

A Servitization Framework for Corporate Companies

Master Thesis Universiteit Twente

January 2016

Public version



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Preface

This is the public version of the thesis. Confidential and company specific content is removed. The thesis is now suitable for public viewing. The non-public version contains information which cannot be shared publicly. The objective of this thesis was to develop a framework to assess a company's business orientation (product-oriented vs service-oriented). A framework is constructed and is based upon combining elements from different concepts of the literature. This framework is part of the public version. It is validated via two cases in order to assess the company's business orientation in two different markets. This validation however, is not part of the public version since it contains company sensitive content.

Management Summary

Servitization is a term given to the transformation of a manufacturer from a product-oriented business towards a service-oriented business. The goal of this research was therefore to develop a framework to support this transformation.

The main research question is formulated as follows: How can corporate companies servitize?

In order to answer the main research question and to assess the opportunities for the company for servitization, different sub research questions have been formulated:

1. What is servitization?
2. What are the characteristics of the current portfolio?
3. What are the current customer segments?
4. What are the job(s) to be done, the pains & gains of each segment?
5. Which value proposition can be derived for each segment?
6. What are their (market) challenges and barriers?

Servitization comprehends the innovation of organizations capabilities and processes to shift from selling products to selling integrated products and services. In the servitization literature a categorization of different types of services has been made, namely: base, intermediate and advanced. Base services are focused on product provision and intermediate services are focused on maintenance of the product condition (Baines & Lightfoot, 2013). An advanced service however is an outcome focused on the delivery of a capability through performance of the product (Baines & Lightfoot, 2013). This capability is a package of products and services and is provided and consumed as a single offering. Advanced services typically feature revenue-through-use contracts (pay-per-use), risk & revenue sharing contracts and rental agreements.

Based on the findings from different concepts in the literature, a framework has been constructed in order to support the transformation. This framework (see Section 4.6) is an intertwined staged process representing the transformation towards a service-oriented business. The current company's service portfolio is plotted on this framework in order to assess the current business orientation (product-oriented or service-oriented). A clear absence of advanced services has been exposed.

In order to become more service-oriented, advanced services should be developed. An Advanced Service model is developed and proposed. This Advanced Service model consists of a complete package of products and services. It should be sold as a single offering featuring regular instalments/payments covering both the asset lease, spare parts supply, consumables and services. This model can then be used to develop and propose service-intensive value propositions in order to address the different needs of the customer segments.

A strong service focus is prerequisite for selling these service-intensive offerings. The business orientation of two markets has been assessed and thereby validating the constructed framework. A big difference in orientation in two markets has been observed. One being very much product-oriented and one being more service-oriented.

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1. Introduction

This chapter presents a short introduction on the key topic and the organization where this research has been conducted in Section 1.1. Section 1.2 presents the problem and Section 1.3 the research goal and research questions. In Section 1.4 the relevance of this research will be presented and an overview of the structure of this thesis is shown in Section 1.5.

1.1 Topic

The key topic of this research is servitization. Servitization is a term given to a transformation and is not a new phenomenon. The first mention of servitization dates back to an article of Vandermerwe & Rada (1988). The authors of this article observed the trend that manufacturers added value to their offerings through services. These companies offered fuller market packages, or bundles of customer-focused combinations of goods, services, self-service and knowledge (Vandermerwe & Rada, 1988). The authors named this movement *the servitization of business* and it captured the zeitgeist of the 1980s. This so-called servitization of business was a result of increased customer demand and broadening the offerings through services was seen as a competitive tool.

Before, there was a clear distinction between manufacturers and service providers. Manufacturers provided products and service providers provided services. In time, this once clear distinction faded and services began to dominate. Today, the portfolio of many manufacturers not only consists of products but also consists of integrated sets of products and services. In 2011, 30% of manufacturers globally were classified as servitized (Neely, Benedettini, & Visnjic, 2011). In the United States, the country with the highest level of servitized manufacturers, 55% were servitized (Neely, Benedettini, & Visnjic, 2011). China, the country with the biggest notable shift in level of servitization reached a level of 19% (Neely, Benedettini, & Visnjic, 2011). Servitized manufacturers develop and offer integrated sets of products and services in order to sustain, differentiate and compete and is often driven by fierce competition from low cost countries, emerging economies and high mature markets. However, servitization is not only externally driven. Servitization includes offering the product as a service and by doing so it generates revenue streams through the entire product's lifecycle. This results in predictable and continuous revenue streams throughout the lifecycle and stability of income. Continuous improvements in technology, especially in ICT, enabled companies to offer more advanced and sophisticated offerings. These services are supporting and focusing at the customer rather than services focused on maintenance of the product's condition. It also enabled the manufacturer to have a closer look at a customer's operation, which could generate new insights for new product and service development. An integrated set of products and services and hereby providing a capability, shifts the risk and responsibility more towards the manufacturer. This shift challenges the manufacturer to organize its organization in such a way that it is capable of bearing the risk and responsibility to guarantee and to provide a capability (Baines & Lightfoot, 2013). The manufacturer also needs to be able to manage, control and deliver these advanced offerings and it often requires a change in culture, structure, strategy and business model. So, servitization could be defined as the innovation of organizations capabilities and processes to shift from selling products to selling integrated products and services (Baines T. , Lightfoot, Benedettini, & Kay, 2009). These integrated products deliver value in use and is a concept for organizations that see the provision of services as key to their future, as well as moving up the value chain in order to generate revenue streams throughout the entire product lifecycle (Baines T. , Lightfoot, Benedettini, & Kay, 2009).

1.2 Problem

The problem is how companies can servitize and how these companies can make the shift from selling separate products and services to selling integrated products and services. In more specific, is the organization where this research has been conducted able to servitize? Are they ready and willing to make the transition towards a service-oriented business?

1.3 Research outline

This section includes the goal of this research as well as the central research questions. The central research question is split into smaller sub questions.

1.3.1 Research goal

This research is a case study investigating how corporate companies can servitize in a competitive and highly mature market. The objective of this research is to develop a framework that can be used to assess the readiness to servitize and to support the transition towards a service-oriented business.

1.3.2 Research questions

The central research question of this research is as follows:

How can corporate companies servitize?

In order to be able to answer the central research question, specific sub questions have been formulated:

1. What is servitization?
2. What are the characteristics of the current portfolio?
3. What are the current customer segments?
4. What are the job(s) to be done, the pains & gains of each segment?
5. Which value proposition can be derived for each segment?
6. What are their (market) challenges and barriers?

1.4 Relevance

1.4.1 Academic relevance

This research develops a framework for manufacturers to make the transition towards a service-oriented business. The development of this framework is guided by the findings of different concepts and topics. This study contributes to the growth of theoretic knowledge in this academic field (servitization) by combining different elements of different concepts.

1.4.2 Practical relevance

This study is conducted at a company. The results of this study deliver recommendations on how the organization can servitize. This study also provides an overview of the challenges and barriers of which the specific markets are facing in their readiness to servitize.

1.5 Thesis structure

This study makes use of a scientific literature study, internal document analysis and interviews. The structure of this thesis is given in Table 1.

Table 1 Thesis structure

INTRODUCTION
•This chapter presents an introduction to the topic, the research problem, the research outline and the relevance.
METHODOLOGY
•This chapter presents the research design and data collection method.
COMPANY
•This chapter presents a company profile and it describes the current situation.
LITERATURE STUDY
•This chapter includes an in-depth view on the key topic servitization and the closely related topics, e.g. product-service systems and service transition.
INTERNAL DOCUMENT ANALYSIS
•This chapter includes the results retrieved from internal documents and describes the product and service portfolio, market segmentation, the customer's job(s), pains and gains.
INTERVIEWS
•This chapter includes the results retrieved from interviews regarding the product and service portfolio, value propositions and market challenges & barriers.
CONCLUSIONS & RECOMMENDATIONS
•This chapter presents the conclusions and recommendations.
LIMITATIONS
•This chapter presents the limitations of this research.

2. Methodology

This chapter comprehends the methodology used in this research. It includes the research design, the data collection method and it provides an overview of the methodology.

2.1 Research design

This research is a descriptive research, whereby the researcher observes and then describes what was observed. It is not an explorative research whereby research is conducted to explore a topic to be familiarized with it. It is also not an explanatory research. The type of analysis is qualitative analysis. It is a non-numerical assessment of observations made through participant observation, content analysis and interviews.

2.2 Data collection

This research includes a scientific literature study on the key topic servitization and the closely related topics. Internal documents within the company are collected and analyzed in order to gain insights in the product and service portfolios, customer segmentations and customer needs. Interviews are held and complement the literature study and data from internal documents. The interviews aim at collecting in-depth insights in value propositions and the challenges & barriers to assess the readiness to servitize. Semi-structured interviews are used as the format for these interviews. Semi-structured interviews are organized around a set of predetermined questions/topics (Whiting, 2007). An interview guide with the questions and topics will be used and notes of these semi-structured interviews will be noted down. The interviews are conducted in two countries.

In one country interviews are conducted with a Business Manager and with the Inside Sales Team. The interviews are conducted during a service growth workshop for a particular business. The process of servitization and the elements/features of servitization are explained to the participants. These interviews are aimed at collecting in-depth insights in their market challenges and barriers.

In the other country the interviews are conducted in Dutch since all of the participants were native Dutch speakers. The participants in these interviews include a Business Manager, a Business Manager Customer Services and an Account Manager. The process of servitization and the elements/features servitization are explained to them. These interviews aim at constructing value propositions and collecting in-depth insights in their market challenges and barriers.

2.3 Methodology overview

A methodology overview is given in Table 2.

Table 2 Methodology overview

Topic	Data collection method
Servitization and closely related topics	Literature
Portfolio	Internal company documents
Segmentation	Internal company documents
Value proposition	Literature, Internal company documents and interviews
Challenges	Interviews

3. Company

This part is excluded from the public thesis since it contains company sensitive content which is not suitable for public viewing.

3.1 Company profile

3.2 The situation

4. Literature Study

This chapter includes an in-depth view on the key topic servitization and the closely related topics, e.g. product-service systems, new service development and service transition, of this research. Section 4.1 discusses the concepts of servitization including its drivers, the process, types of services, challenges and barriers. Section 4.2 discusses the concept of Product-Service Systems including its drivers, different types of Product-Service Systems and the challenges and barriers. Section 4.3 discusses the concept of new service development, Section 4.4 the service transition concept and value propositions will be discussed in Section 4.5. Finally, the conclusions of this literature study for this thesis will be presented in Section 4.6.

4.1 Servitization

This section discusses the concept of servitization. It includes an introduction, the drivers, the process, the different types of services and the challenges and barriers of servitization.

4.1.1 Introduction

According to Vandermerwe & Rada (1988) the servitization of business evolved in three stages and is encouraged by the forces of technology, globalization and fierce competitive pressure:

- goods or services,
- goods + services and
- goods + services + support+ knowledge + self-service

Baines et al. (2009) define servitization as the innovation of organizations capabilities and processes to shift from selling products to selling integrated products and services that deliver value in use. Servitization is a concept for organizations that see the provision of services as key to their future. The objective is moving up the value chain in order to generate revenue streams throughout the entire product lifecycle (Baines T. , Lightfoot, Benedettini, & Kay, 2009). Value in use implies that the customer perceives how its processes function more efficiently and effectively with the support of the supplier's activities (Grönroos, 2007). According to Neely (2009) servitization involves the innovation of an organization's capabilities and processes so that it can better create mutual value through a shift from selling products to selling Product-Service Systems (Neely, 2009). Ahamed et al. (2013) give a more simple explanation by stating that a servitized offering encompasses the bundling of services and goods in order to fulfill the needs of the customers. While the process itself, servitization, is a transition process to the stage where organizations continuously innovates new services and add value with its core product, which in the end signifies a firm as a value provider (Ahamed, Inohara, & Kamoshida, 2013). Table 3 represents frequently used definitions of servitization.

Table 3 Servitization definitions

Author(s) (date)	Definition
Avlonitis et al. (2014)	Competing through value propositions that integrate services with product offerings
Baines & Lightfoot (2013)	The innovation of the service offerings and also the innovation the manufacturer's internal capabilities in operations
Baines et al. (2009)	The innovation of organizations capabilities and processes to shift from selling products to selling integrated products and services that deliver value in use and is a concept for organizations that see the provision of services as key to their future, as well as moving up the value chain in order to generate revenue streams throughout the entire product lifecycle
Neely (2009)	The innovation of an organization's capabilities and processes so that it can better create mutual value through a shift from selling products to selling Product-Service Systems
Ahamed et al. (2013)	A transition process to the stage where organizations continuously innovate new services and add value with its core product, which in the end signifies a firm as a value provider
Bascavusoglu-Moreau & Tether (2010)	A strategy whereby the offering is a customer focused package in order to add value to core corporate offerings is a way to flourish

A service based strategy should not be considered a new phenomenon. A couple years after the first mention of servitization, an article by Anderson & Narus (1995) published in the Harvard Business Review, showed that surprisingly enough most manufacturers still focused only on the product itself and largely ignored the service element. Services however, according to Ahmed et al. (2013), were seen as a necessary add-ons. A few years after the publication in the Harvard Business Review in '95 another article devoted to this topic was published in the Harvard Business Review. Some manufacturers struggled in that period, while others flourished. The cure, according to Wise & Baumgartner (1999), is to go downstream, towards the customer. Those who have flourished went downstream toward the customer, while they have built on their core manufacturing capabilities, and tapped into the valuable economic activity that occurs throughout the entire product lifecycle in order to overcome stagnant product demand and reduced economic growth (Wise & Baumgartner, 1999).

In 2007, 29.52% of manufacturing firms globally were classified as being servitized, while in 2011 the percentage of servitized manufacturers globally did not significantly increase to

30.10%, see Figure 5 (Neely, Benedetinni, & Visnjic, 2011). The data shows that the percentage of servitized manufacturers in the United States, the country with the highest level of servitization even decreased from 57.68% to 55.14% (Neely, Benedetinni, & Visnjic, 2011). Fierce competition from low cost countries is regarded as a motive for manufacturers to servitize in order to avoid price-based competition. In 2007, the level of servitized manufacturers in China was only 0.97%, in 2011 however the level was 19.33%. This growth appears to be stimulated by government intervention (Neely, 2009; Neely, Benedetinni, & Visnjic, 2011).

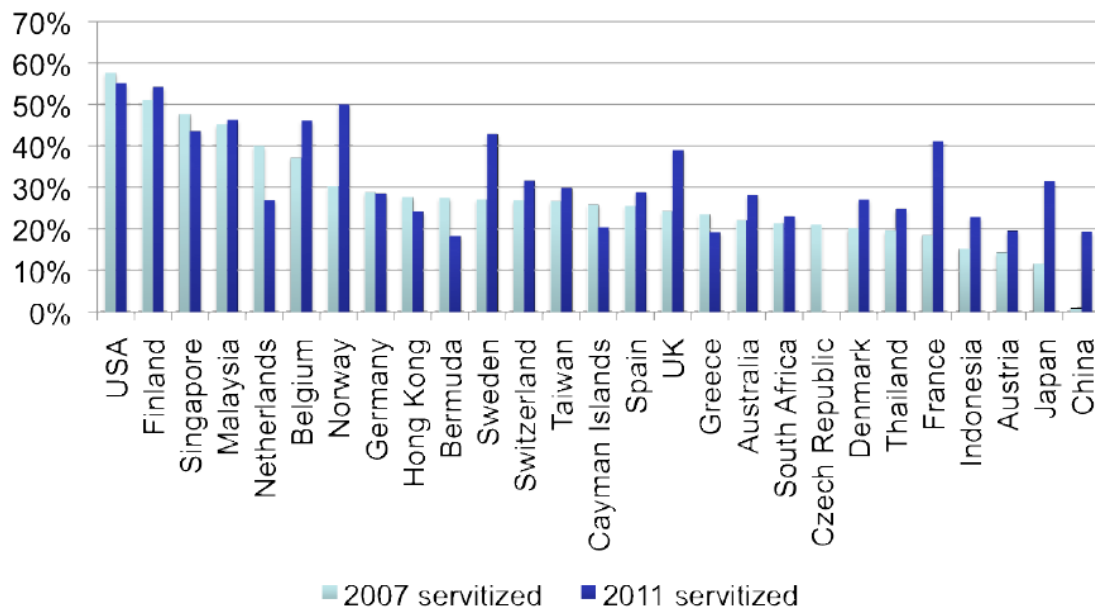


Figure 1 Servitization by country (Neely, Benedetinni, & Visnjic, 2011)

4.1.2 Drivers

The continuous introductions of new technologies, in particular in ICT is regarded as an enabler of servitization (Neely, 2009). Baines & Lightfoot (2013) regard servitization as the expansion of a manufacturer's ICT network into their products. This expansion enables the manufacturer to tap into a customer's operation in order to operate accordingly and proactively. This could generate new insights for new product and service development. A UK based study among servitized manufacturing companies and customers of these servitized manufacturing organizations revealed two main drivers for servitization, namely: defensive and offensive. A defensive driver implies improvements in business efficiencies, cost savings and predictability, while an offensive driver implies improvements of business competitiveness, focus and growth (Baines T. , 2013).

In general mainly 3 factors drive organizations to pursue a servitization strategy, namely financial, strategic and marketing factors (Baines T. , Lightfoot, Benedettini, & Kay, 2009). The main financial drivers are higher profit margins, stability of income in terms of stable revenues despite drop in sales and smooth revenue streams in order to improve commercial viability (Baines T. , Lightfoot, Benedettini, & Kay, 2009; Baines T. , 2013). According to Baines & Lightfoot (2013), the potential profit margins for services could be 2-3 times higher than the profit margins for products. Not only profit margin drives servitization, product-service combinations tend to be less sensitive to price base competition whereby the competition from low-cost economies is intense and these combinations tend to be more resistant to economic cycles (Baines T. , Lightfoot, Benedettini, & Kay, 2009). Servitization could therefore help secure stable revenues and balance the effect of mature markets and unfavorable economic cycles (Baines T. , Lightfoot, Benedettini, & Kay, 2009). As shown in

Figure 5, in 2007 58% of US manufacturers incorporated services in their portfolio, while only 1% manufacturers in China offered services. In 2011 however, 55% of US manufacturers offered services and 19% of Chinese manufacturers incorporated services in their portfolio. This implies that manufacturers in China not only going compete on price with the West, but also on service. This obvious trend should be seen as incentive for western manufacturers to increase their efforts to servitize.

However, not from a supplier perspective but rather from a customer perspective, servitization can decrease predictable support and maintenance costs and reduce risks (Neely, 2009). In terms of strategy, gaining competitive advantage by differentiation is the main strategic driver for servitization. Services can create competitive advantages because services tend to be less visible, more difficult to imitate and more labor dependent (Baines T. , Lightfoot, Benedettini, & Kay, 2009). Moreover from a strategic perspective, the difficulty of imitation and the level of invisibility can induce competitor lock-out (Baines T. , 2013). Offering higher levels of services can increase the attractiveness of the offerings. When this new offering offers a better service than the competition, it can become an important competitive advantage and could even differentiate the firm from its competitors (Ahamed, Inohara, & Kamoshida, 2013). Moreover, manufacturers in western economies focus more and more on their customers. These manufacturers are trying to create products and services that meet customers' needs more comprehensively to avoid competing solely on product innovation technological superiority and low prices. This is partly a result of intensified competition due to the growth of emerging economies in for example Asia (Turunen & Finne, 2014; Baines T. , Lightfoot, Benedettini, & Kay, 2009). So in order to cope with these challenges, manufacturers focus on the servitization strategy as an effective and efficient way for sustainable development (Lin, Shi, & Ma, 2012). This creates opportunities for growth especially in mature markets (Lin, Shi, & Ma, 2012). Another main driver for servitization is marketing. Value creation with customers is getting traction and because of this, manufacturers gain insight in the needs of the customer. They can then develop and offer more tailored offerings whereby services even tend to induce repeat-sale (Baines T. , Lightfoot, Benedettini, & Kay, 2009; Baines & Lightfoot, 2013). In line with this, customer expectations or demands are becoming higher and higher. Organizations should therefore adjust to those high standards in terms of implementing customer centricity (Atos Consulting, 2011). Thus, from a marketing perspective, due to servitization, organizations gain more insight into the needs of customers, which eventually could lead to product differentiation. From this perspective, servitization is a response to customer demands that were not fulfilled before. Implementing customer centricity and intimacy gives more customer touching points. This leads to improved customer relationships, tailored offerings and induces repeat-sale.

We conclude that we can split the various drivers for servitization mainly in financial, strategic- and marketing drivers. They can be driven from a defensive or an offensive perspective. An overview of the drivers for servitization and their characteristics is depicted in Figure 6.

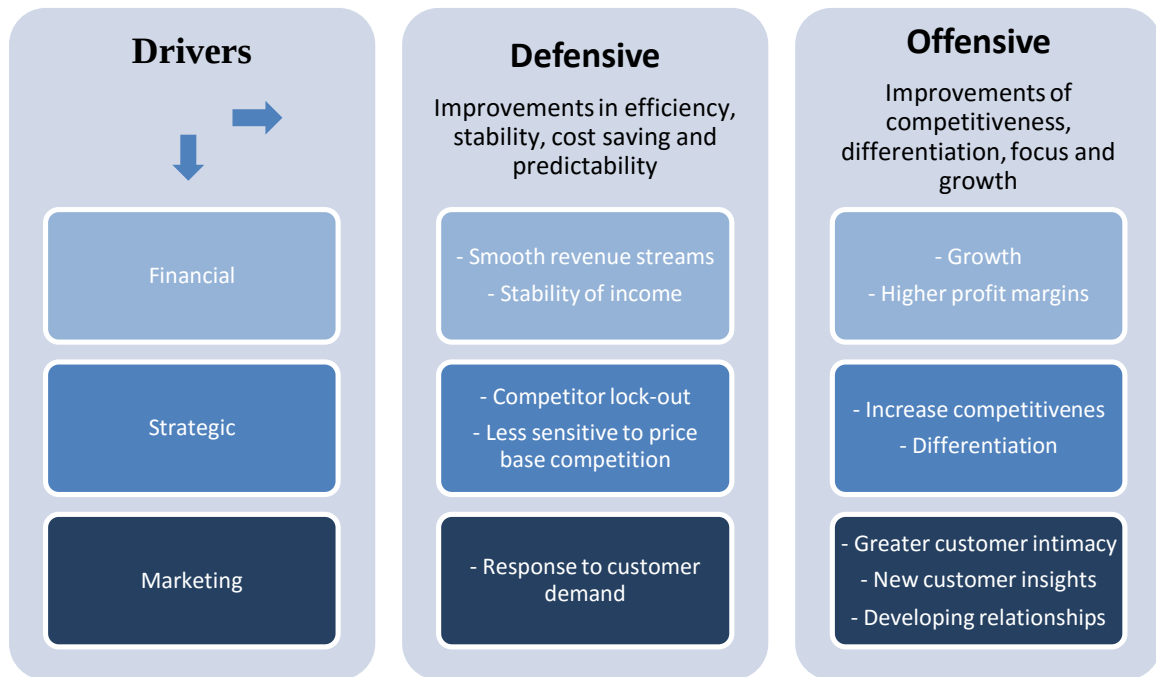


Figure 2 Drivers of servitization

4.1.3 Process

In order to transform from a manufacturer to a servitized manufacturer, different steps have to be taken and several stages to be conquered while bearing and enduring challenges and barriers. Over time the servitization process has evolved.

Figure 7 shows the process of extending the traditional product concept with services towards the provision of benefits. It is a roadmap towards an extended product and is a concrete change of business. The process depicted in Figure 7 is not the most recent and evolved process visualizing servitization, but could be regarded as a stepping stone for the more evolved and recent servitization process visualized in Figure 8. According to Thoben et al. (2001), services are regarded as distinguishing features against competitors and these product extensions could therefore be considered as an opportunity to enhance competitiveness. These extensions have the objective to offer customers utility packages to a fuller extent, rather than just offering customers single products, and are supposed to make it more attractive for customers (Thoben, Eschenbächer, & Jagdev, 2001). New services, often enabled by the improvement in ICT, could serve as a means to extend the intangible aspects of a product.

The process depicted in Figure 7 shows the extension of a product with services, starting with supporting services (maintenance, repair and spare parts). Previously, services have been regarded as a side-show of manufacturers and the main value creation was attributed to the tangible product itself (Wiesner, Peruzzini, Doumeingts, & Thoben, 2012). This changed and the value perceived by the customer is not only attributed to the tangible product itself but also attributed to the offered services. Adding these supporting services facilitate the usage of the core product (Wiesner, Peruzzini, Doumeingts, & Thoben, 2012).

The next step implies the adding of more differentiating services so that the solution contains the product, supporting services and differentiating services. Differentiating services implies providing individualization of the extended product (Wiesner, Peruzzini, Doumeingts, & Thoben, 2012). These differentiating services or not just focused on facilitating the usage of the product in the field, but are more focused on supporting the

customer rather than just the product. Examples of differentiating services are training, remote repair and workflow optimization. The combination of the three components, product, supporting services and differentiating services can now be considered as a utility package in order to satisfy customer's needs (Wiesner, Peruzzini, Doumeingts, & Thoben, 2012).

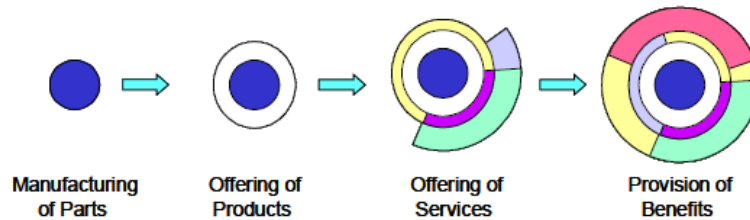


Figure 3. From Manufacturing of Parts to Provision of Benefits (Thoben, Eschenbächer, & Jagdev, 2001)

A more recent and evolved process visualizing the servitization process is presented by Ducq et al. (2012), see Figure 8. This model shows the steps a manufacturer needs to take in order to become a service-oriented business. According to Opresnik & Taisch (2015) all levels of servitization, as depicted in Figure 8, apply to the usage phase, or the utilization part of the product. This final product is not just a physical resource, but contains tangible and intangible resources, which are in the end tradable and valuable resources along the manufacturer's value chain (Opresnik & Taisch, 2015).

The rings apart from the core product (grey) and the tangible product shell (light grey) summarize all the intangible assets, see Figure 8 (Thoben, Eschenbächer, & Jagdev, 2001). So, the outer ring, the differentiating services, summarizes all of the differentiating services (blue, light green), while the ring below summarizes all the supporting services (purple, green and yellow). Hence, the different colors.

This more recent and evolved model does not differ a lot from the model presented by Thoben et al. (2001) (Figure 7). The difference however is that in the final step the combination of the tangible product with the supporting and differentiating services will now be offered as a service to the customer. In this case the functionality of the product will be sold as part of the solution. In the case of selling a capability through performance of the product, a shift in business orientation has taken place. This implies a shift from a product-oriented business towards a service-oriented business.

From a customer perspective, the adding of services, or the combination of the tangible and intangible resources, value is added when the service quality is increased or unexpected downtime is reduced. Other examples of value adding services which increase customer benefits are, according to Opresnik & Taisch (2015), reducing maintenance costs, wider scope of services supporting the product, more sustainable consumption, more regular predictive maintenance, higher service reliability and higher service flexibility.

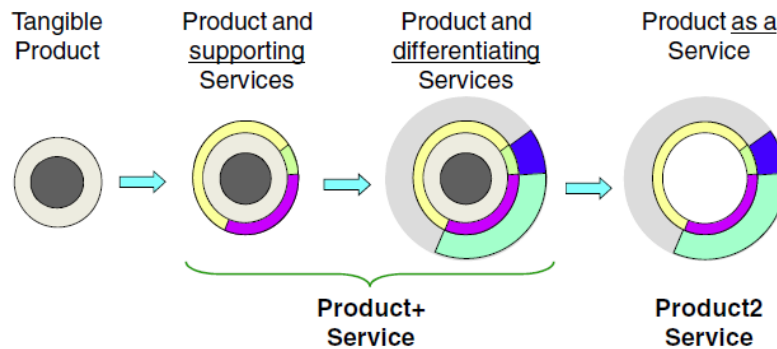


Figure 4 The Servitization Process (Ducq, Chen, & Alix, 2012)

Stage one is the selling of tangible product, while the second stage initializes the servitization process since these added supporting services, i.e. maintenance and repair, are services supporting the product (Ducq, Chen, & Alix, 2012). The third stage is an evolution of the previous one, is more elaborated and increases the differentiation by individualization of the extended product (Wiesner, Peruzzini, Doumeingts, & Thoben, 2012; Ducq, Chen, & Alix, 2012). Examples of differentiating services are training and workflow optimization. Training could be provided to the users of the product in order to increase the efficiency of the usage. Workflow optimization services could be provided in order to optimize the workflow in which the product is used. These types of services are merely focused on supporting the customer rather than focused on maintaining the product. The offering in this stage is regarded as an extend product, see Figure 9. An extended product could be defined as an integrated offer of a product extended by services in order to provide a solution to the customer (Eschenbächer, Thoben, Hesmer, & Herter, 2011).

This stage, the extended product, is closely related to product-service systems and advanced services, hence the notion of product and service in the servitization process model from Ducq et al. (2012), see Figure 8. Elaboration on these closely related topics and the cohesion and affiliation with the extended product will be given in subsequent chapters.

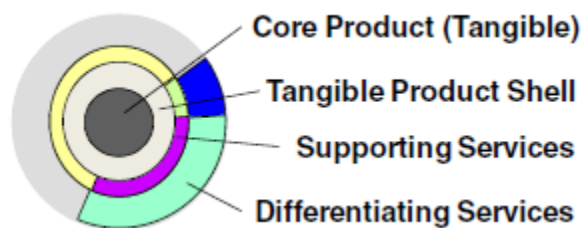


Figure 5 The New Extended Product (Ducq, Chen, & Alix, 2012)

The fourth stage is the differentiator between the old and the new model and visualizes the transformation towards a more service-oriented approach, whereby the value is mainly in the service content rather than the in the products content.

A representation of the move from stage three to four is depicted in Figure 10. It represents the stage whereby a capability is delivered as an outcome through performance of the product (Baines & Lightfoot, 2013). As depicted in Figure 10, the core tangible product has been left out in stage four. This implies/depicts a change in ownership in such a way that ownership is not transferred to the customer but stays at the original equipment manufacturer (OEM). The offerings in this stage are in contrast sharply decoupling manufacturing of goods and selling of services, whereby the revenue derives from services (Ducq, Chen, & Alix, 2012). According to Opresnik & Taisch (2015) this stage is the highest level of servitization. Although the product is still part of the offering, only the functionality

of the product is sold, ownership stays at the OEM and the characteristics of the product are less essential to the customer (Opresnik & Taisch, 2015).

This offering is called a functional sale, hence the notion of selling the functionality rather than just the transfer of a tangible product from manufacturer to customer. The arrangement that goes along with it is also referred to as a functional guarantee, whereby the functionality delivered by the equipment to the customer is a service the manufacturer sells (Gupta, Wallace, & Sondheimer, 2008).

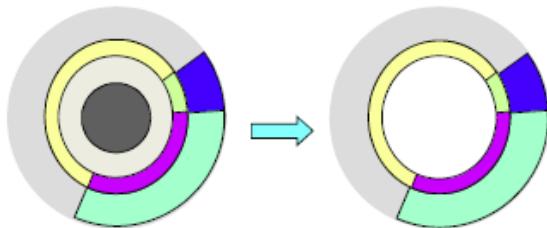


Figure 6 Towards products as a service (Ducq, Chen, & Alix, 2012)

It comprises the complete shift towards a service, by replacing the need for a product (Neely, 2009). In this case, the products are substituted by new services, often driven by new technologies, and it provides incentives for the customers to consume more efficiently (Sundin, 2009). So in this stage the product does not have a central role anymore in the current offering, a change in ownership took place in such a way that the ownership of a product stays at the manufacturer, the revenue comes purely from services, and the outcome could be regarded as the delivery of a capability and/or the selling of functionality. In case the manufacturer sells functionality, the manufacturer determines how to fulfill the function that the customer is buying and a contract must be signed between the two parties (Sundin & Bras, 2004). The advantage for a manufacturer to sell functionality in order to provide the customer with their desired demands is that it will become more knowledgeable about the performance of the product during use and it therefore learns more about the performance throughout its lifecycle (Sundin & Bras, 2004). Another advantage for a manufacturer is a new position. Selling a function leads to a closer connection to the end-user, a better view on the end-user's processes and better knowledge about the performance of the products during use (Sundin & Bras, 2004). It is not only beneficial for a manufacturer to sell a function. The customer, or the end-user, now avoids the risk of ownership, can focus on their core competencies, consumes less capital, gains flexibility and improves their ability to predict costs (Sundin & Bras, 2004).

4.1.4 Advanced services

Previously, services were categorized into supporting and differentiating services. Another categorization has been made in order to categorize the different types of services: base, intermediate and advanced services. Base services are focused on product provision, e.g. product and spare parts delivery, and intermediate services are services focused on maintenance of product condition such as scheduled maintenance, helpdesk, repair, overhaul, operator training and condition monitoring (Baines & Lightfoot, 2013). An advanced service is an outcome focused on the delivery of a capability through performance of the product and is delivered through product-service systems (Baines & Lightfoot, 2013). This capability is package, a combination, of a product and the services that go around the use of the product and is provided and consumed as a single offering (Aston Business School, 2015).

Advanced services are services supporting the customer rather than services supporting the products. Advanced services give the customer a guarantee of a level of availability and

reliability of the capability they are buying (Aston Business School, 2015). With advanced services a manufacturer takes on more risk and responsibility. The manufacturer focusses on outcomes from the performance of their product, but also the responsibility for these being fulfilled (Baines & Lightfoot, 2013). If advanced services only increase the risks and responsibilities for the manufacturer, then a manufacturer is not encouraged to design and deploy advanced services. Providing advanced services generates long-term contracts, closer relationships, new business opportunities and revenue streams and it is aimed to realize greater value for the customer and to better predict its costs (Aston Business School, 2015).

Advanced services typically feature risk & revenue sharing contracts, revenue-through-use contracts, rental agreements and regular revenue payments. The responsibility a manufacturer takes could be defined against the performance, availability and reliability (Baines & Lightfoot, 2013). Performance is regarded as the extent to which the full capability is delivered, the availability is the extent of time that the product is available for use and the reliability is assessed as a measure of frequency of unpredicted failures (Baines & Lightfoot, 2013). With advanced services, ownership of the product is often not transferred to the customer. This requires a different economic model for advanced services. In case ownership is not transferred to the customer, often a financial partner comes into play. In this case, the manufacturer provides the product to the customer and the manufacturer receives a lump payment from the financial partner. The customer pays a periodic payment for the asset to the financial partner. In terms of the services, the maintenance and management services, the manufacturer provides these services and receives a periodic payment for the services minus penalties for failure to perform and/or compensation for poor utilization depending on the contract. Or a financial partner pays a lump payment, the cost price, for the product to the manufacturer. The manufacturer pays a periodic payment plus interest for the product to the financial partner. The customer pays a periodic payment for the equipment and the agreed services. In case of a pay-per-use contract, it will typically stipulate levels of usage with a minimum level agreed such that the manufacturer will receive a base fee and also a maximum level (Baines & Lightfoot, 2013). The usage will be monitored and the end-users will pay the agreed-upon price per use. In terms of risk and reward sharing, advanced services makes manufacturers take on greater levels of responsibility and so risk. Expected maintenance costs are embedded in such an agreement. If the actual costs of maintenance exceed the predicted maintenance costs, then these costs will be shared between the manufacturer and the end-user. If the actual costs are lower than the predicted costs, then the manufacturer will be compensated by the end-user with a share of the maintenance costs savings. Figure 11 illustrates an advanced service model.

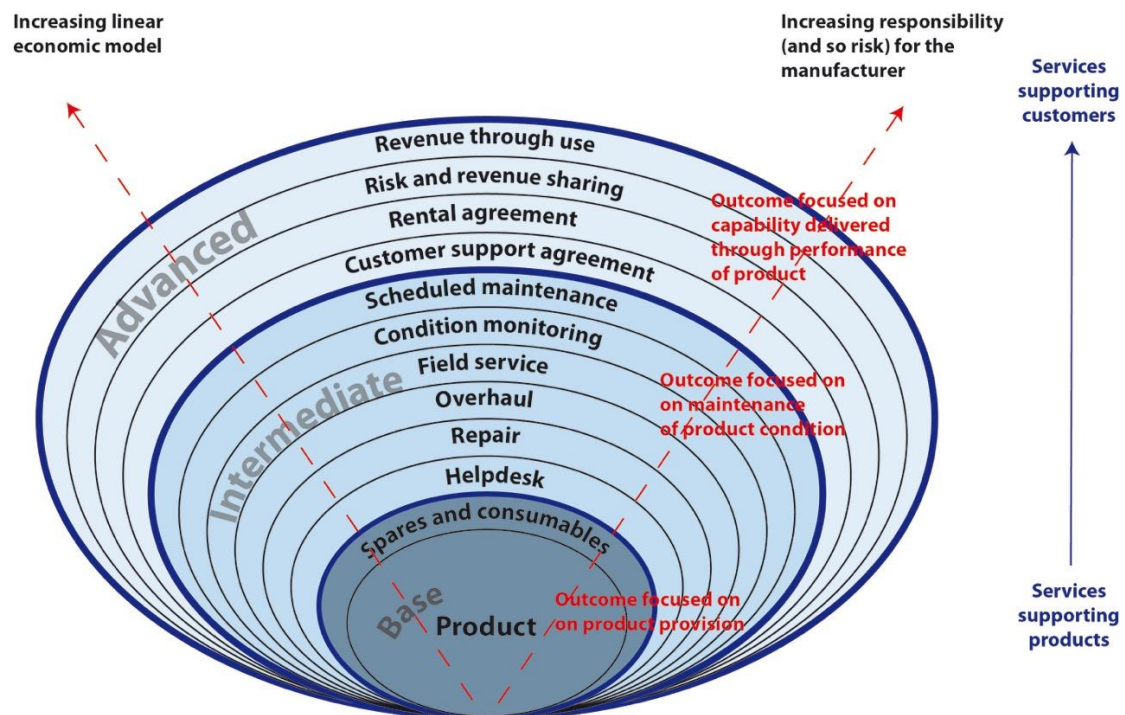


Figure 7 Advanced services (Baines & Lightfoot, 2013)

Advanced services are provided by manufacturers who have an intimate understanding of the customer's key aims- and their difficulties in achieving these, or by partnering with technology innovators and service providers in order to develop the capacity and ability to provide these services (Aston Business School, 2015). A lot of capabilities are necessary for manufacturers to develop and to deliver advanced services. According to Raddats et al. (2014), eight broad servitization capabilities are needed for advanced services, namely: technical expertise, customer-focused methodologies, service culture, network relationships, service innovation, customer intimacy, service infrastructure and tailored & consistent service offerings.

From an internal perspective, a manufacturer needs technical expertise, a service culture and tailored & consistent service offerings. A manufacturer generally possesses high developed product-related expertise. Together with the intra-company links between services and product engineers, this facilitates the delivery of product-related offerings such as maintenance and repair (Raddats, Burton, Zolkiewski, Story, & Baines, 2014). In order to deliver advanced services a shift towards a service-oriented culture is needed. This new focus should be re-positioned in the minds of all the stakeholders, e.g. marketers, engineers, service engineers, customers and shareholders (Raddats, Burton, Zolkiewski, Story, & Baines, 2014). It means that the service should play the central role of the offering and that services should not be seen as necessary add-ons to products. And, according to Raddats et al. (2014), the senior managers who are appointed to implement a service culture, should be able to identify possible blockages in terms of processes and reward structures in order to limit or remove the inhibitors for implementation. Another capability needed for advanced services is the ability to provide tailored service offerings and to provide constant service offerings. A degree of flexibility or modularity is necessary and it allows the customers to select the most suitable one and it allows variation as their requirements change (Raddats, Burton, Zolkiewski, Story, & Baines, 2014).

The capabilities required to successfully develop advanced services with a more customer perspective are considered to be customer intimacy and customer-focused methodologies.

A key requirement is understanding customer's business challenges and what the requirements are in order to deliver effective solutions (Raddats, Burton, Zolkiewski, Story, & Baines, 2014). In order to be able to understand their challenges, customer intimacy and closer positioning to the customer is required. Manufacturers now need to develop service methodologies that align to customer's processes, whereby the technical expertise concerning products is coupled with the knowledge of how end-users perform product-related services as repair and maintenance (Raddats, Burton, Zolkiewski, Story, & Baines, 2014). The goal with this alignment is, according to Raddats et al. (2014), to develop a service offering which offers an improvement on what customers can do themselves and that it has a positive impact on the customer's process.

Not only is a strong relationship with the customer necessary, relationships with other actors in the network, e.g. other OEMs and service providers, is important (Raddats, Burton, Zolkiewski, Story, & Baines, 2014). The relationship with a service provider is important since the service provider and the manufacturer needs to work together and it enables the manufacturer to better understand those elements of the customers' business for which improvements can be made (Raddats, Burton, Zolkiewski, Story, & Baines, 2014). The service provider in this case is closer to the end-user and thus has more insights in the end-user's challenges and requirements. Another key capability, or necessity, is the service infrastructure. Service centers close to the customer can help providing fast resolutions to problems encountered (Raddats, Burton, Zolkiewski, Story, & Baines, 2014). This is of course dependent on the needs of the customers and the size of the business in a region or even country. The final key capability, according to Raddats et al. (2014), is service innovation. It often starts with new customer requirements in order to reduce costs or to improve the performance of an activity (Raddats, Burton, Zolkiewski, Story, & Baines, 2014). This could lead to service innovation, or new service development, and this could address the new customer requirements. Table 4 gives an overview of key servitization capabilities for advanced services according to Raddats et al. (2014).

Table 4 Key servitization capabilities for advanced services according to Raddats et al. (2014)

Capability
Technical expertise
Service culture
Tailored & consistent service offerings
Customer intimacy
Customer-focused methodologies
Network relationships
Service infrastructure
Service innovation

4.1.5 Challenges

Manufacturers pursuing a servitization strategy face a lot of challenges. However, servitization itself can be challenged as well. Desires for increased ownership, hyper-consumption and the disposable society can challenge servitization (Baines & Lightfoot, 2013). Servitization often comprise a shift in ownership. A servitized offering can therefore challenge or create a conflict between the servitized offering and the desire for increased ownership from the customer. Due to a firm's increasing diversification significant challenges arises in terms of required investments and changing risk profile and for this reason servitization raises interesting questions regarding the economic impact of servitization (Neely, 2009). According to Neely (2009) servitized firms generate higher revenues, however they tend to generate lower net profits due to higher average labor costs, net assets and working capital compared to pure manufacturing firms. This is however in sharp contrast to earlier mentioned financial drivers for servitization in terms of higher profit margins, i.e., 2-3 times higher than profit margins for products, and stability of income (Baines T. , Lightfoot, Benedettini, & Kay, 2009; Baines & Lightfoot, 2013).

The adoption of servitization by a conventional manufacturer principally presents challenges for service design, appropriate measurement of market demands and firm's capabilities, as well as their current strategy, processes, policies and structures (Baines T. , Lightfoot, Benedettini, & Kay, 2009; Ahamed, Inohara, & Kamoshida, 2013). Service design differs from conventional product design and could discourage companies from following a servitization strategy since it is a step outside the comfort zone. Design processes need to include both service and product features that are consistent with the delivery of through-life performance (Baines & Lightfoot, 2009). Service design should include the appropriate measurement of market demand. The focus should not be on the amount of services added, but on the added value of each designed service. Quality over quantity. For that reason, offering better and high valued services can become a competitive advantage and differentiate the servitizing firm from its competitors (Ahamed, Inohara, & Kamoshida, 2013).

A shift towards a service culture is an example of another challenge. A service culture implies a culture where an appreciation for good service exists and where giving good service to internal as well as ultimate external customers is considered by everyone a

natural way of life and one of the most important values (Grönroos, 2007). According to Baines et al (2009) creating a service oriented environment is key to success.

According to Neely (2009), there are three broad categories of servitization challenging the ability of firms to recoup the expected level of return from services: shifting mindsets, timescale and business model and customer offering.

- The shifting mindsets category applies to marketing, sales and customers. In terms of marketing, it implies a shift from transactional to relational marketing since long contracts are now offered and this changes the length of the relationship (Neely, 2009). From a sales function perspective, it implies a shift from selling high priced products to selling service contracts and capabilities (Neely, 2009).
- From a timescale perspective, three prevalent challenges of servitization could be noted, namely: managing and delivery of multi-year partnerships, managing and controlling long-term risk and exposure and modelling and understanding the cost and profitability implications of long-term partnerships (Neely, 2009). Due to servitization, firms engage in long-term partnerships with customers and because of this firms need to manage and control long-term risk and exposure and need to understand the cost and profitability implications (Neely, 2009).
- The third category comprises challenges to the firm's business model and customer offerings. According to Johnson & Mena (2008) servitization is more complicated and more extensive process than the development of an integrated supply chain strategy since the deployment of a servitization strategy encompasses more organizational functions and actors. This due to the need to support the offering over a long period of time with the downstream supply chain delivering a range of services (e.g. maintenance, training, installation and implementation) and products (e.g. spare parts) (Johnson & Mena, 2008). The firm needs to understand what value customers and consumers derive from services, as well as understand the organizational capabilities needed for service design and delivery (Neely, 2009).

Servitization has a big impact on the business model as well. The effective provision of an integrated product-service offering requires inter-organizational integration by coordinating logistics systems, maintenance systems, spare parts supply and manufacturing systems, whereby the delivery of these offerings creates tensions within the operations and the supply chain (Baines & Lightfoot, 2009). Therefore, the challenge arises, according to Baines & Lightfoot (2009), to use knowledge and resources effectively and efficiently in order to support the successful integration of integrated product-service offerings. Companies pursuing a servitization strategy should be able to develop their ability to promote and explain advanced service-intensive value propositions and these propositions differ from traditional product offerings (Kindström, 2010). Relationship building competences must be developed, particularly in service sales and delivery, and should include a focus on proactivity, continuity and the ability to capture specific customer needs (Kindström, 2010). Companies should also be more conscious of the customers' processes and could eventually lead to even co-production of services (Kindström, 2010). A dynamic portfolio needs to be designed that is adaptable to changing customer needs in order to approach all their potential customers successfully (Kindström, 2010). Another challenge is the capability of the creation of a service delivery infrastructure and a resource configuration that has the ability to establish relationships with customers, capture their needs and provide an efficient interface with them (Kindström, 2010). Developing new revenue mechanisms based on

customer operations and profitability becomes important if the supplier is to derive long-term sustainable advantage from service provision (Kindström, 2010).

Summarizing, firms seeking to adopt servitization face a lot of challenges, barriers and implications regarding organizational structure, capabilities, mindsets, processes, business model elements, culture, strategy, timescale and transformation. Figure 12 depicts a simplified summary of challenges and implications found in the literature for the adoption of servitization.

Business model	Organizational	Structure	Shifting mindsets & Culture	Timescale
•Service design •Delivery •Value proposition •Customer segment •Customer relationships •Cost structure •Revenue mechanisms	•Strategy •Processes •Policies	•Inter-organizational structure •Supply chain •Marketing •Sales	•Marketing •Sales •Customer •Service culture	•Managing and delivery of multi-year partnerships •Managing and controlling long-term risk and exposure •Modelling and understanding the cost and profitability implications of long-term partnerships

Figure 8 Challenges and implications for servitization

4.2 Product-Service Systems

As mentioned before, servitization is very close related to product-service systems (PSS). Both comprise a set of integrated and combined products and services in order to be competitive and to improve the fulfillment of customer needs. The difference between the two concepts however is the geographical origin of the two research communities, whereby a PSS is a Scandinavian and Northern European concept, and the environmental and sustainability motivations of the PSS research community (Baines T. , Lightfoot, Benedettini, & Kay, 2009). In a PSS consumption and production are more integrated than in traditional product-based business models and this could result in clean, clever and eco-efficient business opportunities (van Halen, Vezzoli, & Wimmer, 2005). Another difference is that servitization is a process to shift from selling products and services to sell an integrated set of products and services, while a PSS implies the configuration of products, services, supporting networks and infrastructure. A PSS is generally given to the broader mechanism or system that delivers advanced services (Baines & Lightfoot, 2013). Although the research communities differ in origin, authors from both communities utilize different elements of each other's concepts and or make use of each other's terminology and definitions. However, it can be said that product-service systems and servitization are similar and not identical.

4.2.1 Drivers

Drivers for product-service systems are merely similar to those for servitization. However, literature also presents different drivers for product-service systems since product-service systems are also driven by sustainable motivations. According to UNEP (2001), United Nations Environment Programme, a product-service system is defined as a system whereby customer needs are satisfied competitively with lower environmental impact over the lifecycle. In general, product-service systems can be driven by strategic, legislative and/or ecological reasons (Goedkoop, van Halen, te Riele, & Rommens, 1999). The benefits for companies to design product-service systems are that it could establish or create opportunities for innovation and market development, longer-term relationships, to find new profit centers, increased operating efficiencies, decrease total resource consumption and improve the corporate identity (UNEP, 2001; UNEP, 2002). It also provides opportunities to see new strategic market opportunities and to respond adequately to market trends, such as staying competitive as production and consumption are transformed by environmental limits (Mont, 2001; Tukker, 2003). Another trend is that customers are interested in obtaining a provided utility or capability and just paying for using the product, rather than just owning the product. Therefore a product-service system could also be seen as an enabling platform in order to lower the entrance threshold for new customers, since it eliminates large initial capital investments, and to provide access to scarce or previously unavailable products (UNEP, 2002; Goedkoop, van Halen, te Riele, & Rommens, 1999).

Depending on the type of PSS the owner/producer retains responsibility for the product over its lifecycle and therefore has an economic incentive to extend the lifecycle in order to postpone disposal costs and the costs of manufacturing a new product (UNEP, 2002). The manufacturer is motivated by finding ways to extend the product lifecycle by upgrading and refurbishment, or by making the products useful at the end of the lifecycle in terms of recycling (Mont, 2001; UNEP, 2002). So, according to UNEP (2002), implementing PSSs can result in making profit and at the same time reducing the environmental impact of the resources consumed. Improved corporate identity could be a result, since it shows environmental and social benefits (UNEP, 2002). Reduced environmental impact could be result of various reasons. A PSS could lead to dematerialization by reducing consumption through alternative scenarios of product use and by closing material cycles (Mont, 2001).

Although a PSS could be a result of a company which is trying to improve its corporate identity, it could also be a respond the legislative threats or covenants with authorities to implement sustainable corporate practices. The legislation threat, covenants with authorities and green purchasing by authorities are considered to be eco-drivers for product-service systems according to Goedkoop et al. (1999). According to Mont (2001), a PSS has the potential to shift the business towards more sustainable practices. This could be achieved by integrating system elements juxtaposed with improving resource and functional efficiency of each element, which could reduce the environmental impact of consumption (Mont, 2001).

4.2.2 PSS

Product-Service System (PSS), is a concept originated in Northern Europe. According to Baines et al. (2007), most authors are from environmental, sustainability and ecological disciplines while contributors to the servitization literature mostly come from the design, engineering and manufacturing disciplines. Within the academic field of products-service systems different definitions for this concept have been used, from very extensive definitions to brief, limited and simple ones. A PSS could be defined as a marketable set of services and products capable of jointly fulfilling specific client needs (Mont, 2001; Tukker, 2003; Goedkoop, van Halen, te Riele, & Rommens, 1999). These product-service systems are either provided by a single company or a strategic alliance of companies (Goedkoop, van Halen, te Riele, & Rommens, 1999). According to Mont (2001) product-service systems replaced the traditional intensive ways of production utilization by fulfilling customer needs through the provision of more dematerialized services.

Figure 13 depicts the transition from the traditional way to product-service systems, or in other words the convergence to a product-service system. This convergence is stimulated by the servitization of products and the productization of services as shown in the model (Baines T. , et al., 2007). Figure 13 shows the evolution to a product-service systems based upon two trends, namely: servitization and productization. The previous chapter includes the concept of the former. The latter implies that productization is including a product in a service component or a new service component marketed as a product (Baines T. , et al., 2007). The evolution or the convergence of the two is the consideration of a service and product as a single offering, or in other words a product-service system (Baines T. , et al., 2007).

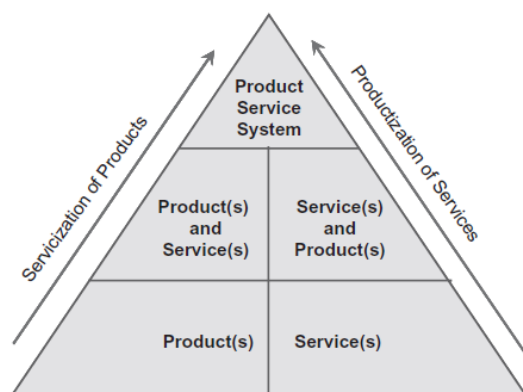


Figure 9 Evolution of PSS (Baines T. , et al., 2007)

A more extensive look on product-service systems is that these systems should be defined as a system of products, services, supporting networks and infrastructure that is designed to satisfy customer needs, have lower environmental impact and to be competitive (Mont, 2001). From a design perspective, a product-service system comprises the business

innovation focus shift from mainly product or mainly service design to an integrated product-service design strategy (Tukker, 2003). Sometimes the term product-service system is used in the servitization field not only to strengthen their own concepts, but used as a part of it. An example of this is that a product-service system is considered to be a mechanism or system that delivers advanced services and is seen a special case within the concept of servitization since it values asset performance rather than ownership and achieves differentiation through the integration of product and services that delivers value in use to the customer (Baines & Lightfoot, 2013; Baines T. , et al., 2007). Morelli (2003) considers a product-service system from three different perspectives, namely: traditional marketing, service marketing and product management. From a traditional marketing perspective it implies that a product-service system is derived from the shift from an entity, or product, that is reducible to its material component to an entity whereby the material and immaterial components are inseparable (Morelli, 2003). Secondly from a service marketing perspective, a product-service system is about offering targeted and personalized services instead of standardized services, whereby this evolution represents the shift away from mass production (Morelli, 2003). From a product management perspective and a traditional product-oriented business, it is about extending the service component around the product and from a service-oriented business about including a new service component marketed as a product (Morelli, 2003).

As mentioned before, researchers from both academic fields, i.e. product-service systems and servitization, utilize different elements of each other's concepts and/or make use of each other's terminology and definitions. From the servitization community a product-service system is defined as a combined service delivery system and a supplier system offering a solution involving both products and service element to deliver required functionalities (Baines & Lightfoot, 2013; Baines T. , et al., 2007). According to Baines & Lightfoot (2013), products are delivered through production systems, see Figure 14, while product-service systems provide capabilities, see Figure 15. In case of a production system, the manufacturer provides the technology and provisional servicing the technology in the field and the manufacturer is rewarded financially since the customer has to purchase the equipment (Baines T. , et al., 2007). A characteristic of this system is that the responsibilities of ownership lie with the customers, and when problems arise the customers performs some diagnostics before arranging/purchasing consumables, maintenance, repair or equipment disposal (Baines T. , et al., 2007). These services are often executed by the customers themselves, independent service providers or the OEM (Baines & Lightfoot, 2013). Baines & Lightfoot (2013) consider this production and consumption system a transactional-based business model. In this model, ownership is transferred to the customer and the revenue streams for the manufacturer are largely based around equipment/product sale and spare parts (Baines & Lightfoot, 2013).

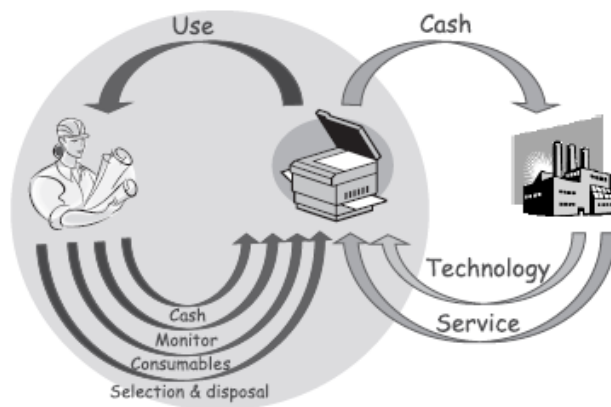


Figure 10 Production System (Baines T. , et al., 2007)

In case of a product-service system, ownership and associated responsibilities are not necessarily transferred to the customers, but the manufacturer provides a capability instead (Baines & Lightfoot, 2013). The manufacturer is in this case responsible for equipment selection, consumable provision, performance monitoring, servicing, e.g. maintenance and repair, and disposal services (Baines & Lightfoot, 2013). Baines & Lightfoot (2013) therefore conclude that advanced services are delivered through product-service systems. The business model in this case of a product-service system is not a transactional-based business model. It is referred to as a value in use business model since the manufacturer receives payments as customers use the provided capabilities, whereby the responsibilities for equipment performance lies with the manufacturers (Baines & Lightfoot, 2013).

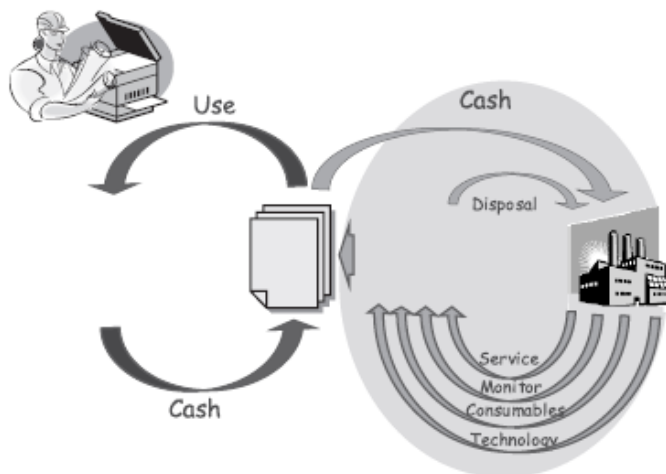


Figure 11 Product-service system (Baines T. , et al., 2007)

In our view however, advanced services are not delivered by any product-service systems. Advanced services could only be delivered through, for example, use oriented or result oriented product-service systems and not through integration, product and service oriented product-service systems. These product-service systems (integration, products and service-oriented) only includes a system/setup to provide basic product-related services. Elaboration on these different types of product-service systems can be found in Section 4.2.3. An example of how a PSS delivers an advanced service is illustrated in Figure 16. This figure shows the elements of a PSS, a service delivery system, the financial system and the supplier systems. This is an example in the rail industry whereby the customer, a train operator, is in need for availability and use of trains. The train manufacturer in this case sells the availability along with maintenance and support and the performance is monitored.

Consumables such as fuels are supplied by either the manufacturer or other partners. The train operator sells seats/tickets to transport passengers. The financial process here is that a financial partner provides funds to purchase the product and the customer pays regular revenue payments that reflect the usage. The customer also pays regular fees to the manufacturer for maintenance and repair.

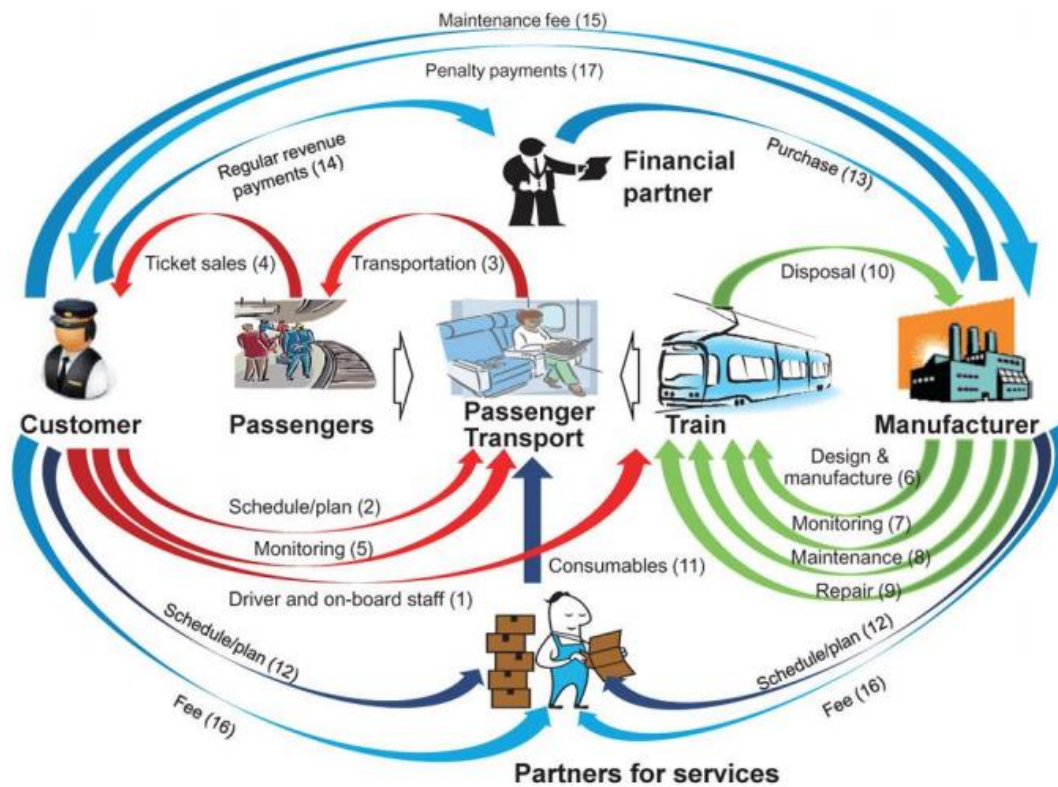


Figure 12 Interactions in a PSS delivering an advance service (Baines & Lightfoot, 2013)

Table 5 gives an overview of frequently used definitions for product-service systems.

Table 5 Product-service system definitions

Author(s) (date)	Definitions
Goedkoop et al. (1999)	A marketable set of services and products capable of jointly fulfilling specific client needs
Mont (2001)	A system of products, services, supporting networks and infrastructure that is designed to satisfy customer needs, have lower environmental impact and to be competitive
Tukker (2003)	Tangible products and intangible services designed and combined so that they jointly are capable of fulfilling specific customer needs.
Neely (2009)	An integrated product and service offering that delivers value in use
Baines & Lightfoot (2013)	A combined service delivery system and a supplier system offering a solution involving both products and service element to deliver required functionalities
Morelli (2003)	An entity whose material and immaterial components are inseparable, a targeted and personalized offering instead of a standardized one reflecting the shift away from mass production and extends the service component around the product for traditional product-oriented business and/or including a product-marketed service component or the other way around, including a product in a service component for service-oriented businesses
Baines et al. (2007)	A market proposition that extends the traditional functionality of a product by incorporating additional services whereby the emphasis is on the sale of use rather than the sale of product
(Opresnik & Taisch, 2015)	An integrated combination of products and services that deliver value to the customer

4.2.3 Types

The literature presents different types of product-service systems, varying from product-oriented, via use-oriented, to result-oriented product-service systems. Figure 17 depicts a frequently used model in the literature for product-service system categories. This figure also shows the different service types within each category identified by Tukker (2003).

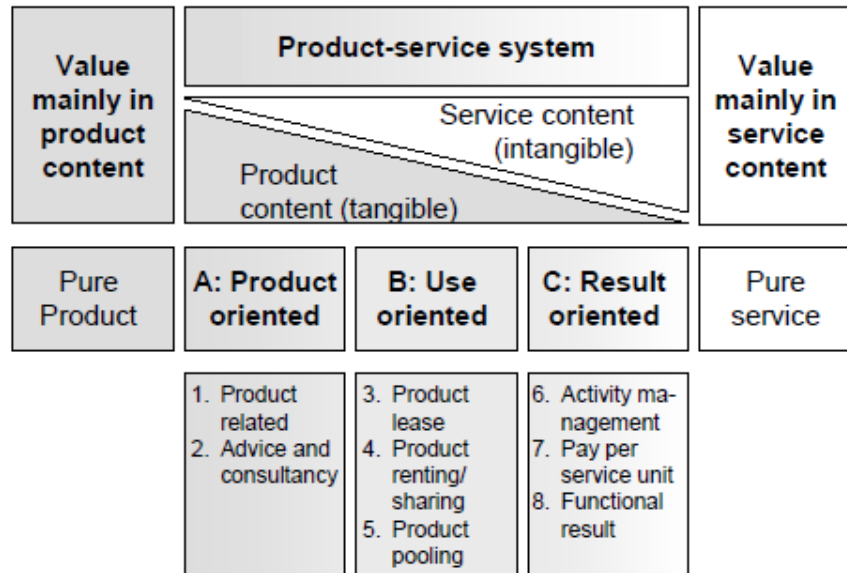


Figure 13 PSS categories (Tukker, 2003)

Basically, three product-service system types have been identified, namely: a product-oriented PSS, a use-oriented PSS and a result-oriented PSS. Besides these three categories, Tukker (2003) identified eight different service types, namely: product related, advice and consultancy, product lease, product renting/sharing, product pooling, activity management, pay per service unit and functional result services. Services often comprise basic service, such as installation, maintenance services to prolong the product lifecycle, and revalorization services aiming at closing the product lifecycle, such as take-back agreements (Mont, 2001).

- A product-oriented PSS encompasses product related and advice & consultancy services. The services provided are directly related and integral to the product. Different examples of services offered with this PSS are maintenance contracts, consumables supply, financing schemes, take-back agreements, design and development and installation services (Tukker, 2003; Neely, 2009; Baines T. , et al., 2007). Advice & consultancy service imply giving advice on the most efficient use of the product provided (Tukker, 2003). Within this system ownership is transferred to the customer. According to Baines et al. (2007), the services provided in this system are additional service to guarantee functionality and durability of the product owned by the customer.
- In a use-oriented PSS the ownership of the product will not be transferred. The provider sells the function, the use or the availability of the product (Baines T. , et al., 2007; Neely, 2009). The provider in this case, is responsible for the maintenance, control and the repair of the product, while the user pays a regular fee to lease, rent, share or pool the product (Tukker, 2003). Leasing the product will give the user unlimited access, while renting or sharing the product will not give the user unlimited access and with product pooling there is a simultaneous use of the

product (Tukker, 2003). The product utility is extracted by the user in this system and not by the provider (Mont, 2001).

- A result-oriented PSS encompasses the selling of a result or a capability, thereby doing away the need for a product by replacing it with a service (Baines T. , et al., 2007; Neely, 2009). In this PSS the ownership will again not be transferred to the customer. Thus, the customer does not buy the product, but it pays for the output of the product according to the agreed use level, in other words a pay-per-service unit (Tukker, 2003). Typical services in this system are activity management, pay-per-service unit and functional results. In this category, the provider extracts the product utility for the user (Mont, 2001).

In functional sales, the service provider decides how to fulfill the function that the customer wants, whereas in leasing the product used for the function specified by the customer and whereby in a renting model the product is even more linked to a specific physical product (Sundin & Bras, 2004). Since the product is not sold in the case of renting, leasing and functional sales, a contract should be constructed between the customer and the provider. When providing functionality, the provider becomes increasingly knowledgeable about the performance of the products during use and its lifecycle due to monitoring services (Sundin, 2009).

According to Neely (2009), the classification of only three types of product-service systems was not sufficient and identified two other PSS types, namely: integration-oriented and service-oriented product-service systems.

- An integration-oriented PSS consists of a product plus services, whereby the services are not directly related to the product as opposed to the services within a product-oriented PSS, and the ownership will be transferred to the customer (Neely, 2009). Examples of services could be retail and distribution, financial and transportation services.
- A service-oriented PSS is a system with coupled product and services, whereby these services are considered to be value added and differentiating (Neely, 2009). An example would be monitoring services, whereby the installed product will be monitored remotely and the customer be advised accordingly.

4.2.4 Challenges & barriers

Like servitization, designing, developing and delivering product-service systems can be challenging. Companies trying to setup these types of product-service systems will face a lot of barriers which they have to overcome. Many of the challenges for servitization also apply for setting-up products-service systems.

The transition towards PSS implies a change in how the company is going to create value, produce, distribute and approach clients (Goedkoop, van Halen, te Riele, & Rommens, 1999). From a company perspective, a shift/change in corporate culture and organization is required to support the service oriented business (UNEP, 2002). This required shift in culture, is considered to be one of the most challenging barriers. Knowledge and experience may be insufficient for service design methods and tools or skilled personnel in service development and provision may be absent (UNEP, 2002). Going towards a service orientation will most likely result in conflicts with the current business orientation. In order to overcome these conflicts, e.g. internal procedures, reporting methods and accounting methods, service management systems should be in place (UNEP, 2002). Barriers could occur in the design, development and delivery phases of product-service systems since it now incorporates service in the design, development and delivery of a PSS. This could also be due to the lack of experience and know-how to design a PSS (UNEP, 2001). Also consumers may not be enthusiastic about losing ownership, and the manufacturer may be concerned with pricing, absorbing risks and shifts in the organization, which requires time and money to facilitate (Baines T. , et al., 2007).

The challenges for product-service systems are also dependent on the type of PSS. The more the PSS moves to a result-oriented PSS the more challenging it becomes. It then needs to be able to develop a PSS ready for selling functionality and needs to develop the capability of guaranteeing this functionality. Besides, the company now needs to be bear the financial risks since ownership will not be transferred. What is specific for PSSs is the challenge to design closed-loop systems (Mont, 2001). As mentioned before, the concept of PSS is motivated by environmental and sustainability arguments. A closed-loop system in this case implies that when a product reaches its end of life, the manufacturer takes it back, reuses it, upgrades it, decommissions it or recycles it. This means that the provider has a very high responsibility for the product's lifecycle, from the beginning of it till the end of it (Mont, 2001). This also means that the provider needs to be able to collect these products and be able to remanufacture or recycle these products.

4.3 New Service Development

An advanced service is an outcome focused on the delivery of a capability through performance of the product (Baines & Lightfoot, 2013). This capability is a package of products and services and is delivered through Product-Service Systems. Servitization involves, among other things, the innovation of the service offerings, or in other words the development of new services. Often the development of services, which are for example used for supporting the product during its lifecycle, does not start simultaneously with the development of new products. Traditionally, product-centric manufacturers do not incorporate service in their product design and development (Wiesner, Freitag, Westphal, & Thoben, 2015).

Product Lifecycle Management (PLM) covers the whole lifecycle of a product from the first idea and concept to recycling and disposal (Wiesner, Freitag, Westphal, & Thoben, 2015). Three lifecycle phases have been identified, namely Beginning of Life (BoL), Middle of Life (MoL) and End of Life (EoL), as show in Figure 18. BoL refers to converting ideas into detailed product specifications, while realization refers to using these detailed product specifications to manufacturer the product to its final form (Wiesner, Freitag, Westphal, & Thoben, 2015). When this product is in the hands of the customer and when it is in use by the customer, the product goes into the MoL phase and needs support from the manufacturer for maintenance. When the product is at the end of its lifecycle, it loses its usefulness and the product goes into the final phase, the EoL. In this phase, the product is retired or upgraded or disposed by the manufacturer or even used for reuse or recycling (Wiesner, Freitag, Westphal, & Thoben, 2015).

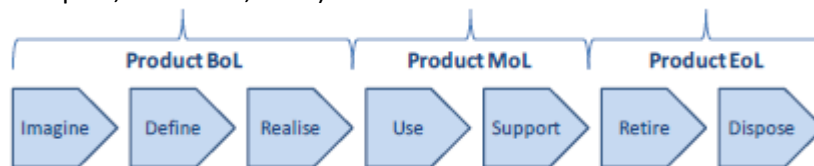


Figure 14 Product Lifecycle Management (Wiesner, Freitag, Westphal, & Thoben, 2015)

Service Lifecycle Management however includes three main phases, service creation, service engineering and service operations (Wiesner, Freitag, Westphal, & Thoben, 2015).

- Service creation comprises service ideation and the transformation of these ideas into service requirements based on market and technical requirements (Wiesner, Freitag, Westphal, & Thoben, 2015).
- The service engineering phase is considered as the starting point for new service development. In this phase, the service is designed, based on the requirements, developed, implemented and tested.
- The final phase, includes service delivery and service evolution, which implies evolution of the service portfolio and controlling the service operations (Wiesner, Freitag, Westphal, & Thoben, 2015).

The most common situation in the manufacturing industry is that Service Lifecycle Management follows Product Lifecycle Management and that SLM is neither aligned with PLM nor integrated (Wiesner, Freitag, Westphal, & Thoben, 2015). In case of integration, both lifecycles are managed in a highly integrative way and is a necessity/prerequisite to effectively realize a Product-Service System, where the components, products and services, are blurred into a holistic solution (Wiesner, Freitag, Westphal, & Thoben, 2015). Wiesner et al. (2015) introduced a Product-Service System Lifecycle model which includes a high level of integration of PLM and SLM, as shown in Figure 19. In this process, it does not start with a focus on a product or a service, but on a certain capability, or even better it targets the PSS

as a holistic solution (Wiesner, Freitag, Westphal, & Thoben, 2015). Then the requirements for the holistic solution should be defined. Subsequently, the design process of both product and service should start simultaneously. The PSS Middle of Life phase comprises the manufacturing of the product as well as implementation of service and this happens separately (Wiesner, Freitag, Westphal, & Thoben, 2015). Testing should take place in order to ensure the compatibility of both, and if this is the case then the solution can be delivered to the customer. After the delivery of the PSS to the customer, it should be supported to ensure functionality and capability. Finally, in the End of Life phase, when the PSS is losing its functionality, the decision for upgrading or decommissioning should be made.

A nice example is an advanced service where a capability is delivered through performance of the product and is proactively supported and maintained during its lifecycle. In order to proactively support the functionality of a product, the product should be equipped with the technology to make this service possible, e.g. remote maintenance or condition monitoring. The design process of a new service should therefore be integrated with the design process of a new product in order to develop a PSS which is capable of delivering functionality and availability.

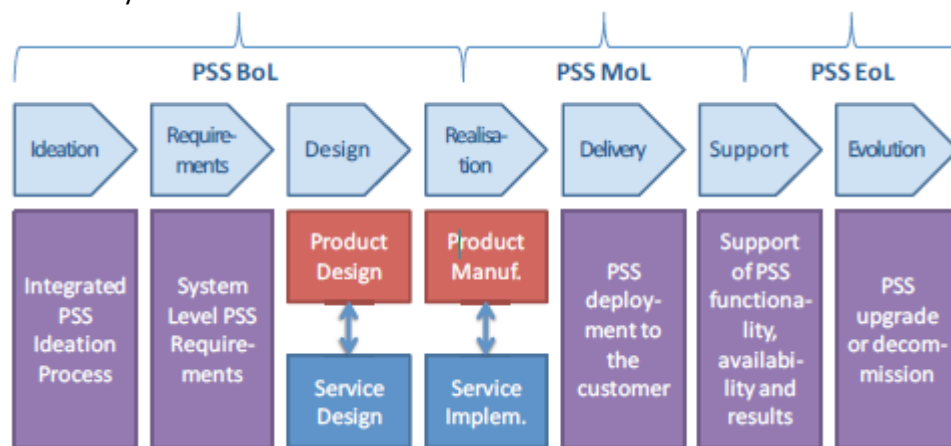


Figure 15 Product-Service System Lifecycle Model (Wiesner, Freitag, Westphal, & Thoben, 2015)

4.4 Service Transition

To make the transition from products to services, a lot of steps need to be taken. This transition does not happen overnight and presents a lot of challenges. It constitutes major managerial challenges and requires new organizational principles, structures, processes and capabilities in order to become a service provider (Oliva & Kallenberg, 2003). In a sample of 10827 manufacturing firms globally, 29.52% offered a combination of products and services, whereby maintenance and support services represented 11.92% of the sample and is the fourth most common service offering (Neely, 2007).

According to Oliva & Kallenberg (2003) the transition from products to services occurs in stages whereby each stage has its own set of issues and challenges. Figure 20, presents a simplified model of this transition process.

- The first step is consolidating the product-related service offering. In this stage, the manufacturing firms provide services to sell and support the products whereby the consolidation of the service offering is accompanied by the initiative to improve efficiency, quality and delivery time of the services provided (Oliva & Kallenberg, 2003). Consolidating the product-related services are often triggered by customers' complaints, or driven by outperforming the competition, whereby these services need to be monitored in terms of effectiveness and efficiency in order to improve the efficiency, quality and delivery time of the services (Oliva & Kallenberg, 2003). Examples of these transactional-based services are documentation, transportation, installation, repair, and spare parts.
- The second step is entering the installed base. A product's installed base (IB) is the total number of products currently under use. The installed base services is a range of product- or process-related services required by the customer, or the end-user, over the useful life of a product in order to run it effectively in its operating process (Oliva & Kallenberg, 2003). It implies identifying a profit opportunity during a product's lifecycle, while setting up the required structures and processes in order to exploit the opportunities (Oliva & Kallenberg, 2003). Products may require different services in different phases of the lifecycle. The first phase of the lifecycle is often accompanied with installation services and training & education services, while in the next phase mainly maintenance and upgrading services are performed. The services provided in the final phase are often recycling, decommission or taking-back services. This second step presents two major challenges. The required cultural change to a service-oriented culture is one and the second one is the difficulty to create a global service infrastructure that is capable of responding locally to the IB (Oliva & Kallenberg, 2003). According to Oliva & Kallenberg (2003) a critical success factor is setting up a separate service unit which takes care of the service offerings. The study of Oliva & Kallenberg (2003) pointed out that firms that ran their own service organization as a separate business unit with profit-and-loss profitability, were the most successful firms in extracting value from the IB.
- Step three involves expanding the IB service offerings. This expansion implies changing from transactional-based services to relational-based services. Examples of services for basic installed services, or transactional-based services, are documentation, transportation, installation, repair, spare parts, upgrades/updates and recycling. When long-term relationships are formed, more detailed knowledge of the application will be gained, which could lead to a stronger position of the manufacturer since it now has a better understanding of the customer's business

requirements (Baines & Lightfoot, 2013). Relational-based services are centered around the product often take the form of maintenance contracts priced in terms of response time and availability, whereby these contracts reduce the variability and increase the predictability of the demand over the installed base capacity (Oliva & Kallenberg, 2003). In other words, it changes the way services are priced, from pricing based on time and material to fixed prices covering all services over an agreed period (Oliva & Kallenberg, 2003). Relationship-based services include services like preventative maintenance, spare parts management, condition monitoring and full maintenance contracts. Although placing condition monitoring under relationship-based services is questionable since valuable data could be gathered via monitoring the used and the condition of the equipment in the end-user's process and this information could be used in order to improve the product's efficiency and effectiveness within the end-user's process.

- Step four, the change on the other dimension, implies shifting from product-oriented services to end-user's process-oriented services and it presents big challenges. It changes the focus from product efficacy to the product's efficiency and effectiveness within the end-user's process, whereby the product is not the center of the value proposition anymore (Oliva & Kallenberg, 2003). According to the study of Oliva & Kallenberg (2003) it presents challenges in setting up a professional service infrastructure, as well as developing management capabilities supporting the service network, and it presents challenges in setting up new networks with new distribution channels. End-user's process-oriented services are highly professional services, e.g. optimization and simulation, requiring very specific knowledge and capabilities to provide these kinds of services which improve the efficiency and effectiveness end-user's process.
- The final step is taking over the end-user's operations. In this case, the transition from a product manufacturer to a service provider is complete. Now operational services are provided which includes taking over end-user's maintenance or operating organization, whereby the transitioning manufacturing firm assumes operating risk and takes entire responsibility of the end-user's process (Oliva & Kallenberg, 2003). This final step goes hand in hand with exploring uncharted territory and this is often the reason for manufacturers not to initiate the step of becoming a pure service provider and to take over the end-user's operations (Oliva & Kallenberg, 2003).

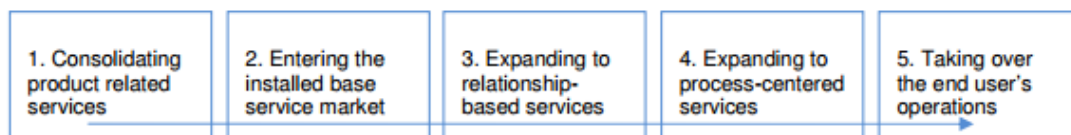


Figure 16 Development towards integrated solutions (Turunen & Finne, 2014)

The services provided in all of these five steps along the two dimensions are visualized in Table 6.

Table 6 The IB service space (Oliva & Kallenberg, 2003)

	Product-oriented services	End-user's process-oriented services
Transaction-based services	<i>Basic installed base services</i> Documentation Transport to client Installation/commissioning Product-oriented training Hot line/help desk Inspection/diagnosis Repairs/spare parts Product updates/upgrades Refurbishing Recycling/machine brokering	<i>Professional services</i> Process-oriented engineering (tests, optimization, simulation) Process-oriented R&D Spare parts management Process-oriented training Business-oriented training Process-oriented consulting Business-oriented consulting
Relationship-based services	<i>Maintenance services</i> Preventive maintenance Condition monitoring Spare parts management Full maintenance contracts	<i>Operational services</i> Managing maintenance function Managing operations

However, these services could even be segmented even further. End-user's process-oriented services could be split into services that support the use in the customers' processes (SSCP) and services that support customers' business (Turunen T. , 2011). Services that support the use in the customers' processes have the purpose to ensure the optimal and correct usage of the product in its operational environment while services supporting the customers' business have the purpose to enable the growth and success of customers' businesses (Oliva & Kallenberg, 2003; Paloheimo, Miettinen, & Brax, 2004). The services supporting the customers' business are directed at the equipment customer's ability to conduct their business optimally, such as plant availability, plant optimization, equipment financing, asset management, financial solutions and consultancy (Paloheimo, Miettinen, & Brax, 2004; Turunen T. , 2011).

This transition is more than just an increased emphasis on service and is also a matter of perspective (Kowalkowski, 2010). This shift in perspective is a shift from a goods-dominant logic, a G-D logic, to a service-dominant logic, a S-D logic. A G-D logic assumes that economic value is added through industrial processes, embedded in goods, distributed, and then realized in exchange in a transactional way (Kowalkowski, 2010). In other words, this is referred to as value-in-exchange (Kowalkowski, 2010). Through the years, the perspectives have changed from a focus on tangible resources, embedded value and transactions to the focus on intangible resources, the co-creation of value and relationships (Vargo & Lusch, 2004). In this service-centered dominant logic the role of the customer and the role of the goods have changed. The customer in this perspective is the co-producer of the service whereby the value of the service is perceived and determined by the customer as value-in-use instead of value-in-exchange and the goods are seen as distribution mechanisms for service provision (Vargo & Lusch, 2004; Kowalkowski, 2010).

To sum up, the transition from a manufacturer to a service provider present big challenges and several steps need to be taken. The first step is to consolidate product related services and the second step is to enter the installed base. Step three and four implies expanding the

services to relationship-based services and process-centered services, or services supporting the use in the customer's process or services supporting customers' businesses. The final step that could be taken is taking over the end-user's operations. The transition implies more than just an increased emphasis on service. It also implies a shift from a goods-dominant logic to a service-dominant logic. Next to an increased emphasis on services, it also encompasses co-creation of value and relationships. Besides this, it encompasses a shift in service valuation from value-in-exchange to value-in-use. Challenges present themselves in the form of cultural change, setting up professional service infrastructures and the development of management capabilities.

4.5 Value Propositions

Servitization affects a manufacturer's business model. It is a move from a product-based business model towards a service-based business model. When making this move, a manufacturer needs to focus on all elements of their business model in a holistic way, and not just changing isolated elements (Kindström, 2010). A business model describes the rationale of how an organization creates, delivers and captures value (Osterwalder & Pigneur, 2009). Servitization completely changes the way how an organization creates, delivers and captures value, and thus changes a manufacturer's business model. A business model can best be described with 9 building blocks, see Figure 21, namely: customer segments, value propositions, channels, customer relationships, revenue streams, key resources, key activities, key partnerships and cost structures.

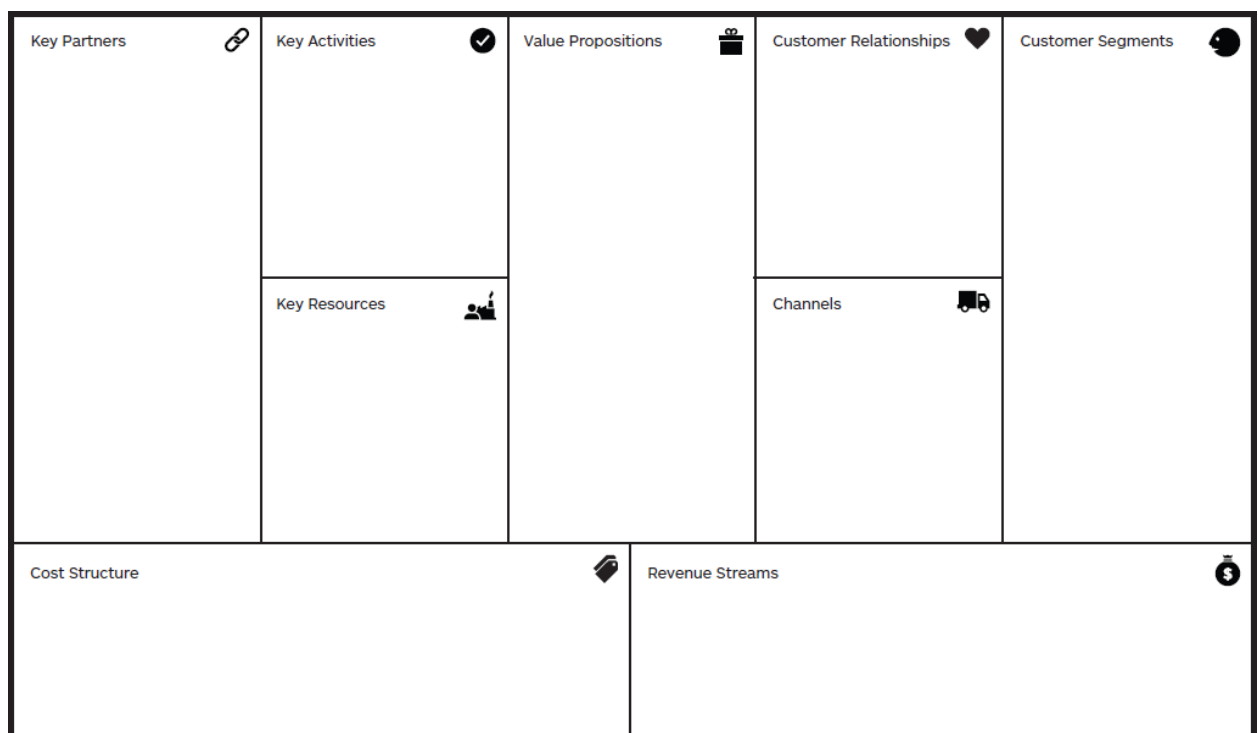


Figure 17 Business model canvas (Osterwalder & Pigneur, Business Model Generation, 2009)

A value proposition visualizes the value of their offerings for the customers. These propositions seek to solve customer problems and satisfy customer needs, and are based on a bundle of products and services that create value for a specific customer segment (Osterwalder & Pigneur, Business Model Generation, 2009; Osterwalder, Pigneur, Bernarda, & Smith, 2014). So in other words, a value proposition is an aggregation of benefits that companies offer to customers (Osterwalder & Pigneur, Business Model Generation, 2009). A shift towards service-based business model changes the value proposition building block. The servitizing manufacturer in this case, should develop the ability to promote, explain and visualize service-intensive value propositions and thus the ability to visualize the intangible value of their service offerings for their customers (Kindström, 2010). A value proposition is aimed at a specific customer segment. In order to specify customers, customers can be grouped into distinct segments with common needs and behaviors or other attributes (Osterwalder & Pigneur, Business Model Generation, 2009). The goal is to create a fit between a value proposition and a specific customer segment. Therefore, a key capability is the ability to offer a dynamic service offering which is adaptive to changing customer needs and can reach all potential customers (Kindström, 2010).

A fit is achieved when the value proposition addresses important jobs, alleviates extreme pains and creates essential gains for the customer and striving for a fit should be the essence of value proposition design (Osterwalder, Pigneur, Bernarda, & Smith, 2014).

The value proposition canvas, as shown in Figure 22, zooms into two building blocks of the business model, the value map and the customer profile, and can be used for designing a value proposition to create a fit between the two (Osterwalder, Pigneur, Bernarda, & Smith, 2014). The value (proposition) map can be broken down into products & services, gain creators and pain relievers. A gain creator describes how the manufacturer intends to produce outcomes and benefits that the customer expects, desires, or would be surprised by with products and services in order to create customer gains (Osterwalder, Pigneur, Bernarda, & Smith, 2014). Pain relievers however, show how the products & services take away customer pains. In a value proposition, it should be explicitly outlined how the products & services intend to eliminate or reduce some of the things that annoy the customer before, during or after they are trying to complete a job or prevent them from doing so (Osterwalder, Pigneur, Bernarda, & Smith, 2014). The customer (segments) profile can be broken down into customer jobs, gains and pains. A customer job is the thing a customer tries to get done (Osterwalder, Pigneur, Bernarda, & Smith, 2014). According to Osterwalder et al. (2014), the customer can be a buyer of value, a co-creator of value whereby the customer participates in the design process or a transferrer of value whereby it tries to transfer it to others for example. Customer pains are the things which give the customer a headache. Customer pains are everything that annoys the customers before, during, and after trying to get a job done or simply prevents them from getting a job done, e.g. risks, obstacles and undesired outcomes (Osterwalder, Pigneur, Bernarda, & Smith, 2014). Customer gains are the things which makes the customer happy. So the gains are the outcomes and benefits a customer want (Osterwalder, Pigneur, Bernarda, & Smith, 2014). According to Osterwalder et al. (2014), gains can either be required, expected, desired or unexpected. Required gains are gains without which a solution wouldn't work, while expected gains are relatively basic gains which are expected (Osterwalder, Pigneur, Bernarda, & Smith, 2014). Desired gains go beyond what was expected, while unexpected gains even go beyond expected and desired gains (Osterwalder, Pigneur, Bernarda, & Smith, 2014).

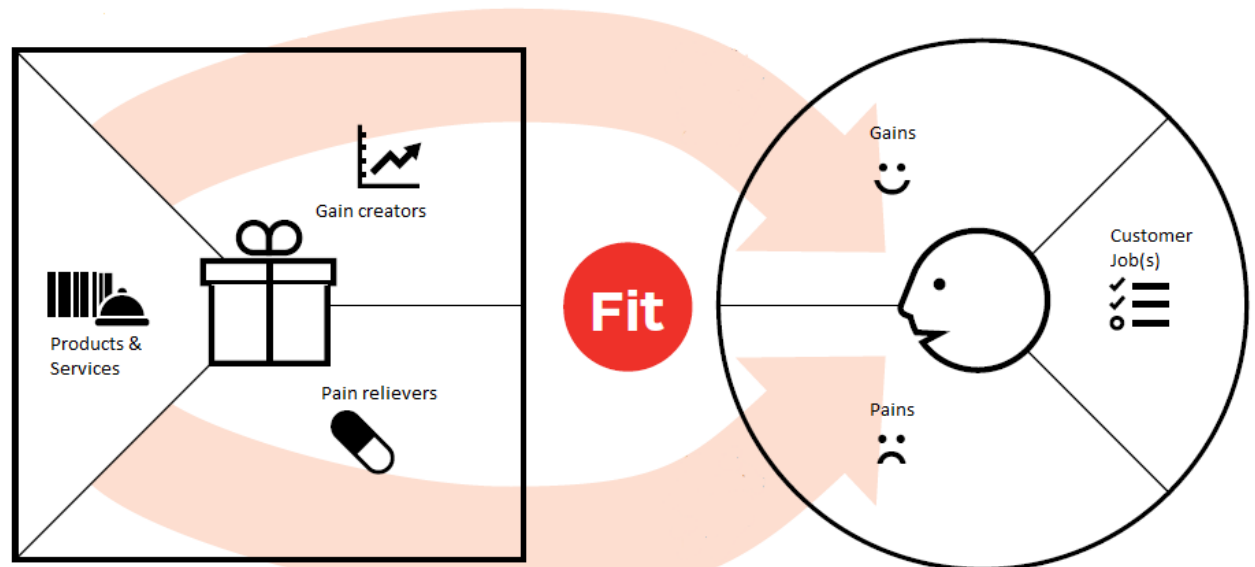


Figure 18 The value proposition canvas (Osterwalder, Pigneur, Bernarda, & Smith, 2014)

It is impossible for an organization to address all the pains and gains of a customer. An organization therefore, should focus on addressing the essential pains and gains in order to create a fit between the value proposition and the customer. According to Osterwalder et al. (2014), there are three kinds of fit:

- Problem-solution fit
- Product-market fit
- Business model fit

A problem-solution fit means that it is plausible that the value proposition addresses the essential pains and gains of the customer. It is a fit on paper, and thus not tested for traction in the market. A product-market fit is achieved when the value proposition gets traction in the market. It means that the organization has found evidence that the products and services are actually creating customer value and it's getting traction in the market (Osterwalder, Pigneur, Bernarda, & Smith, 2014). A business model fit not only occurs when the value proposition gets traction in the market, but when the value proposition can be embedded in a profitable and scalable business model (Osterwalder, Pigneur, Bernarda, & Smith, 2014).

4.6 Conclusions for thesis

In this chapter, conclusions regarding the topics/elements of particular interest for this thesis will be drawn and discussed. Elements of servitization (a), service transition (b) and product-service systems (c) are used to construct a framework. This process is visualized in Figure 23. This framework is constructed in order to assess the current business orientation and to determine the steps needed to make the transition towards a service-oriented business.

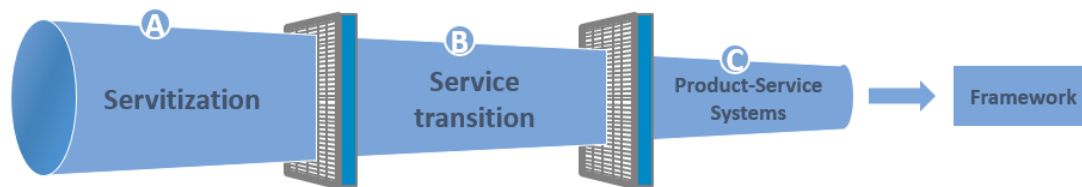


Figure 19 Framework development

According to Baines & Lightfoot (2013), in order to servitize a manufacturer needs to develop advanced services. These advanced services need to be supported with the right structures, infrastructures and processes. An advanced service is an integration of products and services in order to provide & sell capabilities/functionalities. Base services (focused product provision) and intermediate services (focused on maintenance of product condition), are combined with products and offered to the customer as a single offering. This single offering is an advanced service, an outcome focused on capability delivered through performance of the product. An advanced service often consists of a revenue-through-use financial system, risk and revenue sharing contracts and/or rental agreements.

According to Oliva & Kallenberg (2003), the transition of a manufacturer to a service-oriented business happens in five steps. The difference with servitization however, is that there is not a focus on integrating products with services, but on differentiating the service offerings. In these five steps, the consolidation of product-related services and the development and expansion to relationship-based – and process-centered services is included. In this transition another step is to enter the installed base. It means identifying opportunities during a product's lifecycle to address with services, while setting up the required structures and processes in order to exploit these opportunities (Oliva & Kallenberg, 2003). The final step for a manufacturer to become a pure service provider is to take over the end user's operations. This is, according to Oliva & Kallenberg (2003), often uncharted territory for manufacturers. This is often a reason for manufacturers not to initiate this final step to become a pure service provider.

A Product-Service System can be thought of as comprising a service delivery system (i.e. the operations of the manufacturer), plus any financial systems (i.e. financial leasing) and supplier systems (i.e. supply of consumables) (Baines & Lightfoot, 2013). Five types of PSSs are identified, each with its own features, elements and mechanisms to support an integrated product-service offering. The five consecutive PSSs types: integration-oriented, product-oriented, service-oriented, use-oriented and result-oriented. All of these different types of PSS have their own service types. Often, new service development is not included in new product design. Developing a PSS capable of delivering functionality and availability requires alignment of new service design with new product design. In this way, it does not start with a focus on a product or a service, but on a certain capability, or even better it targets the PSS as a holistic solution (Wiesner, Freitag, Westphal, & Thoben, 2015).

Each concept described above has its own elements, features and systems. Thereby, these different concepts identified and categorized different types of services. However, they all represent the transition process towards a service-oriented business. The coherence between these concepts is visualized in Figure 24 (also see Appendix I). This framework is a result of a combination of findings from different concepts. It is developed in order for manufacturers to assess the current business orientation and to determine the steps to make the transition towards a service-oriented business possible. By aligning the concepts into one framework a manufacturer can now easily plot and categorize its service business/portfolio. An assessment of the current service offerings determines, among other things (e.g. culture, setup and strategy), the business orientation (product-oriented or service-oriented). This assessment can then be used to determine which steps need to be taken, which types of services need to be developed and which systems need be set up in order to make the transition towards a service-oriented business.

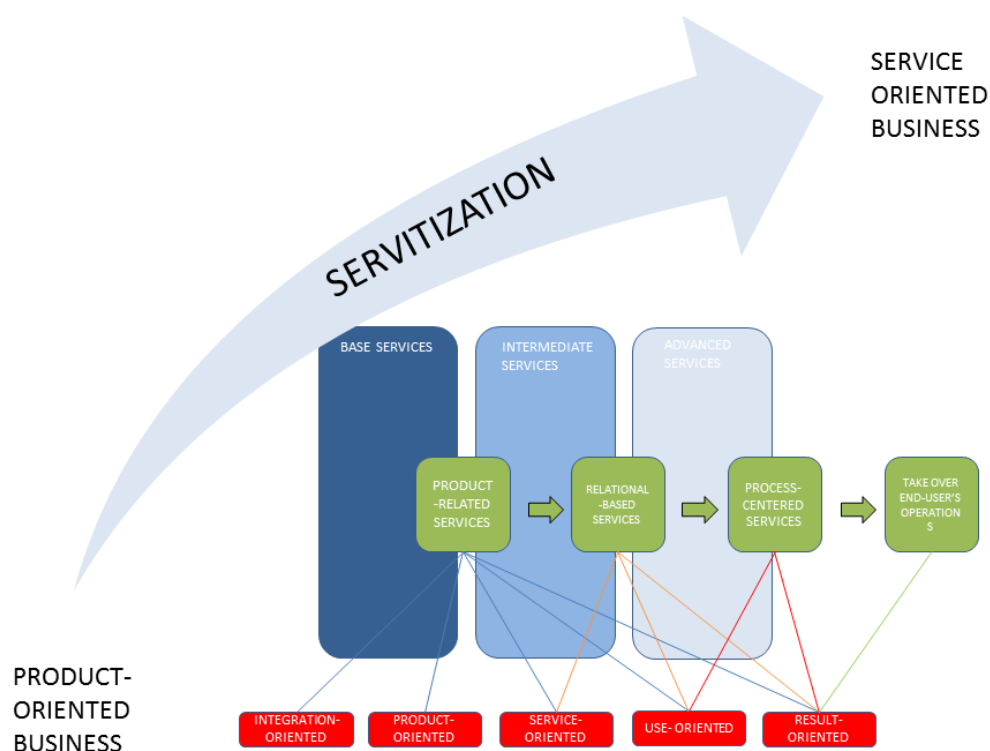


Figure 20 Servitization framework

5. Internal documents

This chapter includes the results retrieved from internal documents and describes the product and service portfolio, market segmentation, the customer's pains and gains and the jobs to be done. It is however excluded in the public version since it contains company sensitive content. General findings which do not implicate the company are shared in this chapter.

5.1 Conclusions for the public thesis

In this chapter general conclusions are given. The constructed framework (A) is used to plot the current service portfolio (B). This process is visualized in Figure 29.

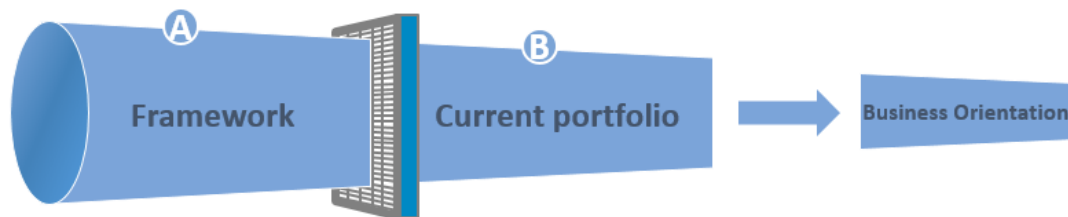


Figure 21 Process

This assessment shows a snapshot of the current business orientation and shows what is currently missing in the service portfolio in order to become a service-oriented business.

A visualization of the current service portfolio, in accordance with the servitization framework presented in Figure 24, is depicted in Figure 30. It is a snapshot of the current service portfolio. The dotted lines in this figure imply that advanced services are not part of the portfolio (pay-per-use contracts, risk & revenue sharing contracts and rental agreements).

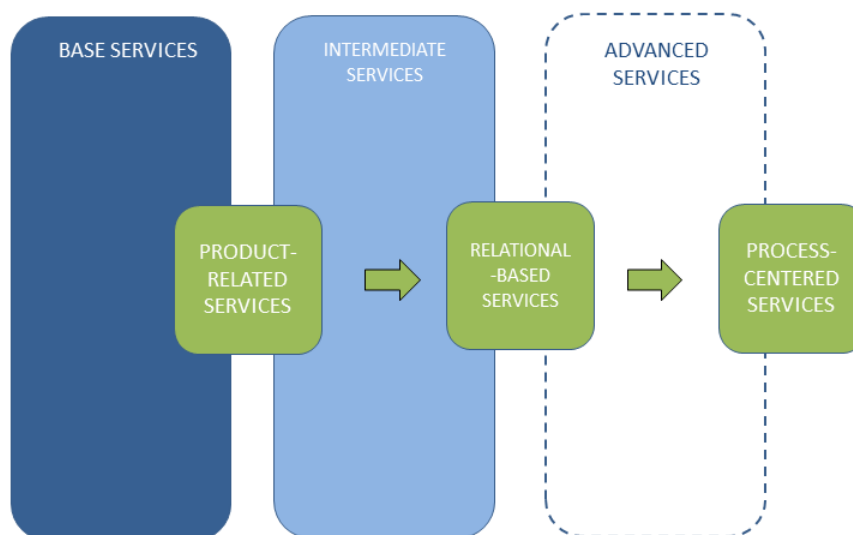


Figure 22 Service Portfolio Plot

6. Interviews

This chapter only includes general results retrieved from interviews regarding the product and service portfolio, value propositions and market challenges & barriers suitable for public viewing. Based on the business orientation as discussed in Section 5.4.1 and the interviews, an Advanced Service model is constructed.

6.1 Conclusions for the public thesis

In this section, general conclusions regarding the portfolio, value propositions and market challenges & barriers are drawn. Company sensitive content is removed.

The advanced service model, presented in Figure 11, is applied to the company's portfolio. And together with the results from the interviews, an Advanced Service Model is developed. It does not only show the application of the advanced services model on the company's portfolio, but also the opportunity for advanced services. Based on the characteristics of the portfolio, certain elements of the original model have been left out and certain elements are added. The constructed Advance Service model is therefore a bundle of products and services covered in a multi-year agreement featuring regular instalments covering both the asset lease and the associated services.

The value propositions are based upon the segment and service category characteristics and are used to target different customer segments. These value propositions are a fit on paper and not tested for traction in the market. This is a so-called problem-solution fit as explained in Section 4.5. In other words, it means that it is plausible that these value propositions address the essential pains and gains of the customer.

In general, one market is very product-oriented since the focus is only on selling product-related services and a few relational-based services, while the other market is a more service-oriented business. This market focusses more on relational-bases and process-centered services and therefor has a more service-oriented focus.

7. Conclusions & recommendations

This chapter includes the conclusions suitable for public viewing.

7.1 Conclusions

The readiness for the company to servitize overnight is limited. Limitations to servitize does not necessary mean that no advancements in the direction of a more service-oriented business can be made.

In order to make the transition towards a service-oriented business, a servitization framework has been developed, see Figure 42 and Section 4.6. This framework is based upon different concepts and is result of a combination of findings/elements of these concepts. These concepts all represent in its way the process towards a service-oriented business. This framework is developed in order to plot a company's current service portfolio and to assess the current business orientation. Product-oriented versus service-oriented. With this assessment it is then possible to determine the steps the company must take to make the transition towards a more service-oriented business.

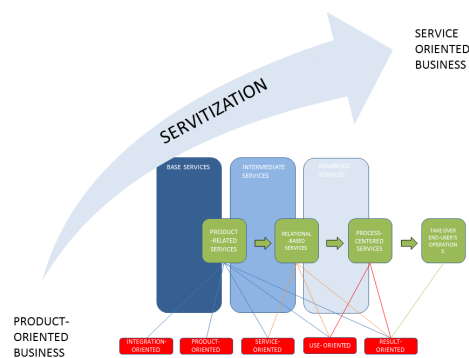


Figure 42 Servitization framework

The current company's service portfolio is assessed and plotted on the constructed framework. This assessment shows the presence of base -, intermediate -, product-related -, relationship-based -, and process-centered services. It also clearly shows the absence of advanced services. The current business orientation differs per country and is largely dependent on the portfolio and the focus. The company in one market has a very product-oriented focus. It lacks a service focus and is a very product-oriented market resulting in focus only on selling base - and product-related services and on selling parts of their service agreement portfolio. The company in another market however, is a more service-oriented business. This results in a focus on base-, intermediate-, product-related services, the full service agreement portfolio and process-centered services.

In order to move the business towards a more service-oriented business, advanced services need to be developed. An Advanced Service model is constructed and proposed, see Figure 43 and Section 6.1.2.1. This model is a comprehensive package of products and services and should be sold as a single offering. These advanced services should contain a financial model not based on pay-per-use, but should feature regular instalments covering asset lease, spare parts supply, consumables and services.

The combination of an segment and the service category together with the Advanced Service Model helps to build value propositions that resonate with the target segments and their pains & gains. The value of this offering is that it addresses the customer pains and

gains with one single offering. The constructed value propositions address different customer needs. It lowers the initial upfront capital expenditures. Thereby it increases the predictability of costs during the agreed period of time. Therefore, it helps the customer to control for costs and supports the customer to focus on their core business.

Offering advanced services requires cross-functional integration since advanced services contain a package of products and services, and not products or services. This comprehends a shift from selling separate products and services via two different sales channels towards selling integrated sets of products and services via one sales channel.

7.2 Recommendations

Market research is needed to investigate the willingness of customers to give up ownership. Another aspect that needs to be investigated is whether a financial model with regular payments is seen as value adding.

8. Limitations

Every research has its limitations. The constructed servitization framework is constructed upon the basis of the findings in the literature. Different concepts have been used for this framework and therefore it could impact the validity of the constructed framework. In this research the method of data collection has been explicitly chosen for qualitative interviews to get qualitative information/insights and not quantitative data. Due to a lack of time, conducting more market interviews was not possible. More market interviews could have led to a fuller overview of market challenges, barriers and enablers for servitization. Another limitation is the lack of qualitative and direct information from hospitals. This information could have been used to get a complete picture on how servitization impacts hospitals and if hospitals are willing to give up ownership and to pay regular instalments. Thereby, this research has been conducted in a period of 6 months which is too short to get a full and complete overview of the complete business. All of this together impacts the validity of the conducted research.

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Appendix

Appendix I: The servitization framework

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