e.g., Payne and Holt, 2001; Ulaga, 2001). Customers are willing to pay for a company's offering (Porter, 1985); traditionally, value is identified as the value the customer receives (Matthyssens, 2008). Conventionally, academia has recognized a company's domination over the value creation, whether it is to support customer's peace of mind (Woodruff, 1997), solve customer's obstacles or issues (Sawhney, 2006), provide customers with more opportunities (Brax and Johnsson, 2009; Sawhney, 2006), satisfying customer needs (Tuli et al., 2007), or merely alleviate some of the customers' burdens (Normann and Ramirez, 1993; Strandvik et al., 2012).

The value concept centers around the assumption of the actual and anticipated cost-benefit ratio to the customer. This can be perceived through paid price, switching, installation, and maintenance costs (Khalifa, 2004; Lindgreen & Wynstra, 2005; Payne & Holt, 2001; Ulaga, 2001). In addition, Gupta and Lehmann (2005) emphasize that value can be divided into two segments: value to the customer, referring to the value creation, and value to the supplier, referring to the value appropriation. Value creation and value

appropriation are complementary concepts since the value created for the customers influences the supplier's profits (Grönroos & Helle, 2010; Gupta & Lehman, 2005).

Traditional views focus on the company's control over the value creation process; in recent years, this viewpoint of value research has been seen as old-fashioned. Vargo and Lusch (2004b) note that value is commonly generated in service-dominant logic in collaboration with suppliers and customers. Consequently, Grönroos and Voima (2012, p. 133) define value as the *"customers' creation of value-in-use"* and *"value co-creation is a function of interaction."* This definition suggests that value is inherently always co-created with others, and value creation does not exist without customers' input.

Heinonen et al. (2010) admit that the customer-centric value perspective demands a different approach: companies should involve themselves in the customers' lives. This perspective contradicts the traditional focus of getting customers engaged in the co-creating process (Grönroos & Voima, 2012) and can be considered fully customer-centric.

Co-creation of services requires collaborative relationships (Bettencourt et al., 2002; Chang & Gotcher, 2007; Chen et al., 2011; Hu et al., 2013) as well as cooperation, learning, and information allocation (Grönroos and Voima, 2012; Lusch et al., 2010; Payne et al., 2008). However, Grönroos and Voima (2012) continue stating that customers' input in value creation is not linear, nor is it necessarily after the company's activities. The value created in use is customer-driven and expands over time in the customer's sphere, concluding that value is created in various dimensions and moments (Heinonen et al., 2010; Helkkula et al., 2010; Voima et al., 2010). This suggests an inequality exists between the value co-production creates for the customer and the suppliers (Payne et al., 2008).

Payne et al. (2008) conclude that the value co-creation process depends on offering a superior value proposition for customers to create value in use. The study continues to note that the superior value proposition ought to result in better opportunities for co-

creation for the supplier and the customer and perks for the company, such as revenues, profits, referrals, etc. Payne and Frow (2005) propose that companies may expand the lifetime value of their key customer segments when steering the value co-creation and exchange process. Lusch and Vargo (2006) praise the value for companies of value co-creation since it may benefit companies in emphasizing the customer's experience and developing the front-end process of determining their needs and wants. Dialogue between the supplier and customer through every step of product planning and delivery can be considered beneficial collaborative knowledge exchange (Ballantyne, 2004), nurturing the mutual relationship of customers and suppliers. Wise and Baumgartner. (1999) support shifting from a traditional product-centric to a customer-centric perspective.

Manufacturing companies must understand their distinctive capabilities and leverage their unique resources to support these capabilities to generate successful offerings (Ulaga and Reinartz, 2011). Kindström and Kowalkowski (2009) highlight that manufacturing companies should develop services that support their initial product portfolios before developing services that assist customers.

Organizational Structure and Sustainability Initiatives

Strategy theorists propose that external dynamics influence organizations and that they must adapt their strategies to survive and succeed in these complex environments (Andrews, 1980), with organizational structures playing key roles in realizing their strategic goals (Mintzberg, 1978). Organizations comprise formal and informal structures that coordinate tasks, allocate decision-making authority, establish standard operating activities and rule protocol, and foster priorities and objectives within the issue domain (Soderstrom & Weber, 2020). These structures make an organization's activities reliable and more independent from personal and situational factors, thus creating and fostering our fundamental perceptions of organizations. Structures also indicate the way new issues, such as new technologies (Barley, 1986), regulatory requirements (Dobbin & Sutton, 1998; Kellogg, 2011), or lines of business (Child, 1972) are approached. According

to Andrews (1980), strategic decisions produce specific structural conditions and recognize the resources required to achieve goals, outlining the value to be generated for the environment. Therefore, cultural change within the organization and physical transformation are necessary. Mathieu (2001a) highlights the importance of cultural transformation in the transition towards more proactive measures in servitization.

Implementing sustainability initiatives is a nuanced and challenging process demanding collaboration and commitment throughout companies' supply chains (Pekaar et al., 2024). Soosay and Hyland (2015) found similar results, stating that an important characteristic of a sustainable supply chain is its inter-organizational responsibility and employing processes. This may result in a complex situation since establishing sustainable supply chains creates exigencies and demands resources emerging from various co-dependent organizations (Soosay & Hyland, 2015). Pekaar et al. (2024) note that "This inter-organizational dependency implies that each proactive attempt to balance sustainability demands and resources triggers an update in the sustainability resources and demands of their supply chain partner(s). Regarding an organization's influence on its partner organizations, one company's sustainability initiatives may result in enforced sustainability measures throughout the supply chain.

On an organizational level, Oliva and Kallenberg (2003) suggest that service activities should be physically separated from other manufacturing-related activities within the company. Gebauer et al. (2006) propose separate service organizations to boost service-based growth. Fang et al. (2008) root for a similar idea, arguing that organizational conflicts are more straightforward to avoid and solve when product, service, and service groups are isolated.

When discussing sustainable servitization and its influence on organizational structures, it must be remembered that for many companies, sustainability is a side-effect of their business model, not a core capability. In other words, sustainability is not the first concern when designing organizational structures. Tukker (2015, p. 88) states that service

integration “*is not the sustainability panacea*”, while other studies suggest the same (e.g., Doni et al., 2019) and do not guarantee a profound improvement regarding resource efficiency or the CE.

In terms of sustainable servitization, the strategic balance centers around servitization that support the company's sustainability objectives. In the process of organizational change toward sustainability, the role of middle managers is not to be understated, as they are important actors in pushing sustainable initiatives from the bottom up (Wickert and de Bakker, 2016). Soderstrom and Weber (2020) highlight the crucial role of interaction processes in creating potential coalitions and formalizing organizational sustainability practices.

Kotter (1995) notes that, in most cases, organizational changes are unsuccessful. The most common reason is the resistance to change on personal and organizational levels (McKay et al., 2013, p. 55), and the acceptance of change “*reflects the process wherein employees, influenced by information received from change drivers, peers, and other contextual clues, perceive the change as necessary and achievable and display a willingness to support change efforts.*” The phrasing in the previous quote regarding acceptance of change centers around specific change initiatives, not change as a phenomenon.

2.4.2 Processes and mechanisms

Sustainable servitization strategy

Kohtamäki et al. (2024) interpret sustainable servitization as “*the interaction between strategic emphasis on sustainability and company profitability.*” It is the interplay of strategic focus on sustainability, supporting choices, activities, business models, and servitization (Kohtamäki et al., 2024). To fully embrace a sustainable servitization strategy requires establishing a comprehensive implementation plan. Raddats et al. (2010) state that companies must adjust their internal structure and strategy according to external settings. Even though servitization literature identifies the importance of sustainability

and established concepts such as dematerialization and selling solutions (Alonso-Rasgado et al., 2004; Tukker, 2004), the implementation of servitization does not inherently lead to sustainable outcomes (Tukker, 2015). Hence, the strategic balance of sustainability and servitization is necessary to establish and set measures to examine the results of said strategy. Finding this balance may be challenging. Kohtamäki et al. (2024, p. 2) state that *“the current literature lacks empirical evidence and theoretical understanding about sustainable servitization - a concept that balances profitability and sustainability through service-oriented capabilities.”*

For companies, a service-centric approach to servitization may generate resource efficiency through different strategies. These strategies may include offering solutions supporting sharing and adequacy, lengthening the product life cycle through improvement and repair, offering recycling services at the end of the product’s life, and upcycling the original product (Kohtamäki et al., 2024). Strategy centering around sustainability includes establishing an action plan for diverse scenarios and selecting business models that align with the company’s strategic vision, strategy, and objectives involving choices and consequences (Casadesus-Masanell and Ricart, 2010). At its core, the business model should signify a strategic focus (Aspara et al., 2010; Kohtamäki et al., 2013) that may focus on sustainability and can be supported in various ways within the business model. A sustainable business model accentuates sustainable value creation, delivery, and capture.

According to Spence (1974), a company's strategic focus is dictated by the measures it considers crucial to accomplishing its vision, which sends a signal to both internal and external stakeholders. However, Lindblom (1994) and Suchman (1995) propose that the encouraging factor for companies' sustainability reporting is the aspiration to achieve legitimacy in the public eye. The end objective of implementing ESG activities is to be viewed as “a good company” on a societal level.

Sustainability measuring

Sustainability in the manufacturing industry is a relatively studied subject, and companies in this field face much pressure from governments and NGOs. According to Mani et al. (2014), the essence of sustainability varies from sector to sector, category, and region. In some instances, manufacturing processes can be considered high-quality if they include sustainability performance measurement, even though the concept lacks a similar metric that conveys the impact and provides an unbiased comparison (Mani et al., 2014).

Most often, sustainability performance measuring for manufacturing activities centers around the contrast between the current performance and the desired performance (Mani et al., 2014). *“Performance measurement, in general, identifies the gaps between the current and desired performance and indicates the progress made towards closing the gaps”* (Mani et al., 2014, p. 5895). The positive influence of measuring sustainability performance is prominent. However, the complexity of the activities utilized throughout manufacturing makes performance measurement somewhat challenging to estimate.

According to Mani et al. (2008), traditional performance indicators for the manufacturing industry cater to information about productivity and constituting the throughput, cost, material, etc., while Mani et al. (2014) establish the need for a performance measurement indicator to estimate the performance but also include a metric for that indicator as well. Several indicators have been suggested (Feng, Joung & Li, 2010; OECD, 2011), while some of the indicators have been commonly accepted in the industry, thus becoming KPIs.

Traditional methods for sustainable manufacturing measurement include planning, data collection, analysis, interpretation, and reporting to guarantee efficient use of resources (Mani et al., 2014). According to Mani et al. (2014), common key process indicators that help to improve sustainability include energy, energy efficiency, embodied energy, carbon dioxide, waste, water, and emissions.

2.4.3 Outcomes

Zhou et al. (2024) conclude that sustainable servitization has tangible outcomes on sustainability-related performance (e.g., achieving sustainability targets) and other impacts on the organization internally and externally. Several studies have discovered that specific PSS results in overall better sustainability performance (e.g., Evans et al., 2007; Kolling et al., 2022; Li et al., 2022), while some others detected no direct or limited impact of servitization on sustainability performance (e.g., Doni et al., 2019). For example, Zhang et al. (2022) suggest that servitization does not always influence environmental performance positively but can boost social performance. Abdelkafi et al. (2022) propose a more complex link between servitization and sustainability. In addition, Kanatlı and Karaer (2022) highlight the optional nature of servitization and sustainability, stating that factors such as product-related cost, customer heterogeneity, and market composition influence their positive linkage.

In terms of competitive advantage, Gebauer et al. (2017) and Manzini and Vezzoli (2003) reported that better company performance is influenced by sustainable servitization. Also, Szász and Sheer (2018) proposed that implementing services, from basic to gradually more advanced, would lead to a higher competitive advantage and a better sustainability performance. Implementing sustainable servitization practices has also been mentioned to decrease consumption, resulting in better management of the product life-cycle and enhanced knowledge management (Stoughton & Votta, 2003). However, Annarelli et al. (2021) emphasized that the cause-and-effect relationship between servitization and sustainability is tenuous since existing research has primarily focused on the possible outcomes rather than delivering evidence of the actual influence of PSS.

Sustainability-related issues and demands evolve rapidly in today's world; Zhou et al. (2024) propose that engaging in sustainable servitization is a continuous process. Sustainable servitization's outcome is expanding knowledge and capabilities as a premise for future improvements and sustained development (Fain et al., 2018; Moro et al., 2021;

Szása & Seer, 2018). Sustainable servitization should lead to improved competitive advantage and sustainability performance. Even though, on some occasions, the influence on sustainability is debatable and requires time to adjust, sustainable servitization results in higher knowledge and competitive advantage.

2.5 Summarizing sustainable servitization in manufacturing

The epitome of sustainable servitization in manufacturing is to adapt a company's business model to serve changing demands. Vandermerwe and Rada (1988) first conceptualized the idea that adding services would add value to businesses' offerings, thus increasing their profits and sharpening their competitive edge. Offering a bundle of customer-focused products, services, and support was a groundbreaking transformation in how managers "*think, act, and do business in the future*" (Vandermerwe and Rada, 1988, p. 315). Wise and Baumgartner (1999) advised manufacturing companies to go downstream to create businesses to gain profits from the customer's part of the value chain.

The traditional manufacturer would offer complimentary maintenance services to increase their product sales. In their paper, Wise and Baumgartner (1999) encouraged manufacturers "*to look at the value chain through the customer's eyes, examining all the activities the customer performs in using or maintaining a product throughout its lifecycle, from sale to disposal*" (Wise & Baumgartner, 1999, p. 135). In Wise and Baumgartner's depiction of servitization, a supplier should offer embedded services, comprehensive services, integrated solutions, and finally, take over the customer's distribution. The focus of servitization was somewhat product-oriented, and the technical abilities of servitization were addressed heavily. The benefits of servitization were noted as strategic ways to differentiate from competition, gain larger control of the installed base, and evolve from the trap of commoditization.

In the 1990s, the concept of PSS emerged, and from here, the idea behind servitization's sustainable benefits was recognized. Sustainable and economic value could be generated within the same value proposition. Originating from the idea of dematerialization,

selling functionality became prevalent in PSS literature (Alonso-Rasgado et al., 2004; Dobers and Wolff, 1999). A step towards sustainable servitization was taken. The business logic behind selling sustainable functionality frequently included eco-design, cleaner production, efficient delivery, and remanufacturing (Rabetino et al., 2018). The concept of Sustainable PSS (SPSS) mirrored the transition toward more sustainability-centered research (Manzini et al., 2001; Roy, 2000). Services were now seen as tools to operate cleaner and sustainable manufacturing. However, the transition did not occur as previously hoped. PSS does not inherently offer sustainable solutions (Tukker, 2015) even though PSS has features that *may* enhance resource optimization (Kjaer et al., 2019). Therefore, employing a PSS or servitization strategy is not inherently sustainable without an intended emphasis on capturing sustainable value.

This transformation from product-centered manufacturing to PSS and offering sustainable solutions may be complicated from a supplier's viewpoint. Bocken et al. (2014) note that manufacturing companies are facing escalating pressure to accentuate their input to economic, social, and environmental sustainability. Increasing sustainability legislation provides a strong inducement to increase sustainable practices in business operations and practices. However, pressure does not equal smooth transformation. Especially for traditional manufacturers operating in stable industries, a strategic transition may be challenging due to inadequately refined capabilities required for transformation (Korkeamäki et al., 2021; Tronvoll et al., 2020). The process of transforming an offering into a sustainable offering begins with establishing sustainability as part of their strategy's focal point (Ameer & Othman, 2012), involving action plans, formulating objectives, and presenting choices and consequences (Casadesus-Masanell & Ricart, 2010). Emphasizing solutions to grand sustainability challenges, such as improving circular economy and decarbonization, are possible strategic focal points for manufacturing companies. Sustainability measuring, for instance, implementing life cycle assessment and emission control, are examples of sustainable tools for sustainable servitization. The objective at the end is to generate sustainable value promise supported by organizational structures, strategy, and vision.

2.6 Summarizing the conceptual underpinnings of the thesis

As the concept of sustainable servitization has been explained on the theoretical level, it is appropriate to examine how this process is established and what concrete processes it involves in the context of an industrial manufacturing company. This section presents the framework utilized in this thesis. Sustainable servitization represents the synergy between sustainability (e.g., choices, practices, and business models) and servitization as a strategic focus (Kohtamäki et al., 2024). In these circumstances, capabilities affiliated with servitization can promote sustainable value creation. A relatively small number of distinctive models depict sustainable servitization in detail. The stage model utilized in the research analysis is adapted from Kinnunen and Turunen (2012), who formed a conceptualized model of the servitization capabilities of manufacturing companies.

The model (see figure 1.) examined servitization as a phenomenon influenced by various organizational factors during the early stages of the servitization transition. The model does not depict sustainable servitization per se. However, when developing its servitization strategy, it portrays the supplier's strategic decision and transformation of the organization's configuration and organizational culture. Much like foundational frameworks by Vandermerwe and Rada (1988), Wise and Baumgartner (1999), and Oliva and Kallenberg (2003), the model employed in this thesis portrays a stepwise servitization framework consisting of four different stages. The model is not a linear representation of servitization as it does not present servitization as a gradual transformation but rather as a strategically decided stance at the beginning of the servitization process. Therefore, a manufacturing company may be simultaneously within two stages of the framework or have only a few factors and belong to a particular stage.

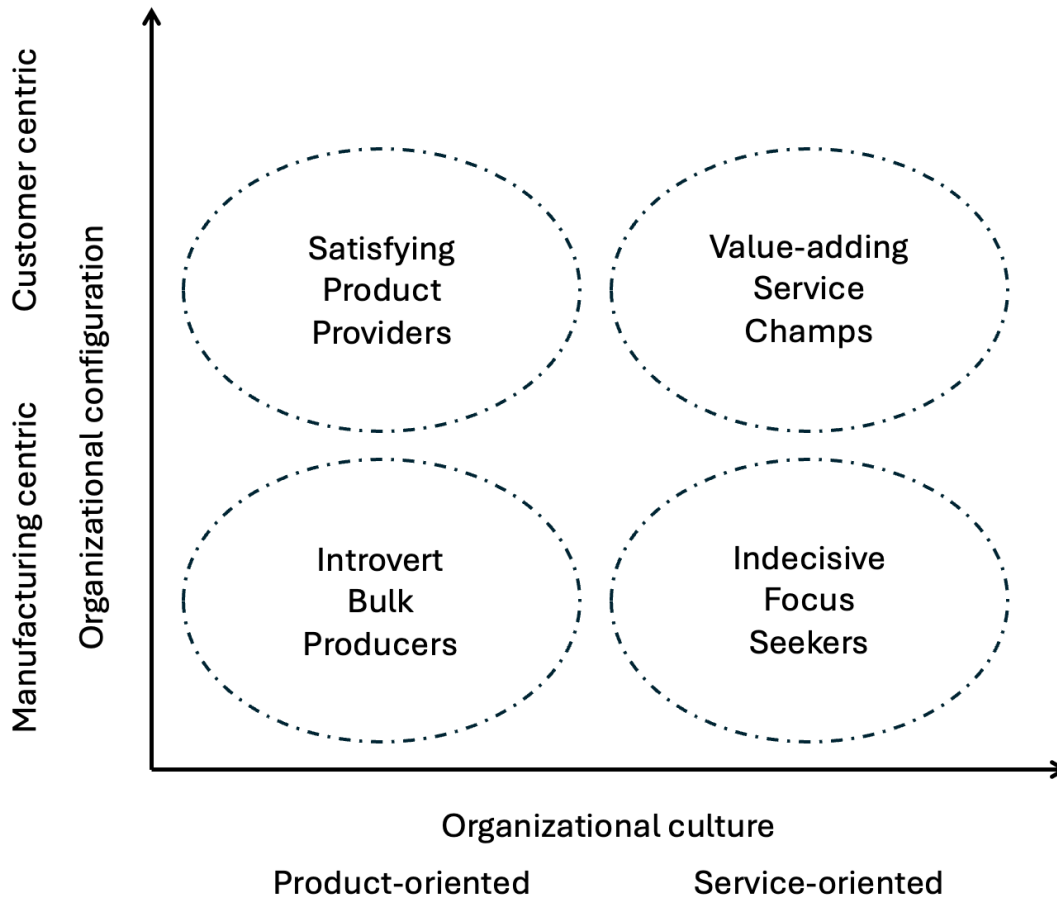


Figure 1: Servitization Capability Model (Kinnunen & Turunen, 2012, p, 71)

In Kinnunen and Turunen's (2012) model (see figure 1.) the stage *Satisfying Product Producers* refers to product-oriented and customer-centric suppliers serving product-related services to boost product sales (Kinnunen & Turunen, 2012). The business opportunities in the service offering are noted but not fully utilized, while service development does not receive consideration, and the resources needed to create more value-centric services for the customers are not allocated. Therefore, supplier-customer relationships are often transaction-based because a proper understanding of the customer's business is lacking (Kinnunen & Turunen, 2012).

Another stage in the model is called *Introvert Bulk Producers*, referring to suppliers that are product-oriented and contain manufacturing-centric configuration, thus embracing

the archetype of product-centric manufacturer that mainly focuses on physical products and operations instead of customers and services (Kinnunen & Turunen, 2012). The operational objective is to enhance manufacturing and efficiency through technological developments. Competitive advantage revolves around the pricing and technological capabilities of suppliers' products, which may be a profitable strategy but does not hold a strong market pull (Kinnunen & Turunen, 2012). Lack of supplier-customer relationship may lead to the production of unwanted products or information gaps, resulting in misuse of products.

The third stage of the model is *Indecisive Focus Seekers*, which represent service-oriented and manufacturing-centric business units (Kinnunen & Turunen, 2012). The imbalance of this stage results from the promotion of services and customer relationships; the organizational configuration fails to support customer contact points when it is appropriate to manufacture products. A transition towards servitization may be unsuccessful due to a manufacturing-centric structure. Kinnunen and Turunen (2012) note that operational efficiency and standardization remain the focus, although services and customer relationships are emphasized. A supplier functioning in this manner may operate in a niche market or provide superior quality products and added services (Kinnunen & Turunen, 2012). Overall, the strategy between manufacturing and servitization is imbalanced or implemented poorly.

The final stage of the model is called *Value-adding Champs*, referring to the manufacturers that are viewed to be most capable of servitizing their operations, given that they have already overcome some significant challenges in servitization, and they are service-oriented and maintain a customer-centric configuration (Kinnunen & Turunen, 2012). Manufacturers in this stage can benefit significantly from the service business if they can use their knowledge about their customer's business and operations. Usually, companies can gain knowledge through partner relations with their customers, which can also be a competitive advantage. Kinnunen and Turunen (2012) note that if the supplier has heavy

investments in manufacturing facilities, it is necessary to maintain high product sales and production levels even when going forward in the servitization process.

Kinnunen and Turunen's (2012) model is utilized in this thesis for two reasons: the servitization process is not always linear (Grönroos & Voima, 2012). Various reasons influence companies' ability to transform their business model and practices. This thesis aims to capture a general overview of key factors driving manufacturing companies' transition to sustainable servitization and the outcomes of those implementations. Kinnunen and Turunen's model depicts servitization from the perspective of a company that is starting to adopt more service-dominant logic. This is why the model functions as a framework for companies early in the sustainable servitization transformation.

According to Kinnunen and Turunen (2012, p. 72), *“even though the model focuses on business unit-level analysis, the main goal is to optimize the company's operations as a whole”*, which is the second reason this model is utilized in the thesis. Servitization is a strategic focus made possible in the manufacturing industry through the physical products produced. Hence, the model must support the multifaceted nature of this strategic decision. Because manufacturing companies have such a strong influence on resource utilization and energy demand, it is relevant that this model is used to gain a comprehensive overview of a company's operations and sustainable influence.

3 Methodology

Following the theoretical background, this chapter presents and explains the methodological tools chosen for this study. The following subchapters will demonstrate the general attributes of academic research and this thesis's chosen methodology. This chapter also includes a section in which the case company, Wärtsilä Oyj Abp, is presented. This chapter explains the data collection and analysis while assessing the data quality. Along with the theoretical background, the methodology chapter will provide a basis for the findings of this thesis.

3.1 Research strategy and method

The most utilized research methods in academic settings are probably quantitative and qualitative. This thesis employs a qualitative approach as it is a single-case study analyzing the case company and its progression within sustainable servitization development. Single-case study is best utilized when it is relevant to understanding the dynamics present within single settings (Eisenhardt, 1989) and, for example, can be used to provide description (Kidder, 1982), to test theory (Pinfield, 1986; Anderson, 1983), or generate theory (Gersick, 1988; Harris & Sutton, 1986). This study focuses on theory building from a single case study. Eisenhardt and Graebner (2007) defined theory building as the research strategy where one or more cases from real-life evidence are applied to develop theoretical constructs, propositions, and midrange theory.

The inductive nature of case studies is to use cases to develop theory by recognizing patterns and relationships among constructs within and between cases and their underlying arguments (Eisenhardt & Graebner, 2007). Yin (1994) notes the benefits of case studies in their broad, empirical depiction of a distinct incident or a phenomenon, usually based on various data sources. A theory-building approach through a single-case study is justified to discover more about the relationship between servitization and sustainable outcomes. In addition, a case study approach is necessary when inspecting current events (Yin, 2009). Since the selected case company represents a contemporary

player as a manufacturer transforming its service strategy and enhancing sustainable servitization, the study can depict the current transformational process of sustainable servitization in a precise manner.

3.2 Company case selection

The case company selected for this research is Wärtsilä Oyj Abp, a Finnish, publicly listed (Nasdaq OMX Helsinki) manufacturing company. Its net sales in 2024 totaled over EUR six billion, and the company employs 18,300 professionals in 77 countries (Wärtsilä, 2025a). The data in this research were collected from Wärtsilä's annual reports, which are publicly available on the Internet. The timeframe for this research is from 2000 to 2024, i.e., twenty-four (24) years.

Given the inductive nature of this research and its objective in theory-building, theoretical sampling was chosen to select the case. This research focuses on one case company, which, as Eisenhardt (2007) highlights, is selected because of its notable benefits for illuminating and developing connections and logic among constructs. In addition, Yin (1994) notes that theoretical sampling of single cases is relevant when they are extremely revelatory, atypical examples, or opportunities for exceptional research access. The case company in this research is Wärtsilä, meaning the sample size is one.

This study presents a revelatory case for understanding sustainable servitization as a transition, which is why a case company with a strong history and emphasis on traditional industrial manufacturing is a relevant subject to examine sustainable servitization. Sustainable servitization is also exceptionally topical due to increasing sustainable regulations and pressure to participate in sustainable development endeavors. In addition, Wärtsilä is a notable, stock-listed company with a nearly two-hundred-year-old history (Wärtsilä, 2025b). Thus, there is a lot of authentic, public data available. The data used in this research from sustainability reports and annual reports are public and published on the company's website.

Qualitative case studies usually investigate six sources of data: documentation, archival records, interviews, direct observation, participant observation, and physical artifacts (Stake, 1995; Yin, 2009). This research employs annual reports as the primary data source, which can be classified as a source of documents. According to Yin (2009), documents represent a stable, inconspicuous data source providing an extensive description of long-term events. On the other hand, documents have some reliability issues regarding their validity as a source of information. First, a reporting bias questions the internal validity of documents as sources. The bias of reporting refers to the (unknown) bias of authors/s. However, based on the case company's annual reports, this study investigates sustainability reporting as part of sustainable servitization. Therefore, it is relevant to exclude other data sources.

Choosing a qualitative analysis method as the research method for this study is relevant to providing distinctive insights from a specific industry. The manufacturing industry plays an essential role in establishing sustainability initiatives. Thus, it is relevant to understand the industry developments in sustainable servitization over the past decades. Accessibility and retrievability refer to the effort to locate and access the documents (Yin, 2009). The annual reports acquired for this research are publicly accessible, legitimate company documents; thus, accessibility and retrievability in this case are high. However, each annual report's author(s) are unidentified, and they probably prioritized different concerns. In addition, it is unknown whether the authors have been guided during the writing process of these reports.

3.3 Data collection

The data utilized in this research consists of annual reports of a Finnish manufacturing company operating in Finland and Worldwide, Wärtsilä. The objective of this study is not to execute an industry analysis but rather to investigate the development of sustainable servitization and the sustainable servitization process. Once the case company for this study was chosen, the data collection began. To analyze data within a case study, Yin (2009) proposes forming a matrix of categories and arranging the evidence according to

their context. This rationale was employed during the essential data collection process from annual reports; servitization- and sustainability-related quotes were initially gathered from each annual report, thus making it the first step in the data collection process.

Secondly, the quotes were divided based on key themes of sustainable servitization following the relevance of their context (see Appendix 1. Sustainable servitization key themes of annual reports). Thirdly, the key theme groups provided with the relevant quotes were placed under the *Four Levels of Sustainable Servitization Development* framework (See figure 1), thus producing a chronologically advancing document depicting the sustainable servitization development of the case company. According to Yin (2009), a chronologically advancing structure is a favored solution to manage data collected through a case study method.

The last step of the data collection process was to pinpoint the most essential and illustrative quotes in terms of their contents (see Appendix 1. Sustainable servitization key themes of annual reports) to utilize them in the later examination. Reliability refers to the level of consistency in research, e.g., another researcher can replicate the study with similar results (Eriksson & Kovalainen, 2006, p. 305). The reliability of this study is influenced by the chosen methodology of a single-case study; however, investigating a broad period covering over two decades verifies higher reliability, given that the topics in the annual reports cover similar topics. Since the study focuses on a single case company, subjectivity is another factor when selecting citations.

3.4 Data analysis

Citations utilized in this study are direct quotes taken from the annual reports, which enhances external validity since the quotes are retrieved from the original, official company documents, i.e., annual reports; however, the author controls which citations to use in the study. A case study researcher operates as a spectator who seeks to identify a company's goals and tries to control other partners through documents (Yin, 2009). This foundation demands that researchers evaluate the data critically when making

conclusions. Even though the quotes selected for this study were chosen mindfully and objectively, the overall reliability is decreased because of the posed unpredictability. If other researchers were to conduct the same study, they might choose to utilize different quotes from the ones examined in this study.

Internal validity refers to establishing a causal relationship, an observation that some precise conditions appear to lead to other conditions. External validity is linked to the extent to which the study's conclusions can be generalized. According to Buchanan et al. (2009), reliability depicts that the processes conducted throughout the study (e.g., the data collection process) may be replicated and concluded with the same findings. A thorough analysis of the collected data validates the findings of this study. The data from the annual reports was divided based on their themes to structure the data in a manner that made it possible to conduct the analysis systematically, thus increasing the validity.

This study is essentially qualitative research since the annual reports serve as the principal source for this study. Nevertheless, Yin (2009) notes that case studies may contain quantitative data too. Buchanan et al. (2009) state that employing qualitative and quantitative data to combine sources is feasible when implementing a case study. Despite being a qualitative study, this study employs quantitative data, such as net sales, which is applied in this paper.

The conceptualized model for sustainable servitization by Kinnunen and Turunen (2012) is utilized when analyzing and contextualizing the data. Yin (2009, p. 13) proposes four analytical strategies when analyzing case study evidence from which a description is developed for this research. Based on the descriptive analysis, a framework of sustainable servitization is produced and presented in the fifth chapter.

4 Findings

This chapter describes the findings of this study. First, the general and summarized findings of sustainable servitization development within the study's timeframe at the case company are presented. The objective of the first section is to depict a detailed picture of how the case company has developed in its sustainable servitization path. Figure 2 depicts that the service share of net sales has developed gradually over the past two decades. The research revealed that Wärtsilä has undergone four phases of sustainable servitization development over the past twenty-four years, from Product-centered Sustainability to Sustainable Performance.

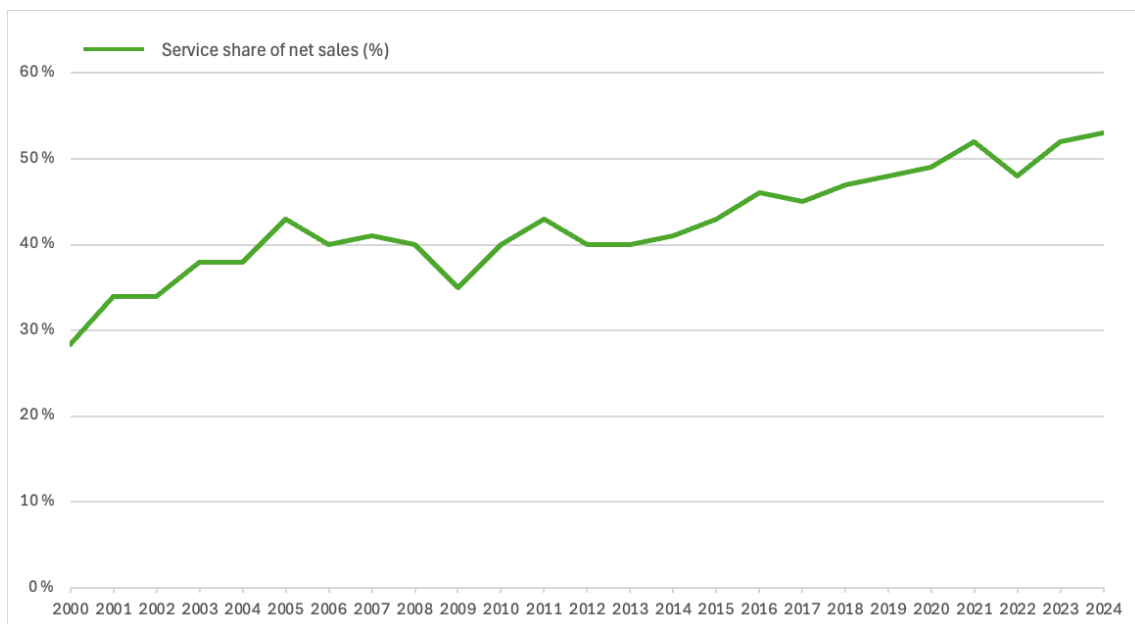


Figure 2: Wärtsilä's service share of net sales in 2000-2024

At the beginning of the millennium, Wärtsilä was a heavily product-centered company with a strategic focus on physical products and related engineering. Consequently, the level of servitization and sustainability was relatively low. The following citation from 2000 states the company's strategic emphasis in engineering:

“The distribution of Sanitec shares in spring 2000, and the sale of the Assa Abloy shares are part of Wärtsilä’s strategy to concentrate on engineering.” (Wärtsilä, 2000, p. 7)

The image of a product-centered company is also visible in the relationships established between the supplier and the customer. Initially, it may be challenging for companies to transform their business model from product-centered to service-centered. In addition, this may result in hesitation on the customer’s part to establish a tighter relationship with the supplier.

“Although Wärtsilä enjoys a long-term relationship with most of its customers, few of them have as yet signed long-term service agreements. Wärtsilä’s aim, accordingly, is to increase the volume of its service operations based on agreements.” (Wärtsilä, 2000, p. 30)

In terms of emphasis on sustainability, in 2000, Wärtsilä published its first environmental report, representing a new era for the company’s sustainability journey and emphasis on environmental matters. Indeed, in the early 2000s, annual reports mainly focused on surface-level sustainability and overall adapting to new measuring methods:

“Sustainability reporting is very challenging. This report does not cover the operations of all the Wärtsilä units. Our aim in the future is to make a well-balanced report covering all the three elements of sustainability and all units.” (Wärtsilä, 2000, p. 3).

“Wärtsilä also further developed its environmental reporting function during the year by defining the scope and content of Wärtsilä’s environmental report. Wärtsilä plans to release its first environmental report during 2001.” (Wärtsilä, 2000, p. 37)

“Besides complying with legal requirements, the purpose of Wärtsilä’s environmental management systems is to prevent pollution, to anticipate environmental risks, to control emissions and to achieve cost savings.” (Wärtsilä, 2001, p. 16)

“Environmentally sound solutions have a major impact on the environmental performance of Wärtsilä’s customers due to the long operational lifetime of the products. Wärtsilä supports its customers throughout the operational lifetime by

providing environmentally sound solutions also for products which are already in use.” (Wärtsilä, 2002, p. 21)

“Environmental performance in Wärtsilä relates mainly to our manufacturing operations. The most significant environmental aspects concern consumption of energy and natural resources, and therefore emissions. Efficient energy consumption and reduced emission levels are top priorities in Wärtsilä factories.” (Wärtsilä, 2003, p. 27)

The focus is generally on tangible resources such as material efficiency and engineering quality. After-sales services are provided and are acknowledged as applicable. At the beginning of the 2000s, twenty-eight percent of Wärtsilä’s net sales came from services (Wärtsilä, 2000). The need for distinctive services is noted in the following citations:

“Spare parts services and scheduled maintenance form the core of the service business, however, demand for other services is rising steadily. One priority area is engine reconditioning and upgrading, by which an old engine performance can be raised to the latest environmental standards and the output can be increased.” (Wärtsilä, 2000, p. 30-31)

“Our Service business is a strategically important pillar of our operations and one that offers our company the greatest opportunities for growth. We further developed our range of repair and operations services during the year with the acquisition of three new service companies, each of which in its own way supports our aim to build a versatile, global marine service network.” (Wärtsilä, 2002, p. 8-9)

Manufacturing companies often separate their business units, which Oliva and Kallenberg (2003) also promote. This strategy is followed by Wärtsilä, given that the company has undergone several organizational changes over the years. The service emphasis of Wärtsilä was divided somewhat disproportionately in the 2000s between the two main manufacturing divisions of the Ship Power division and the Power Plant division. The Ship Power unit focused on ship installations, while the Power Plant unit centered around power plants’ power supply. It seems that in terms of the Ship Power division, servitization has followed slightly slower than the servitization of the Power Plant division. The following quotes depict the differences between the Power Plant and Ship Power divisions:

"We consider extended maintenance and operation a strategic focus area. We believe that the extended maintenance concept will gradually gain acceptance not only in power plants but also at sea." (Wärtsilä, 2001, p. 9)

"In acquiring new service companies Wärtsilä's aim is to broaden and deepen the range of services it offers. The Ciserv group, which provides a comprehensive portfolio of ship maintenance and reconditioning services, expanded during the year with the addition of three companies and today this group comprises seven service companies at central points along key maritime routes." (Wärtsilä, 2003, p. 4)

"Wärtsilä will expand this business by providing innovative, reliable and valuable service, such as non-OEM service in key ports, scheduled and condition-based maintenance and condition-based maintenance, as well as operations and maintenance contracts." (Wärtsilä, 2004, p. 10)

"In line with our efforts to broaden our services to the shipping community we acquired the marine service activity of Deutz AG in January 2005." (Wärtsilä, 2004, p. 13)

"O&M services in the marine market are relatively unexploited. Wärtsilä is targeting increasing growth in this sector by developing new concepts and maintenance solutions to meet the requirements of this market." (Wärtsilä, 2006, p. 13)

Oliva and Kallenberg (2003) promote separating different business units to avoid confusion, which usually leads to establishing a separate service unit within an organization. After establishing a distinctive service unit, companies strive to increase their installed base service market by expanding the existing service offering to other product-centered services. The second strategy is to acquire a supplementary installed base, thus developing into a service supplier for third-party-provided equipment (Oliva & Kallenberg, 2003). Throughout the research span of this study, Wärtsilä has established in its annual reports that it has proactively sought ways to broaden its service offering and enlarge its installed base. The following citations depict Wärtsilä's strategy to refine its service business over the years:

"Our Service business is a strategically important pillar of our operations and one that offers our company the greatest opportunities for growth. We further developed our range of repair and operations services during the year with the

acquisition of three new service companies, each of which in its own way supports our aim to build a versatile, global marine service network.” (Wärtsilä, 2002, p. 8-9)

“In order to provide an unmatched range of service products and the highest level of customer service, Wärtsilä started in 2001 to acquire service companies of local strategic importance.” (Wärtsilä: 2002, p. 29)

“A key milestone for the year was further strengthening our offering of smart solutions through the acquisition of Transas, a leader in marine navigation solutions, training and simulation services, as well as ship traffic control.” (Wärtsilä, 2018, p. 5)

“The demand for Wärtsilä’s services is supported by the increasing technological sophistication of the installed equipment base. Digitalisation provides further opportunities to develop a value-adding customer offering. It also enables the leveraging of new technologies to build capabilities that will create a future offering with equipment-as-a-service.” (Wärtsilä, 2018, p. 38)

“Trident B.V. is a Netherlands-based company specialised in underwater ship maintenance, inspection, and repair services. With this acquisition, Wärtsilä builds in-house competence, captures the full potential of services’ product synergies, and strengthens its position in the market.” (Wärtsilä, 2018, p. 199)

When transforming from product-centered sustainability, manufacturing companies develop their offerings from product-centered services such as assembly, selling, delivery, and spare parts. Wise and Baumgartner (1999) named more advanced levels of services as financing, leasing, maintenance, capacity planning and scheduling, refurbishment, resale, training, and taking over the provided product. Sustainable servitization presents a compelling role in advancing efficient operations and practices that promote resource optimization (Kohtamäki et al., 2024). Hence, broadening service offerings can serve as a way to transform services to a more sustainable ground, given that many of the utilized services advocate longer product life cycles and efficient resource usage. Wärtsilä has taken a proactive role in increasing the number and quality of its service offerings. The following examples depict Wärtsilä’s growth in the field of advanced services:

“A Wärtsilä O&M agreement means that we take care of everything from recruitment, training and management of the O&M staff to energy production, logistics and other services. An O&M agreement brings production performance guarantees and financial predictability, giving owners a predictable and stable O&M cost profile over the years.” (Wärtsilä, 2003, p. 16)

“An operations & maintenance agreement allows the shipowner to hand over responsibility for operation and maintenance of the full engine room to Wärtsilä.” (Wärtsilä, 2005, p. 21)

“Wärtsilä manages the lifecycle of its products through product design, careful choice of suppliers, production methods, optimizing transportation, maintenance and repair during the products’ operational lifetime, and by training and advising customers.” (Wärtsilä, 2007, p. 93)

“Our project management capabilities enable us to optimise the performance of our customers’ installations through upgrades, modernisations, fuel conversions and safety solutions, while allowing customers to concentrate on their core business.” (Wärtsilä, 2011, p. 51)

“Moreover, we provide specific training and advice for our customers to ensure environmentally sound and safe utilisation of Wärtsilä products, and that the products and systems are used in the most efficient way. We also offer service agreements and products that help customers to optimise their operations, and actively support them in selecting suitable solutions already in the early phase of projects.” (Wärtsilä, 2019, p. 64)

“We deliver innovative and competitive solutions efficiently and with high quality, while our lifecycle service offering is supported by an unmatched global service network and technical support. We identify, plan, and perform all maintenance and upgrades for Marine Power equipment, the aim being to reduce emissions, maximise asset utilisation, enable safe operations, and achieve compliance with regulations, while minimising fuel and maintenance costs.” (Wärtsilä, 2020, p. 25)

In the early 2000s, Wärtsilä began aggressively promote its service offering by providing a set of long-term maintenance agreements (Wärtsilä, 2003, p. 16), at first for Power Plant business unit’s customers and gradually to the Ship Power business unit (Wärtsilä, 2005, p. 11), the benefits of allowing Wärtsilä to take control over the customer’s machinery it has sold and assembled, is accentuated in the annual reports:

“Wärtsilä has continued to make progress in its goal of complementing its range of long-term service agreements by selling operations and maintenance (O&M) agreements. Under an O&M agreement Wärtsilä takes on full responsibility for operating a power plant. An O&M agreement also includes service and maintenance of power plants.” (Wärtsilä, 2002, p. 27)

“For Services, the target is to sign long-term service agreements aimed at keeping the customer’s investment productive throughout its lifetime. This enables the customer to focus on his core business while Wärtsilä ensures optimal performance of the installation.” (Wärtsilä, 2013, p. 41)

“Services’ order intake increased by 9%, totalling EUR 2,045 million. Several important long-term service agreements were signed during the year, with particular interest from customers with gas fuelled vessels, as well as cruise customers.” (Wärtsilä, 2014, p. 48)

“The demand for services continued at a good level, and our marine and energy customers showed increasing interest in long-term service agreements.” (Wärtsilä, 2023, p. 11)

When utilizing a service-dominant logic, the organization's and its personnel's skills are emphasized. Wise and Baumgartner (1999) state that manufacturing companies should develop and acquire new skills and capabilities when moving downstream the value chain and toward the customer. Over the past twenty-four years, Wärtsilä has reported its intention to develop its personnel’s skills and related requirements on numerous occasions to better the company’s performance:

“More than half of the total personnel are employed today in service functions and only a quarter in manufacturing. This development requires a thorough review of skills and competences throughout the organization. Two major HR projects supported this strategic change. The Wärtsilä Academy was created as an in-house framework for management learning.” (Wärtsilä, 2001, p. 14).

“Wärtsilä's aim is to provide the best value and service to our customers by continuously developing our competencies and way of working. The strategic goal of Wärtsilä's social responsibility and people strategy is to bring the business strategy alive by developing Wärtsilä's organisation and competencies to meet the evolving business needs.” (Wärtsilä, 2012, p. 107)

“To further strengthen the development of skills and competences at Wärtsilä, a global Competence Management framework with a renewed global competence catalogue will be built during 2025-2026.” (Wärtsilä, 2024, p. 129)

Davies et al. (2006) state that instead of buying a package of products and services, they are more willing to pay for a comprehensive solution guaranteeing smooth, undisturbed operations. However, providing solutions requires a supplier to re-evaluate their pricing policies. The value of solutions is more challenging to measure because solutions require cooperation and trust, and it may not be easy to assess the lifetime costs of a provided solution to set a price for the contract (Brady et al., 2005). Oliva and Kallenberg (2003) report that pricing services have gradually shifted from pricing separate labor or required parts to a fixed price that covers all services within a specific time frame. The following citations represent Wärtsilä’s pricing models:

“We tailor our service agreements to the customers’ needs, letting them choose from different levels of partnership, thus allowing them to concentrate on their core business. Technical management agreements include regular inspections, monthly reporting, and exchange programmes for spare parts. In our maintenance agreements, we provide fixed prices for inspections, technical support, spare parts, training, and maintenance work. Our operations and maintenance agreements can cover full operational, management and maintenance services, as well as installation performance guarantees.” (Wärtsilä, 2013, p. 31)

“In the energy markets, we are applying data-based solutions as we step up efforts to support our customers in understanding and accelerating the energy transformation. An example of this is the launch of the Energy Transition Lab, a platform that provides a better understanding of the implications of the increased integration of energy from renewable sources, such as wind and solar, on electricity generation, demand, and pricing.” (Wärtsilä, 2020, p. 11)

Customers view value from a subjective standpoint. Mathieu (2001b) states that clients ought to have an opportunity to customize the products and services that they buy. Customization represents *“designing, modifying or selecting products to fit into a customer’s environment”* (Tuli et al., 2007, p.7), which provides the supplier an ample opportunity to engage the customer in an early stage of production (e.g., co-design) (Payne et al., 2008). Even though replication of a successful service is important (Davies et al., 2006),

it is also a valuable advantage to accommodate product and service offerings to answer a specific business problem of the client (Brady et al., 2006). According to Galbraith et al. (2002), the value creation process is generated in customization since it best fits the client's problem. The following citations from Wärtsilä's annual reports have taken a proactive approach to providing customizable services and solutions over the past decades:

"Since different vessels require different systems Wärtsilä tailors each solution to its customer's needs." (Wärtsilä, 2002, p. 19)

"Wärtsilä currently offers three different capacity classes adapted to marked needs. Standardisation is vital for reducing cost and improving competitiveness." (Wärtsilä, 2013, p. 46)

"The company's value propositions are based on customised solutions with guaranteed performance, one-stop-shopping project services, and lifecycle commitment through long-term operation and maintenance agreements. Modularity and repeatability are key enablers for ensuring cost competitive solutions. Wärtsilä will continuously expand the fuel portfolio to ensure wide market coverage, and will focus on products and projects that make economic sense and provide unquestionable environmental benefits." (Wärtsilä, 2015, p. 30)

"The importance of these agreements to our strategy is emphasised by the fact that we renewed our organisational structure at the beginning of 2019, forming it around two businesses integrating both equipment and services. A central aim of this change is to better enable the tailoring of our lifecycle solutions to specific market needs." (Wärtsilä, 2019, p. 4)

In terms of an advanced level of servitization, Wärtsilä has established ways to provide performance guarantees and outcome-based solutions. In 2021, Wärtsilä established its most recent strategic framework, Wärtsilä Way, guiding the company's financial and decarbonization targets (Wärtsilä, 2021, p. 14). Wärtsilä's current strategic target is to mold the decarbonization of the marine and energy industries, while the company's purpose is to empower sustainable societies through its innovations in technology and services (Wärtsilä, 2021, p. 14).

The updated strategic framework, Wärtsilä Way, affirms the company's commitment to sustainable servitization. Advanced services are also evolving to provide sustainability-as-a-service, meaning that sustainability is the primary source of value (González Chávez, 2023). Wolfson et al. (2013) analyzed the interchange between companies providing and delivering sustainability values for their clients as a physical good or a service. In terms of traditional outcome-based offerings, Wärtsilä has been able to provide specific performance guarantees throughout the past decades. In the 2020s, the company seems to be developing more purposefully towards a sustainability-as-a-service business model. The following citations depict Wärtsilä's performance-based services and an example of Wärtsilä's sustainability-as-a-service offering:

“The focus of Wärtsilä’s R&D activities is on digitalisation, new products, and solutions that are flexible, efficient, reliable, safe, cost-efficient to operate, and that have a minimal environmental footprint throughout their lifecycles. A substantial proportion of the company’s investments in product development is targeted at securing environmental compliancy and providing short- and long-term benefits for the company’s customers.” (Wärtsilä, 2016, p. 48)

“Emphasis is given to optimising performance through upgrades, modernisations, fuel conversions, and safety solutions, and to using data analytics and artificial intelligence to support customer business decisions. The utilisation of connectivity and smart technologies plays a key role in the optimisation of assets and in providing strategic input to customers in order to enhance their business growth. Asset management will drive future growth in lifecycle solutions and enable new "as-a-service" business models.” (Wärtsilä, 2019, p. 15)

“Extensive service network, positioned for growth both in transactional services and performance-based agreements” (Wärtsilä, 2021, p. 18)

“Moving up the service value ladder and growing our service business both in marine and energy are key levers for reaching our profitability target. This is supported by our strong offering in the transactional services business, service agreements, and performance-based agreements.” (Wärtsilä, 2023, p. 11)

“A great example of developing our service business is our new offering of carbon capture and storage (CCS) feasibility studies to shipowners and operators. Conducted by Wärtsilä experts, the study provides owners with a qualified analysis of

the costs of CCS integration, and a clear list of considerations on how a potential retrofit could be conducted in the least intrusive way.” (Wärtsilä, 2023, p. 11)

In recent years, the rising usage of digital tools in servitization has developed into the concept of digital servitization. Even though this thesis does not cover digital servitization per se, it is notable that digital tools can generate sustainable value. In addition, digital tools assist companies in providing sustainability-as-a-service. The following citations depict how Wärtsilä aims to utilize digitalization in its sustainable service offering:

“Wärtsilä Genius services enable the real-time optimisation of customers’ assets, improved predictability, and help in the solving of issues with digital solutions. Other examples of the increased transparency and availability made possible through digital innovations are the Wärtsilä Online Services platform for spare parts ordering and tracking and technical support, as well as remote service concepts, such as the Virtual Service Engineer.” (Wärtsilä, 2016, p. 46)

“Digitalisation means leveraging new technologies, enhancing the core business, and building capabilities enabling installation-as-a-service future offering. Wärtsilä’s competences are constantly being developed in order to extend the service capabilities to cover multiple brands of equipment.” (Wärtsilä, 2017, p. 20)

“Simultaneously, we have continued to invest in developing our digital offering and fuel flexible solutions, enabling us to capture future growth opportunities related to the decarbonisation and transformation of the marine and energy industries.” (Wärtsilä, 2020, p. 11)

“We deliver enhanced performance through optimised maintenance and performance-based agreements, where we share the operational risk and guarantee performance by leveraging connectivity, big data, and analytics.” (Wärtsilä, 2021, p. 23)

“Wärtsilä’s strategy for shaping the decarbonisation of the energy sector was strengthened with the introduction of a Decarbonisation Services business model. With the ultimate aim to help Wärtsilä’s customers to decarbonise their assets, the service utilises the company’s sophisticated power system modelling and optimisation tools alongside in-house expertise to reduce power system emissions and energy costs” (Wärtsilä, 2022, p. 28)

“By combining AI and data analytics with product know-how, we can support customers in improving performance, while improving our own service operations. As an example, in 2023 we signed an extension of our performance-based agreement with Carnival Corporation covering the maintenance, technical support, optimisation, and fuel-saving solutions for their 57 cruise ship global fleet.” (Wärtsilä, 2023, p. 11)

When a manufacturing company has aligned its organizational culture and configuration, it should be able to generate sustainable performance through its service practices. This is the highest level of sustainable servitization, where the most advanced levels of servitization, such as performance guarantees, operational and outsourcing services, and outcome-based services, are provided (Kohtamäki et al., 2024). Oliva and Kallenberg (2003) state that the most developed form of servitization is taking over the customer’s service or operating organization. In Wärtsilä’s case, there have been several mentions of taking over customers’ power generation operations; however, only in the 2020s has there been a broader offering of sustainable services. Rabetino et al. (2015) state that sustainable servitization includes broader lifecycle service offerings, such as product upgrades, refurbishment, recycled materials, and performance-based pricing. For instance, Wärtsilä has updated its strategy and pricing policy several times. The citations below depict the change discovered:

“At Wärtsilä, we strive to optimise the lifecycle cost of installations. We do this because it makes economic sense to our customers, since we understand the pressure for reducing costs and investing in developing products and solutions that will help achieve significant savings. Furthermore, improved efficiency results in better environmental performance.” (Wärtsilä, 2014, p. 41)

“We deliver innovative and competitive solutions efficiently and with high quality, while our lifecycle service offering is supported by an unmatched global service network and technical support. We identify, plan, and perform all maintenance and upgrades for Marine Power equipment, the aim being to reduce emissions, maximise asset utilisation, enable safe operations, and achieve compliance with regulations, while minimising fuel and maintenance costs.” (Wärtsilä, 2020, p. 25)

5 Discussion

To answer the research question of this thesis, it is necessary to ponder the theoretical and managerial implications of this study. Therefore, the key outcomes of the case company's annual reports will be examined, and the general findings will be summarized. This chapter consists of three sections. The first section introduces a framework derived from the findings of this research. The second section covers the theoretical implications, and the third provides the managerial implications.

5.1 Framework for sustainable servitization

This thesis contributes to the existing literature (Kohhtamäki et al. 2024; Rabetino et al., 2024; Li et al., 2024) by providing a stage model depicting the progression of sustainable servitization development. The conducted research was based on Kinnunen and Turunen's (2012) conceptual framework of the servitization capabilities of manufacturing companies. Based on the findings from the case company's annual reports and supported by theoretical background, the author presents the following framework: *Four Levels of Sustainable Servitization Development* (Figure. 3).

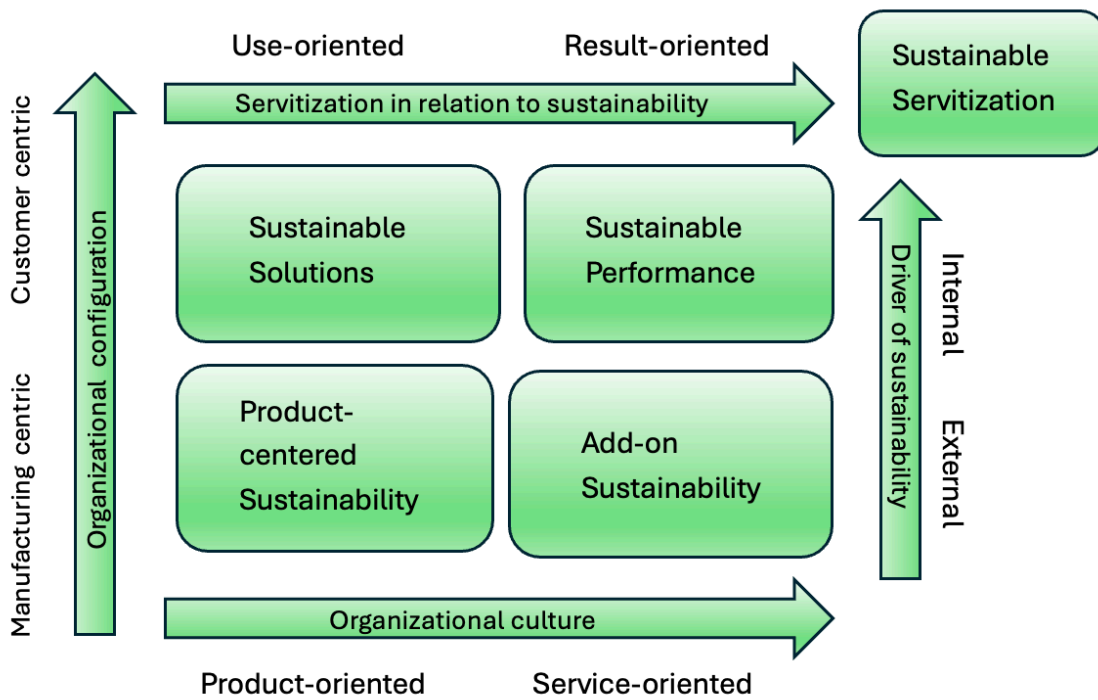


Figure 3: Four Levels of Sustainable Servitization Development

5.1.1 Product-centered Sustainability

In the *Product-centered Sustainability* phase, the efforts are externally motivated and product-centric. Sustainability centers around the influence of a company's physical products, and servitization is minimal (Kohtamäki et al., 2024). The company faces external pressure from regulations and stakeholders and implements sustainability initiatives. Environmental assurance, emissions reduction, supply chain management, and servitization improve environmental performance by enhancing energy consumption (Doni et al., 2019).

This means that the company is yet to fully understand the possibilities of sustainable servitization as an origin of competitive advantage. The positive influence of sustainable servitization is recognized, yet the company cannot generate comprehensive organizational support for this structure. Advancing from *Product-centered sustainability* would require companies to extend their value proposition and transition from operational excellence to engaging customer relationships and loyalty. Transitioning from the *Product-*

centered sustainability phase, manufacturers must understand the possibilities of enhanced sales in future services and sustainability.

Product-centered sustainability focuses on the physical products, the sustainability influence of manufacturing, and the operational sustainable influence the product has on the customer. Alas, the business focus is still on tangible resources, and the influence of sustainable servitization is yet to be embraced. The value created in Product-centered sustainability is generated via the produced physical product and possible after-sales services, such as repair services, but they are relatively low compared to sales.

In the *Product-centered sustainability* phase, sustainability initiatives are usually established due to regulations and societal pressure, so their influence is mild on organizational and operational levels. This results in sustainability initiatives being established and implemented at the surface level in their service logic. For the company to progress in the process, the management should incorporate sustainable practices throughout the value chain and deepen the understanding of customer processes to map how the supplier's product and service offerings serve customers' activities.

5.1.2 Add-on Sustainability

Add-on Sustainability has a result-oriented nature. However, the driver of sustainability is still external. This refers to the imbalance between the company's strategy and supporting organization. During this stage, the managers realize the possibilities of emphasizing sustainable initiatives throughout the value chain in the *Add-on Sustainability* phase of this framework. Incorporating more service-dominant logic in organizational culture emphasizes services and customer relationships while enhancing the sustainable influence of PSS. However, the organization cannot fully support servitization, given that the company's configuration is more appropriate for producing standardized products, and the awareness of customers' business is lower. In the *Add-on Sustainability* phase, servitization concerning sustainability is result-oriented, referring to the added sustainable features of a company's offering.

While the drive for sustainability is still external, manufacturing companies may present their products and services as sustainable, highlighting sustainable value by utilizing sustainability initiatives in the *Product-centered Sustainability* phase. However, the value is generally generated by adding services to existing physical products and broadening the offering within the possibilities of the company's configuration. In the second phase, the company may realize its configurational restrictions, implement organizational changes, and employ specific skills, knowledge, and resources to enhance its services. The development towards sustainable servitization is like other servitization transitions since, much like servitization, updating sustainability initiatives and processes changes constantly.

In the *Add-on Sustainability* phase, manufacturing companies are slowly improving their organizational commitment and understanding of customer needs. Services may include repair, reuse, recycling, upgrading, and additional monitoring and training services.

In the *Add-on Sustainability* phase, a supplier focuses more closely on servitization and re-evaluates its service offering. The traditional manufacturing-centric and product-oriented strategy has shifted to focusing more on services as a fundamental part of the total customer offering. The need to develop business configuration and the installed base is recognized. However, services are inherently limited and restricted to superficial add-on services instead of a comprehensive customer solution. Compared to the product-centered sustainability phase, there is a greater drive to extend and exploit the opportunities related to both services and sustainability.

5.1.3 Sustainable Solutions

In the *Sustainable Solutions* phase, the servitization concerning sustainability is use-oriented, while the drive for sustainability is internal. Use-oriented servitization refers to the supplier's customer-centric strategy and a heavier emphasis on customers' processes than physical products. Organizational configuration in this phase is overall customer-centric. The organizational culture may still be somewhat product-oriented, meaning

that the customer offering has its roots in traditional manufacturing; the supplier can establish tighter relationships with customers and provide use-oriented solutions for the customer.

The emphasis on sustainability in the Sustainable Solutions phase is notably higher than in the previous phases discussed. This often results from the suppliers' overall focus on servitization and investments, leading to a more advanced level of servitization, employing a more sustainable service business model and more service-related capabilities (Huikkola & Kohtamäki, 2017; Lenka et al., 2017; Ulaga & Reinartz, 2011). The investments established in the *Add-on Sustainability* -phase begin to pay off, and the sustainable servitization paradox can be avoided and/or defeated (Kohtamäki et al., 2024).

Even though previous stages of *The Four Levels of Sustainable Servitization Development* (figure 3.) include sustainable and environmentally friendly services, they most often support existing pre-sale efforts and physical products. Moving locusts towards the customer's end process and its sustainable impact is a crucial, strategic step in servitization and this framework. Consequently, this progress requires, in addition to investments in servitization, re-establishing the level of sustainability in services to support and improve efficiency and utilization of the installed base.

The level of sustainability embedded in services is a valuable source of competitive advantage. However, it also may change the eligible customer groups in the final stage because the customer base established in the previous phases was captured with a product-centered offering. Wise and Baumgartner (1999) state that by establishing a loyal bond with the customer, a manufacturer can grow into their favored supplier of services throughout the product life cycle. In the *Sustainable Solutions* phase, the objective is to develop and maintain strong, lucrative relationships.

5.1.4 Sustainable Performance

Sustainable Performance -phase represents the most advanced level of sustainable servitization in the *Four Levels of Sustainable Servitization Development* framework. On this level, the organizational culture is service-oriented, the organizational configuration is customer-centric, servitization is result-oriented, and the driver of sustainability is internally motivated. Sustainable servitization requires a strong strategic emphasis on servitization (Kohtamäki et al., 2013; Kohtamäki et al., 2024), which is why the Sustainable Performance phase employs advanced levels of servitization, such as performance guarantees, operational and outsourcing services, and outcome-based services (Kohtamäki et al., 2024).

The advanced level of services includes broader lifecycle service offerings, such as product upgrades, refurbishment, utilizing recycled materials, and circular economy strategies employed throughout the product's lifespan (Rabetino et al., 2015). During this phase, suppliers also employ digital tools to enhance servitization. Oliva and Kallenberg's (2003) framework's final stage depicts a supplier taking over the user's service or operating organization for a comprehensive performance offering. This strategy is possible in the Sustainable Solution phase since it enhances resource utilization efficiency (Rabetino et al., 2017) and is an outcome-based solution. Outcome- or performance-based pricing is utilized in this phase, ensuring a high-reliability outcome while concurrently reducing the cost of ownership (Jin & Wang, 2012). In the *Sustainable Performance* phase, the supplier and customer have a co-creative relationship due to the supplier's involvement in the user's processes.

5.2 Theoretical implications

This thesis contributes to the existing literature (Kohtamäki et al., 2024; Li et al., 2024; Rabetino et al., 2018) by inspecting the current phenomenon of sustainable servitization and by providing a stage model depicting the progression of sustainable servitization. In addition, the findings of this thesis support the idea that sustainable servitization

development does not progress through distinctive stages but is a strategic choice that can be supported with organizational configuration and orientation. The provided framework (figure 3. *Four Levels of Sustainable Servitization Development*) can be used to examine manufacturing companies' sustainable servitization development in the future.

Concerning RQ 1 (*How does servitization evolve to integrate sustainability in manufacturing companies?*), this thesis proposes that the level of servitization enhances the sustainable emphasis via implementing sustainable initiatives in the company's value proposition and value chain to enhance sustainability. The investigated case company progressed immensely in its sustainable servitization development between 2000 and 2024. Consequently, the research revealed that proceeding through the sustainable servitization development phases is achievable swiftly, provided the transformation is implemented attentively. In the case of the company's context, the transition was carried out within twenty-four years, during which the company went through one development stage within three years, while two other levels progressed within around ten years, respectively. Wärtsilä reached the final level in 2021, and the transition towards more advanced levels of sustainable servitization may be shorter (or longer) than transitions in previous levels. However, it seems clear that there is no specific time frame for the manufacturing company's sustainable servitization development.

Based on the findings, the company's ability to integrate sustainability in its servitization development demands a strong strategic emphasis on servitization and fostering capabilities that support the transformation. For instance, Wärtsilä held and developed the required capabilities and showcased its willingness to progress from its initial strategic focus further along sustainable servitization. The commitment from the managerial level is seen as a necessity to implement organizational changes, and its importance is supported by literature (Galbraith, 2002, p. 104; Lusch & Vargo, 2004b, p. 2; Raddats et al., 2019, p. 207). Even though the framework utilized in this thesis is not a gradual model per se, the case company seemed to advance sequentially from one level to another

during its sustainable servitization process. It went through all the levels in sustainable servitization development instead of skipping some other level.

The practices of how the case company reported its sustainability, servitization, and sustainable servitization developments changed throughout the years. For instance, at the beginning of the 2000s, Wärtsilä published its first environmental report, in which the company evaluated the sustainable outcomes of its operations and services. Between 2000 and 2005, Wärtsilä published a separate environmental/sustainability report; in 2006, the company started to include a sustainability section in its annual reports and continued doing so until 2024. Wärtsilä has emphasized different points of its servitization, and in recent years, the service offering has focused more precisely on sustainable features. For instance, customization has sustainable impacts depending on the level at which the customer wants to emphasize sustainability and resource reduction. Also, designing and installing a more efficient engine for a specific customer has its place in sustainable servitization development. Wärtsilä took over some of its client's operations and/or equipment through long-term service agreements. The proactive stance in decarbonization utilizing digital tools and technological competence is a sign of committing to sustainable initiatives through sustainable servitization. The provided framework (figure 3. *Four Levels of Sustainable Servitization Development*) depicts levels of sustainability a manufacturing company can initiate when progressing in its servitization development, mirroring the results of this research, which is supported by other findings in the literature (Kohtamäki et al., 2024).

The strategic focus shifted drastically in the case company within twenty-four years. In 2000, Wärtsilä's service share of net sales was 28%, while in 2024, the service share of net sales was 53%, meaning that the share has increased by twenty-five percentage points in twenty-four years. Concerning RQ 1, the case company seems to have transformed towards a more sustainable and service-oriented business configuration between 2000-2024. In terms of literature, studies propose that servitization is progressively adapted (Baines et al., 2009; Windhal et al., 2010), and it seems sustainable

servitization is the rising trend (Li et al., 2024) in the academic community. The quantitative data of the case company's service portfolio and the company's intensifying interest in sustainability-related services discovered in the annual reports support the flourishing trend in the sustainable servitization phenomenon. Above all, this thesis supports the notion that the manufacturing industry is progressively more interested in the sustainable benefits of services.

Progressing in the sustainable servitization development appears to increase the service share of the case company's total net sale (see figure 2. *Wärtsilä's service share of net sales in 2000-2024*), suggesting that employing more advanced means of servitization results in more sustainable outcomes. This thesis suggests that the case company attained its topmost service share of net sales when it evolved into more advanced levels of servitization, emphasizing the economic benefits of moving towards advanced service development phases. This conclusion supports the claim (Kohtamäki et al., 2024) that seeking profitability may come through increasing portions of sustainable services in their business units. However, there are contradictory findings in the servitization literature (Brax et al., 2021; Kohtamäki et al., 2018) suggesting that a lack of suitable servitization strategy results in decreasing profits and sustainability paradox of servitization (González Chávez, 2023; Kohtamäki et al., 2024). The influence of the sustainable servitization paradox has been raised in the literature, and the benefits of sustainable servitization have received varying implications among scholars (Verboven & Vanherck, 2016). Kohtamäki et al. (2024) emphasize the strategic focus on servitization when progressing towards sustainable servitization. If implemented poorly, sustainable servitization may negatively influence a company's financial performance.

The results of this thesis discovered that advancing sustainable servitization has had a positive financial result for the case company. This notion suggests a positive correlation between the company's financial performance and the service share of net sales. Overall, this finding promotes the idea that advancing sustainable servitization positively influences the financial performance of a manufacturing company.

5.3 Managerial implications

The results of this thesis have several managerial implications. The first one is that annual reporting is one of the company's key means of communication with its stakeholders; services and their objectives should be stated clearly to provide sensible information about the company's development within a sustainable servitization process. When implementing a sustainable servitization strategy, one understands that every company is in a different position and has varying capabilities, skills, resources, and possibilities. Understanding all these aspects influences how servitization ought to be implemented and how it is possible to include sustainable practices in the service logic. Therefore, management must be informed and aware of the service development level the company is currently in, to determine the direction in which the organization should target next. The managerial process is advised to initiate through defining the current service offer and its influence in sustainable objectives; are they attractive in customers' eyes, are they complementary, mandatory, or embedded, what is the cost-profit ratio, and what type of product/service offering they support? Gaining information on the logic behind all the before-mentioned questions requires communication and knowledge-sharing from every functional business area. There may not be a one-fits-all solution to the information-gathering process, but one strategy is meeting with managers, middle managers, and employees of all business units. This type of meeting allows service managers to obtain first-hand knowledge of service-related experience and knowledge, which can be further delivered to the company's executives and stakeholders.

The third managerial implication promotes caution when implementing a sustainable servitization strategy. For instance, this paper has mentioned several times the pitfalls of the sustainable servitization paradox (González Chávez, 2023; Kohtamäki et al., 2024; Verboven & Vanherck, 2016) and the overall difficulty in providing profitable solutions (Galbraith, 2002). In addition, when discussing full lifecycle costs and benefits of sustainable servitization for the client and the supplier, it is necessary to understand the customer's usage costs over the product's life span, its price, and if the servitization is necessary or even possible for this company. To be precise, management ought to

understand the requirements, processes, and possible outcomes of its sustainable servitization presented in this thesis when seeking to develop its service business logic.

The case company of this thesis, Wärttilä, developed its sustainable service offering drastically over the studied period. It is worthwhile to mention that the sustainable service offering has broadened somewhat consistently from product-centric to performance-based services. Not only were basic services (maintenance and repair) provided, but more advanced services (long-term service agreements and performance-based results) were also offered. As Theodore Levitt said, *“people don’t want to buy a quarter-inch drill. They want a quarter-inch hole!”* (Christensen, 2006); people seek solutions instead of products, and manufacturers ought to provide solutions for their customers. Therefore, management should seek close relationships with its customers and form a profound knowledge of the problems they are trying to solve.

According to the findings of this study, the case company made the highest profits from the more advanced and sustainable services it offered. Also, the case company emphasized in its annual reports throughout the study period that it will continue investing in sustainable services in the future. Since sustainable servitization benefited the case company, the final recommendation for the managers is to encourage manufacturing companies to progress in their servitization process and seek ways to implement sustainable offerings in their business logic.

5.4 Limitations, suggestions, and avenues for future research

As with all research, this thesis has its limitations. This thesis is an inductive single-case study examining a Finnish manufacturing company; therefore, the results of this study cannot be generalized. In the future, the study's sample size can be higher since involving more companies in similar research may contribute more generalizable findings. Further research is advised to be performed outside of Finland to gain a broader perspective of servitization development in companies operating in different cultural and geographical contexts. While this thesis focuses on the manufacturing industry, it is advised that other

industries be studied to gain insights into possible similarities and differences between them.

Again, a single-case study is a limited source for generalization. Eisenhardt et al. (2007) note the underlying expectation that forming theory from cases is less objective, precise, and rigorous than extensive hypothesis examination. Another issue regarding the methodology of this thesis is the selected data source, i.e., annual reports, which are the primary source of company information. In further research, it is recommended to utilize a broader set of sources, although the key idea of this study was to rationalize the findings based on the information covered in the annual reports. Diversifying the data sources may influence the outcomes, and thus, it is encouraged.

Another limitation of this study is the lack of explanatory reasoning behind the cause-and-effect phenomenon and the connection between the company's financial performance and levels of sustainable servitization implemented. Therefore, future research is recommended to study this connection further. Since the study examined a single company, evaluating how the industry-related factors affected the findings is relatively complex. For example, companies operating in different manufacturing industries may have different paths when incorporating sustainability in their servitization development. Therefore, I advise further research to consider industry-related factors when evaluating sustainable servitization development. Alas, it may be fruitful to expand the scope of future research to include varying industry fields.

Most of this study's limitations center around the single-case study method chosen and the secondary source of data, the annual reports, chosen for this thesis. Therefore, future research must examine a larger sample size in different industries. This study could be expanded to investigate the investment of an organization's personnel concerning sustainability in the company's servitization process and what motivational factors influence implementing such a strategic transformation.

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Appendices

Appendix 1. Annual reports

	Wärtsilä
Annual reports utilized in the study (year)	2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021 2022, 2023, 2024
Environmental report, sustainability report, or sustainability review utilized in the study (year)	2000, 2001, 2004, 2005

Appendix 2. Sustainable Servitization key themes of annual reports

Manufacturing centric, product-oriented

Producing machinery

“The distribution of Sanitec shares in spring 2000, and the sale of the Assa Abloy shares are part of Wärtsilä’s strategy to concentrate on engineering.” (Wärtsilä, 2000, p. 7)

Transactional-based relationship with the customer

“Although Wärtsilä enjoys a long-term relationship with most of its customers, few of them have as yet signed long-term service agreements. Wärtsilä’s aim, accordingly, is to increase the volume of its service operations based on agreements.” (Wärtsilä, 2000, p. 30)

Surface-level sustainability reporting + focus on emissions

“Sustainability reporting is very challenging. This report does not cover the operations of all the Wärtsilä units. Our aim in the future is to make a well-balanced report covering all the three elements of sustainability and all units.” (Wärtsilä, 2000, p. 3).

“Environmental performance in Wärtsilä relates mainly to our manufacturing operations. The most significant environmental aspects concern consumption of energy and natural resources, and therefore emissions. Efficient energy consumption and reduced emission levels are top priorities in Wärtsilä factories.” (Wärtsilä, 2003, p. 27)

“Wärtsilä also further developed its environmental reporting function during the year by defining the scope and content of Wärtsilä’s environmental report. Wärtsilä plans to release its first environmental report during 2001.” (Wärtsilä, 2000, p. 37)

“Wärtsilä offers advanced technology for emissions control and eliminating visible smoke. Wärtsilä engines are also extremely competitive in comparison with alternative technologies such as gas turbines. The high efficiency of Wärtsilä engines coupled with their low fuel consumption results in lower nitrogen oxide and carbon dioxide emissions, while Wärtsilä’s Common Rail technology provides the means to eliminate emissions of visible smoke.” (Wärtsilä, 2000, p. 21).

Manufacturing centric, service-oriented

Expanding service offering

“Spare parts services and scheduled maintenance form the core of the service business, however, demand for other services is rising steadily. One priority area is engine reconditioning and upgrading, by which an old engine performance can

be raised to the latest environmental standards and the output can be increased.
“ (Wärtsilä, 2000, p. 30-31)

“Our Service business is a strategically important pillar of our operations and one that offers our company the greatest opportunities for growth. We further developed our range of repair and operations services during the year with the acquisition of three new service companies, each of which in its own way supports our aim to build a versatile, global marine service network.” (Wärtsilä, 2002, p. 8-9)

“We consider extended maintenance and operation a strategic focus area. We believe that the extended maintenance concept will gradually gain acceptance not only in power plants but also at sea.” (Wärtsilä, 2001, p. 9)

“Wärtsilä will expand this business by providing innovative, reliable and valuable service, such as non-OEM service in key ports, scheduled and condition-based maintenance and condition-based maintenance, as well as operations and maintenance contracts.” (Wärtsilä, 2004, p. 10)

Acknowledging the possibilities of services

“O&M services in the marine market are relatively unexploited. Wärtsilä is targeting increasing growth in this sector by developing new concepts and maintenance solutions to meet the requirements of this market.” (Wärtsilä, 2006, p. 13)

Acknowledging the possibilities of services + expanding service offering through acquisitions

“Our Service business is a strategically important pillar of our operations and one that offers our company the greatest opportunities for growth. We further developed our range of repair and operations services during the year with the acquisition of three new service companies, each of which in its own way supports our aim to build a versatile, global marine service network.” (Wärtsilä, 2002, p. 8-9)

Added sustainability value + lifecycle thinking

“Besides complying with legal requirements, the purpose of Wärtsilä’s environmental management systems is to prevent pollution, to anticipate environmental risks, to control emissions and to achieve cost savings.” (Wärtsilä, 2001, p. 16)

“Environmentally sound solutions have a major impact on the environmental performance of Wärtsilä’s customers due to the long operational lifetime of the products. Wärtsilä supports its customers throughout the operational lifetime by providing environmentally sound solutions also for products which are already in use.” (Wärtsilä, 2002, p. 21)

“Wärtsilä manages the lifecycle of its products through product design, careful choice of suppliers, production methods, optimizing transportation, maintenance and repair during the products’ operational lifetime, and by training and advising customers.” (Wärtsilä, 2007, p. 93)

Expanding installed base + acquiring new competencies

“In acquiring new service companies Wärtsilä’s aim is to broaden and deepen the range of services it offers. The Ciserv group, which provides a comprehensive portfolio of ship maintenance and reconditioning services, expanded during the year with the addition of three companies and today this group comprises seven service companies at central points along key maritime routes.” (Wärtsilä, 2003, p. 4)

“In line with our efforts to broaden our services to the shipping community we acquired the marine service activity of Deutz AG in January 2005.” (Wärtsilä, 2004, p. 13)

“In order to provide an unmatched range of service products and the highest level of customer service, Wärtsilä started in 2001 to acquire service companies of local strategic importance.” (Wärtsilä: 2002, p. 29)

“Trident B.V. is a Netherlands-based company specialised in underwater ship maintenance, inspection, and repair services. With this acquisition, Wärtsilä builds in-house competence, captures the full potential of services’ product synergies, and strengthens its position in the market.” (Wärtsilä, 2018, p. 199)

Customer centric, product-oriented

Providing solutions + lifecycle optimization

“Our project management capabilities enable us to optimise the performance of our customers’ installations through upgrades, modernisations, fuel conversions and safety solutions, while allowing customers to concentrate on their core business.” (Wärtsilä, 2011, p. 51)

Total service provider + outsourcing + long-term agreements

“Our Total Service concept includes service for a wide variety of engine brands, as well as parts, technical support, commissioning, condition-based maintenance, and long-term service or operations and maintenance (O&M) contracts.” (Wärtsilä, 2004, 19)

Total solution provider + performance guarantees

“A Wärtsilä O&M agreement means that we take care of everything from recruitment, training and management of the O&M staff, to energy production, logistics and other services. An O&M agreement brings production performance guarantees and financial predictability, giving owners a predictable and stable O&M cost profile over the years.” (Wärtsilä, 2003, p. 16)

Total solution provider + taking over the customers' equipment

“An operations & maintenance agreement allows the shipowner to hand over responsibility for operation and maintenance of the full engine room to Wärtsilä.” (Wärtsilä, 2005, p. 21)

“Wärtsilä has continued to make progress in its goal of complementing its range of long-term service agreements by selling operations and maintenance (O&M) agreements. Under an O&M agreement Wärtsilä takes on full responsibility for operating a power plant. An O&M agreement also includes service and maintenance of power plants.” (Wärtsilä, 2002, p. 27)

Solution provider + expanding service offering through acquisitions

“A key milestone for the year was further strengthening our offering of smart solutions through the acquisition of Transas, a leader in marine navigation solutions, training and simulation services, as well as ship traffic control.” (Wärtsilä, 2018, p. 5)

Long-term service agreements

“The demand for services continued at a good level, and our marine and energy customers showed increasing interest in long-term service agreements.” (Wärtsilä, 2023, p. 11)

Development of skills + strategic focus in services

“More than half of the total personnel are employed today in service functions and only a quarter in manufacturing. This development requires a thorough review of skills and competences throughout the organization. Two major HR

projects supported this strategic change. The Wärtsilä Academy was created as an in-house framework for management learning.” (Wärtsilä, 2001, p. 14).

“Wärtsilä's aim is to provide the best value and service to our customers by continuously developing our competencies and way of working. The strategic goal of Wärtsilä's social responsibility and people strategy is to bring the business strategy alive by developing Wärtsilä's organisation and competencies to meet the evolving business needs.” (Wärtsilä, 2012, p. 107)

“To further strengthen the development of skills and competences at Wärtsilä, a global Competence Management framework with a renewed global competence catalogue will be built during 2025-2026.” (Wärtsilä, 2024, p. 129)

Training + customization + added sustainable value

“The operation of our products is primarily supported by customized product documentation, which includes instructions for handling issues that could have an environmental impact. We also offer customized training at our training centres as well as on-site training as required to provide the skills needed to operate and maintain the products in optimal condition, considering also the environmental aspects of the engine and installation.” (Wärtsilä, 2000, p. 25).

Tailoring solutions

“Since different vessels require different systems Wärtsilä tailors each solution to its customer's needs. ” (Wärtsilä, 2002, p. 19)

“Wärtsilä currently offers three different capacity classes adapted to marked needs. Standardisation is vital for reducing cost and improving competitiveness.” (Wärtsilä, 2013, p. 46)

“The importance of these agreements to our strategy is emphasised by the fact that we renewed our organisational structure at the beginning of 2019, forming it around two businesses integrating both equipment and services. A central aim of this change is to better enable the tailoring of our lifecycle solutions to specific market needs.” (Wärtsilä, 2019, p. 4)

Tailoring solutions + performance guarantees + lifecycle thinking + sustainable value

“The company’s value propositions are based on customised solutions with guaranteed performance, one-stop-shopping project services, and lifecycle commitment through long-term operation and maintenance agreements. Modularity and repeatability are key enablers for ensuring cost competitive solutions. Wärtsilä will continuously expand the fuel portfolio to ensure wide market coverage, and will focus on products and projects that make economic sense and provide unquestionable environmental benefits.” (Wärtsilä, 2015, p. 30)

Total solution provider + lifecycle thinking + performance guarantees

“We tailor our service agreements to the customers' needs, letting them choose from different levels of partnership, thus allowing them to concentrate on their core business. Technical management agreements include regular inspections, monthly reporting, and exchange programmes for spare parts. In our maintenance agreements, we provide fixed prices for inspections, technical support, spare parts, training, and maintenance work. Our operations and maintenance agreements can cover full operational, management and maintenance services, as well as installation performance guarantees.” (Wärtsilä, 2013, p. 31)

Extending service offering + extending service agreement types

“Moving up the service value ladder and growing our service business both in marine and energy are key levers for reaching our profitability target. This is

supported by our strong offering in the transactional services business, service agreements, and performance-based agreements.” (Wärtsilä, 2023, p. 11)

Acknowledging services as part of competitive advantage

“The division is boosting its competitiveness by increasing its specialist know-how and expanding its strategic service network. Few companies in the market can offer such a comprehensive, global network. The total service concept and the company’s in-depth knowledge of its customers and its good relationship with them, further increase the competitiveness.” (Wärtsilä, 2002, p. 27)

Machinery provider + added sustainable value

“As the ship power supplier, Wärtsilä has identified considerable potential for reducing the environmental impact of ships. In its leading position Wärtsilä also has a significant responsibility to develop products and technologies that impose the smallest possible environmental burden over their lifetime. In this respect our work concentrates on improving the total efficiency of our solutions and reducing emissions by our solutions.” (Wärtsilä, 2002, p. 9)

Customer centric, service-oriented

Performance provider + digitally enhanced sustainable value

“In the energy markets, we are applying data-based solutions as we step up efforts to support our customers in understanding and accelerating the energy transformation. An example of this is the launch of the Energy Transition Lab, a platform that provides a better understanding of the implications of the increased integration of energy from renewable sources, such as wind and solar, on electricity generation, demand, and pricing.” (Wärtsilä, 2020, p. 11)

Digitalization + sustainable value + lifecycle thinking

“The focus of Wärtsilä’s R&D activities is on digitalization, new products, and solutions that are flexible, efficient, reliable, safe, cost-efficient to operate, and that have a minimal environmental footprint throughout their lifecycles. A substantial proportion of the company’s investments in product development is targeted at securing environmental compliancy and providing short- and long-term benefits for the company’s customers. “ (Wärtsilä, 2016, p. 48)

Digitalization + performance guarantees + as-a-service -model

“Emphasis is given to optimising performance through upgrades, modernisations, fuel conversions, and safety solutions, and to using data analytics and artificial intelligence to support customer business decisions. The utilisation of connectivity and smart technologies plays a key role in the optimisation of assets and in providing strategic input to customers in order to enhance their business growth. Asset management will drive future growth in lifecycle solutions and enable new "as-a-service" business models.” (Wärtsilä, 2019, p. 15)

Performance provider + performance-based agreements

“Extensive service network, positioned for growth both in transactional services and performance-based agreements” (Wärtsilä, 2021, p. 18)

Providing sustainable performance

“A great example of developing our service business is our new offering of carbon capture and storage (CCS) feasibility studies to shipowners and operators. Conducted by Wärtsilä experts, the study provides owners with a qualified analysis of the costs of CCS integration, and a clear list of considerations on how a potential retrofit could be conducted in the least intrusive way.” (Wärtsilä, 2023, p. 11)

Digital enablers of servitization

“Wärtsilä Genius services enable the real-time optimisation of customers’ assets, improved predictability, and help in the solving of issues with digital solutions.

Other examples of the increased transparency and availability made possible through digital innovations are the Wärtsilä Online Services platform for spare parts ordering and tracking and technical support, as well as remote service concepts, such as the Virtual Service Engineer.” (Wärtsilä, 2016, p. 46)

Digitalization + as-a-service -model + outsourcing

“Digitalisation means leveraging new technologies, enhancing the core business, and building capabilities enabling installation-as-a-service future offering. Wärtsilä's competences are constantly being developed in order to extend the service capabilities to cover multiple brands of equipment.” (Wärtsilä, 2017, p. 20)

Expanding the installed base + digitalisation added value + as-a-service -model

“The demand for Wärtsilä's services is supported by the increasing technological sophistication of the installed equipment base. Digitalisation provides further opportunities to develop a value-adding customer offering. It also enables the leveraging of new technologies to build capabilities that will create a future offering with equipment-as-a-service.” (Wärtsilä, 2018, p. 38)

Solution provider + sustainable value

“At Wärtsilä, we strive to optimise the lifecycle cost of installations. We do this because it makes economic sense to our customers, since we understand the pressure for reducing costs and investing in developing products and solutions that will help achieve significant savings. Furthermore, improved efficiency results in better environmental performance.” (Wärtsilä, 2014, p. 41)

“We deliver innovative and competitive solutions efficiently and with high quality, while our lifecycle service offering is supported by an unmatched global service network and technical support. We identify, plan, and perform all maintenance and upgrades for Marine Power equipment, the aim being to reduce emissions,

maximise asset utilisation, enable safe operations, and achieve compliance with regulations, while minimising fuel and maintenance costs.” (Wärtsilä, 2020, p. 25)

Solution provider + training + service agreements

“Moreover, we provide specific training and advice for our customers to ensure environmentally sound and safe utilisation of Wärtsilä products, and that the products and systems are used in the most efficient way. We also offer service agreements and products that help customers to optimise their operations, and actively support them in selecting suitable solutions already in the early phase of projects.” (Wärtsilä, 2019, p. 64)

Solution provider + lifecycle thinking + sustainable value

“We deliver innovative and competitive solutions efficiently and with high quality, while our lifecycle service offering is supported by an unmatched global service network and technical support. We identify, plan, and perform all maintenance and upgrades for Marine Power equipment, the aim being to reduce emissions, maximise asset utilisation, enable safe operations, and achieve compliance with regulations, while minimising fuel and maintenance costs.” (Wärtsilä, 2020, p. 25)

Performance provider + taking over the customers’ equipment

“For Services, the target is to sign long-term service agreements aimed at keeping the customer’s investment productive throughout its lifetime. This enables the customer to focus on his core business while Wärtsilä ensures optimal performance of the installation.” (Wärtsilä, 2013, p. 41)

Digitalisation + sustainable performance + decarbonisation

“Simultaneously, we have continued to invest in developing our digital offering and fuel flexible solutions, enabling us to capture future growth opportunities

related to the decarbonisation and transformation of the marine and energy industries.” (Wärtsilä, 2020, p. 11)

Performance provider + digitalisation

“We deliver enhanced performance through optimised maintenance and performance-based agreements, where we share the operational risk and guarantee performance by leveraging connectivity, big data, and analytics.” (Wärtsilä, 2021, p. 23)

Sustainable performance provider + decarbonisation

“Wärtsilä’s strategy for shaping the decarbonisation of the energy sector was strengthened with the introduction of a Decarbonisation Services business model. With the ultimate aim to help Wärtsilä’s customers to decarbonise their assets, the service utilises the company’s sophisticated power system modelling and optimisation tools alongside in-house expertise to reduce power system emissions and energy costs” (Wärtsilä, 2022, p. 28)

Performance provider + digitalization + sustainable value

“By combining AI and data analytics with product know-how, we can support customers in improving performance, while improving our own service operations. As an example, in 2023 we signed an extension of our performance-based agreement with Carnival Corporation covering the maintenance, technical support, optimisation, and fuel-saving solutions for their 57 cruise ship global fleet.” (Wärtsilä, 2023, p. 11)