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Servitization Practices in Healthcare: The case of Royal Philips

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Abstract

This research considers to what extent servitization in the healthcare industry has evolved and transformed in this sector. As healthcare costs have risen over the last few decades, significant attention has been directed to purchasing within this sector. Servitization is a promising business model for healthcare since it can reduce costs and risks when obtaining products and services. This study has the main objective to understand if healthcare manufacturers are already implementing this business model, if they do, which practices are they implementing, understand how the transformation process was and which changes were made. In addition, this study aims to understand the challenges the company faced and the benefits servitization can bring. A single case study in the form of research has been performed as a qualitative investigation on Royal Philips, a Dutch product manufacturing company operating in the global market that manufactures medical equipment. Besides that, the data was collected through semi-structured interviews and the second data was available on the Philips website. In addition, this study has an objective to contribute to the academic literature on servitization and the healthcare manufacturing industry since it is a topic that lacks data and research. The findings of this study were that Royal Philips is still in the initial phase of shifting to a more services-oriented business, and they are already implementing servitization strategies in some departments. The company faced some challenges during the implementation, but at the same time, this business model will bring many benefits. Still, the company intends to improve their business model in the coming years.

Keywords: Servitization; Servitization in the healthcare; Healthcare sector; Healthcare manufacturers; Medical equipment manufacturing.

9713 words

Resumo

A presente pesquisa tem em consideração em que medida a servitização na indústria da saúde evoluiu e transformou este mesmo setor. Nas últimas décadas os custos com a saúde têm aumentado e devido a este fator, maior atenção tem sido direcionada às compras neste setor. A servitização é um modelo de negócio promissor para o setor da saúde pois pode reduzir os custos e riscos no que toca à obtenção de produtos e serviços. O presente estudo tem como principal objetivo perceber se os fabricantes no setor da saúde estão a implementar este modelo de negócio, e se sim, que práticas estão a implementar e perceber como foi o processo de transformação. Em adição a presente pesquisa pretende também perceber os desafios e os benefícios que a companhia enfrentou na implementação. Um estudo de caso único em forma de pesquisa qualitativa é realizado na Royal Philips Healthcare, uma empresa holandesa que opera no mercado global que fabrica equipamentos médicos. Os dados foram reunidos através de entrevistas semiestruturadas e dados disponíveis no site da Philips. Em adição, este estudo tem como objetivo contribuir para a literatura académica sobre o tópico da servitização a respeito da manufatura de equipamentos médicos, visto que é um tópico ainda pouco explorado até à data. As conclusões deste estudo foram que a Royal Philips ainda está numa fase inicial no que toca à mudança para um negócio orientado a serviços e já está a implementar algumas estratégias de servitização em determinados departamentos. A companhia passou por alguns desafios ao implementar o modelo de negócio, mas ao mesmo tempo este trará muitos benefícios. No entanto, a empresa pretende melhorar o modelo de negócio nos próximos anos.

Palavras-chave: Servitização; Servitização no setor da saúde; Setor da saúde; Fabricantes no setor da saúde; Fabricação de equipamento médico.

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Introduction

In the past years, the manufacturing industry suffered several changes because of declining product margins, growing competition, and transparent offerings (Schouten, 2021 cited in Neely, 2008). Therefore, to confront these ever-increasing circumstances, companies started progressing their competitive advantage from focusing on selling goods to providing integrated services. The term servitization was first indicated as the method of “moving from the old and outdated focus on goods or services to integrated ‘bundles’ or systems with services in the lead role” in earlier literature by Vandermerwe and Rada (1988), meaning that by turns of traditional manufacture only selling goods, they would transition to produce combinations by incorporating services to products. In other words, the concept of servitization is conducted on manufacturing companies that start to sell a mix of products and services as a solution to their customers.

Shifting towards a business model that offers services and solutions associated with products can be challenging for companies, given that it is a complex process involving organisational adjustments. Some of the world’s most outstanding companies, such as Rolls Royce, IBM, and BAe Systems, successfully implemented these servitization practices by making the necessary changes in their business and establishing new strategies related to offering solutions (Neely, 2008). In contrast, many companies face difficulties transitioning to a servitization business model because of the challenges they confront during the transformation process. These challenges involve relationships with customers, changing the business culture, capability, and structure, and sometimes it can be a demanding transformation process for companies to provide services as solutions.

Royal Philips is a multinational conglomerate founded in the Netherlands in Eindhoven, a technology company that works with lighting, healthcare, and consumer well-being markets. It operates in the following segments: lighting, innovation, group and services, consumer lifestyle, and healthcare (Philips, 2019). This research will focus on Royal Philips, which operates in the healthcare segment regarding medical device manufacturing.

Regarding healthcare, Royal Philips is a leading health technology company that provides its customers with image-guided therapy, diagnostic imaging, health informatics, patient monitoring, home care, and consumer health (Philips, 2022). Companies such as Royal Philips in the healthcare segment are still in an initial stage of transformation towards implementing servitization because they are still in a testing phase to implement this business model. The shift started in 2019, but the company did not make significant changes yet. Therefore, companies facing the same transition as Philips need to understand how the transformation process works and identify the necessary changes inside the company to provide solutions while manufacturing medical equipment. As a result, this study aims to comprehend what changes were made and how was the process of transformation when implementing servitization in healthcare manufacturing companies. Besides, the other objective of the study is to understand the challenges companies go through and the benefits that servitization can bring to businesses.

Thus, the proposed research questions were the following:

- *What was the transformation process regarding medical equipment manufacturers in the healthcare sector when implementing servitization?*
- *What challenges and benefits did healthcare manufacturing companies face during the transformation?*

An analysis of the transformation progression in Philips will be investigated based on a qualitative methodology in the form of a case study in combination with the literature review.

This thesis is divided into five chapters. The first one is the health sector context, in which an overview of the healthcare sector is given. Afterwards, chapter two, "Literature review", will provide a concept of the servitization and servitization in the healthcare sector. Moreover, chapter three discusses the methodology and explains the research method chosen for this study and how data was collected. The fourth chapter will discuss a summary of the data collected and findings. Finally, in the fifth chapter, the main conclusions and the research question are described and responded to.

Chapter 1. Healthcare Sector Context

To provide clarity on the healthcare sector, according to Batrancea (2021), it is a highly competitive, attractive, profitable, and ever-changing market. This sector occupies 10% of gross domestic product (GPD) in a few developed countries. When considering the case of the United States of America (USA) market, their healthcare services and products stated approximately 18% of their GPD in 2020. Their health spending share proliferated in 2013, and in Central Europe, a similar tendency was seen, where healthcare services exemplify one of the critical sectors in the current economy (Lábaj et al., 2018). It explains why many companies enter the healthcare market and operate to differentiate from competitors and capture excellent levels of financial performance. Besides, many companies engage in the public sector to provide their stakeholders with acceptable profit margins (Batrancea, 2021).

Expenditure in the healthcare sector tended to grow more rapidly than GPD. It was revealed to be one of the more significant challenges in supply chain management in the healthcare industry regarding managing the costs while meeting customer needs (Lábaj et al., 2018).

The healthcare sector has considerable relevance in the economy because of its structure of costs and new medical technology, and improvements in information. For example, Germany and France were the countries in Europe with the highest healthcare expenditure to GDP in 2019, according to statistics from Eurostat (2021). In terms of numbers, Germany spent 403 billion euros and France 270 billion euros (2021).

Besides that, healthcare organisations nowadays emphasise environmental, social, and economic impacts. Therefore, new, sustainable health services are emerging; hence, people have greater access to them, so companies must adopt new organisational structures and more intricate financing mechanisms.

Involving the sustainability concept in the healthcare industry is essential to protect available resources and develop the overall services provided to patients (Elabed et al., 2019).

Sustainability awareness has increased among businesses. Thus, several companies are trying to adopt sustainable strategies and new business models, setting a framework by which the product waste can be eliminated or managed and, if possible, extend its lifecycle.

Healthcare costs have risen over the last decades, so medical equipment manufacturers' attention has been directed to purchasing behaviour within this sector. Servitization is a promising business model for healthcare since it can reduce costs and risks when obtaining products and services, increasing efficiency (Elabed et al., 2019). Therefore, this topic will be discussed in the following chapters

Chapter 2. Literature Review

This chapter is combined into two parts: the first part of this section aims to combine the existing literature about servitization in a more general way. Afterwards, the second section integrates current literature on servitization practices in the healthcare sector.

2.1. Servitization concept

Servitization is the name given to the process of using services to develop and thrive revenue streams for manufacturing companies (Lay, 2014). To muddle through consumers' growingly differentiated needs and wants and rigorous competition in the product sector, many manufacturing companies have revolutionised their product-based business models to a modified amalgamation of service and product models to develop sustainably competitive businesses. The practice of servitization has become prevalent over these years because most manufacturing companies aim to achieve stable cash flows, higher profit margins, and loyal customers. It is primarily believed that a diversified business model is a key to uninterrupted revenue streams. In addition, Baines et al. (2020) express the concept as a service-based business model innovation. The servitization process allows companies to increase value by incorporating services within the existing product portfolios. Kuhn (2020) believes this is one of the emerging approaches toward creating, delivering and capturing value for companies. As services are being added to product portfolios, there is a more significant opportunity for business model innovation.

To achieve servitization on an organisational level, it is integral to reshape the value chain for manufacturers. The goal can be accomplished through loftier product development by conducting research and development, vertical integration of production and delivery processes, and development of a sustainable market position and improved economies of scale (Kuhn, 2020).

A few researchers have highlighted how servitization provides a valuable prospect of creating a sustainable competitive advantage for organisations by allowing them to reduce cost and innovation competitions within the industry and focusing on higher rates of customer satisfaction and product-service differentiation (Rosler et al., 2022). Several existing works represent a positive, consistent, and non-linear correlation between company performance and service implementation, primarily via customer satisfaction and product-service differentiation strategies.

Vendrell-Herrero et al. (2021) recognise four distinct servitization stages for original equipment manufacturers' (OEM) business structure. They shift from being the product manufacturer to the value-added manufacturer, full-service provider, and finally an integrated solutions provider. The level of servitization of the manufacturer is dependent upon the range of services being products, for example: whether the services are an 'add-on' to the original products or services are being provided with tangible goods. The gradual shift throughout the four stages allows the manufacturer to transform from the actual product to a somewhat proactive service provider. Lay (2014) explains the difference between a full-service provider and a value-added manufacturer. The latter concentrates mainly on the customers' usage of the product and its thorough functioning. The former is concerned about the efficaciousness and productivity inculcated in the end-users activities because of the product.

Something continuously stated in literature when mentioning servitization is product service systems (PSS). Servitization is a business model very close

associated with product-service systems (PSS). Both concepts include integrated products and services, but the difference between these two definitions is that PSS involves configuring services, products supporting infrastructure, and networks. It usually is given to a system that delivers advanced services. In contrast, servitization is an operation to shift from selling products and services to selling a combination set of products and services (Lightfoot et al., 2013). The term PSS was initially framed in Ahamed et al. (2013) research and how it is a marketing model for organisations that assimilates products and services, essentially due to a transformation towards servitization. This is achieved by introducing added benefits and value to products or deriving a complete shift in the product's payment structure.

Current literature mentions the challenges faced by companies when transitioning to servitization. During its process, several hurdles and problems will need to be resolved. Therefore, implementing this technique randomly is sure to fail. According to the currently available data, service businesses have a mortality rate much higher than the industry average (Atos Consulting, 2011). According to Martinez et al. (2010), the most significant parts of the servitization problem categories are deeply ingrained product-service cultures, integrated offerings, internal procedures and capabilities, strategic alignment, and supplier relationships. The authors Baines and colleagues believe that it is vital to make the shift from "product thinking" to "system thinking" (2007). Because services are more challenging to explain and ambiguous, the design process for services is quite different from those for commodities. This is the primary reason why there is such a significant difference between the two (Slack, 2005). Companies need to consider competition from customers, distributors, and suppliers that comes from beyond their usual area of influence. In addition, they are required to participate in new activities that customers formerly carried out. Consider how the value proposition will be communicated to the customer in building a service

offering. The organisation will have a tough time adjusting to the fundamental changes that are occurring in the system (Baines et al., 2009).

Current literature indicates that the benefits, challenges, advantages, and disadvantages of servitization strategies can be divided into the following dimensions: organisational, operational, strategic, technological, financial, and environmental which can be shown in table 1 and table 2.

Classifying the benefits when transitioning to servitization (M.M. Kamal et al., 2020)

Organisational	Operational	Strategic	Technological	Financial	Environmental
<ul style="list-style-type: none"> • Improved Efficiency and Productivity • Mitigating Risks • Retaining Design & Production Capabilities • Delivering Distinctive Value-Added Capabilities • Organizational Transformation • Improved Decision-Making 	<ul style="list-style-type: none"> • Reduced Operational Uncertainty • Services provide differentiation in operational activities • Improve Efficiency and innovation of manufacturing • Improving maintenance efficiency and effectiveness • Favourable Position in the value chain 	<ul style="list-style-type: none"> • Focused on Fulfilling customer demands • Sustainable source on competitive advantage • Value-added services to customers • Facilitate customer relationship • Achieve customer satisfaction • Improved customer loyalty • Opportunity to generate new business • Services support in increasing product distinctiveness • Gain in customer retention (Annarelli et al. 2018) 	<ul style="list-style-type: none"> • Developing System Integration Capabilities • Potential to provide real-time data regarding operation and maintenance • Integrated and customised offering • Implementing and efficient delivery system for goods and services • Knowledge creation, capturing and management 	<ul style="list-style-type: none"> • Increasing sales revenue and profitability • Reduced production costs • Improved financial performance • Increase economics benefits 	<ul style="list-style-type: none"> • Environmental sustainability • Decreased cost pressure from foreign competitors • Differentiating from competitors' products • Reducing the environmental impact of production • Vital role in sustainable economic growth • Improved efficiency and productivity • Increase in Market attractiveness • Reusable/Recyclable product (Annarelli et al. 2018) • Extending product lifecycle

Table 1- Classifying benefits and advantages of transitioning to servitization (Adapted from M.M.Kamal et al. (2020))

The adapted table illustrated above (Table 1) represents the detailed findings of M.M. Kamal (2020) regarding the benefits companies face when transitioning to a servitization business model. The author's research focused on empirical and conceptual studies in different manufacturing companies, such as companies that manufacture and design high-value equipment for power, semiconductors, aerospace and defence markets, heating, automotive, etc.

Existing literature demonstrates how the servitization process can bring various benefits, such as strategic and market-based finances. When companies include services to their existing products, they can dramatically accelerate the performance and mitigate customer complaints. Consequentially, the inclusion of services to products can improve customer loyalty which is then helpful in multiplying sales (Zhang & Qi, 2021). It is usually more probable for loyal customers to make purchases of their goods and services from the same company. In addition, for the company, servitization can also assist them in developing sustainable competitive advantages because their models have fewer chances to be plagiarised than the other models that rely only on the product base.

M.M. Kamal and colleagues (2020) mention that several benefits are discussed in the current literature. In his opinion, manufacturers have plenty of reasons to combine services in their offerings and introduce them to customers to get a closer relationship with them, increase customer loyalty levels, expand more valuable supplier-customer relationships, and achieve recurring and incremental revenue streams (Annarelli et al., 2018).

While analysing the benefits servitization can bring to companies, the author mentions that sustainable competitive advantage was one of the most quoted benefits. Overall, adding services to current business models influences customer satisfaction and improves competitiveness (M.M. Kamal et al., 2020).

Classifying the challenges when transitioning to servitization (M.M. Kamal et al., 2020)

Organisational	Operational	Strategic	Technological	Financial	Environmental
<ul style="list-style-type: none"> • Need for new business models • Providing Services is beyond capability • Management support hampering the service delivery • Lack of communication/feed back Channels with customers • Shift in Corporate Organisational Culture/ Need for Organisational transformation • Lack of Standardisation, Internal Processes & Capabilities 	<ul style="list-style-type: none"> • Lack of Training and education facilities for staff • Slow transitioning from product manufacturer to service provider • lack of knowledge on transitioning towards servitized manufacturing • lack of delivery of integrated offering • lack of understanding and guiding principles, structures, and processes • Difficulties in maintenance planning (Annarelli et al. 2018) • Need for process re-engineering (Annarelli et al. 2018) 	<ul style="list-style-type: none"> • A complex multi-dimension model • Lack of strategic/relationships with suppliers/customers • Aligning organisational design with service strategy • Servitization adoption is challenging for organisational strategy • Lack of knowledge on how customers value the strategic service provision • Developing less complex and innovative services • Failure in deploying a successful service strategy 	<ul style="list-style-type: none"> • Lack of Required infrastructure maintenance management • Unsophisticated design of service offering creates problems • Lack of expertise on technical aspects of servitization • Lack of developing integrated service system • Design principles for goods/services are inapt for functional products 	<ul style="list-style-type: none"> • Lack of economic potential of the service component of product • Lack of profitability due to inconsistent and fragmented information • Higher costs of service provisions • Higher investment in resources and difficulty to quantify the costs • Lack of understanding of financial risks 	<ul style="list-style-type: none"> • Low level of maturity and lack of engagement in servitized market • Difficulty in assessing the environmental impact • Constantly evolving competitive environment • Difficulty in improving environmental performance • Lack of understanding of the environmental factors of impact of service deployment

Table 2- Classifying the types of challenges in transitioning to servitization (Adapted from M.M.Kamal et al. (2020))

Kamal and colleagues (2020) report that transitioning to a servitization business model results in considerable benefits. However, offering services can provide several challenges to companies. Table 2 illustrates a company's challenges while transitioning to this business model. Suppose a company does not provide the

needed support from decision-makers and has a poor service culture. In that case, it will be a challenging transformation process to move to a service-centric approach. Besides that, the scholars mention that while implementing servitization it is essential to change the company from top to bottom. For example, the author addresses the need to align the servitization strategy with corporate culture, production, marketing, and high investment resources; therefore, service-centric approaches are so challenging.

According to the research findings of Kamal et al. (2020), one of the main challenges that companies face while transitioning to a servitization business model is deploying a successful service strategy, cautious and slow transition to servitization, and lack of strategic relationships with suppliers or customers.

2.2. Servitization in the Healthcare Sector

The literature on servitization in the healthcare sector clarifies that delivering and implementing servitized solutions into the healthcare business models is already being practised across several regions (Kowalkowski et al., 2022). Hospitals are partnering with service providers to review and evaluate the advantages of servitization for medical equipment, more precisely radiology. This was particularly important for the healthcare practitioners to understand its role and usage in radiology and the cost required to develop a servitized model. Another example cited in the literature focused on servitization for medical and imaging equipment. Zolkiewski et al. (2021) comment that although there is a superior degree of satisfaction due to the greater involvement of the supplier in the provision of services at the hospital's end, there is an interruption to further development of service models due to multiple challenges.

According to the research conducted by Zolkiewski et al. (2021), manufacturers in the healthcare sector are open to servitization and digitisation processes to

upgrade customer satisfaction levels, improve differentiation, and create business moats that allow them to obtain noteworthy performances and competitive edge via a robust organisational focus and a range of service-driven operations. The efforts required and recommended for servitization enable the manufacturers to craft and retain value throughout the product lifecycle, as well as throughout the integral system of the organisation.

2.2.1. Servitization in the healthcare sector and Organizational Resilience

Robinson & Chan's (2015) study reveals how servitization in healthcare is favourably associated with organisational resilience. Rosler et al. (2022) restate how servitization is essentially the diversification of business models. It has helped alleviate the impacts of administrative and operational disruptions due to the pandemic outbreak and periods of extended lockdowns. Considering the proposition of diversification within the healthcare sector, most researchers, such as Zhang & Qi (2021), recommend an original avenue for medical device-manufacturing organisations to strengthen their organisational resilience. Most of these companies have already incorporated service provisions into their conventional products to derive enhanced value for consumers. Some services include IT-enabled remote service, repair and maintenance services for the equipment, training services for technological developments, etc. Continuing the ideologies proposed in earlier studies on healthcare servitization, Calabrese's (2019) work explains how the servitization approach can drastically upgrade organisational resilience and allow manufacturing companies to tackle environmental and external challenges more effectively. Guarcello & De Vargas (2020) explore servitization with the primary aim of suggesting mechanisms that can thrive long-term benefits for product manufacturers. Furthermore, Kuhn (2020) states how servitization has emerged as one of the most competitive strategies for participating in the era of rigorous product competition. When

additional services are available with products, Lay (2014) suggests a greater 'customer stickiness' with the organization and a greater sense of customer interaction.

2.2.2. Market Positioning and Servitization of the Healthcare Sector

Manufacturing companies in the healthcare sector are transitioning to servitization competitive strategies, and Paiola et al. (2021) identify how digital healthcare provides a unique and distinctive competency of mindset to companies. Compared to other industrial sectors, the healthcare industry offers a unique approach where a significant portion of its value chain is conveyed downstream in scenarios embedded with consumers, especially when some facets of the company tend to increase those downstream involvements, such as a service branch. It can be implied through research-based evidence that various servitization strategies can provide varied outcomes according to the company's existing position in the value chain. The differentiation concept is not essentially associated with performance in the medical industry, such as medical devices. Instead, it is closely linked to customer satisfaction and how it is a principal indicator of good performance and advantage. The medical device industry comprises a plethora of niches and specialities, and the ideology of transforming toward service-based models can provide manufacturers with the prospect of innovating and developing their business at a smooth and steady pace (Baines et al., 2020). At the same time, the more commercial aspects of the business can innovate based on consumer perceptions. Also, the companies can better customise their product-service models to gain the most significant possible customer satisfaction advantages.

Zolkiewski et al. (2020) highlight 'downstream customer satisfaction as one of the driving forces behind the efficacious servitization of business models. The most significant impediment in undergoing the digital revolution lies within the

existing salesforce structures embedded with in-house sales representation instead of distributor-based representation. The company is subject to taking a strategic decision as it makes a prudent choice between external or in-house sales partnerships. The decision is integral in the healthcare industry due to the critical nature of the salesforce, as well as the research and development feedback loop. Manufacturing companies within the healthcare sector can typically use partnerships with external distributors to conveniently tackle the convolution of creating a business-oriented, commercial organisation as they strive to develop new customer relationships. Lightfoot et al. (2013) criticise the inability of service organisations to directly connect with their consumers, as this can deteriorate new product development.

2.2.3. Product-Service Systems in Healthcare

PSS is a business model that could bring many benefits to a healthcare manufacturing company. Robinson & Chan's (2017) study identified some of the most advantageous servitization shifts. He highlighted the concept of a results-oriented servitization model that held the influence of delivering thriving performance levels in healthcare. This work constitutes the foundations of Calabrese et al. (2019) study, which demonstrated the significance of PSS in accepting technological developments, but without any impending drawbacks during the course. Concepts such as service innovation, servitization, and service-dominant logic, have been expanding across operations management, marketing, and design studies. However, PSS in the healthcare industry, especially as regarding medical equipment investigation, is still insufficient. To put into practice, the PSS system, according to Mittermeyer et al. (2011), is needed an entirely new mindset from both the manufacturer and the consumer since the adoption of this system will require many challenges in the company and a considerable investment of money and time will be needed. Hence, there is substantial evidence in existing literature regarding the impact of servitization of

medical devices on delivering a competitive advantage to companies operating within a progressively commoditised and merchandised healthcare industry.

2.2.4. Stages of Servitization for Original Equipment Manufacturers (OEMs)

This study will focus on OEMs as regards healthcare manufacturing and its process while transitioning to a service-based approach. Scholars such as Ahamed and colleagues (2013) mention that to implement servitization in an OEM, the current business model will undergo several changes, and therefore companies will face challenges in this transformation process. In the healthcare industry, the concept of servitization implies how the hospital will no longer hold its position as the equipment holder. Instead, the product or product-service combination owner becomes the equipment owner. Hence, servitization calls for a drastic shift in the original business model and the culture of the OEM and the healthcare sector. The most forward-looking stage of the service model or the OEM is the incorporated solutions provider that delivers an all-encompassing range of solutions by fostering long-term relationships (Ahamed et al., 2013).

Regarding challenges faced by OEMs and suppliers emerging due to servitization in the healthcare sector, it can be segregated with respect to manufacturers and hospitals.

Considering the case of manufacturers, they are challenged to recognise the most appropriate types of services that can be provided in targeted global markets. There is also a constrained internal alignment with suppliers, implying a strong possibility of missing out on core business functions in the early stages. In addition, the servitization model does not offer a clear and explicit bifurcation of the risks and responsibilities attributed to hospitals and suppliers (Lightfoot et al., 2013).

From the hospitals and clinics' perspective, these are bound to offer commitment toward long-term service contracts, often limiting the possibility of switching

between suppliers. There is again a restricted and narrowed internal alignment within healthcare centres, thus leading to the misalignment of the practitioner's expectations with the hospital's service contract. There is also the possibility of disagreeing interests and choices between the suppliers' sales staff and medical practitioners. The pronouncement of opting for servitized products and solutions for a hospital is ideally based upon forecasts and strategy. Pourabdollahian & Copani (2015) correctly identify the reason behind this, stating these contracts are typically long-term and reliant upon investing currently to obtain equipment in the future which may not have been completely developed during the formation of the contract.

2.2.5. Services and Benefits for Healthcare

Paiola et al.'s (2021) research focused on evaluating medical device creators to comprehend better the impact of providing services other than conventional products and to recognise the extent to which manufacturing corporations can give value by progressing their service strategies toward a result-oriented model. The findings indicate a surging belief in cutting-edge service provisions emerging as the most significant revenue driver across the service range and a predictable rise in revenue across all service-providing features in the value chain. The findings also present insights regarding how the newly developed proficiencies and competencies in the additional services will lead to a long-lasting competitive advantage in the healthcare sector. Paiola et al.'s (2021) research state that there is only limited empirical evidence on how differentiation in medical devices can only be achieved through service offerings. Baines et al. (2009) show how a competitive advantage for an organisation can be gained through high levels of customer satisfaction, which can further be linked to improved patient outcomes and operational efficiency.

The literature reviewed indicates that remote monitoring technology is a successful service implemented by manufacturing companies in healthcare

(Gubric, 2012). This technology can bring benefits to customers and the manufacturer. As regards the customer, it minimises the downtime and transfer risks to the manufacturer, so the faults and errors are detected remotely. The right tools and spare parts will be prepared in advance to repair the equipment, which will minimise downtime. However, the author mentions that the most significant benefit of remote monitoring technology is that it prevents the equipment from breakdown. Now the benefits of this service-based approach to the manufacturer, according to the author (2012), is that adopting remote monitoring technology will improve the equipment performance of their products. So, it will enhance effectiveness, maintenance, and differentiation from the competitors. Besides that, since remote diagnosis is from a distance, there is no need for direct customer contact. The information is exchanged by direct input from the equipment being monitored. The findings of Gubric (2012) also reveal that adopting this technology will bring cost reduction advantages, insight into customers' needs and feedback for R&D, enabling knowledge creation and learning.

2.2.6. Critical Success Factors to Implement Servitization in healthcare

The review of existing literature expounds on some of the critical success factors and approaches fundamental to successfully implementing servitization in the healthcare sector. It is advisable to have a trust-based, venerable working relationship between the supplier and the hospital. This is important to maintain trust and keep track of the service performance. It is essential to have a shared and conjoined opinion of practitioners, manufacturers, and hospitals regarding the future developments expected of servitization. It is also crucial to embrace digitalisation and innovation during the processes by tapping the high technological know-how of both sides. In addition, customer-centricity is expected for both parties to understand better service requirements and the

customer's business (Paiola et al., 2021). An augmented sense of flexibility is expected to allow hospitals to switch among suppliers to continue benefitting from innovative and cutting-edge technological solutions. It is also crucial for the employees to possess the necessary qualifications and skills to perform the services. Product adaptation is also integral, meaning that it is probable to adapt the technical product accordingly with the application of new services. A measure of the success of servitization can also be made per the equipment's conditions. Strategic sourcing expertise is key to a good servitization strategy as it is formulated on a high level. The board should be finalising decisions on the supply chain management and the insourcing and outsourcing services rather than the procurement (Zhang & Qi, 2021). The companies' performance should be monitored through a good alignment of interfaces and processes. Cost categories are expected to be a challenging process due to the existence of services; however, a profound understanding is still required. Finally, organisational cultural change is particularly needed to adopt the service throughout the organisation successfully.

We can conclude how OEMs have exhibited the success of servitization models in enhancing customer value. As organizations shift from merely selling products to delivering outcomes essentially linked with customer objections, ownership costs can dramatically reduce whilst maximising efficiency gains. Due to constrained profit margins and inflated prices within the healthcare sector, servitization has become an incipient trend allowing OEMs to grant services to hospitals and medical care centres. Servitization offerings have been inaugurated at various levels but are often limited and narrowed due to specific attributes of the healthcare sector. The review comprehensively discusses the purpose, benefits, obstacles, and success factors required for adopting servitization in the healthcare sector. To capitalise on the possible benefits, it is crucial for the hospitals and OEMS to meticulously collaborate and avoid the existing barriers

as highlighted in the review. Uncertainty needs to be administered well by OEMs that stem from long-term contracts. They should be working towards gaining a clear view of the current and future circumstances and evaluating the resources required for service delivery. On the other hand, hospitals must pay attention to the guidelines needed to achieve their business goals.

Chapter 3. Methodology

The current chapter will describe the methodological approach chosen for this research. At first, there will be a brief explanation of the research strategy and afterwards, the interpretation of the research design will be defined.

3.1. Research Strategy

By analysing the existing literature about servitization and servitization practices used by the healthcare sector the main objective that emerged was to understand if companies in this sector are already practising the servitization business model in their operations and if they do, the research intends to comprehend what changes were done and how was the process of transformation. Besides, this study aims to understand which challenges and benefits the service-based business model brought to the company. A qualitative research methodology was used to define the following research questions: *“What was the transformation process regarding medical equipment manufacturers in the healthcare sector when implementing servitization?”* and *“What challenges and benefits did healthcare manufacturing companies face during the transformation?”*

The qualitative research methodology is a research strategy that “aims to provide researchers with approaches that can be used to discover and examine the ways in which interconnected people encounter, perceive, understand, and bring into being processes, practices, and phenomena.” (Moen & Middelthon, 2015). Therefore, two in-depth semi-structured interviews with a duration of fourteen minutes were directed to employees in the different departments and markets of the company Philips with the main objective of gathering data on the main challenges and transformation developments that the interviewees faced while working in the company during the past, what they face in the present and what they expect to confront in the future.

A qualitative method approach was the most adequate for this study since it enabled the researcher to collect in-depth observations related to a phenomenon and consider interviewees' feelings (McIntosh & Morse, 2015). The fact that Philips didn't provide an overview or a detailed understanding of their transformation and progress path as regards servitization, a qualitative method is logical in this setting.

Therefore, a single case study method was thought to be the most applicable technique to gather information in the field to gain a deeper understanding of the potential future of servitization in the healthcare sector and to demonstrate the current practices used by companies at the moment as regards to servitization. Therefore, this case study was directed within the organisation Philips, a medical equipment manufacturer in the healthcare sector that operates on a global market scale.

3.2. Data Collection and Analysis

The case study method gathers a few sources of information to allow an in-depth understanding of a few social situations (Madureira, 2004, citing Einsenhardt 1989, Yin 1994, & Creswell 1998).

First, to contextualize the topic of servitization, secondary data was used to analyse the term servitization and give more transparency to the phenomenon in context. After that, in-depth semi-structured qualitative interviews were conducted in order to respond to the research question. A qualitative interviewing "is a special form of conversation involving a researcher, a research participant, and a theme. The interview entails interpersonal interaction between epistemologically active subjects and aims at joint construction of knowledge through reflection and articulation." (Moen & Middelthon, 2015).

Both interviews were conducted online (zoom meetings) because of the distance.

When the interviews were directed, at the beginning of each interview, the researcher asked the participants' permission to record and transcribe the interview to analyse the information.

These types of interviews ensure that the interviewee is free to respond to open questions as they desire, and the researcher may investigate these responses. Besides that, it contributes to the flexibility to explore complex definitions in detail, providing the researcher with in-depth comprehension of the participator's knowledge of the transformation process (McIntosh & Morse, 2015).

To analyse the interview information, data was first organised in transcriptions, and after that, the data was analysed manually.

Chapter 4. The Royal Philips Case

In this chapter, the discussion from two interviews is going to be discussed. The interviews were conducted with one company, Philips, in the Netherlands. First, a case description will be given, and after the discussion will take place.

4.1. Case Description

The case company Royal Philips is a multinational conglomerate global manufacturer founded in the Netherlands in Eindhoven. It is a technology company that works with lighting, healthcare, and consumer well-being markets. It operates in the following segments: lighting, innovation, group and services, consumer lifestyle, and healthcare (Philips, 2019). The segment analysed in this study is healthcare. The company was founded in 1891; it is headquartered in Amsterdam and has been operating in the healthcare industry for 125 years (Philips, 2015). Royal Philips targets healthcare technology and operates in the business-to-business and business-to-consumer markets.

In 2014 the company separated from its lighting activities to create a stand-alone company and decided to focus on two business units: healthcare and consumer lifestyle. After that, Royal Philips continued to operate as a health tech business, and they had the opportunity to redesign their company, focusing on providing solutions such as services. In terms of health products and services, Philips (2020) operates in three areas: Diagnosis and treatment, Connected Care, and Personal Health. First, the part of diagnosis and treatment (in which this study will focus), the company focuses on selling ultrasound equipment, image-guided therapy systems and devices, diagnostic imaging, high-end radiology and cardiology informatics. As regards connected care, the company practices patient monitoring, personal emergency response, respiratory care, and sleep care. Finally, personal care involves male grooming, oral healthcare, mother and childcare, and domestic appliances.

Philips's main objective is to change its current business model and implement a service-based approach in the healthcare segment. However, this transformation is taking longer given that they are stuck in a mature company's cultures, norms, routines, and values (Philips, 2015).

As defined in Royal Philips's annual report (2021), solutions-based sales and recurring revenues generated an increasing proportion of total sales in 2021 in the healthcare segment, standing at 45%. So, to maintain this flow of health technology innovation moving forward, the company invested 1.8 billion euros in research and development R&D in 2021 to develop service-based sales.

The company's primary strategy regarding the healthcare segment is to focus on customer needs and understand how innovation can benefit people's health and healthcare outcomes. So, it is Philip's strategy to lead with innovative solutions that integrate systems, products, software, services, and operational data and leverage clinical to deliver customers with improved patient experience, improved staff experience, lower cost of care, and better health outcomes (Philips, 2021).

4.2. Discussion

After two conducted interviews with Royal Philips in Eindhoven, the Netherlands, with two participants working in the healthcare segment, the researcher tried to respond to the research question, *"What was the transformation process regarding medical equipment manufacturers in the healthcare sector when implementing servitization?"* and *"What challenges and benefits did healthcare manufacturing companies face during the transformation?"* in order to understand the transformation towards servitization in the company and the challenges and benefits the company went through the process.

The respondents of the interview were both from different business units. The first participant was a business instructor in the department of medical imaging

products such as magnetic resonance imaging (MRI). The second participant was a venture leader for image-guided therapy, for example, X-rays equipment.

Now focusing on the status of Royal Philips in the implementation of servitization, the company is still in the process of transformation toward providing services as solutions. One of the respondents pointed out that 2015 was the year when a change in the industry happened (the traditional product-focused approach becoming less predominant and new propositions of mixes of products and personalised services being developed):

“In 2015, we noticed a change in the general industry to shift towards solutions and find offerings to the customer, not a box only but a full service itself.”

However, the participant mentioned that the shift only started to take effect in 2019, which illustrates that the transformation process to provide services was hard to implement in 2015 when the industry shift happened, which determines that the company faced challenges to start incorporating this new business model.

“But the shift really happened or has started to happen, like two years ago when we looked specifically into addressing some of the challenges which come with the business concept and transforming the company from one entitlement towards a receiving recurring revenue.”

Implementing servitization randomly will end in failure (Atos Consulting, 2011). Therefore, it is essential for the company first to investigate which changes will take in transitioning to servitization.

Scholars such as Zolkiewski et al. (2021) confirm that manufacturers in the healthcare sector are open to servitization and digitisation processes to upgrade customer satisfaction, obtain noteworthy performances and gain a competitive edge; however, the development of new service models will bring multiple challenges.

Classifying the challenges faced by Philips in their process of transformation (M.M. Kamal et al., 2020)

Organisational	Operational	Strategic	Technological	Financial	Environmental
<ul style="list-style-type: none"> • Need for new business models • Providing Services is beyond the capability • A shift in Corporate Organisational Culture/ Need for Organisational transformation 	<ul style="list-style-type: none"> • Slow transitioning from product manufacturer to service provider • lack of knowledge on transitioning towards servitized manufacturing • lack of understanding and guiding principles, structures, and processes • Need for process re-engineering (Annarelli et al. 2018) 	<ul style="list-style-type: none"> • Aligning organisational design with service strategy • Servitization adoption is challenging for organisational strategy • Failure in deploying a successful service strategy 	<ul style="list-style-type: none"> • Lack of expertise on technical aspects of servitization • Lack of developing integrated service system 	<ul style="list-style-type: none"> • Lack of profitability due to inconsistent and fragmented information • Higher costs of service provisions • Higher investment in resources and difficulty in quantifying the costs 	<ul style="list-style-type: none"> • Difficulty in improving environmental performance • Lack of understanding of the environmental factors of impact of service deployment

Table 3 - Classifying the challenges faced by Philips in the process of transformation (Adapted from M.M.Kamal et al. (2020))

The transformation towards a servitization business model in Phillips presented a problem in the general change management. Table 3 shows the challenges the company faced when implementing changes at the different levels of the organisation. Regarding operational challenges, it is identified that the company fears the slow transition from product manufacturer to service provider or the failure of this business model because they may be unable to capture growth, face customer relevance, and lose market share. Because of these challenges, Royal Philips may have a reduced ability to overcome the negative impacts on their health technology business models, rising long-term risks of default, and customer dependency. Therefore, all these factors may influence Philips's business in terms of financial and operational results (Philips, 2021).

Other challenges faced by the company were specifically in organisational and financial dimensions. Kamal and his colleagues (2020) mention in the literature

that when adopting servitization, companies will face challenges in the part of organisational strategy, organisational transformation, and service design. It requires enormous changes regarding servitization strategy, corporate culture, production, marketing, and high investment resources, making it challenging for businesses to shift to a servitization business model. The second interviewee mentioned that some years ago, the company focused on developing marketing strategies to represent their services and ensure that their customers were educated about the service-based approach. However, she stated that the process was still slow, and the transitioning shift will take 5 to 10 years to take place.

According to the same participant, the model “has just kicked in” in the company’s business unit. Thus, the company is still performing pilots, analysing what it wants to offer, and investigating the positioning and what they intend to provide. Then they will start to implement the service-based business model in specific markets when they are sure that it might succeed with the service-based business model.

Servitization calls for a shift in the current business model and organisational culture. It can be challenging for the company to create new strategies and business models while transitioning to servitization. Scholars such as Ahamed (2013) mention that the most forward-looking stage of the service-based approach to an OEM is delivering an all-encompassing range of solutions by fostering long-term relationships with its customers. Participant 1 states that he is aware that the relationship with customers will change after introducing solutions such as services to clients, which will traduce benefits for the company in terms of strategic advantages. The participant mentioned:

“Notice that having a more interactive approach with the customer brings some benefits. In the past, we delivered the box and came back after seven or ten years to a union contract, and now we have a more... servitization will enable us to have regular touchpoints with the customer.”

In terms of financial challenges, the company expects to have higher costs in their investments in resources with new services. As regards operational challenges, it is evident that the company is going through a slow transition from product manufacturer to service provider. In addition, a lack of understanding and guiding principles, structures, and processes is occurring:

“Same for if we would still use software AI features, we need to do many costs in getting in paying doctors to help annotate and create the software, and we need to make much more R&D investment to get it there and then our sale of the software we get much less so we would need huge quantities to get a return on investment on that on the software as well. So, financially it’s going to be an interesting challenge to remain positive on the balance sheet so that we can make those investments move longer to our money. Operationally we need to change the organizational structure to be able to sell this in a more structured way and also deliver on our contractual agreements organised and sell it, go to the next customer. We sell it and return to the first one after ten years for selling something new. But we would need it, yeah operations processes that we sell and constantly deliver the service to a higher quality.”

The quality of the service is also something that Philips may experience some challenges with. Issues such as service design, suppliers, and cyber security threats are some of the problems that could lead to higher costs of design, financial liabilities and claims, damage to the brand reputation and competitive disadvantage.

In the image-guided therapy department, the company is still offering customers the traditional payment models, but the company is expecting it to change and implement a different purchasing behaviour. But it was mentioned by the participant that it is difficult to change the mindset of some clients because they are stuck to what they have always been doing and do not want to know new business models because they are stuck to the institutional culture.

Classifying the benefits faced by Philips in their process of transformation (M.M. Kamal et al., 2020)

Organisational	Operational	Strategic	Technological	Financial	Environmental
<ul style="list-style-type: none"> • Improved Efficiency and Productivity • Delivering Distinctive Value-Added Capabilities 	<ul style="list-style-type: none"> • Reduced Operational Uncertainty • Services provide differentiation in operational activities • Improve Efficiency and innovation of manufacturing • Improving maintenance efficiency and effectiveness 	<ul style="list-style-type: none"> • Focused on Fulfilling customer demands • Sustainable source of competitive advantage • Value-added services to customers • Achieve customer satisfaction • Improved customer loyalty • Gain in customer retention (Annarelli et al. 2018) 	<ul style="list-style-type: none"> • Developing System Integration Capabilities • Potential to provide real-time data regarding operation and maintenance • Integrated and customised offering • Implementing and efficient delivery system for goods and services • Knowledge creation, capturing and management 	<ul style="list-style-type: none"> • Increasing sales revenue and profitability • Improved financial performance • Increase economics benefits 	<ul style="list-style-type: none"> • Environmental sustainability • Differentiating from competitors' products • Reducing the environmental impact of production • Improved efficiency and productivity • Increase in Market attractiveness • Reusable/Recyclable product (Annarelli et al. 2018) • Extending product lifecycle

Table 4- Classifying the benefits faced by Philips in the process of transformation (Adapted from M.M.Kamal et al. (2020))

As Lay (2014) stated, the concept of servitization has become prevalent over the last decades because most manufacturing companies aim to achieve higher profit margins, stable cash flows, and loyal customers. Table 4 illustrates the benefits servitization can bring Philips while transitioning to services combined with products. In the case of Philips, both interviewees are aware that by implementing the servitization business model the company will benefit in terms of financial advantages by building revenue streams and generating profit.

“Servitization or the concept of servitization is the process of trying to build revenue streams.”

In addition, the first interview participant mentioned that in his business unit, the company is heading towards the goal of selling services as solutions to customers, which means that in his department, the company is still in the

process of investigating the new business model of servitization. In order to bring strategic benefits to the company and meet customer needs while transitioning to servitization, the business is trying to focus on fulfilling the customer needs, providing value-added services to customers, facilitating customer relationships, and achieving customer satisfaction (Kamal et al., 2020) so it is their objective investigating different payment models and looking for what customers are asking from the company:

“Are they asking for basic services? Are they asking for advance services?”

Scholars (Lightfoot et al., 2013) claim that from a healthcare systems perspective, these are bound to engage in long-term service contracts, limiting the possibility of switching between suppliers. Royal Philips is implementing service contracts. As mentioned by the second participant:

“So, 100% of my customers buy a service contract. So that is already for the last 20 years that we sell big equipment it costs 600,000 euro’s and most of the customers buy a service contract whit it. So that is a type of servitization I think that’s there for a long while.”

However, it is identified by the participant that the customer purchases their solutions via a capital expense, which means the healthcare providers buy the equipment and a license in a one-time purchase. Given this, it is unclear if Philips is currently establishing long-term contracts with its customers.

The company considers the environmental strategy when focusing on the entire lifecycle of the product.

“Making the customer interact with you as a company not only when the selling of this box happens but also towards working with the entire lifecycle of the product.”

Zolkiewski and his colleagues (2021) recommend that shifting to a servitization business model allows manufacturers to retain and craft value throughout the product lifecycle.

By offering these unique and value-added services, the healthcare manufacturer will gain a competitive advantage by providing distinctive competency (Paiola et al., 2021). Furthermore, this competitive advantage can also be translated into high levels of customer satisfaction which can further be linked to improved patient outcomes and operational efficiency, which is one of Philips' objectives (Baines et al. 2009).

Something that Philips is concerned about at the moment is trying to educate both the staff and clients regarding the servitization business model, which will result in a closer relationship between the developer and the customer and traduce in strategic benefits for the company.

In terms of technological benefits, since the company is the leader in offering health tech solutions and innovations, the company needs to continue with innovation, deliver it to the market on timely bases, and gain a sustainable competitive advantage when providing services to its customers. The company must define the right value proposition and exemplary architecture to succeed when launching innovations (Phillips, 2021).

The results of this study show that the company is still going through a long process of transformation. In order to successfully implement the servitization business model in the company, it must be the company's focal point in its strategic and operational plans. Furthermore, having good communication with staff and clients is a must because these two factors are the ones that are more important to implementing the changes. So, they need the correct information and present an attitude toward the change.

Chapter 5. Conclusion

This study aimed to understand if healthcare manufacturing companies are already practising the servitization business model in their operations and, if they do, what changes were done, and how was the transformation process. Therefore, to understand how the servitization business model takes place in the manufacturing company, it was also analysed how servitization affects the change in the current business model in terms of benefits and challenges. The research question answers how the transformation process in the healthcare manufacturing company was, what changes the company had to implement at an organisational level and what challenges and benefits they faced when integrating servitization into the existing business model.

According to the research findings, businesses still in the process of servitization have a higher success rate when it comes to services than companies with business models that have been around longer. This indicates that the initial benefits of a service-oriented strategy may be quickly gained since modifications to business structures are often just minor. However, to fully enjoy the benefits of this shift, companies that transition from "value-added manufacturers" to "service providers" need to analyse their business model and organisational structure in-depth. In the case of Philips, the company is still investigating and piloting the service-based business model to understand the changes needed in the organisation's core.

A critical addition that may be made to the existing body of research on servitization is the development of a theoretical understanding of the transformative shifts brought about by the digital servitization of labour in Philips. The current body of research on digitalisation and Philips' service strategy is expanded significantly because of the findings in three significant

ways. In general, this information contributes to the definition of a company's measures to ensure the digital servitization process is successful.

This study aimed to understand the implementation of service-based business models' transformation in the health manufacturing company. However, the conclusions did not cover all critical factors and challenges when integrating servitization into the actual business model of the company.

For a manufacturing company to achieve the desired servitization outcomes, it needs to assess the various challenges in line with its performance purposes and the challenges addressed in the short-term and long-term. Additionally, aligning servitization strategy with organisational culture is vital to provide space for service innovation (M.M. Kamal et al., 2020).

As with any scientific and academic research, this study and its findings have limitations.

One limitation of this study was that the customer perspective and their experience with the manufacturer were not included. All the data was collected from interviews with the manufacturer (Royal Philips) and secondary data provided in documents on Philips's website. The customer perspective would have provided to the research the market situation as regards the servitization business model offers, and the perceived value from the customer would be described. In future studies, customer perception could be included in order to understand where the customer stands within the servitization business model.

In addition, the study did not investigate other competitors on the market. For future studies, this topic could also be a subject to be analysed to create a more inclusive investigation of this matter.

Another limitation of this study was the time that it took for the company to respond regarding the interviewees' participation in this research study. The company's response took some time from the researcher, which would be necessary to conduct further research.

Another constraint to be mentioned is the methodological limitation of the case study. Only two interviews were conducted, which provides a limited view on shifting towards a service-based approach in a large-scale company such as Philips. Because of the time constraints, it was impossible to interview more people and business units. For future research, in order to have more details about the process of transformation in the company, more interviews will be conducted in a variety of departments and in a different geographical scope.

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