

# Classification of PS offerings

## Master thesis Business Administration

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## Preface

This report is the result of my graduation project for the Business Administration master – Service and Change management at the university of Twente. Ever since Bart Nieuwenhuis talked about servitisation during a guest lecture, this concept peaked my interest. I was happy to hear a servitisation thesis project was available. At first this servitisation project was set out at the printers and copiers unit of Canon/Océ. After an inspiring conversation with a strategist of Canon/Océ the outlines of the master thesis project became clear. The focus would lie on classifying the product and service offering in order to determine the servitisation position and development. Unfortunately, after some months, Canon/Océ withdrew their servitisation assignment. However, the research that I already conducted and the information gained through conversations with employees of Canon/Océ didn't go to waste. The servitisation project could continue with little changes. Instead of using the model as a tool to analyse PS offerings at a specific firm, this research focuses on evaluating the model on its usage to classify PS offerings at different firms. Although these changes during the execution of the research caused uncertainties about the direction of the project, I did learn a lot about servitisation and the dynamics of projects: exactly what I was aiming for in the first place.

Writing this research thesis would not have been possible without the help of others. Therefore I would like to use this part to thanks some persons in particular. First, I would like to thank Bart Nieuwenhuis, my first supervisor, for his expertise on the concept of servitisation and his practical outlook on this project. In addition I would like to thank Celeste Wilderom, my second supervisor, for her detailed feedback to improve my research and helpfulness to guarantee my graduation before 2015. Further, I would like to thank Martin Leppen for listening and advising me on problems I encountered during this research and also providing me with feedback. Finally, I would like to thank my parents, sister and brother in law for supporting me during this research.

Susan Grouve

Enschede, December 2014



## Management summary

This present research focuses on classifying PS offerings, based on the concept of servitisation. This topic is chosen, because servitisation is an attractive movement for manufacturing firms and the suitability of PS offerings is important for the success of servitisation.

This present research selects and analyses a classification model for PS offerings, which provides insight to the current servitisation position, based on the offering. This analysis is executed using the multi-dimensional classification model of Gaiardelli et al. (2014). The following research questions is addressed in this present research:

*“How can PS offerings be classified, based on the concept of servitisation?”*

By conducting a literature study more knowledge is acquired about the concepts of servitisation and PS offerings. Also, several classification models for PS offerings from the literature are described. This leads to the selection of the multi-dimensional classification model of Gaiardelli et al. (2014) to be further examined in this research. This selected classification model incorporates the most frequently used dimensions according to the literature, namely *PS offering orientation* (consisting of the dimensions *product ownership*, *product use* and *product decision making*), *PS offering focus* and *nature of interaction*. Due to the combination of multiple popular dimensions, this classification model offers an extended view on the classification of PS offerings. Gaiardelli et al. (2014) have placed 30 specific PS offerings into their model, which provides a detailed mapping tool of the PS offering of a firm. By plotting the current PS offering of a firm into the model and differentiate between the PS offerings, based on package bundles, partnerships, customer groups and different performance indicators, detailed information is generated regarding the firm's servitisation position. In general the model intends to help managers to describe and compare existing PS offerings, while interpreting and evaluating their differences.

In order to apply the classification model, this research uses a survey strategy to conduct structured interviews at three different firms, namely Alcast, Nedap and TMSi. During these structured interviews the 30 PS offerings described by Gaiardelli et al. (2014) are discussed, based on possible bundles, and graded by the respondents, based on different performance indicators. The firm-specific collected data is illustrated in the classification model to determine the current position of the PS offerings, based on the stated servitisation strategy.

Furthermore, the insights and experiences obtained by applying the classification model at the different firms are discussed and evaluated. This research elaborates on different aspects of the model, namely: the dimensions used in the model, the selected PS offerings, the application of the model and the results from applying the model.

As a conclusion, it can be stated that the model of Gaiardelli et al. (2014) is sufficient to categorise PS offerings. However, because this model provides unique classifications of PS offerings for every firm, it makes it harder to find guidelines or standards regarding benefits and possibilities for servitisation. Also, the list of PS offerings and performance dimensions used in this research need further evaluation and might even be altered, based on practical data collections.

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# Chapter 1: Problem statement

## 1.1 Introduction

It has become increasingly difficult for manufacturing firms to compete solely on basis of cost due to changing customer demands and market dynamics (Ahamed, Inohara, & Kamoshida, 2013). Offering a core product is not sufficient and differentiating enough to gain a competitive edge and to keep customers satisfied. Investing in customer relationships and anticipating on their needs has become of vital importance to manufacturing firms in order to outperform the competition. To strengthen the customer relationship, sustain the market position and achieve desired profits, manufacturing firms should develop a product and service offering (PS offering) that support or complement the core products, based on customers' needs (Neely, Benedettini & Visnjic, 2011; Alvizos & Angelis, 2010). This change in strategy involves a business model shift from a (pure) product-oriented system to a more product-service-oriented system (PSS) (Ahamed et al., 2013). Manufacturing firms with a PSS create integrated bundles of PS offerings that provide high-value solutions (Vandermerwe & Rada, 1988). The movement towards implementing services into the core product offering is called servitisation (Gaiardelli, Resta, Martinez, Pinto, & Albores, 2014).

In order to offer high value solutions to customers, manufacturing firms need to know *how* to create suitable PS offerings (Almeida, Cauchick Migual, & Terra da Silva, 2008). The literature doesn't clearly describe the extent of service integration and implementation that is needed to successfully servitise manufacturing firms (Oliva & Kallenberg, 2003). This lack of knowledge results in struggles with service integration (Kindstrom & Kowalkowski, 2014). Within the literature this struggle is known as the *service paradox*, which indicates that it is more difficult for firms to make profits by adding services than might be expected (Neely, 2009). Merely adding services to the core product offering is not enough for manufacturing firms to deploy a successful servitisation strategy (Gaiardelli et al., 2014). Manufacturing firms that add services to their offering need to consider which services are most suitable to offer regarding desired strategy and benefits. Therefore, a classification of the PS offerings could provide insights in the current position of a firm regarding effective servitisation.

## 1.2 Research objectives and questions

As described in the introduction, servitisation forms an attractive movement for manufacturing firms experiencing changes in their market dynamics and customer demands. However, the suitability of the PS offering is important to the success of servitisation. Identifying which services and solutions to integrate and implement is important for manufacturing firms to reduce the *service paradox* and successfully form a PSS.

This present research selects and analyses a classification model for PS offerings, which provides insight to the current servitisation position, based on the offering. This analysis is executed using the multi-dimensional classification model of Gaiardelli et al. (2014).



Based on the described purpose of this present research, the following research question will be addressed:

*“How can PS offerings be classified, based on the concept of servitisation?”*

In order to answer the research question, several sub-questions will be answered. Answers to the first sub-question aim to deeper understand the concept of servitisation. It is important to deepen the understanding of this concept, based on a literature study, in order to make assumptions regarding PS offerings. Therefore, the first sub-question addresses the following:

*Sub-question 1: What defines servitisation with regard to the implementation of services and solutions?*

The answer to this first sub-question will focus on definitions of servitisation, the motives for manufacturing firms to servitise and the challenges and success factors associated with servitisation.

The answer to the second sub-question focuses on the definition of product service offerings and how the selection of a specific PS offering is important for manufacturing firms who are servitising their business. The second sub-question addresses the following:

*Sub-question 2: What are PS offerings?*

The answer to this second sub-question will focus on PS offerings and their role in the process of servitisation.

With a deeper understanding of servitisation and PS offerings, the answer to the third sub-question will focus on classification models to classify different types of product service offerings. Therefore, the second sub-question addresses the following:

*Sub-question 3: What models do exist for the classification of PS offerings?*

The answer to this third sub-question provides an insight to classification models found in the literature that classify PS offerings, based on different dimensions. The classification models help to determine and evaluate which services and solution are most suitable for different manufacturing firms with different servitisation goals.

Based on the characteristics and benefits of each described classification model, one will be selected and applied to several cases to test its usability and validity.

After identifying which PSS classification model suits this present research, the answer to the next sub-question focuses on a practical implication. The following sub-question addresses the following:

*Sub-question 4: How can the PS offering be classified, based on the selected classification model?*

This sub-question leads to a classification of the servitisation related PS offering of several firms. This classification provides insight to the usability of the selected classification model and it's possible strengths and weaknesses.

By answering the four sub-questions, sufficient information will be generated to answer the main research question, which describes the evaluated classification model to classify PS offerings and possible improvements, based on a review of a number of cases.

### 1.3 Significance of the research

This present research provides scientific and practical relevance, because it consists of a literature study and practical implication at several firms. Both aspects of relevance can contribute to a greater understanding of the topic of servitisation and classification of PSSs.

The scientific relevance of the research indicates the implication of a classification model found in the literature. Applying the selected model tests its usability to identify and classify PS offerings of several firms. Whether a literature model is useful in other settings, industries and situations than those already tested in the literature, is important to strengthen the literature regarding this model.

The practical relevance of the research reported in this thesis indicates the classification of PS offerings as a means to illustrate the current servitisation position. The classification of PS offerings helps identify the servitisation position of a firm and how it relates to its strategy and goals. A classification model provides managers with a tool that may help them to read insights to the current and future total PS offering.

## Chapter 2: Literature review

*In the previous chapter several research questions were described, based on the research objectives regarding servitisation. This chapter provides a literature study in order to find answers to the first, second and third sub-questions. Also, a classification model for PS offerings is selected.*

### 2.1 What defines servitisation?

The first formulated sub-question focuses on the concept of servitisation and how it relates to the implementation of services within the core offering of manufacturing firms. In this present research paper, the answer to this sub-question aims at providing the definition of servitisation, the manufacturing firms' motives to servitise and an indication of challenges and success factors associated with servitisation.

#### Definitions

Vandermerwe & Rada (1988) first coined the term servitisation. They describe servitisation as a *movement* towards focusing on the customers' needs as a whole by offering integrated bundles of products and services (also referred to as the PS offering), with services in the lead role. (Vandermerwe & Rada, 1988) By summarising the servitisation dialogue, Alvizos et al. (2010) note that servitisation of firms not only incorporates any combination of products and services, but also elements of *support*, *self-service* and *knowledge*. This indicates that the concept of services also entails these additional elements as value increasing activities. Despite different ratios of products and services within the integrated bundles, the general objective of servitisation is to add value to manufacturing products by offering solutions that collectively focus on customer's needs (Ahamed et al., 2013).

In order to contextualise the concept of servitisation, Alvizos et al. (2010) identified, based on a literature overview, two dominant indicators.

The first indicator identifies servitisation as "a popular general orientation towards a certain direction", also called a *trend* (Alvizos & Angelis, 2010). This context corresponds to the widespread efforts of firms to servitise their product offering to integrated bundles of products and services (Neely et al., 2011), which is happening in all industries on a global scale (Vandermerwe & Rada, 1988). Neely et al. (2011) identified five underlying trends that can encapsulate the movement of servitisation. First, they mention the shift from a world of products to a world including solutions in which managers are focussing on the customer's needs as a whole. Second, the shift from outputs to outcomes broadens firms' offering from providing simple outputs towards finding suitable outcomes for their customers. Third, firms view their customers from a different perspective in which the nature of interactions shifts from simple transaction towards long term relationships. Fourth, firms also change their interaction with suppliers by approaching them as network partners. Fifth, managers broaden their perspective from seeing their firm as a small element in the market towards seeing their firm as an important part of an eco-system. (Neely et al., 2011)

Figure 1 summarises these five trends that encapsulate the movement of servitisation.

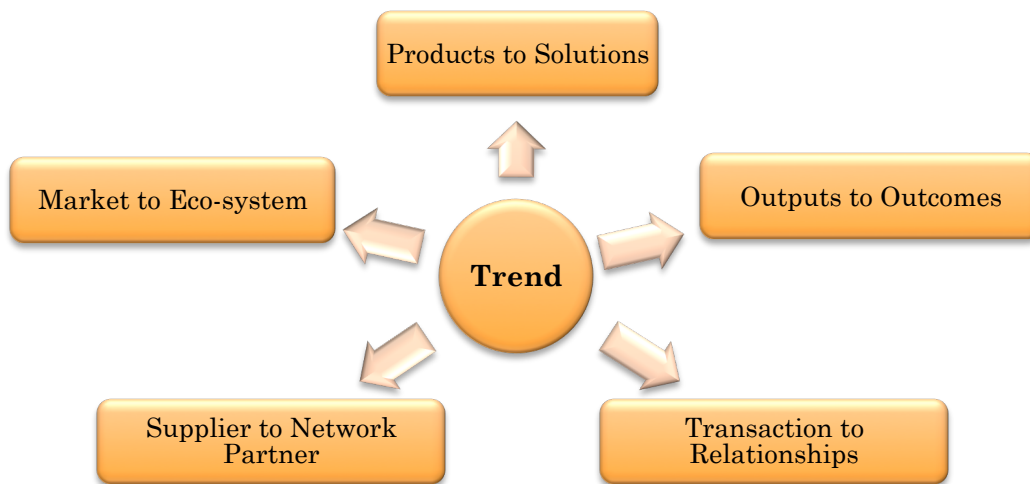


Figure 1. Trends that encapsulate the movement of servitisation (Neely et al., 2011)

The second indicator identifies servitisation as “a systematic plan designed to achieve a certain long-term goal”, also called a *strategy* (Alvizos & Angelis, 2010). This corresponds with the need of manufacturing firms to develop a strategic plan to change their system and activities in order to incorporate services and solutions. A strategy of servitisation differentiates firms from their competitors by offering better and more complete solutions (Ahamed et al., 2013). By creating a higher value than competitors and creating a more complete market package by shifting the firm’s business model from a product-oriented system towards a product-service-oriented system (PSS), firms can sustain a competitive advantage (Ahamed et al., 2013). Baines et al. (2007) summarize the definition of a PSS as “an integrated combination of products and services that deliver value in use”, which refers to the offering of bundles of products and services that defines the core of servitisation concepts (Aurich et al., 2010). Within a PSS the focus lies on providing customers with solutions that support or complement the products (Neely et al., 2011), and by doing so, differentiate firms from their competitors (Ahamed et al., 2013). The implementation of specific PS offering bundles therefore colours and shapes the strategy of firms and the relationship with their stakeholders (Vandermerwe & Rada, 1988).

Despite the overlap in concepts between servitisation and the PSS, they cannot be used as synonyms, because the PSS also entails a reversed perspective. In general, the PSS forms the convergence between the *servitisation process* of enhancing product offering with services, and the *productisation* process of enhancing service offerings with products (Baines et al. (2007); Beuren et al. (2013)). However, this present research focuses on the changes needed for manufacturing firms to servitise their product offering, therefore the concept of PSS will only be described from the servitisation perspective.

Both indicators for the contextualisation of servitisation are useful for this present research and will be referred to. On the one hand, contextualising servitisation as a *trend* helps understanding the general movement and motives for firms to change their business perspective. On the other hand, contextualising servitisation as a *strategy* helps developing a specific plan to successfully servitise.

Whether viewing servitisation as a trend or strategy, the movement of servitisation has changed the perspective regarding products and services. Within the servitisation movement, it has become clear that a simplistic distinction between products and

services is no longer valid; one cannot do without the other while sustaining a competitive advantage (Vandermerwe & Rada, 1988).

## Motives

The literature identifies several main reasons for manufacturing firms to servitise. These motives can be divided, based on the contextualisation of servitisation as a trend or a strategy.

Servitisation, viewed as a trend, incorporates the general movement of servitisation around the globe. Based on this perspective, two main reasons for servitisation are identified. The first reason regards the stronger *focus on customers*. Due to the easy and unlimited access to information, customers are better informed and therefore have a better bargaining base. This has made customers more critical and difficult to please and has increased their demand for services. To conform to these new demands and needs, firms are pushed towards servitisation. (Vandermerwe & Rada, 1988) The second reason regards the *movement on the value chain*. In order to sustain a competitive advantage in the turbulent market, firms broaden their market package through moving up or down the value chain. By forming partnerships or alliances, firms are able to offer more services and solutions through integrated bundles and thereby strengthen their position in the market. (Vandermerwe & Rada, 1988) The cooperation entails vertical integration up and down the value chain and also horizontal integration, which means that firms can cooperate together on one project but compete on another (Neely, (2009); Neely et al., (2011)). In general, these partnerships help firms to differentiate from competitors and ensuring a strong position in the market and value chain (Vandermerwe & Rada, 1988).

Servitisation, viewed as a strategy, incorporates the internal development and implementation of PS offerings. Based on this perspective on servitisation, several motives for firms to servitise are identified, based on a managerial and environmental perspective. Vandermerwe & Rada (1988) describe three reasons from a managerial or economic perspective. The first reason is to *lock out competitors*, because integrated bundles of products and services provide higher valued and more complete solutions. (Neely, 2009) This reduces the risk of losing customers to competitors (Vandermerwe & Rada, 1988). The second reason is to *lock in customers*, because focussing on customers' needs stimulates long-term relationships and continuous sales (Neely, 2009). Locked in customers are loyal customers that form a dialogue with the firm and provide the firm with first hand knowledge about their needs. Further, customers become locked in because the integrated bundles of solutions outperform what customers can provide on their own and therefore it creates a customer dependency with the firm's offering. (Vandermerwe & Rada, 1988) The third reason is to *increase the level of differentiation*, because the offering of services and solutions creates unique bundles of solutions. (Neely, 2009) This increase in differentiation can provide opportunities of growth in mature markets (Almeida et al., 2008). Furthermore, servitisation motives from an environmental perspective focus on minimising the environmental impact by changing business models and conceptions of ownership. (Neely, 2009) For example, there can be a reduction in waste and an increase in recycling of spare parts if firms retain ownership of certain products instead of handing them over to their customers. In this construction, the customer uses a certain product, such as a printer, to fulfil their needs and the firm performs maintenance on this product and recycles it when it wears out.

Figure 2 shows the different motives for firms to servitise categorised, based on the two contextualisations of servitisation.

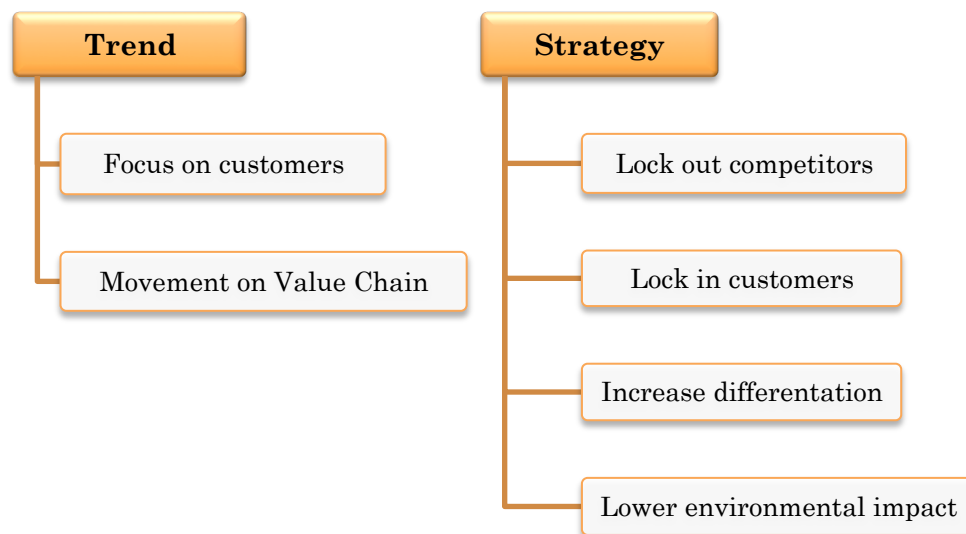


Figure 2. Motives for servitisation, based on the current Trend and Strategy contexts

Regardless of which reasons managers want or have to servitise their business; the overriding motive for firms to servitise is to gain a competitive advantage (Vandermerwe & Rada, 1988).

### Challenges and Success factors

Whatever motives managers have to servitise their firm, successful change towards a servitised firm entails more than adding services to the core products. A lot of firms start adding services to their product offering in the hope to achieve the advantages of a servitisation strategy, but fall for the so called *service paradox* and thereby fail to gain anticipated results. The *service paradox* indicates the underestimation of the challenges firms face when they servitise their product offering to realise beneficial (monetary) returns. Firms often experience higher costs without returns while heavily investing in services. (Gaiardelli et al., 2014) This so-called *service paradox* arises when firms do not take the challenges, which can be divided into three general categories, into account. (Neely, 2009)

The first category of challenges indicates three types of *mindset changes* needed within manufacturing firms to successfully servitise. The shift in mindset from transactional to relational indicates the first needed mindset change. A successfully servitised firm has a relational mindset in which interactions with customers are essential to form long term contracts and relationships. In order to form these bonds with the customers, the second mindset regarding the nature of what is being sold, has to change. Pure manufacturing firms sell products and when the transaction is complete, the interaction between the firm and customer ends. (Neely, 2009) Also, services are seen as add-ons that are only offered to support the sales of products (Oliva & Kallenberg, 2003). In contrast, a servitised firm offers solutions to the customer in which the product forms a subordinated element of the PS offering. This change in mindset requires firms to blur the distinction between products and services and focus on offering solutions to the customer at any given moment in time. When firms focus on the solutions they can offer to customers, a third mindset change regarding ownership is needed. To successfully servitise the firm, it might be beneficial that firms keep ownership of the physical product provided with the offered bundle of product and services.

This implies a mindset change from focus on ownership to usage, which doesn't only concern firms, but also the customers who may become emotionally attached to the products they buy. (Neely, 2009) At the core of these mindset changes lays the fact that manufacturing firms are set in their view on services as tools to help sell core products. For these firms, products are the source of value, which makes it challenging to get excited about service offerings and viewing the offering of solutions as the core of the system. (Oliva & Kallenberg, 2003)

The second category of challenges indicates challenges regarding *business models and customer offerings*. The focus of servitisation on customers' needs enforces a change in business models and tools to measure value with. The measurement tools and methods of manufacturing firms are not sufficient to indicate the value of services. Because the value of services is a subjective concept, it is important to view the value of services from a customers' perspective. However, there is relatively little knowledge about the design of services and the capabilities needed to deliver services in order to create high valued solutions. Based on this lack of knowledge it can be challenging for firms to adjust their product-oriented systems and customer offerings towards a PS offering. (Neely, 2009)

The third category of challenges indicates challenges regarding *timescales*. As the interaction with customers in manufacturing firms is often short and superficial, a servitised firm comes across challenges of maintaining long-term relationships with customers. The partnership that is formed between firm and customer comes along with different types of risk and exposure for the firm and makes modelling and understanding of the (long term) returns of this relationship a challenge. (Neely, 2009)

Figure 3 shows the different categories of challenges that manufacturing firms need to address in order to successfully servitise manufacturing firms.

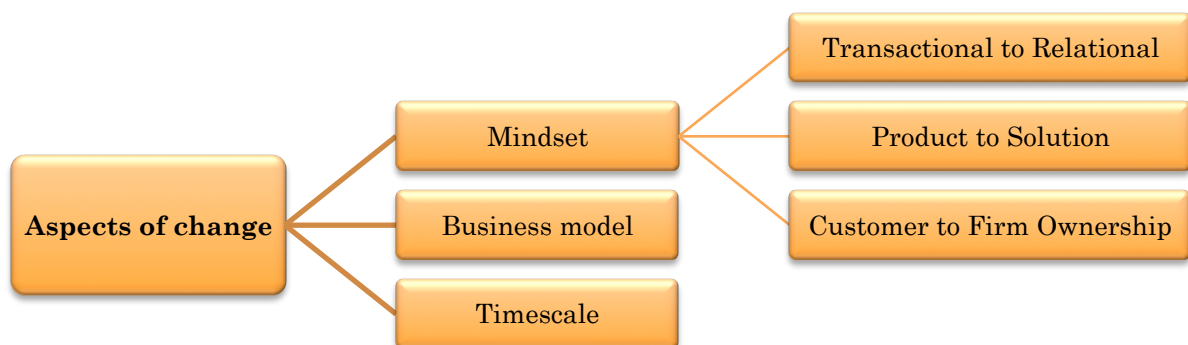


Figure 3. Aspects of change regarding servitisation

These different categories of change aspects indicate how complex it is to successfully servitise firms. If firms do not incorporate changes in their capabilities, culture, structures, processes, value measurements and business model, they might fall for the *service paradox* and underestimate the essentials for successfully adopting a servitisation strategy. How these aspects specifically need to be adjusted to successfully servitise firms is beyond the scope of this present research. In general it can be stated that adding services to the core products is simply not enough to servitise a manufacturing firm; the entire firm needs to change their focus of attention (Almeida et al., 2008). However, this present research will focus, due to limited scope and resources, on the changes related to business models. This aspect of change corresponds with classifying the PS offering as an element of a PS business model.

## Summary

In this section, a definition of servitisation is described. The concept of servitisation can be viewed as a movement towards focusing on the customer's needs as a whole by offering integrated bundles of products and services, in which the term services also includes activities of support, self-service and knowledge. Furthermore, servitisation has been described as a strategy or trend in which firms focus on the customers' needs as a whole: by offering integrated bundles of product and services in order to gain a competitive advantage. However, in order to successfully servitise firms, a shift in mindset, business models and partnerships is essential.

When firms fail to understand which changes are needed to achieve the benefits of servitisation, they have fallen for the *service paradox* and have underestimated the challenges. This present research will limit its scope to incorporate only the business model change aspect of a servitisation strategy. This distinction incorporates the classification of PS offerings to determine a suitable PSS.



## 2.2 What are Product Service offerings?

The second sub-question focuses on the definition of product service offerings. As mentioned before, the suitability of the PS offering forms an important factor that determines the success of a servitisation strategy. This second sub-question describes the concept of PS offering, how it fits into a PSS and the purpose of classifying PS offerings.

### Product Service offering

PS offerings indicate the combination of product and services provided by firms. The specific selection and bundling of services and products are important for the success of the servitisation strategy of firms. The PS offering of a firm illustrates an aspect of the PSS, which was mentioned in previous section regarding the connection to servitisation. In general, the PSS reflects an alternative business model for servitising firms and contains of three elements, namely a *product*, *service* and *system*.

### Product Service System

In order to classify PS offerings with regard to the adopted PSS, it is important to further define the concept of PSSs. There are three authors most cited in the literature, based on their definition of a PSS (Beuren et al., 2013). First, Goedkoop et al. (1999) stated the first formal definition of a PSS as “a marketable set of products and services capable of jointly fulfilling a user’s need. The product/service ratio in this set can vary, either in terms of function fulfilment or economic value”. Second, Mont (2002) highlights in the description of a PSS the environmental impact and focuses on dematerialising the offering and changes in ownership (Mont, 2002; Beuren et al., 2013). Third, Baines et al. (2007) describe PSS as “a market proposition that incorporates additional services to focus on the *sale of use* in which ownership is changed and differentiation from competitors is achieved”.

In summary, a PSS can be viewed as a competitive proposal or business model that differentiates a firm from competitors by satisfying customers’ needs through the offering of products and services (Beuren et al., 2013). Also, through the dematerialisation of products and the change of ownership, the PSS is identified as an environmentally sustainable proposal (Tukker & Tischner, 2006).

### Business models

Determining a suitable PSS, as a business model, is an important part of the changes firms make in order to servitise. The process of servitisation demands new kinds of business models that better suit the firm than traditional ones. Aurich et al. (2010) described business models as “simplified descriptions of the mechanism, which companies use to create value”. Within the literature there is some degree of agreement about the different elements of a business model. The four elements of a (PS) business model are *value proposition*, *architecture of value creation*, *relationship capital* and *sustainable aspects and other benefits* (Gaiardelli et al., 2014; Aurich et al., 2010).

This present research corresponds with the first element of a business model, namely the *value proposition*. This element refers to the PS offering of a total PSS (Gaiardelli et al., 2014). The other aspects of a business model will not be incorporated in this present research due to limited time and resources. When there is a reference to a business model, such as a PSS, only the element of value proposition is targeted.

## Purpose

As stated before, the distinction between manufacturing and service firms is fading away. This indicates a continuum, which displays firms that are mainly manufacturers who see services as add-ons on the one side, and firms that are mainly service providers who see products as add-ons on the other side. In between these two extreme types of firms are firms who are moving up or down this continuum by changing the focus of their PPS. (Oliva & Kallenberg, 2003) Figure 4 illustrates this *product service continuum*.

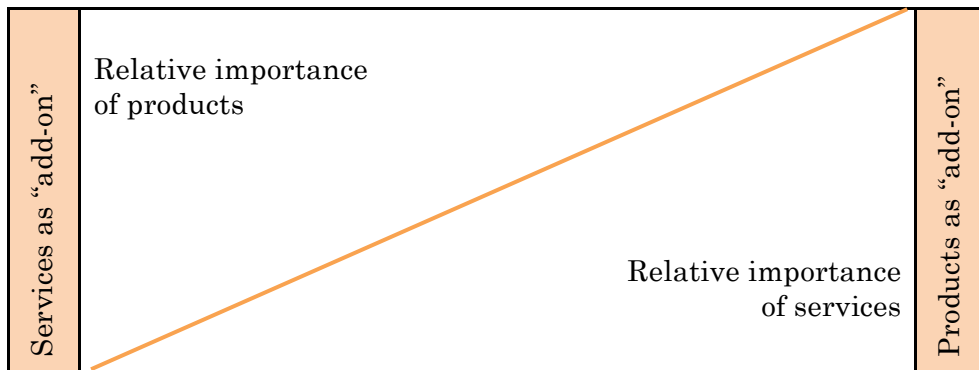


Figure 4. Product service continuum (Oliva & Kallenberg, 2003)

When manufacturers are motivated to servitise, they need to decide how far they are willing and able to shift their PS business model from offering products to offering solutions. It is not in every firm's best interest to strive for the development of PS offerings in which services precede products (Neely et al., 2011). In order to successfully servitise a firm, it is important to target the intended position on the continuum by determining to what extent and which services and solution should be incorporated in the firm's total offering. These insights help firms to establish a suitable PSS for their servitisation strategy.

The product-service continuum shows a wide range of possible positions of the PSS with regard to the focus on products or services. This is consistent with the wide variety of PSSs found in the literature, which will be further described in the next section.

## Summary

A PSS consist of three elements, namely *product*, *service* and *system*, and can be viewed as a competitive proposal or business model that differentiates a firm from competitors by satisfying customers' needs through the offering of products and services. A business model is described as a simplified description of the mechanism, which companies use to create value. This present research focuses on the first element of a (PS) business model, namely the *value proposition* or PS offering.

The product-service continuum indicates the large quantity of possible PSS, and thereby different combinations of PS offerings, situated between a pure manufacturing firm and pure service provider. Identifying which specific PS offering suits a firm is an important step toward developing a PS business model.

## 2.3 Models for the classification of PS offerings

The third sub-question focuses on different classification models of PS offerings. This section describes several classification models found in the literature. First, a popular classification model is described. Second, several popular dimensions used in the literature to classify PS offerings are described. Third, some of these dimensions are further illustrated by describing classification models using these dimensions.

### Popular classification model

Despite the wide variety of PSS classification models, based on different dimensions and labels found in the literature, most authors consider Tukker's (2004) main classification of PSSs as an appropriate method to represent the PS offering of different PSS (Baines et al., 2007). This classification of Tukker (2004) differentiates three classes of PSSs, based on the dimensions *Product use* and *PS offering focus*.

The first class represents the *product-oriented system*. Here, firms offer products in a traditional manner and add value by adding services to the existing products (Baines et al., 2007). There is a clear distinction between products and services within firms' offerings (Vandermerwe & Rada, 1988). In this traditional situation, customers have ownership over the tangible product (Neely, 2009). This stage encourages a so-called *Razor & Blades*' type of approach to the value proposition of the business model in which the core product performs as a contact point of additional or complementary services. (Alvizos & Angelis, 2010) Services fitting the product-oriented system are after-sales services which guarantee functionality and durability of the product, such as maintenance, repair and re-use (Baines et al., 2007). As a result, limited sustainability improvements can be achieved through better maintenance (Tukker & Tischner, 2006). This type of PSS incorporates product-oriented services, which requires incremental changes within firms and are easily incorporated in firms' offering (Tukker, 2004).

The second class represents the *use-oriented system*. Here, firms offer the use of the product (Tukker & Tischner, 2006) and thereby focus on adding value through services instead of products. This system stimulates awareness of the complementarity of products and services and how firms need both of them to sustain competitive advantages (Vandermerwe & Rada, 1988). In this non-traditional situation, ownership over the tangible product retains at the firms (Neely, 2009). This encourages a so-called *Bait & Hook* type of approach to the value proposition of the business model in which the core product is combined or enhanced by services to provide solutions to the customer and build a relationship (Alvizos & Angelis, 2010). The use of a product is offered through services such as renting, sharing and pooling (Beuren et al., 2013). This change in focus from product to services results in intermediate sustainability improvements through the change in ownership over the tangible product (Tukker & Tischner, 2006). This type of PSS is relatively common although it requires tangible and intangible sacrifices from customers due to the shift in ownership (Tukker, 2004).

The third class represents the *result-oriented system*. Here, firms fully anticipate on customers' needs by offering solutions through combinations of product and services (Tukker & Tischner, 2006). In this situation, firms do not differentiate between products or services, but solely focus on creating solutions that customers need (Beuren et al., 2013). Firms retain ownership over tangible products that are part of the solutions (Baines et al., 2007). The core product is being offered as a service, which encourages a so-called *Total Care* type of approach to the value proposition (Alvizos & Angelis, 2010). This type of PSS has the potential to create substantial sustainability improvements, because firms become responsible for the total solution and therefore have great incentive to optimally create and use the solutions (Neely, 2009).

Although this business model is becoming more common, the risk element for firms of taking over all liabilities makes it essential to agree with customers on performance criteria and user behaviour (Tukker, 2004).

These three classes of PSSs can be placed in ascending order, based on the degree of changes needed within firms to integrate the services in their PS offering. The *product-oriented system* requires the least amount of organisational change and the additional services are relative easily integrated. In contrast, the *result-oriented system* requires radical changes in organisational perspectives and processes to create the solutions. Figure 5 show the three types of PSSs with regard to the *product service continuum*.

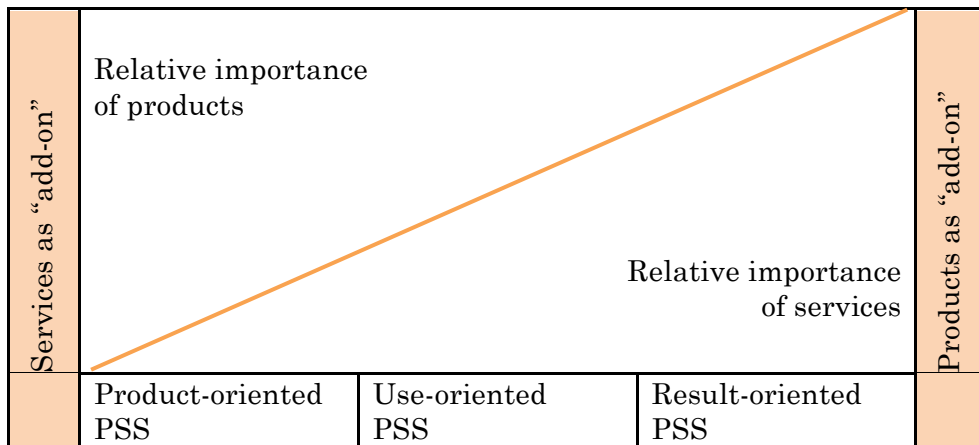


Figure 5. Product service continuum and main classes of PSSs

## Popular dimensions

These three main classes of PSSs are well accepted within the literature and authors have used these dimensions and classes as basis for further classifying PSSs, based on additional dimensions. Gaiardelli et al. (2014) identified several dimensions used in the literature to classify different classes of PSSs. They found that the dimension of *product ownership* is mostly used by authors, followed by the dimensions of *product use*, *PS offering focus* and *nature of the interaction*. Each of these dimensions and related classes of PSSs will be described next.

### Product ownership

The dimensions *product ownership* refers to the aspect of who owns the product after purchasing (Gaiardelli et al., 2014). In traditional business models, customers buy the product and become owners. However, in servitised firms, this aspect might change, resulting in ownership retaining at the firm who only sells the use or solution regarding the product. This dimensions is classified into two types, namely *ownerships at the firm* or *ownership at the customer*.

### Product use

The dimension *product use* is often applied in combination with the *product ownership* dimension (Gaiardelli et al., 2014). This dimensions refers to who uses the product. In traditional business models, customers are owners of the product and therefore are the sole users of the product. However, in servitised firms, the usage of the product can shift to the firm or other users through leasing or pooling contracts. In general, there are four types of *product use*, namely a single customer, different customers in sequencing order, different customers at the same time, and the firm.

### PS offering focus

The dimensions *PS offering focus* refers to the role of the service within the integrated bundle of products and services that is offered. In traditional business models, the product forms the main focus of value and is purchased by customers (Gaiardelli et al., 2014). However, in servitised firms, the focus of the offering changes from selling a product to selling a solution. There are different types described in the literature regarding this dimensions, such as Mathieu's (2001) types of *customer service*, *product services* and *service as a product* regarding the focus on the process or product within an organisation.

### Nature of the interaction

The dimension *nature of the interaction* refers to the type of interaction between firms and customers (Gaiardelli et al., 2014). In traditional business models, the interaction has a transactional focus in which the contact between firm and customer ends after selling the product. However, in servitised firms, the interaction between firms and customers has a long-term focus in which customers' needs play an essential role. The interaction doesn't end after the transaction, but a long-term relationship based on trust and loyalty is built between firms and customers.

### Dimensions in use

Due to the variance in dimensions used to classify the value proposition of PSSs, a lot of different classification models exist, which focus on different elements, usages or purposes. In the following, three classification models are described to illustrate the wide variety of classification models found in the literature.

First, Mathieu (2001) used the *PS offering focus* as key dimension to classify different PSS. The classification of the *PS offering focus* is based on two elements.

The first element represents *service specificity*, which focuses on the nature of the offering in relation to providing an effective solution to customers. This element differentiates three levels of service types, namely *customer service*, *product services* and *service as a product*. These three levels of services are ascending regarding the role of services in relation to the products and customers. (Mathieu, 2001)

The second element represents *organisational intensity*, which focuses on the extent to which firms are servitising their business and the different positions and structures firms can adopt. This element is identified based on two aspects, namely *strength* and *scope* of the impact on the structure and processes of the firm. Based on this element, three levels of intensity are described. The first level of intensity regards a *cultural change*, which reshapes the underlying belief system of firms and their mission. The second level of intensity regards a *strategic change*, which aims to add key competencies to the portfolio of firms without changing the mission. The third level of intensity regards a *tactical change*, which is limited to specific activities of firms. The three levels of intensity are descending in order; a cultural change has much more scope and strength regarding changes in organizational structures and processes than a specific tactical change. (Mathieu, 2001)

Figure 6 illustrates the two elements and the different underlying levels regarding the classification, based on the PS offering focus. Firms with a service specificity of *customer service* and organisational intensity on a *tactical level*, have a product focused PS offering as part of their PSS. These services offer standardised solutions and require a low intensity relationship with customers (Gaiardelli et al., 2014). In contrast, firms with a service specificity of *service as a product* and organisational intensity on a *cultural level*, have a process focused PS offering. These services mostly offer customised solutions and require a high commitment and involvement relationship with customers (Gaiardelli et al., 2014).



		Organisational intensity		
		Tactic	Strategic	Cultural
Service specificity	Customer service	<div>Product focus</div> <div>Process focus</div>		
	Product service			
	Service as a product			

Figure 6. Classification of PS offerings focus from Mathieu (2001)

Second, even Tukker (2004) described more specific types of PS business models, based on his three main classes of PSS. To identify these specific types of PSSs, Tukker (2004) used the dimensions of *Product ownership* and *Product use*.

Within the first main class of *product-oriented systems*, Tukker (2004) identified two specific types of PSSs. The first PSS represents *product-related services*. With this specific PS business model, the firm offers additional services, which are needed during the usage of the product, such as maintenance contracts. The second PSS represents *advice and consultancy*, in which the firm offers advice on the most effective and efficient usage of the product, such as an advice regarding the optimal logistics within the factory the product is used. Both specific PSS categories offer a more efficient usage of materials and resources for the customer, and therefore create additional value. The firm can benefit from these types of PSSs through the lowering of customer barriers and the increase in innovation speed due to strengthening customers' contact and loyalty. (Tukker, 2004)

Within the second main class of *use-oriented systems*, Tukker identified three specific types of PSSs. The first two specific PSS represents *product lease* and *product renting or sharing*. With both these PSSs, the customer pays for usage of the product and the firm retains owner of the product. The difference between *product lease* and *product renting or sharing* regards the time of usage and individual access to the product. While *product lease* offers unlimited time of usage and individual access to the product, *product renting or sharing* has limited time of usage in which different customers use the product in sequential order. The third specific PSS represents *product pooling* and differs only little from *product renting or sharing*, based on the aspect that customers are *simultaneously* using the product. These types of PSSs are beneficial for customers, because the costs of ownership and activities are retaining at the firm. However, customers need to sacrifice the tangible ownership of the product and need to put in time and effort to obtain and use the product. Firms have to cope with the extra costs of ownership, risks and contracts to lease, rent or pool their products in a beneficial way. (Tukker, 2004)

Within the third main class of *result-oriented systems*, Tukker (2004) identified three specific types of PSSs. The first specific PSS represents *activity management or outsourcing*. Here, firms outsource part of their activities to third parties, based on contracts that include performance indicators to control the quality of the outsourced service. The second PSS represents *pay per service unit*. Firms with this PSS take over all activities needed to offer solutions and to make sure customers continue to receive the needed solutions. The third PSS represents the *functional result*. Here, the level of abstract, related to the created results, increases and firms offer functional results that are not directly related to a specific technological system.

For example, instead of offering certain gas or cooling equipment, the firm offers 'optimal office climate' and is free to determine how to deliver this result. An agreement on

performance criteria and level of control between firms and their customers is important regarding these types of PSSs. (Tukker, 2004) Figure 7 shows the more specific types of PSS on the product service continuum.

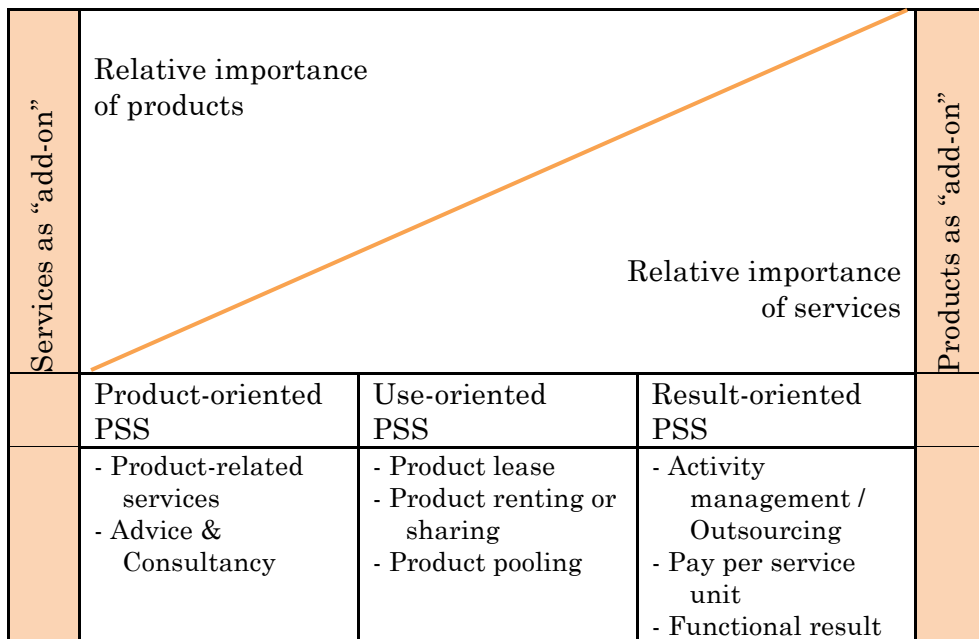


Figure 7. Product service continuum and Tukker's (2004) types of PSSs

Third, Penttinen and Palmer (2007) described another classification model, based on the dimensions *Nature of relationship* and *Completeness of the offering*.

The authors describe the *Nature of relationship* dimension as a continuum with on the one side *transactional interactions* and on the other side *relational interactions* between firms and customers. In order to assign the nature of a relationship of a specific firm on the continuum, the Penttinen and Palmer (2007) use the measurement elements of Cannon and Perreault (1999). According to Cannon and Perreault (1999), the first measurement element focuses on *information exchange*. This element refers to the willingness of firms and customers to share important information (Cannon & Perreault, 1999). When there is a lot of information exchange between firms and their customers, these cases are found on the relational side of the continuum. The second measurement element focuses on *operational linkages*. This element captures the extent to which the procedures of firms and customers have been linked to facilitate a flow of operations (Cannon & Perreault, 1999). When the operations of firms and customers are linked, these cases are found on the relational side of the continuum. The third element represents *legal bonds*, which include contractual agreements regarding the roles and obligations of both firms and customers (Cannon & Perreault, 1999). Legal bonds regulate future relationships and are therefore related to the relational side of the continuum. The fourth element focuses on *cooperative norms*. This element refers to the expectations of firms and customers regarding achieving mutual and individual goals through their relationship (Cannon & Perreault, 1999). When cooperative norms are strongly intertwined between firms and customers, these cases are found on the relational side of the continuum. The fifth measurement element represents *relationship-specific adaptations*, which regards the adjustments of processes or procedures of firms to the needs of their customers or vice versa (Cannon & Perreault, 1999). When a lot of adaptations are being made to adjust to customers' needs or vice versa, these cases are found on the relational side of the continuum.

Figure 8 illustrates the two dimensions and the five corresponding elements regarding the nature of relationships on the PS continuum.

Services as “add-on”	<div> <div>Relative importance of products</div> <div>Relative importance of services</div> </div>		Products as “add-on”
	Transactional Interaction	Relational Interaction	
	<ul style="list-style-type: none"> <li>- Low information exchange</li> <li>- Low operational linkages</li> <li>- Low legal bonds</li> <li>- Low cooperative norms</li> <li>- Low relationship-specific adaptations</li> </ul>	<ul style="list-style-type: none"> <li>- High information exchange</li> <li>- High operational linkages</li> <li>- High legal bonds</li> <li>- High cooperative norms</li> <li>- High relationship-specific adaptations</li> </ul>	

Figure 8. Nature of relationships on PS continuum

The classification of Penttinen and Palmer (2007) also indicates the dimension of *completeness of the offering*, which refers to two elements. The first element focuses on the offering of bundles or packages of products and services. The second element focuses on the degree to which customers’ problems are solved and how much additional work is left for customers to achieve the solution. (Penttinen & Palmer, 2007) When the firm’s offering completely solves a customers’ problem related to the firm’s offering and in addition the customer doesn’t need to perform additional work, it is considered a *complete offering*.

Based on the two dimensions described by Penttinen and Palmer (2007) a two-by-two matrix is formulated, which illustrates four types of PS offerings. Figure 9 shows this matrix.

Completeness of offering		Nature of Relationship	
		Transactional	Relational
	Less complete	Basic components	Integrated components
	More complete	Basic solution	Integrated solution

Figure 9. Classification of PS offerings by Penttinen and Palmer (2007)

### Multi-dimensional classification model

The three described classification models focus on one or several dimensions and use different elements to help assign firms into a PSS class. Gaiardelli et al. (2014) identified the need for multi-dimensional classification models that captures a richer picture of servitisation and offer more comprehensive classifications of the PS offerings. As a solution, they developed a multi-dimensional classification model, which identifies the position and the characteristics of a PS offering and therefore provides guidelines regarding (extended) servitisation changes. This multi-dimensional classification model



consists of several dimensions also used in the previous described classification models and will be further elaborated.

Gaiardelli et al. (2014) explain that their classification model is relevant to the *value proposition* or PS offering of a business model. The dimensions used in the model are related to *traditional* and *green* PS offerings in which green offerings represent PSSs that are designed to be environmental-friendly (Gaiardelli et al., 2014): A topic connected to servitisation literature due to the cleaner production options available through servitisation, such as reduction of waste by changing ownership and dematerialisation of PS offerings. Also, in line with a servitisation strategy: environmental-friendly offerings help to differentiate firms from their competitors. The purpose of the classification model stated by Gaiardelli et al. (2014) is “to capture all characteristic dimensions of both traditional and green PS offerings and assist to understand the structure and nature of PS portfolio’s” (Gaiardelli et al., 2014). This classification model can be used in business-to-consumers and business-to-business domains. According to Gaiardelli et al. (2014), applying the model helps to “map the transformation of the PS offering over time and compare different firms within a market”. The model consists of three complementary dimensions, namely *product orientation*, *nature of the relationship* and *PS offering focus*. Each of these dimensions will be discussed next.

The first dimension, *product orientation*, incorporates three dimensions namely, *product ownership*, *product use* and *product decision maker*. Based on these dimensions, Gaiardelli et al. (2014) differentiate Tukker’s (2004) classes of PS offerings, namely *product-oriented*, *use-oriented* and *result-oriented* PSSs. The authors identify *Product-oriented* service offerings as an offering in which customers become owners of the product, use the product and also have the decision making power. *Use-oriented* service offerings are identified as an offering in which customers use the product and have the decision making power over it, but the firm retains ownership over the product. *Result-oriented* service offerings have a cooperative focus in which the customer and firm are both users of the product and both have the decision making power, while the firm retains ownership of the product. (Gaiardelli et al., 2014)

The second dimension, *PS offering focus*, incorporates two elements to differentiate two extremes, namely focus on *product* or *process*. The first element to indicate the PS offering focus represents the *relationship intensity* between firms and customers, which forms a continuum between high or low. The second element represents *level of customisation*, which also forms a continuum between high or low. Firms with an intensive relationship with their customers and a high level of customisation will be placed in the PS offering focus category *process*. (Gaiardelli et al., 2014)

The third dimension, *nature of interaction*, is divided into two categories, namely *relationship-based* and *transaction-based*. Both categories are differentiated based on two elements, *risk* and *price* of the offering. With a transaction-based PS offering, customers carry the risks of using and owning the product. The prices used in these kinds of offerings are usually mark-up or fixed-fee. In contrast, with a relationship-based PS offering, firms carry the risks of the offering, because they retain ownership over the product. These risks are also incorporated in the price of the offering; therefore prices are usage-based, performance-based or result-based. (Gaiardelli et al., 2014)

Figure 10 shows the PS offering classification model of Gaiardelli et al. (2014) in which the three dimensions are represented.

<i>PS offering orientation</i>	<b>Result</b>		<b>Process</b>	<i>PS offering focus</i>
	<b>Use</b>			
	<b>Product</b>			
		<b>Transaction</b>	<b>Relationship</b>	
		<i>Nature of interaction</i>		

Figure 10. PS offering classification model of Gaiardelli et al. (2014)

### Summary

Despite the wide variety of PSS classifications, based on different dimensions and labels, most authors consider Tukker's (2004) main classification of PSSs as an appropriate method to represent different PS business models. Dimensions that are frequently used to classify PS offerings are *product ownership*, *product use*, *PS offering focus*, and *nature of the interaction*. All classification models described use one or more of these dimensions.

Gaiardelli et al. (2014) developed a multi-dimensional classification model that incorporates the most frequently used dimensions according to the literature. This model uses the dimensions of *PS offering orientation* (consisting of the dimensions *product ownership*, *product use* and *product decision making*), *PS offering focus* and *nature of interaction*.

## 2.4 Selection of classification model

This section describes the selection of the classification model for this present research and further elaborates on details and usage of the chosen model.

### Multi-dimensional classification model

The multi-dimensionality of the classification model of Gaiardelli et al. (2014) forms a suitable model for this present research. It provides extended insights regarding the classification of PS offerings of firms due to the incorporation of several important classification dimensions from the literature. Also, the model is developed recently and hasn't been validated within the literature. This present research can help the validation process by applying the classification model within several firms.

### Classifying PS offerings

The described classification models all help to identify to what extent firms should incorporate services into their product offering and formulate a suitable PS offering. The selection of the PS offering is an important step to the development of a PS business model.

To use their classification model, Gaiardelli et al. (2014) classify PS offerings and places them within the classification model to determine the structure of a firm's PS offering and the possible changes or improvements desirable regarding the firm's servitisation goals. Gaiardelli et al. (2014) assign specific PS offerings to the dimension of *PS offering orientation* consisting of the three main classes. The authors further adopt the more specific classification described by Tukker (2004) to divide specific PS offerings into sub-classes. The assignment of different PS offerings within each class and sub-class formulated by Gaiardelli et al. (2014) will be described next.

The first class of *product-oriented PS offerings* is thereby divided into two sub-classes, namely *product-related service offering* and *advice & consultancy-related service offering*. The first sub-class, product-related service offering, focuses on the product and includes embedded services that help customers to use the product. Within this sub-class three sub-forms are described, based on the nature of interaction dimension, namely *pure transactional services*, *extended warranties and preventive maintenance services*, and *condition-based maintenance services*. Examples of product-related service offerings are maintenance contracts, supplying spare parts, product inspection, repair, transportation, cleaning and upgrades. (Gaiardelli et al., 2014) The second sub-class, advice & consultancy-related service offering, focuses on both product and process and includes services that focus on the most efficient use of the product. Also in this sub-class can several sub-forms be identified, based on the nature of interaction dimension, these sub-forms regard *customer's product*, *customer's process*, *customer's business* and *internal function*. Examples of advice & consultancy-related service offerings are documentation, help desks, training and advice. (Gaiardelli et al., 2014)

Figure 11 shows the service offerings related to the class of product-oriented PS offering. Appendix A shows more specific descriptions of the services included in the class of product-oriented PS offering formulated by Gaiardelli et al. (2014).

<b>Product-oriented PS offerings</b>	<i>PS offering orientation</i>	<i>PS offering focus</i>	<i>Nature of interaction</i>
<b>Product-related services</b>			
Pure transactional - Installation - Spare parts	Customer	Product	Transactional
Extended warranties and preventive maintenance - Repair - Maintenance	Customer	Product	Relational
Condition-based maintenance - Maintenance contracts	Customer	Product	Relational
<b>Advice &amp; consultancy-related services</b>			
On customer's product - Documentation	Customer	Product	Transactional
On customer's process - Helpdesk	Customer	Process	Towards relational
On customer's business - Training	Customer	Process	Towards relational
Internal function or BU management	Customer	Process	Relational

Figure 11. List of service forms within the product-oriented PS offering class

The second class of *use-oriented PS offerings* is divided into the three sub-classes described by Tukker (2004), namely *product lease*, *product renting or sharing*, and *product pooling*. The *nature of the interaction* dimension differentiates the services within each sub-class, based on the kind of contracts used between firms and customers. Whether these contracts are long-term or short-term determines if the interaction is transactional-based or relationship-based.

Figure 12 shows the service offerings related to the class of use-oriented PS offering. Appendix A shows more specific descriptions of the services included in the class of use-oriented PS offering formulated by Gaiardelli et al. (2014).

Use-oriented PS offering	<i>PS offering orientation</i>	<i>PS offering focus</i>	<i>Nature of interaction</i>
Product lease services			
Lease	Customer is user and decision maker; Firm retains ownership	Process	Transactional
Product renting or sharing services			
Short term renting	Customer is user and decision maker; Firm retains ownership	Process	Transactional
Long term renting			Relational
Sharing			Relational
Product pooling services			
Pooling	Customer is user and decision maker; Firm retains ownership	Process	Relational

Figure 12. List of service forms within the use-oriented PS offering class

The third class of *result-oriented PS offering* is divided into three different sub-classes described by Tukker (2004), namely *activity management / outsourcing*, *pay-per-use* and *functional result services*. The nature of the interaction regarding each sub-class is based on the relationship between customers and firms. Also, all the services related to the result-oriented PS offering class are focusing on the process instead of the product in which the firm retains ownership over the product. (Gaiardelli et al., 2014)

Figure 13 shows the service offerings related to the class of use-oriented PS offering. Appendix A shows more specific descriptions of the services included in the class of result-oriented PS offering formulated by Gaiardelli et al. (2014).

<b>Result-oriented PS offering</b>	<i>PS offering orientation</i>	<i>PS offering focus</i>	<i>Nature of interaction</i>
<b>Pay-per-use services</b>			
Pay-per-use	Customer is user and decision maker regarding the product	Process	Relational
<b>Activity management / Outsourcing services</b>			
Outsourcing	Firm uses the product, customer is decision maker	Process	Relational
<b>Pay-per-result services</b>			
Pay-per-result	Firm is user and decision maker regarding the product	Process	Relational

Figure 13. List of service forms within the use-oriented PS offering class

Based on the above-described classes, Gaiardelli et al. (2014) have placed a total of 30 specific PS offerings in their model. This has resulted in the following distribution of PS offerings, based on the dimension of PS offering orientation: 22 PS offerings are categorised as Product-oriented PS offerings, 5 PS offerings are categorised as Use-oriented PS offerings and 3 PS offerings are categorised as Result-oriented PS offerings. This placement of the specific PS offerings has been determined through a literature study. Appendix B shows the original model of Gaiardelli et al. (2014) with the 30 PS offerings positioned in the model.

The structure of the PS offering can be illustrated by identifying the different PS offerings of a firm and mapping them into the classification model of Gaiardelli et al. (2014). The positions of the PS offerings on the three dimensions help to identify possible gaps in the PS offering or opportunities for firms to strengthen their servitisation position.

### Applying classification model

In their article, Gaiardelli et al. (2014) apply their model to a firm operating in the transportation market. Their implementation consists of three steps, which will be described next.

First, they provide a short description of the firm, based on its focus, strategy and customer groups.

Second, eight PS offerings of transport firm are selected from the 30 PS offerings incorporated in the model. Further, a short note is made about the lack of integrated packages of services at this firm. Also, the authors describe how the firm offers one PS offering type that contributes to the sustainability of the firm and two PS offering types that contribute to the green awareness of its customers.

Third, the authors describe the financial situation of the firm, in terms of their revenue streams of the selected PS offerings. The obtained data is then transferred into the model in which the values of specific variables are illustrated through different sizes of the dots, such as amount of service revenue.

In their conclusion the authors describe how their model allows firms to identify the landscape in which they can expand their revenues. Also the model can be used for several alternative purposes, such as: (i) to map each individual services as part of the entire PS offering, (ii) to benchmark different offerings within the same market, (iii) to map the servitisation journey of a firm over time, and (iv) to represent integrated packages that comprise several services by linking the dots together. In general the model helps managers to describe and compare existing PS offerings, while interpreting and evaluating their differences. (Gaiardelli et al. (2014), p. 517)

### Summary

The multi-dimensionality of the classification model of Gaiardelli et al. (2014) will be applied in this present research. Due to the combination of multiple popular dimensions, this classification model offers an extended view on the classification of PS offerings. Gaiardelli et al. (2014) have placed 30 specific PS offerings into their model, which provides a detailed mapping tool of the PS offering of a firm. By plotting the current PS offering of a firm into the model and differentiate between the PS offerings, based on package bundles, sustainability or revenue streams, detailed information is generated regarding the firm's servitisation position. In general the model helps managers to describe and compare existing PS offerings, while interpreting and evaluating their differences.

## Chapter 3: Methodology

The previous chapter contained a literature study, which described concepts of servitisation, PS business models and PS offerings. The practical part of this present research focuses on applying the classification model of Gaiardelli et al. (2014) to several firms in order to evaluating the usefulness of the model to classify PS offerings. This chapter outlines the selected methodology and techniques to answer the research question.

### 3.1 Research approach

The research union model of Saunders et al. (2012) is used to illustrate the different approaches to the methodology of this present research. An important outer layer in the research union model of Saunders et al. (2012) differentiates between *deductive* and *inductive* research approaches. The purpose of this present research is to classify PS offerings of firms, based on the concepts of servitisation. Based on the literature study, a classification model to determine the current PS offerings of firms is selected. This indicates a *deductive* approach in which research moves from theory to data.

Furthermore, the nature of the adopted research approach can be categorised as descriptive-explorative. According to Saunders et al. (2012), an exploratory study is useful to clarify the understanding of a problem or phenomenon and to seek new insights. A descriptive study forms often a forerunner for an explorative or explanatory study, because it provides an actual picture of the concepts to be analysed (Saunders et al., 2012). The descriptive part of this present research focuses on the literature study and the description of several concepts related to servitisation. The explorative part of this present research focuses on applying the classification model to several firms. Also, this present research evaluates the usefulness of the classification model, which hasn't been done in the literature yet.

### 3.2 Research strategy

Saunders et al. (2012) describe several research strategies as another layer in their research union model. The selection of a research strategy depends on several factors such as the research question and objective, extent of existing knowledge, and the amount of available time and resources (Saunders et al., 2012). The deductive approach with the descriptive-explorative nature of this present research fits a survey strategy. According to Saunders et al. (2012), a survey strategy incorporates the collection of quantitative data through a standardised questionnaire to ease comparison. Besides a questionnaire, another popular data collection technique used with the survey strategy is a structured interview with standardised questions. (Saunders et al., 2012),

Research can make use of qualitative and or quantitative data. A general distinction can be made in which qualitative data focuses on non-numerical data and quantitative data focuses on numerical data. The data used in the research is collected and analysed with specific methods. The research choice indicates which method is used to obtain the needed data. Saunders et al. (2012) differentiate between mono method and multiple methods as options for data collection techniques and corresponding data analysis procedure. This present research uses multiple methods to obtain the data, which contains qualitative and quantitative information. Further, this present research uses a mixed-method technique to obtain the data, which means that quantitative and qualitative data collection techniques are used to obtain the data. Also it means that the data is not combined. Thus, quantitative data is analysed with quantitative procedures and qualitative data is analysed with qualitative procedures.



This present research can be classified as cross-sectional, which focuses on a single moment in time and aims to find answers to the research questions.

Saunders et al. (2012) point out that cross-sectional research often employs a survey strategy and is often chosen when researchers experiencing certain a time constrain.

### 3.3 Research design

The research design describes the selected data collection and procedures of a research. As described above, this present research adopts a survey strategy and uses multiple methods to obtain the needed data. The research questions require information about the current PS offering of specific firms.

#### Instrumentation

Generally, research uses some sort of measurement instrument to collect the desired data. The selected instrument can be created by the researcher or referring to an existing theory or framework. This section describes the instrument for data collection that is used to obtain data about the PS offering of several firms.

As described in the literature study of this present research, the classification model of Gaiardelli et al. (2014) is selected to determine the current PS offering of specific firms. This model incorporates three dimensions to classify the PS offering of firms, namely *PS offering orientation*, *Nature of interaction* and *PS offerings focus*. The dimension *PS offering orientation* is classified in three groups, namely Product-, Use- and Result-based offerings. The other two dimensions form continuums on which PS offerings can be placed. Gaiardelli et al. (2014) have selected these dimensions, based on a literature study in which they chose the most popular dimensions for their model. In order to determine the PS offering of specific firms, Gaiardelli et al. (2014) have placed 30 PS offerings in the model.

In their article, Gaiardelli et al. (2014) apply their model to a firm operating in the transportation market through three steps. This present research further tests the usability and utility of the classification model by applying it to other firms in different markets. By doing so the three main steps described in the article are followed, although some alterations are made in order to improve the possibility of useful responses. Each of the steps taken in this present research will be described next.

First, information of the firms' focus, strategy and customer groups is obtained from the website and during a structured interview. The website might provide information about the strategy, the mission and the history of the firm, which can help to develop a general description of the firm. During a structured interview more information about the strategy of the firm regarding servitisation is discussed.

Second, the 30 PS offerings from the classification model are presented in order to select only those PS offerings the firm provides. This selection of PS offerings is then further discussed with regard to possible integrated packages that are offered, customer groups on which it focuses or partners with whom the firm offers the PSS offering.

Third, the financial situation of the firm has been measured in a different way than the authors describe in their article. The researcher of this thesis has experienced that firms do not have or cannot easily provide financial information on specific PS offering types. Therefore, in order to differentiate between the different PS offering types, this present research uses several performance indicators as variables of measurement. Respondents were asked to weigh the selected PS offering types on a scale from one to ten, based on these performance indicators. This measurement method leads to a more accessible way to differentiate between the PS offering types. Also, this measurement method incorporates more than the variable revenue stream: it also measures the amount of *sales*, *strategic fit*, *future potential*, *customer satisfaction* and *amount of new customers*.



Although this measurement method is less detailed and specific, it has a broader scope and is more accessible for discussion. More details about the specific variables used for the measurement, will be described later on in this chapter.

### **Setting and participants**

In order to classify the PS offerings of specific firms, this present research has conducted structured interviews. This section describes the sample techniques used to provide the selected sample of firms.

#### **Sampling technique**

Saunders et al. (2012) describe two types of sampling techniques, namely probability and non-probability sampling techniques. Non-probability sampling techniques focus on the logical relationship between the sampling technique and the purpose of the research. Also, with a non-probability sample, researchers cannot make statistical inferences about the characteristics of a population. (Saunders et al., 2012; p. 213) This present research is based on a non-probability sampling technique, because it has a focus on testing a new model instead of generalising theories within a population.

Gaiardelli et al. (2014) applied their model on one firm in the transportation market. Therefore, applying the model to any other manufacturing firm fitting the servitisation context in any other market could provide additional data regarding the usability and utilisation of the model. This makes a non-probability sampling technique appropriate for this present research in which the specific sample size is unknown and less relevant to the purpose of the research.

#### **Sample selection**

To determine the sample for this present research, a purposive sampling technique is used. This form of sampling describes a sampling technique in which the researcher uses his judgement to select specific cases that meet the objectives of the research (Saunders et al., 2012). There are several purposive sampling strategies, which have different focus points regarding the selection of cases. This present research has used a heterogeneous sampling strategy in which cases might be completely different from each other. The focus of this present research is on the classification of PS offerings, which is done by testing the selected classification model at firms. Therefore, a heterogeneous sample has been chosen to test the model on different types of firms and their servitisation positions. The heterogeneity of the sample provides different data to classify in the model, which results in a more comprehensive analysis of the usefulness of the model than using similar firms.

The different firms participated in this present research were found with different methods. One firm was found through the Chamber of Commerce of Limburg. They contacted firms that are servitising and asked for participation in this present research. Unfortunately, only one firm responded. Other firms were contacted through the personal network of family members and supervisors. Also, the classification model has been discussed with one of the employees of Canon: to gain insight in their position of servitisation and views on the classification model. A total of three firms operating in different markets were found willingly to participate in this present research.

The heterogeneous sampling strategy used to find firms has resulted in a large geographically spread of participating firms in the country. Therefore, the structured interviews were conducted through phone in order to save costs and time.

## Structured interview description

To acquire the needed information, the described study uses a structured interview, which contains qualitative and quantitative aspects. In this section the specific interview parts are described in more details.

The first part of the structured interview focuses on the general information about the firm. This part focuses on information related to the general history, strategy, offering, customers, markets and partners of the firm. Because each individual firm has different philosophies and circumstances regarding these elements, this part of the structured interviews contains open questions.

The second part of the structured interview focuses on the servitisation strategy the firm has adopted. This part contains open and closed questions.

The open question focuses on the specific description of the firm regarding their servitisation process. Here the respondent is encouraged to describe the servitisation strategy and process of the firm in as much detail as possible.

The closed questions that follow try to classify the firm's servitisation strategy. These are related to the three dimensions of the classification model and try to determine the desired location of the PS offerings of the firm.

The use of different ways to illustrate and describe the current servitisation strategy of a firm results in a more complete overview of the servitisation strategy. Using only the description of firms makes comparison of the different servitisation strategies impossible. However, only using the indicators of the dimensions to characterise servitisation strategies might not be detailed enough to differentiate between the different firms. The use of open and closed questions provides the researcher with more detailed context and possibilities for an accurate comparison.

The third part of the structured interview focuses on the PS offering of the firm and uses the 30 PS offerings incorporated into the model. Before the interviews, a list with the 30 PS offerings is handed out to the firm. During the interview only the PS offerings the firm provides are being selected. By handing out the list with PS offerings before the interview, the respondent knows what knowledge is needed of him during the interview. This reduces the possibility of the respondent not well enough knowing which PS offerings the firm provides.

The selection of PS offerings is further discussed and classified, based on several aspects. First, possible bundles of products and services, which are mostly offered together as integrated packages, are identified. Second, possible partners of the firm with whom they offer specific PS offerings are identified. Third, customer groups for whom the firm offers specific PS offerings are identified. All these discussed aspects result in different types of bundles of PS offerings in the model. Each aspect helps with the analysis of the current PS offering and the servitisation position.

Besides forming linkages or bundles between the different PS offerings, each selected PS offering is measured through several performance indicators. This helps with prioritising the different PS offerings in relation to each other and the firm. The selected indicators are a combination of financial, internal organisational and customer specific concepts, which prioritise the PS offerings on a scale from 1 to 7. The indicators are selected from a survey-research of Storey and Kelly (2001) in which they analyse popular performance measurement activities, based on new services development within firms. In their research, Storey and Kelly (2001) describe several performance measures that are popular amongst marketers, business developers and managers (total of 43 respondents). Tables 1-3 illustrate the different performance indicators described by Storey and Kelly (2001). The ranking illustrates how many respondents have said to use the indicator as a means to measure performance of new services.

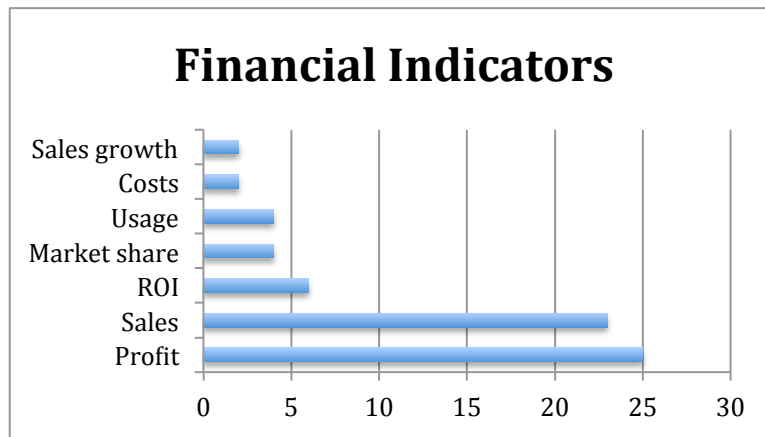


Table 1. Financial measurement indicators (Storey and Kelly, 2001)

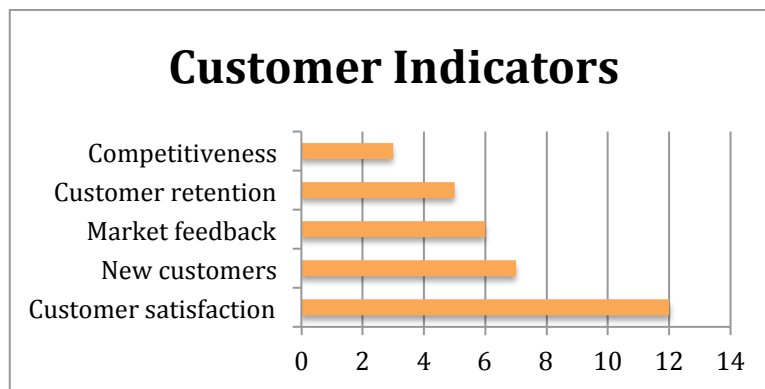


Table 2. Customer measurement indicators (Storey and Kelly, 2001)

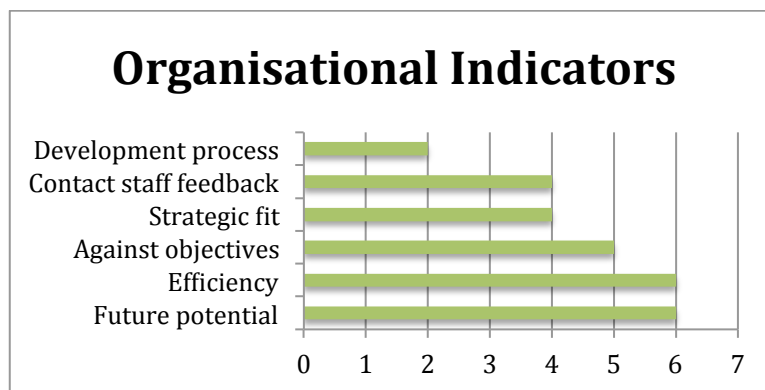


Table 3. Internal organisation measurement indicators (Storey and Kelly, 2001)

This present research has selected the two most popular financial and customer indicators, namely *Profit*, *Sales*, *Customer satisfaction* and *New customers*. From the internal organisation indicators is the *future potential* selected as indicator for this present research, because it is the most popular indicator from this category. Also, the indicator *strategic fit* has been selected. This present research selected this less popular indicator, because the *strategic fit* indicator corresponds with the importance of selecting suitable PS offerings in order to successfully servitise as a firm.

The respondents are asked to grade the specific PS offerings, based on the six selected performance indicators with a 1 to 7 mark (1 being lowest and 7 being highest). Appendix C shows the structured interview questions.

### 3.4 Research methods

The data collected with the structured interviews provide means to analyse the classification of PS offerings and the usability of the selected classification model. How the collected data is analysed will be described next.

The collected general organisational information provides means to describe the firms in more detail. The qualitative nature of this part of the interviews will not be analysed with specific tools or methods. The information will be described as received.

The closed questions about the strategy of servitisation refer to the three dimensions of the classification model to locate a position on the classification model. This position illustrates the most desired PS offering position of the firm: the servitisation goal of the firm.

The selected PS offerings are illustrated by a coloured dot on the assigned location in the model. These PS offerings are then bundled with a line between them, based on the identification of integrated packages, customer groups and partnerships. By linking the different PS offerings, the relationships between the PS offerings can be described and compared to different firms.

The prioritisation of the specific PS offerings is done by assigning grades, based on the six selected performance measurement indicators. Each performance indicator has been given a weight factor to differentiate between the indicators. The weight factors are related to the response rates described in the research of Storey and Kelly (2001). The performance indicator *Profit*, for example, has been cited 25 times by the respondents in the research. Therefore, the weight factor of the indicator *profit* is calculated by dividing 25 respondents using this indicator by the total of respondents and results in 0.58. The grades given by the respondents to specific PS offerings are multiplied by their weighted factors to indicate their relative priority. The outcomes to these calculations are illustrated in the model by different sized circles around the specific PS offerings-dots to show a performance prioritisation of the selected PS offerings. Table 4 shows the weight factors of each performance indicator used for this present research.

Indicator	Respondents cited	Calculated Weight factor
Profit	25	0.58
Sales	23	0.53
Customer satisfaction	12	0.28
New customers	7	0.17
Future potential	6	0.14
Strategic fit	4	0.09

Table 4. Weight factors per performance indicator

### 3.5 Validity

The validity of a research indicates to what extent the findings are referring to what the research is intended to measure. There are different types of validity to take into consideration, namely *internal*, *content*, *criterion related* and *construct* validity. (Saunders et al., 2001) Each type of validity will be discussed next in relation to this present research.

Internal validity refers the congruence of the selected questions with the intended measurements; do the questions measure to what is intended to be measured? This present research uses the PS offerings list described in the article of Gaiardelli et al. (2014) as important part of the questionnaire. This part of the questionnaire is internally valid. Also, the specifications of the PS offerings through bundles of products

and services, customer groups and networking partners all refer to important aspects of servitisation and are therefore internally valid.

The prioritization of PS offerings, based on performance indicators, is selected through a literature study of Storey and Kelly (2001) who described and classified important performance indicators. The goal of this prioritization is to classify the PS offerings on their value to the firm to determine the focus of the total PS offering of the firm. The selection of important performance indicators as means to classify the PS offering is considered internally valid.

Content validity refers to the extent to which the measurement covers the whole content of analysis. This present research analyses all the PS offerings incorporated into the model, which supports content validity. However, the content validity of the specification of the PS offerings through bundling is less solid. This present research adopted the bundling options described in the article of Gaiardelli et al. (2014), but there might be more options to bundle PS offerings in relation to servitisation and business models. Also, the classification of the PS offerings, based on their scores on the performance indicators, might differ if alternative indicators are selected. This present research chose the most popular performance indicators and the indicator related to strategic fit, according to the article of Storey and Kelly (2001). However, this isn't enough to imply that this content is completely valid and other indicators or other articles could influence the results.

Criterion related validity refers to the ability of the measures to make accurate predictions. This present research is not strong on criterion related validity, because it does not use statistical analysis to test this type of validity. The focus lies on testing a classification model by using the measurement tools used in the article, such as the list of PS offerings. However, this present research takes on a different approach to classify the PS offerings due to restricted access to the required data. The performance indicators are selected through a literature study and are not statistically tested. Despite the lack of criterion related validity, the collected data offers enough information to test the model and determine its usefulness and possible improvements.

Construct validity refers to the congruence of the questions with the intended constructs. This present research is considered to have construct validity, because the selection, bundling and classification of the PS offerings are all based on related literature studies. The aspects of servitisation, PS offerings and performance are all selected and described based on literature and thereby relevant to this present research.

### Threats to validity

There are five different threats to the validity of a research that will be discussed next.

The first validity threat, *history*, indicates events that have occurred in the past that influence the results of the research. Saunders et al. (2001) describe how the opinion of customers on a product might be influenced if that product has recently been recalled.

This present research is somewhat sensitive to this threat to its validity, because it measures the PS offerings of firms who are changing due to servitisation. The data collected at a firm might be influenced by historic events that have occurred and lead to the current PS offerings. However, this present research has particularly chosen a diverse sample of participating firms to illustrate possible PS offerings classifications with the model. Therefore, this threat to validity is possible with regard to the data of participating firms, but does not influence the overall results of this present research.

The second validity threat, *testing*, indicates that participants are changing their labour intensity if they think a specific outcome is desired. Saunders et al. (2001) illustrate this with the length of phone calls of telesales operators. This might change during a testing period, because operators believe long phone calls lead to better results and make them seem better telesales operators.

This present research is somewhat sensitive to this type of validity, because the participants consist of managers who probably do not want their firm to look less good, since it is a reflection of their work.

However, this present research has interviewed these managers at one point in time, which eliminates the possibility of changing certain work aspects during this time. This present research focuses on PS offerings and not on specific labour intensities, which makes the overall results less sensitive to this type of validity threat.

The third validity threat, *instrumentation*, indicates that participants have given specific instructions or instrumentation to perform better during the testing period. (Saunders et al., 2001)

This present research is less sensitive to this type of validity, because there is only one interview in which all the data is collected. Participants are not able to change the outcomes for a next moment of contact. Therefore, this type of validity does not influence this present research.

The fourth validity threat, *mortality*, indicates the leave of participants during the research. (Saunders et al., 2001)

This present research is less sensitive to this type of validity, because all the participants finished the structured interviews. Informing the participants about the length of the interview and making an appointment for conducting the interview prevent mortality as a threat to the validity.

The fifth validity threat, *maturation*, indicates that external events might influence the participant's behaviour or results.

This present research is less sensitive to this type of validity, because it does not focus on analysing the reason why firms are where they are with regard to servitisation and their PS offering. The specific reason why the firm strives for a specific servitisation strategy or has selected the specific PS offerings are not important to the results of this present research.

### 3.6 Reliability

The reliability of a research refers to the consistency of the data collection techniques applied in a study. There are several threats to the reliability of a research, namely participant error, participant bias, observer error and observer bias. Each of these threats is discussed next with regard to this present research.

The first threat, *participant error*, indicates that a participant might answer or behave differently at different moments in time. Saunders et al. (2001) describe an example of employee enthusiasm and how this fluctuates during different moments in the workweek. They also describe that this type of reliability threat can be avoided by selecting a neutral moment at which it is expected that participants are not overly influenced by the moment of time.

This present research is to some extent sensitive to this threat of participant error, because servitisation implies a change trajectory. The collected data illustrates the changing firm at a certain point in time, which might result in different answers of the participants at a different moment in time. However, this present research focuses on the possible classification of PS offerings and uses different firms to help test the classification model. Therefore, the threat to participant error does not result in a lack of reliability of this present research, only to the specific firms used as test-cases.

The second threat, *participant bias*, indicates that participants might answer a certain way because they think it is the correct or anticipated information and thereby not being realistic. (Saunders et al., 2001)

This present research is sensitive to this type of reliability threat, because participants are asked to grade the performance of PS offerings of their own firm. The respondents in



this present research mostly consist of managers who might be biased about their own firm and its performance. However, during the interviews the researcher tried to explain and pursue the respondents to answer correctly and truthfully. Also the fact that the interviews were held through the telephone could have helped the participant to feel less observed and judged, which might have resulted in truthful answers.

Nevertheless, the threat of participant bias is hard to overcome when only managers of a firm are participating in interviews. However, the focus of this present research made specific measures to overcome this threat to reliability unnecessary, because even biased answers can provide useful data to explore the possible classification of PS offerings.

The third threat, *observer error*, indicates that observers differ the way they ask questions and thereby are given different answers by participants. This threat can be prevented if researchers use a well-structured interview schedule. (Saunders et al., 2001)

This present research is less sensitive to this type of reliability threat, because all the interviews are structured and performed by one researcher. Each respondent has given the same documents of information and the same structured questions. Therefore, this type of threat does not have influence on the validity of this present research.

The fourth threat, *observer bias*, indicates that different observers might interpret the data differently, which might result in different outcomes of the collected data. (Saunders et al., 2001)

This present research is less sensitive to this type of reliability threat, because the data is analysed by one researcher through a set of structured questions that leave little room for different interpretations by researchers themselves. Thereby eliminating the threat of different interpretations of the collected data.

## Chapter 4: Results

*In the previous chapter the methodology of this present research regarding data collection and analysis was described. This chapter describes and analyses the collected data from the participating firms. However, before describing the collected data, a short overview of the different firms is provided.*

### 4.1 Overview of firms

A total of three firms have participated in this present research. Each firm is different based on several aspects, such as size, market, products and PS offering. This contributes to a more extensive evaluation of the classification model. Table 5 illustrates the firms, based on general organizational aspects.

	<b>Alcast</b>	<b>Nedap: Health Care</b>	<b>MSTI</b>
<b>Product</b>	Aluminium frames	Software Solutions	Physiological Amplifiers
<b>Size</b>	17 employees	55 employees	27 employees
<b>Market</b>	Dealer sector	Health sector	Research sector
<b>Servitisation duration</b>	7 years	15 years	-

*Table 5. Overview of participating firms*

Besides these three firms, there have been conversations regarding servitisation and the selected model with employees of Canon/Océ, namely Harrie Keusters and Willem Boijens. During these conversations it became clear that Canon couldn't properly be fitted into the classification model to fully represent its PS offering, based on the servitisation strategy. Although Canon isn't applied to the model in detail, the information and remarks regarding the Canon-case and the classification model are incorporated when evaluating the classification model, which is done in the next chapter. The following sections describe the collected data of the three participating firms and how the PS offerings are classified into the model.

### 4.2 Case 1: Alcast

This section describes the collected data from Alcast who specialises in aluminium frames. Alcast has participated in this present research due to an advertisement of the Chamber of Commerce of Limburg. The respondent, Frans Seijssener, is the managing director of Alcast.

#### Company description

Alcast is a specialist in aluminium frames. The organisation currently has 17 employees who operate in a flat organisational structure. The focus within the firm lies on producing aluminium frames for doors and windows.

Seven years ago, management of Alcast adopted a different strategic direction that focuses on an alternative market. Normally, aluminium frame-producers focus primarily on the market of contractors and utility. Alcast thought this market became too competitive and price sensitive, given the current crisis and the focus on the low prices. Therefore, Alcast changed their focus to the dealer market, consisting of smaller companies selling aluminium frames at their own risk. Since this change of direction, the dealer-market covers around 75% of total supply for Alcast. By focussing on this alternative market, Alcast is able to differentiate itself from competitors, who only operate for a small percentage in this market.



Alcast wants to strengthen the relationships with their dealer-customers by delivering additional value and reduce the emphasis on low prices. At this moment, Alcast has a nationwide network of dealer-customers who are located mainly in western, southern and central Netherlands. Ultimately, Alcast wants to achieve a full nationwide network of dealer-customers, who are able to sell more Alcast-frames due to better knowledge and resources provided by Alcast.

### **Servitisation strategy**

Alcast has described the following servitisation strategy:

*"Searching for maximum support of our customers, in order to give our customers good knowledge of the products they offer and applications for the products on the market they serve."*

To achieve this goal of creating a strong relationship with the dealer-customers, Alcast differentiates several phases of their servitisation process. The intended phases are described below. At this time Alcast is still in the first phase.

The first servitisation phase focuses on updating the communication channels. Currently Alcast is trying to strengthen the marketing and communication side of the organisation by hiring new specialists. The updated website is an important step toward improving the communication channels. In addition, Alcast plans to launch campaigns to deliver sales leads to its dealer-customers in order to create a stronger relationship.

The second servitisation phase focuses on informing the dealer-market about aluminium products through technical training, business training and supplying sales leads. Aluminium frames are in fact premium products and will cost more than wooden or plastic frames. To let customers choose aluminium frames, knowledge of the advantages and application of aluminium frames is required. Alcast would like to share its knowledge with dealer-customers.

The third servitisation phase focuses on creating a network of other relevant operators and producers with whom Alcast can organise workshops or lectures for (dealer)-customers about the benefits of aluminium. For example, creating partnerships with architects and glass suppliers to inform customers how the combination of products from each party can lead to a desirable product.

### **Classification of PS offerings**

#### **Preferred Position**

Given the objective of the servitisation of Alcast, the focus lies on product-oriented PS offerings with an emphasis on a strong customer relationship and personalisation.

#### **Mapping the PS offerings**

The list of PS offerings incorporated into the classification model is discussed with the respondent of Alcast to select the PS offerings they currently provide. From this list, Alcast offers five PS offerings, which are classified as product-oriented offerings. The list of PS offerings that Alcast currently offers is shown below in table 6.

Nr.	PS offering	Description
1	Home delivery	Deliver product to home of customer
3	Spare parts and consumables delivery	Deliver consumables and genuine spare parts
8	Inspection and diagnosis	Providing inspection, check-up and diagnosis services demand
13	Documentation	Regarding installation, use, repair and disassembly
14	Help desk – Hot line on product	Information and assistance regarding management of product use, maintenance and repair via communication tools, direct asses to customer database and advice to go to service centre

*Table 6. PS offerings provided by Alcast*

### **Bundling of PS offerings**

During the mapping of the PS offerings, possible bundles of products and services were identified. However, Alcast has no specific PS offerings that are offered with other services or products. The reason for this is that Alcast provides a low maintenance product and contracts relating to maintenance and repair are not applicable. The second type of bundle illustrates certain PS offerings offered in collaboration with external parties. Alcast doesn't offer PS offerings with other partners. The third type bundle illustrates specific customer groups for which specific PS offerings are provided. Again, Alcast does not provide specific PS offerings incorporated into the classification model to customer groups. However, Alcast wants to generate sales leads to its class-A customers in order to build a stronger relationship. The classification model doesn't incorporate this type of PS offering related to customer groups, which results in an absent of bundles regarding customer groups in the model.

In conclusion, there are no bundles of PS offerings on the basis of products, partners or customers identified in the classification model for Alcast.

### **Performance scores**

Besides possible bundles, this present research uses overall performance indicators to determine the focal points and priorities of the PS offerings. The indicators represent a mix of financial, organisational and customer-specific aspects. As indicated, Alcast currently provide five PS offerings. Appendix D shows the different scores that are given to each PS offering of Alcast.

The different scores are classified, based on the application by marketers and managers as described in the study of Storey and Kelly (2001). The following diagram illustrates the different scores on each indicator relative to their assigned weight factor.

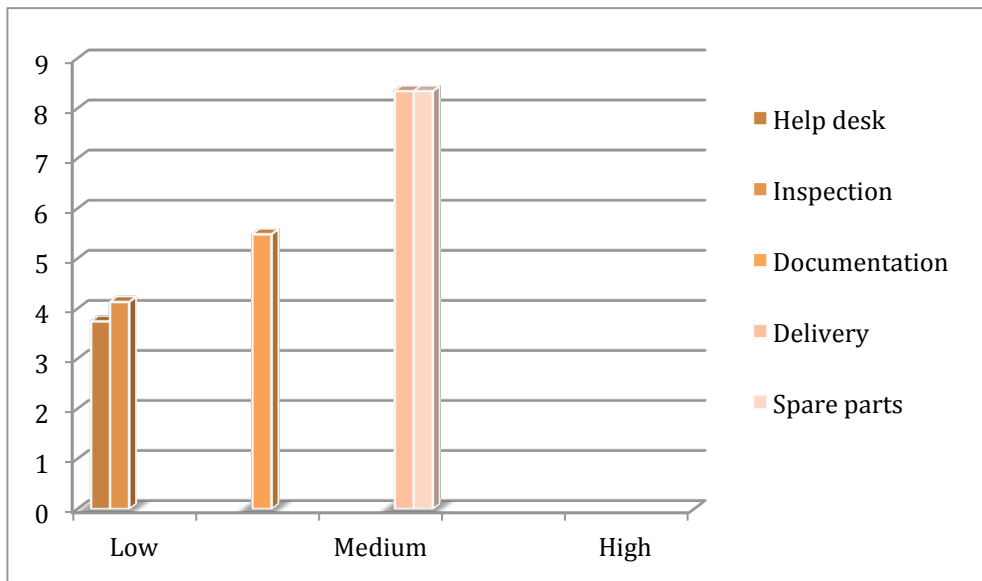


Figure 14. Prioritisation of PS offerings, based on performance indicators

Figure 15 shows the classification model with the current PS offering of Alcast. The different scores are reflected on the basis of different sizes of the circles for each PS offering: a larger circle indicates a higher performance score. In addition, the coloured section indicates the desired servitisation position of Alcast.

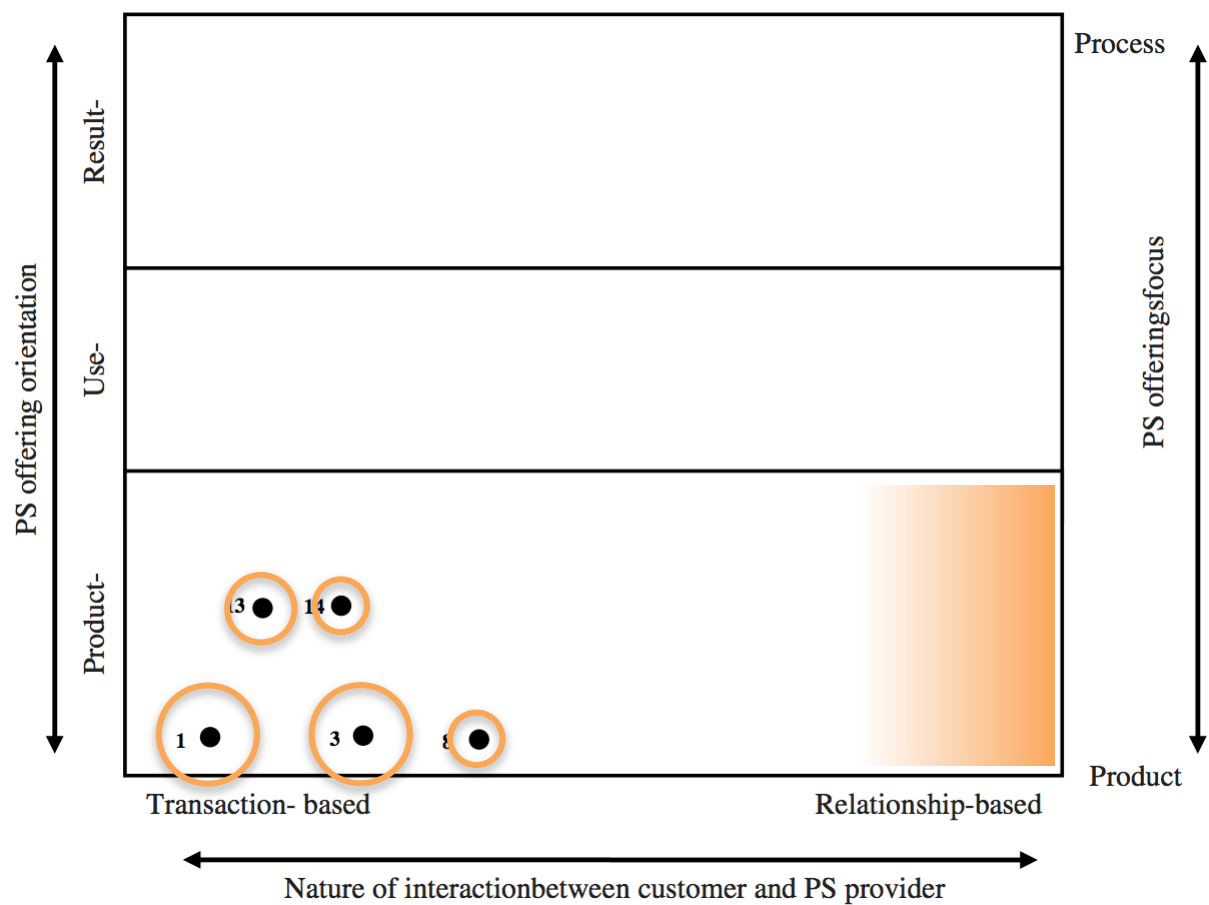


Figure 15. Classification Model for Alcast-case

Nr.	PS offering	Scores
1	Home delivery	8,5
3	Spare parts and consumables delivery	8,5
8	Inspection and diagnose	4,0
13	Documentation	5.5
14	Help desk – Hot line on products	4,0

*Table 7. Relative performance scores of PS offerings of Alcast*

### Analysis Alcast

The model illustrates some specific findings for Alcast. Currently, Alcast only offers transaction-oriented PS offerings, which focus on product functionality. Further, the PS offerings "Home delivery" and "Spare parts and consumables delivery" are counted as PS offerings with the highest scores on overall performance and can therefore be identified as currently the most important PS offerings for Alcast.

In order to reach the targeted strategy location illustrated in the model, Alcast should focus more on a strong relationship with its customers to shift its PS offerings horizontally in the model. Based on the PS offerings in the classification model, Alcast should therefore provide additional PS offerings such as "Extended warranty", "Preventive maintenance", "Full maintenance contracts" or "Consultancy" offerings. However, these additional PS offerings do not fit the type of product Alcast offers. Since Alcast offers a low maintenance product, PS offerings extended warranties and maintenance are not suitable. Therefore, it can be stated that the model doesn't provide suitable additional PS offering for Alcast. Another explanation for this misfit between the strategy location and possible expansions of PS offerings could be originating in the stated servitisation strategy. Alcast might pursue a servitisation strategy that doesn't fit the type of product they offer, which results in an unsuitable PS offerings advice from the model. Although Alcast focuses on increasing customer relationships and creating partnerships, they might have graded their desired customer relationship too high, which resulted in a location of their servitisation strategy in the model that doesn't suit their market and customers.

### 4.3 Case 2: Nedap

This section describes the collected data from the Health care business unit of Nedap who specialises in optimising health care administration systems. Nedap – Health care (Nedap HC) has participated in this present research due to a social media announcement of the researcher. The respondent, Peter van Soolingen, is a sales-manager at Nedap HC.

#### Company description

Since 1929, Nedap is a manufacturer of intelligent technological solutions. The focus lies on solving relevant problems with solutions that aim for day-to-day business. Nedap strives for elegant, user-friendly technological products that are created in innovative and creative ways. There are twelve business units, so-called market groups, within Nedap that operate independently from each other in different markets. A competitive strength of Nedap is the fast development and launch of new products due to the smart use of knowledge and experience within the different market groups.

Because each market group operates as an independent firm within Nedap, this present research focuses on the Health care market group. This market group focuses on fully automating the administration process for health care employees, so they have more time to provide their clients with care. Fifteen years ago, Nedap HC entered the health

care market in which several software packages for client-administration were offered. However, the health staff still worked with paper-based administration systems.

Nedap HC developed a scanning device to digitalise the staff administration. At first, Nedap HC profited from the sales of the scanning devices and other related hardware. Later, Nedap HC focused more on developing software-related facilities that could compliment the hardware. Nowadays, almost all the profit for Nedap HC comes from software-related services in which the hardware devices became means to sell the software. They work with a Software-as-a-Service system (also known as Software on demand) in which the customer pays a monthly fee and is provided with up to date services to perform their activities. This illustrates a servitisation process in which the focus shifted from products to services (software).

Nedap HC focuses on the health care market in which 15 direct competitors are operating. At the moment, Nedap HC has a market share of 40% and strives for being the biggest player in the health care market. Therefore, they want to expand to different market segments and obtain a market share of at least 60%.

Important partners for Nedap HC are consultancies who advise customers on the use of the products and administrative possibilities. Although Nedap HC develops, sells and supports their software and hardware offerings, they outsource the consultancy towards customers.

### **Servitisation strategy**

Nedap HC has described the following servitisation strategy:

*"Nedap profits from its services, not its products. By creating additional value for our customers by further developing our current offering, we can keep our customer satisfied and willing to choose for our offerings."*

Thus, in order to pursue this strategy, Nedap HC focuses on developing and innovating their current (software) offering in order to keep their customers satisfied. This strategy fits the market of Nedap HC, because it is considered that the customers all have the same needs for their administration systems. Therefore, Nedap HC can solely focus on developing and improving their current offering in which diversification of the offering isn't a priority.

## **Classification of PS offerings**

### **Preferred Position**

Given the objective of servitisation for Nedap HC, the focus lies on result-oriented services with an emphasis on a strong relationship with the customer. However, Nedap Health care doesn't offer personalized products or services, since they consider all customers to have the same needs.

### **Mapping the PS offerings**

The list of PS offerings incorporated into the classification model is discussed with the respondent from Nedap HC to select the PS offerings they currently provide. This shows that Nedap HC offers a wide range of PS offerings from the three different categories. From this list, there are 21 PS offerings that Nedap HC offers. Below is the list of PS offerings that Nedap HC currently offers.

Nr.	PS offering	Description
3	Spare parts and consumables delivery	Deliver consumables and genuine spare parts
4	Updates / Upgrades	Provision of new hardware or software
8	Inspection and diagnosis	Providing inspection, check-up and diagnosis services demand
9	Repair and Maintenance	On or off-site repair, direct or remotely, programmed or available for emergencies
12	Full maintenance contract	Provider is completely responsible for performance, offered through package
13	Documentation	Regarding installation, use, repair and disassembly
14	Help desk – Hot line on product	Information and assistance regarding management of product use, maintenance and repair via communication tools, direct asses to customer database and advice to go to service centre
15	Help desk – Hot line on process	
16	Help-desk Hot line on business	
17	Product-oriented training	Training services to support client while defining how to use product and obtain best performance, improving efficiency, assuring safety and improvement of business
18	Process-oriented training	
19	Business-oriented training	
20	Product-oriented consultancy	Regarding product development and use, and business improvements
21	Process-oriented consultancy	
22	Business-oriented consultancy	
23	Leasing	Lessee pays regular fee for unlimited and individual use of product
27	Pooling	Simultaneous use of a product by different customers
28	Pay per use	Provider covers the activities needed to maintain the availability of the function, customer pay for their use.
29	Outsourcing	Provider managers one or more activities for customer, but decision regarding how to perform and control these activities remains customer's responsibility

*Table 8. PS offerings provided by Nedap HC*

### **Bundling of PS offerings**

During the mapping of the PS offerings the respondent was asked about possible bundles of products and services.

The first bundle identifies products and services that are offered as a package. In the case of Nedap HC, all the selected PS offerings are part of one bundle, namely the offering of an administrative system for health care staff. Customers who buy an administrative system are provided with the hardware and software related to this system that consists of the selected PS offerings. Therefore, there are no specific bundles of products and services within the selected PS offerings.

The second bundle identifies specific partners with whom Nedap HC offers certain PS offerings. As described above, all consultancy-related services are provided by partners of Nedap. These consultants are certified and trained by Nedap in order to advise customers about the benefits and application of Nedap administrative systems. Because external parties offer the advice-related PS offerings, the respondent couldn't provide specific performance scores to these services, as seen in the next section.

The third bundle identifies specific customer groups on which specific PS offerings focus. Nedap doesn't differentiate between customers in their market and even provides a standardised administration system that suits the needs of every specific customer. In conclusion, Nedap HC has external partners with whom they offer advise-related services.

## Performance scores

Besides possible bundles, this present research uses overall performance indicators to determine the focal points and priorities of the PS offerings. As indicated, Nedap HC currently provides 21 PS offerings. Appendix 4.1.2 shows the different scores that are given to each PS offering of Nedap.

The following diagram illustrates the different scores on each indicator relative to their assigned weight factor. Differentiating between the different types of helpdesk and training was not possible for the respondent; these PS offerings are grouped together as one PS offering of “helpdesk” and “training”. The respondent has provided one set of scores to each of these groups.

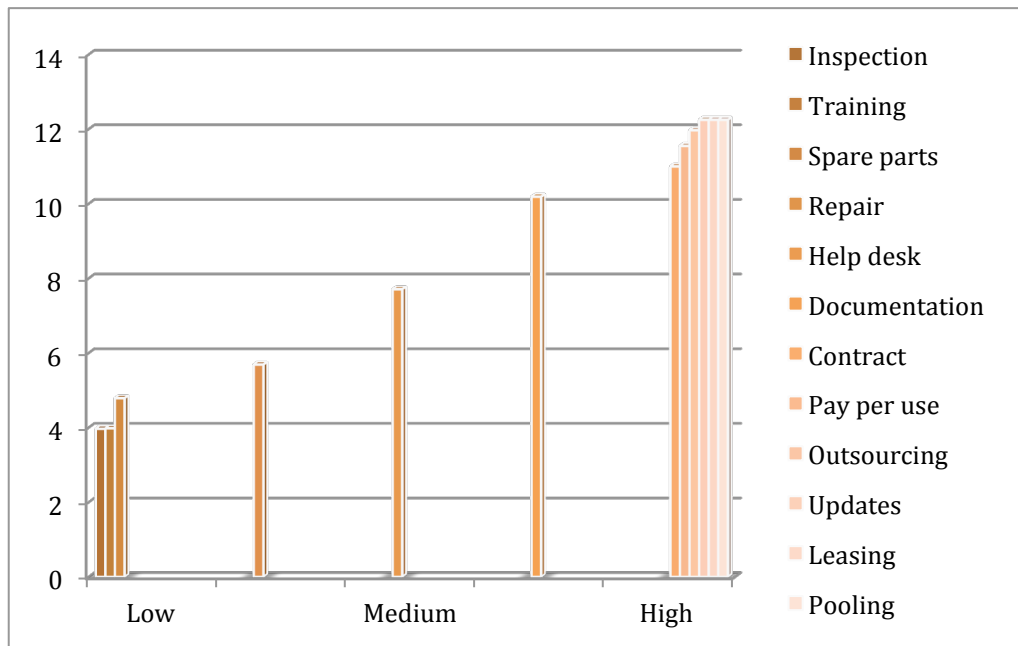


Figure 16. Prioritisation of PS offerings, based on performance indicators

Figure 17 shows the classification model with the current PS offering of Nedap HC. The different scores are reflected on the basis of different sizes of the circles for each PS offering: a larger circle indicates a higher performance score. The PS offerings provided by external partners are illustrated through a square-shape around the specific PS offering. In addition, the coloured section indicates the desired servitisation position of Nedap HC.

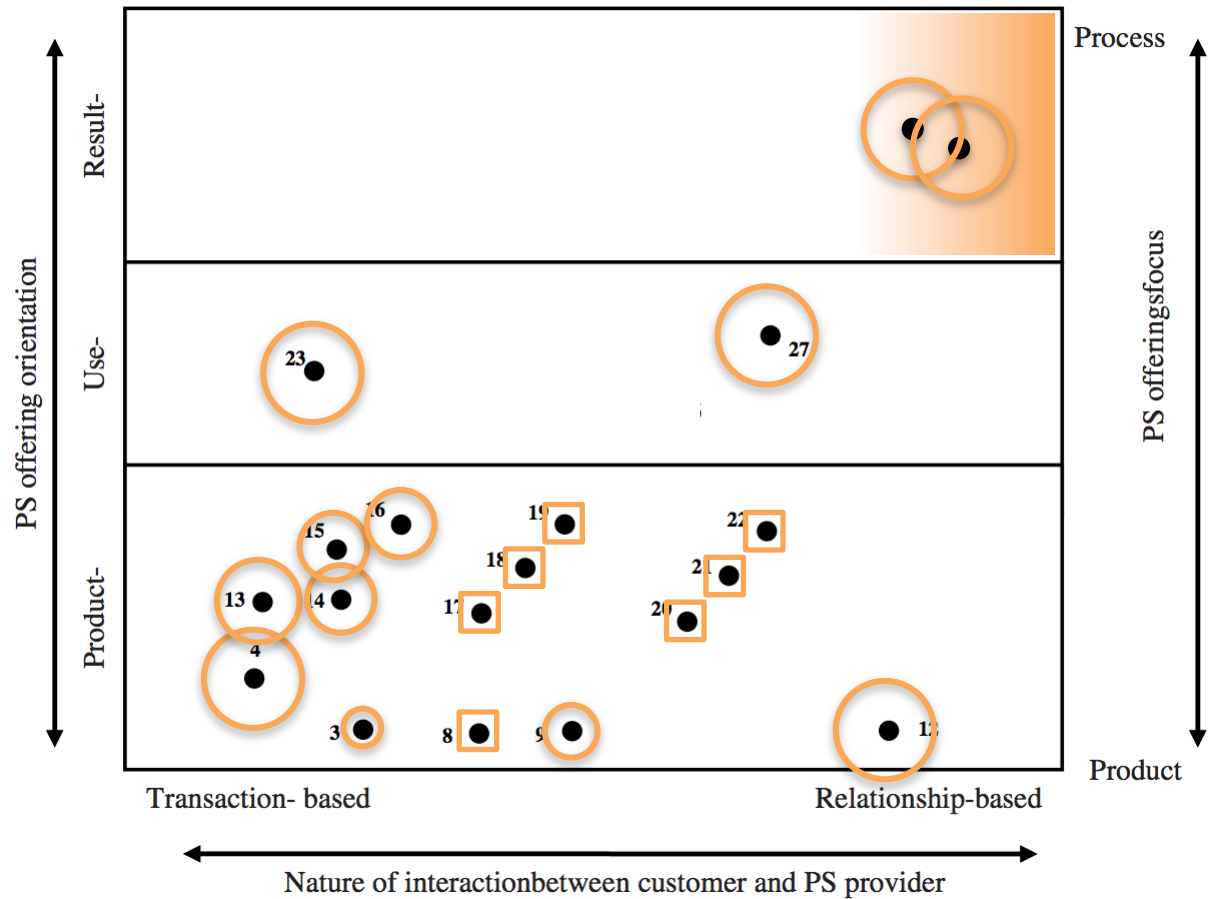


Figure 17. Classification Model for Nedap-case

Nr.	PS offering	Scores
3	Spare parts and consumables delivery	5,0
4	Updates / Upgrades	12,0
8	Inspection and diagnosis	4,0
9	Repair and Maintenance	5,5
12	Full maintenance contract	11,0
13	Documentation	10,0
14	Help desk	8,0
17	Training	4,0
23	Leasing	12,0
27	Pooling	12,0
28	Pay per use	11,5
29	Outsourcing	12,0

Table 8. Relative performance scores of PS offerings of Nedap

### Analysis Nedap

The model illustrates some specific findings for Nedap HC. Currently, Nedap HC offers a diverse set of products and services that range from product-oriented to result-oriented offerings. Further, the PS offerings "Update/upgrade", "Leasing" and "Pooling" are counted as PS offerings with the highest scores on overall performance and can therefore be identified as the most important PS offerings for Nedap HC.

As shown in the classification model, Nedap provides PS offerings that are located at the same position as their intended servitisation strategy. Also, these PS offerings all have high scores relative to other PS offerings of Nedap HC, which indicates that the PS offerings close to the intended strategy are also valuable to Nedap HC.



By offering valuable PS offerings that are at the targeted strategy position, it can be stated that Nedap HC is successful in pursuing their servitisation strategy.

According to the classification model, Nedap HC could extend their PS offering by providing “Functional-based pay-per-use” services. During the interview, the respondent explained that Nedap HC is indeed working towards offering this type of PS offering to its customers. Therefore, the model does provide adequate insights to additional PS offerings that suit Nedap HC and their servitisation strategy. However, after extending the PS offering towards a functional-based pay-per-use system, the model doesn’t provide further PS offering suggestions to expand the offering for Nedap HC. Comparable with the case of Alcast, this could also be related to the selected location of the servitisation strategy. It might even be considered that the desired location of servitisation cannot be placed into the current classification model, because they almost outgrow it with their current offerings.

Another remark that could be made about the case of Nedap HC is the fact that all the selected PS offerings provided by Nedap HC are offered as one package. All customers of Nedap are provided with the same software and hardware, which they can alter and use any way they want to. The software part of the offering can be used in different ways, but all possible applications are always provided even though the customer may chose not to use them. As a result of this kind of offering, some PS offerings are overlapping and thereby hard to score individually, based on the performance indicators. For example, Nedap HC selected “pooling” as a PS offering; because they offer one system that all the customers use. Also, they selected “pay per use” as a PS offering; since customers pay for the system they are provided with on a monthly base. Further, customers are able to use the system in any way that fits their needs, which corresponds with the PS offering of “outsourcing”. During the interview, the respondent had a hard time differentiating between these different PS offerings, because they all refer to the same system that Nedap HC offers.

#### 4.4 Case 3: TMSi

This section describes the collected data from TMSi who specialises in developing high-precision multi-channel amplifiers, data acquisition and communication solutions for (electro-)physiological applications. TMSi has participated in this present research due to a social media announcement of the researcher. The respondent, Benjamin de Jonge, is a product manager at TMSi.

##### Company description

TMSi produces high quality (electro-)physiological measurement amplifiers ranging from heart scans to muscle activity scans. TMSi started producing amplifiers in 1980 for measuring (electro-)physiological signals with children in incubators. The original concept of the firm is the same since their startup, given the innovations of the applied electro-techniques. The firm consists of 27 employees who work in different departments from engineering to sales and marketing. Each department has a specific executive officer. The strategy of TMSi focuses on developing the best amplifiers in their market(s).

At the moment, 91% of the profit revolves around selling amplifiers to universities and other research institutions. This forms the central customer group for TMSi.

There are a couple of competitors in the market who compete on the basis of sales. TMSi doesn’t focus on its competitors, but rather on the customers. Providing needed customer services is important to TMSi. With their accessible support department, customers can easily obtain answers to their questions and solutions to their problems. Customers generally do not need to pay for support.

TMSi doesn't see itself as a product-manufacturer, because of their focus on providing support and advice to customers. Their knowledge helps to provide high quality advice to customers about the solutions to their problems and result in selling a suitable amplifier.

### **Servitisation strategy**

TMSi isn't specifically trying to servitise their business, but naturally focuses on knowledge as most important asset and tries to build a relationship with its customers. Further, the emphasis of TMSi lies on solving the problems of customers by selecting and developing the most suitable amplifier. Although not consciously pursued within TMSi, the following strategy could be formulated:

*"TMSi focuses on a strong customer relationships by offering personalised products that solve problems and even exceed expectations due to our expert knowledge. Also, customer satisfaction is obtained through a strong support system and cooperative development options."*

This indicates the importance of customer relationships and providing high quality knowledge and support essential for selling suitable amplifiers.

## **Classification of PS offerings**

### **Preferred Position**

Given the objective of servitisation for TMSi, the focus lies on product-oriented PS offerings with an emphasis on a strong relationship with the customer. This corresponds with the strategic focus on customer satisfaction by providing high quality advice and support.

### **Mapping the PS offerings**

The list of PS offerings incorporated into the classification model is discussed with the respondent from TMSi to select the PS offerings they currently provide. This shows that TMSi offers almost exclusively product-oriented PS offerings (except from outsourcing). From this list, there are 15 PS offerings that TMSi offers. Below is the list of PS offerings that TMSi currently offers.

Nr.	PS offering	Description
1	Home delivery	Deliver product to home of customer
2	Product installation / start-up commissioning	Start-up Care package or online installation
3	Spare parts and consumables delivery	Deliver consumables and genuine spare parts
4	Updates / Upgrades	Provision of new hardware or software
6	Recycling and take back	Removes product and dismantling services
8	Inspection and diagnosis	Providing inspection, check-up and diagnosis services demand
9	Repair and Maintenance	On or off-site repair, direct or remotely, programmed or available for emergencies
10	Extended warranty	For fixed fee, repair during standard warranty are charged to supplier
14	Help desk – Hot line on product	Information and assistance regarding management of product use, maintenance and repair via communication tools, direct asses to customer database and advice to go to service centre
15	Help desk – Hot line on process	
16	Help desk – Hot line on business	
17	Product-oriented training	Training services to support client while defining how to use product and obtain best performance, improving efficiency, assuring safety and improvement of business
21	Product-oriented consultancy	Regarding product development and use, and business improvements
22	Process-oriented consultancy	
29	Outsourcing	Provider managers one or more activities for customer, but decision regarding how to perform and control these activities remains customer's responsibility

*Table 9. PS offerings provided by TMSi*

### **Bundling of PS offerings**

During the mapping of the PS offerings the respondent was asked about possible bundles of products and services.

The first bundle-option relates to PS offerings that are mostly offered together. Within TMSi two specific bundles of PS offerings are identified. The first bundle of PS offerings consists of Product installation, Product-oriented Training and Product- and Process-oriented advice. The respondent explained how customers are provided with training and advice during the installation and start-up of the amplifier at the customer's location. The second bundle consists of the Help-desk, Updates/upgrades and Inspection/diagnosis. The respondent explained how the help-desk follows through with actions to solve the problems customers are experiencing by offering updates or diagnosis of the customer's amplifier. This emphasizes the focus of TMSi on satisfying their customers by providing support in any needed way.

The second bundle-option relates to specific partners of TMSi with whom they provide the products or services. TMSi doesn't have specific partners with whom they regularly do business. However, TMSi does sometimes co-develop products with other related (software) firms. In such a case, TMSi develops a product or part of a product, the partner companies adds software or hardware components to it and sells it as their own. Thus, the PS offering of outsourcing is offered through a partnership.

The third bundle-option relates to specific customer groups to which TMSi offers specific PS offerings. The respondent explained that only the PS offering of Extended warranty is offered to partner companies who use a part of TMSi products in their own offering. This also forms another bundle of PS offerings that are offered as a package.

The majority of the PS offerings are for their most important customer group consisting of universities and research institutions.

In conclusion, TMSi has three bundles of products and services that are often provided as a package. Further, TMSi offers outsourcing services to related firms who use (part of) the products of TMSi to enhance their own offering. Also, TMSi offers a selected PS offering to a specific customer group.

### Performance scores

Besides possible bundles of PS offerings, this present research uses overall performance indicators to determine the focal points and priorities of the PS offerings. As indicated, TMSi currently provides 15 PS offerings. Appendix 4.1.3 shows the different scores that are given to each PS offering of TMSi.

The following diagram illustrates the different scores on each indicator relative to their assigned weight factor. Differentiating between the different types of helpdesk and consultancy was not possible; these PS offerings are grouped together as one PS offering of “helpdesk” and “consultancy”. The respondent has provided one set of scores to each of these groups.

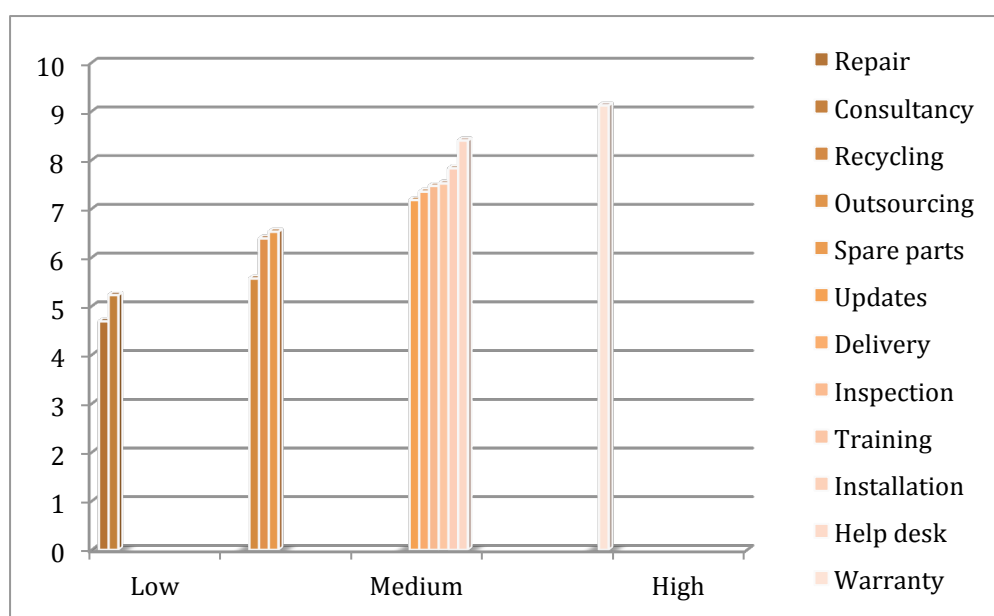


Figure 18. Prioritisation of PS offerings, based on performance indicators

Figure 19 shows the classification model with the current PS offering of TMSi. The different scores are reflected on the basis of differing sizes of the circles for each PS offering. In addition, the connected PS offerings indicate the bundles of PS offerings. The green line indicates the bundle of Help-desk, Updates/upgrades and Inspection/diagnosis. The blue line indicates the bundle of Product installation, Product-oriented Training and Product- and Process-oriented advice. The red line indicates the bundle of Outsourcing and Extended warranty. The PS offering provided by external partners is illustrated through a square shape around the specific PS offering. The triangle-shape indicates PS offering for the specific customer group (external companies who use (part of) a product of TMSi to sell separately with additional features). The coloured section indicates the desired servitisation position of TMSi.

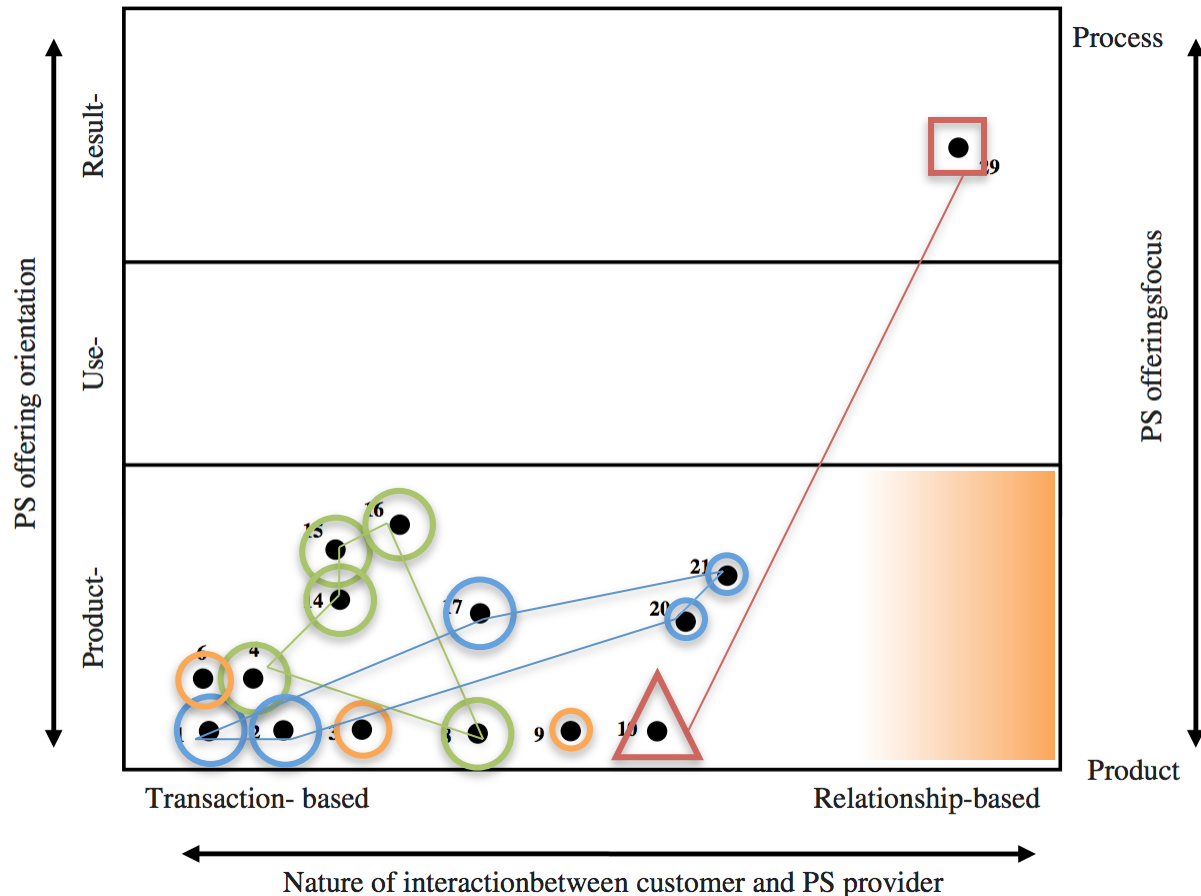


Figure 19. Classification Model for TMSi

Nr.	PS offering	Scores
1	Home delivery	7,5
2	Product installation / start-up commissioning	8,0
3	Spare parts and consumables delivery	6,5
4	Updates / Upgrades	7,0
6	Recycling and take back	5,5
8	Inspection and diagnosis	7,5
9	Repair and Maintenance	4,5
10	Extended warranty	9,0
	Help desk	8,5
17	Product-oriented training	7,5
	Product- and process-oriented consultancy	5,0
29	Outsourcing	6,5

Table 10. Relative performance scores of PS offerings of TMSi

### Analysis TMSi

The model illustrates some specific findings for TMSi. Currently, TMSi offers a diverse set of products and services that focus almost exclusively on product-oriented PS offerings. Further, the PS offerings "Extended warranty" and "Help desk" are counted as PS offerings with the highest scores on overall performance and can therefore be identified as the most important PS offerings for TMSi.

TMSi has the same goals with their servitisation strategy as Alcast, based on the dimensions of this model. According to the classification model, TMSi could extend their PS offerings by offering "preventive maintenance" and "full maintenance contracts".

Based on the type of products that TMSi offers, namely (electro-)physiological amplifiers, these PS offerings are fitting and thereby form a suitable advice. Another advice for TMSi, based on the model, could be to focus more on increasing the performance of consultancy and maintenance related PS offerings located in the lower right of the model.

## 4.5 Conclusion

By applying the model of Gaiardelli et al (2014), a classification is created of the PS offerings in relation to the servitisation dimensions. The results show that each firm has a different pattern of PS offerings and different bundles, based on products and services, partners or customer groups. Gaiardelli et al. (2014) claim that their classification model identifies the landscape of PS offerings and possible opportunities to expand revenue. Overall, the classification model provides managers with insights to compare, analyse and evaluate PS offerings (Gaiardelli et al., 2014). The results of the three firms confirm that the classification model provides insight regarding the classification of the PS offerings. Also, opportunities to expand revenue can be derived from the model by increasing the performance scores of PS offerings that are closest to the location of the servitisation strategy. However, insights to additional PS offerings that might bring the PS offering closer to the location of the servitisation strategy are less clear or fitting to some firms than others. For example, the additional PS offerings indicated by the model do not match with the products of Alcast. Also, the model indicates only one type of PS offering possible for Nedap HC to add to their total offering in order to further pursue its servitisation strategy. However, this can also be explained due to unsuitable servitisation strategies or limitations of the model to support firms who are already offering use-oriented PS offerings and want to servitise even further.

## Chapter 5: Evaluation of classification model

*This chapter evaluates the usefulness of the model to classify PS offerings, based on the three firms and conversation with Canon/Océ employees. First, the chosen dimensions of the model are examined. Second, the selection of PS offerings in the model is discussed. Third, the application of the current model is discussed, based on the data collection of this present research. Fourth, the results from the model, based on the three firms, are further discussed.*

### 5.1 Dimensions

In this section the dimensions applied in the model are discussed.

A notable aspect of the model of Gaiardelli et al. (2014) is the use of a total of three dimensions. These dimensions are chosen, based on a literature study performed by the authors who selected the most popular dimensions to classify PS offerings.

The first dimension, *product offering orientation*, consists of three complementary characteristics, namely product ownership, product use and decision maker power. The authors use the categorisation of Tukker (2004) to differentiate between three levels of product offering orientation. The second dimension, *PS focus*, consists of two characteristics, namely relationship intensity and level of customisation. The third dimension, *nature of interaction*, differentiates between transactional and relational interactions between firm and customers.

Although the model claims to be a three-dimensional classification model, it illustrates the three dimensions in a non-conventional manner. Normally, three-dimensional models consist of three axes, which all represent an independent dimension to classify data on. However, the selected classification model uses only two axes, in which the Y-axis represents two dimensions. Because of this nature, the two dimensions of *product offering orientation* and *PS focus* are based on matching characteristics. Also, the characteristics representing the dimension *nature of the interaction*, on the X-axis, have a dependent relationship with the characteristics of the other dimensions: since the description of the three categories of Tukker (2004) already incorporates a shift from transactional to relational interactions. Therefore, the model of Gaiardelli et al. (2014) indicates a linear connection between the dimensions in which firms move on a diagonal line from the lower left to the upper right when they servitise. According to the categories of Tukker (2004) incorporated in the model, not all movement of firms is possible in the model. For example, firms need a better relationship with their customers in order to grow to another level of Tukker's categories, which makes vertical movement from PS offerings located lower left to upper left less likely to appear. Figure 20 illustrates the intended movement of PS offerings, based on the categories of Tukker (2004) and the dependent relationships between the dimensions.



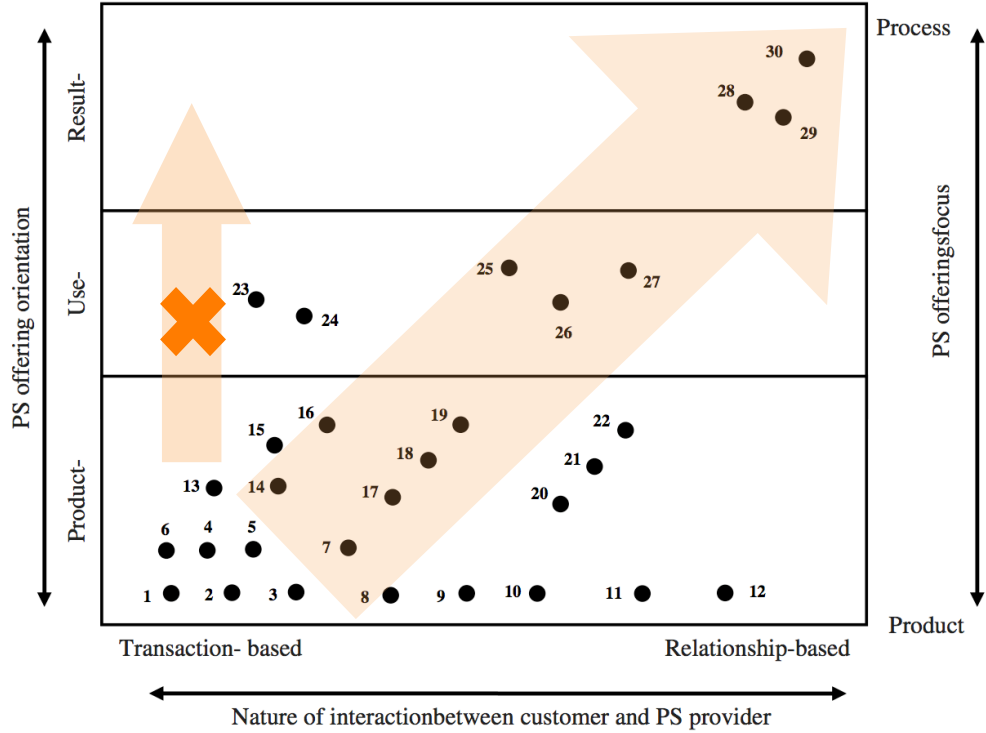


Figure 20. Intended movement of PS offerings

As a result, the model doesn't match other conventional three-dimensional models in which the dimensions are independent from each other and possible movement is more likely to occur in multiple directions.

Despite the fact that the three dimensions relate to each other and have overlapping characteristics, they are not redundant. The model uses its dimensions to further differentiate the PS offering within the three categories of Tukker (2004). Although Tukker (2004) did further specify its categories by describing more types of PS offerings per category, Gaiardelli et al. (2014) take this specification to another level with their model by incorporating specific PS offerings. This goal can only be met when the dimensions do in fact have dependent relationships. Thus, although the three-dimensional model isn't in fact a traditional three-dimensional model, it is still valuable to classifying PS offerings.

## 5.2 PS offerings

In this section the PS offerings located into the model are discussed. Four remarks can be made, based on the PS offerings located into the model. The first remark focuses on the method used to plot the PS offerings. The second remark focuses on the alignment of the dependent relationship of the dimensions with the spread of the PS offerings. The third remark focuses on the local spread of the PS offerings. The fourth remark focuses on the standardisation of the list of PS offerings. Each remark will be described next.

First, in their article, the authors don't explain their process of selecting the specific PS offerings and their location in the model. Also, when contacting the authors about their methodology regarding the selection and location of the PS offerings, they explained that they used a literature study to select and plot the PS offerings into their model. However, details about this literature study are not described.

Second, the thirty PS offerings are roughly plotted on a diagonal line from bottom left to top right. Despite the density of PS offering in the product-oriented category, the



intended movement for servitisation is visible through this diagonal line on which almost all the PS offerings are plotted.

Third, the PS offerings are mostly located in the product-oriented category of the *product offering orientation* dimension. This seems to show a focus of the classification model on firms that are starting to servitise and still focus on products. Due to this focus on product-oriented PS offerings, certain types of firms are less suitable for the model, such as firms who do not manufacture products themselves or are mostly offering use- and result-oriented PS offerings. Also, this disproportionate distribution of PS offerings limits the analysis of possible PS offerings that firms could add to further servitise their business. Because most PS offerings are located in the product-oriented category, this category might gain more attention and make the other two categories seem less important or reachable for servitisation.

Fourth, standard models provide the analyst with guidelines and characteristics that help classify certain data. To apply such a model, the research evaluates the data, based on the incorporated characteristics, and classifies the information, based on own interpretations into the model. The model of Gaiardelli et al. (2014) differentiates from the standard models by offering a detailed list of PS offerings. By doing so, they leave little room for interpretation, which results in a more consistent implementation of their model. This aspect of the model can be seen as both positive and negative. The positive side of a standardised list of specific PS offerings is the fact that the model is relatively easy to apply to firms and it therefore strengthens the reliability and usability of the model. The negative side relates to possible constraints to this standardisation: the model doesn't support alternative PS offerings or special cases with different types of PS offerings. This was the case with all of the three participating firms and was also recognized at the case of Canon: there are PS offerings that do not fit the standardised list of PS offerings, such as "Creating sales leads" at Alcast. As with every model or theory that is standardised: when cases fit the norm, the model will work fine, but when cases form exceptions to that norm, models tend to fall short and different interpretations are needed. As with servitisation, the concept is variable, based on different firms, strategies, customers and markets. Using a standardised model might therefore not be the best suitable choice. However, as Gaiardelli et al. (2014) point out, the literature lacks certain guidelines about how to servitise and which PS offerings to offer as a firm. Although a standardised model may not encompass every possible PS offering, it can still be valuable when the incorporated PS offerings can provide adequate advice and insights regarding servitisation.

### 5.3 Application

In this section the application of the model is discussed, based on the cases used in this present research. As mentioned before, the model incorporates a standardised list of PS offerings. Also, the authors show in their article how to apply the model to a case. This provides the researcher with very specific guidelines to apply the model and a reliable method to classify PS offerings. As with the cases used in this present research, the list with PS offerings was well defined and the respondents understood the meaning of each of the PS offerings, based on the given descriptions. By providing the respondents with the list of PS offerings and their definitions, the respondent could quickly tell which PS offerings are incorporated in the firm's total offering. This made it possible to interview the respondent over the phone and in a short period of time.

However, as mentioned before, there are also downsides to this standard list of PS offerings. First of all, the list of PS offerings isn't validated yet. Currently, the position of the different PS offerings is based on a methodology that hasn't been elaborated or described by the authors. Secondly, the list of PS offerings doesn't cover every PS

offering of the firms participated in this present research. This leaves certain PS offerings out of the model that contribute to the servitisation position of firms.

Further, the identification of bundles was less clear during the interviews. Two out of the three cases didn't offer any bundles of product and services. In the case of Nedap, every PS offerings formed one bundle, which nullified specific bundles within the selected PS offerings.

Also, the authors use *revenue streams* from secondary data as means to determine the importance of certain PS offerings and show the importance of services to a firm's total offering. Two remarks can be made related to the revenue streams used in the model to indicate performance and importance. First, it is experienced to be difficult to obtain detailed financial information for specific PS offerings from firms, because the financial records do not provide that kind of detail or firms are not willing to share that kind of financial details. Second, the authors measure performance solely on the bases of revenue, which is a long-term goal in the case of servitisation. Before firms can profit from providing services and having a close relationship with its customers, other performance indicators are needed to show progress and benefits. Therefore, this present research incorporated a broader base on which performance was measured. Still revenue and sales aspects were given the biggest weights, but customer- and internal organizational-related aspects were also included.

Overall, the application of the model is made clear and reliable through the standardised PS offering lists and example case of the authors in their article.

## 5.4 Analysis

In this section, the analysis of the data is discussed, based on the cases used in this present research. The model provides insights into the PS offerings the firm currently offers in relation to servitisation. Due to the use of the performance indicators, the PS offerings are further classified and differentiated for a more in-depth analysis. This differentiation, based on performance indicators between the PS offerings, especially helps to identify the focal point of the current offering of firms. As a result, opportunities towards the servitisation goal can be identified, based on the model.

Strength of the model is the ability to make diverse classifications of PS offerings. Traditional classification models identify several quadrants or typologies and firms are placed in one of these quadrants as a form of classification. The model of Gaiardelli et al. (2014) does not have specific quadrants or categories to classify a firm, but every combination of PS offerings creates a new category. By supporting unlimited combinations of PS offerings, the model doesn't generalise the PS offerings of specific firm, which results in detailed reproduction of the offering and more specific analysis. This is clearly derived from the results in this present research: all three cases have a different spread of the PS offerings they currently offer. Even though Alcast and TMSi have classified their servitisation strategy on the same spot in the model, their PS offerings are different.

Although the absence of specific quadrants to classify the PS offering offers more firm-specific results, it also has a drawback. Due to the lack of typologies or quadrants, the results of specific firms are hard to compare or analyse, based on best practice cases or literature or practical standards. The model doesn't provide insights in aspects of best practice or beneficial PS offerings to offer if a firm wants to servitise. This means that the model gains value when it has been applied over a period of time within one firm or maybe one market. That way the development of the PS offerings can show the servitisation path of the firm. However, determining if this path is right for the firm or if there are other more beneficial paths, based on the model, is less straightforward. Therefore, the model has a strong illustrative focus to inform managers about the

servitisation position of the current and past PS offering: Advice on how to improve and benefit from PS offerings is less clear due to the unlimited combinations of PS offering that are possible.

## 5.5 Conclusion

Gaiardelli et al. (2014) have created a classification model that further differentiates and specifies the PS offerings-categories described by Tukker (2004). The model uses three dependent dimensions to plot PS offerings, based on the three categories of Tukker (2004). The dependent relationships between the dimensions help to further classify PS offerings, based on the original categorisation of Tukker. Every combination of PS offerings forms a unique category in the model, which results in firm-specific classifications of PS offerings. Differentiating the selected PS offerings of firms by performance indicators, results in a more in-depth analysis about the focal point and position regarding the servitisation strategy. The downside to this free formatted classification model, is the lack of typologies and standards to provide insights to develop and improve the offering of firms. Even though the PS offerings can be compared, based on the performance indicator scores, it doesn't provide guidelines to the total PS offering and its relation to the servitisation strategy. Another important downside to the model relates to the PS offerings incorporated into the model. By standardising this list, alternative PS offerings are left out that might be important for specific firms that are servitising.

## Chapter 6: Conclusion and Discussion

*In this chapter the conclusion of this present research will be described, based on the previous chapters. Also, limitations and possibilities for future research are being discussed.*

### 6.1 Conclusion

This present research focuses on classifying PS offerings, based on the concept of servitisation. This topic is chosen, because servitisation is an attractive movement for manufacturing firms and the suitability of PS offerings is important for the success of servitisation. In order to answer the research question, several sub-questions have been formulated in the first chapter. After concluding the research, the answer to each sub-question can be described and will lead to the answer to the research question. Each sub-question and answer will be briefly described next.

The first sub-question is: *“What defines servitisation with regard to the implementation of services and solutions?”*

The answer to this sub-question has been provided through a literature study of the concept of servitisation. In short, the concept of servitisation can be viewed as: a movement towards focusing on the customer’s needs as a whole by offering integrated bundles of products and services. Furthermore, servitisation has been described as a strategy or trend in which firms focus on the customer’s needs as a whole by offering integrated bundles of products and services in order to gain a competitive advantage.

The second sub-question is: *“What are PS offerings?”*

The answer to this sub-question has also been provided through a literature study focusing on servitisation and PS offerings. In short, PS offerings are part of the value proposition of a business model. In the case of servitisation, a PSS can be viewed as a business model that differentiates a firm from competitors by satisfying customer’s needs through offering PS offerings. The product-service continuum indicates the large quantity of possible PSS, and thereby different combinations of PS offerings situated between pure manufacturing firms and pure service providers. Identifying which specific PS offerings suits a firm is an important step towards developing a successful PSS.

The third sub-question is: *“What models do exist for the classification of PS offerings?”*

The answer to this sub-question has also been provided through a literature study focusing on different classification models. Several classification models for PS offerings are found in the literature. Each model differs, based on the use of different dimensions and characteristics. Despite the variety of models, the classification model of Tukker (2004) has been a popular model within the literature. Other authors often use the dimensions described by Tukker as a base for new models. Gaiardelli et al. (2014) also based their model on the dimensions of Tukker and used it to create a three-dimensional model consisting out of the most popular dimensions used to classify PS offering. Also, this model differentiates itself from other models through a detailed positioning of thirty specific PS offerings. The model of Gaiardelli et al. (2014) helps managers to map their offering and to illustrate and describe their current PS offerings, while interpreting and evaluating their opportunities. This model has been selected for this present research.

The fourth sub-question is: *“How can the PS offering be classified, based on the selected classification model?”*

Applying the model to three participating firms has provided the answer to this sub-question. The three firms, namely Alcast, Nedap and TMSi, are all different, based on strategy, products, customers, markets and structure. This study provided diverse data to evaluate and test the classification model of Gaiardelli et al. (2014) on its usability to classify PS offerings. The data has been obtained through structured interviews in which

the list of PS offerings was discussed, several bundles of products and services were identified and each PS offering was provided with performance-based scores.

The answer to the four sub-questions provide enough information to answer the main research question, which is formulated as followed:

*“How can PS offerings be classified, based on the concept of servitisation?”*

The applied model of Gaiardelli et al. (2014) shows firm-specific classifications of the PS offerings and thereby forms a tool to classify PS offerings. The model doesn't include typologies or fixed quadrants, which results in unique classifications of PS offerings for each firm. This strengthens the firm-specific analysis that can be made with the model, because results are not generalised into typologies. However, it does make it harder to find guidelines or standards to a firm-specific classification of PS offerings regarding benefits or possibilities. By making every classification-case unique, the model lacks general principles to analyse the data. However, the model focuses on illustrating the spread of the PS offerings, which helps to analyse the current situation. In order to analyse possibilities or opportunities, the model in general needs more evaluation, especially regarding the spread of PS offerings, and more data from one firm, for example different periods of one firm to compare and analyse progress.

## 6.2 Limitations

This section provides a description of the limitations of the research. The most important limitation to this present research is the small sample size used to test the classification model. Only three firms were found willingly and able to participate in this present research within the short time period. Despite this small sample, the collected data provided enough information to apply and evaluate the classification model. This is also caused by the diversity of firms that participated. Each firm differed on basis of strategy, structure, products, markets and customers, which made the evaluation of the usability of the model more in depth. Therefor, the limited sample doesn't negatively influence the conclusions of this present research.

## 6.3 Future research

The evaluation chapter of this present research described several remarks regarding the classification model. The critical evaluation of the model on all its aspects has resulted in several suggestions for further research. Each suggestion will be described next.

A first suggestion for further research regards the chosen dimensions of the model. The evaluation chapter explains why the dependent relationships between the dimensions help to further classify PS offerings. However, it does triggers the question if the model can be reformed into a traditional three-dimensional model with independent dimensions on three different axes. Since, using dimensions that incorporate unique and independent characteristics of PS offerings might offer new means to classify PS offerings and analyse their position. Searching and analysing possible alternative dimensions is beyond the scope of this present research and could be applied in further research.

A second suggestion for further research regards the selection and location of PS offerings. Because the PS offerings are selected through non-described literature study, the completeness and preciseness of the PS offerings in the model might be questioned in further research. During the structured interviews, it has become clear that not all PS offerings are incorporated into the model. Also, the precise position of each PS offering within the model should be validated, since the authors do not explain their choices.

A possible way to improve the PS offerings of the model is by using practical information to position the PS offerings. This could be done by setting up a internet survey in which a large sample of servitising firms are asked to describe five or ten of their most important PS offerings. Next, the respondent determines the position of each specific PS

offering by classifying the PS offering on each individual axis of the model. This results in a unique positioning of the provided PS offering of a firm. The steps incorporated in this present research of bundling and prioritising can then follow, based on the described PS offerings. When this procedure is used at a large sample, a new pattern of PS offerings might occur that is more accurate and possibly incorporates more PS offerings. Also, this can provide specific information of firms in the same market. If all the managers are describing the same PS offerings as important to their servitisation strategy, it can be concluded that firms in that particular market should offer them in order to servitise too. That way, the model can in fact offer advice on guidelines and standards for servitisation on specific markets or products. Or maybe even based on servitisation phases. By making the fix PS offering list more flexible by encouraging managers to describe their own PS offering that are important to their firm, the model can be made more market-specific in terms of analysis.

A third suggestion for further research regards the selection of performance indicators. This present research selected and assigned weight factors to the performance indicators, based on a literature study of Storey and Kelly (2001). However, further research might find out if the selected performance indicators and their weight factors are indeed optimal for this present research.

A possible way to verify the selected performance indicators is to add this assignment to the online survey described above. While asking managers for their most important PS offerings, questions about their most important performance indicators can be added. This might result in market-specific performance indicators or even a shift in importance of certain performance indicators during the servitisation process. Also, a more detailed literature study can be performed to find out which specific performance indicators are important during servitisation and if there are differences between phases of servitisation or markets or types of firms.



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## Appendix

### A: List of PS offerings

#### Product-related PS offerings

Nr	Service	Description
<b>Product-related services</b>		
1	Home delivery	Deliver product to home of customer
2	Product installation / start-up commissioning	Start-up Care package or online installation
3	Spare parts and consumables delivery	Deliver consumables and genuine spare parts
4	Updates / Upgrades	Provision of new hardware or software
5	Remanufacturing, Refurbishing, Cleaning, Safe keeping	Selling additional products and services
6	Recycling and take back	Removes product and dismantling services
7	Financial services	Financial support to buy product or repair services
8	Inspection and diagnosis	Providing inspection, check-up and diagnosis services demand
9	Repair and Maintenance	On or off-site repair, direct or remotely, programmed or available for emergencies
10	Extended warranty	For fixed fee, repair during standard warranty are charged to supplier
11	Preventive maintenance	Maintenance programs defined by standard, customized or special contracts
12	Full maintenance contract	Provider is completely responsible for performance, offered through package
<b>Advice &amp; Consultancy</b>		
13	Documentation	Regarding installation, use, repair and disassembly
14	Help desk – Hot line on product	Information and assistance regarding management of product use, maintenance and repair via communication tools, direct access to customer database and advice to go to service centre
15	Help desk – Hot line on process	
16	Help-desk Hot line on business	
17	Product-oriented training	Training services to support client while defining how to use product and obtain best performance, improving efficiency, assuring safety and improvement of business
18	Process-oriented training	
19	Business-oriented training	
20	Product-oriented consultancy	Regarding product development and use, and business improvements
21	Process-oriented consultancy	
22	Business-oriented consultancy	

#### Use-oriented PS offerings

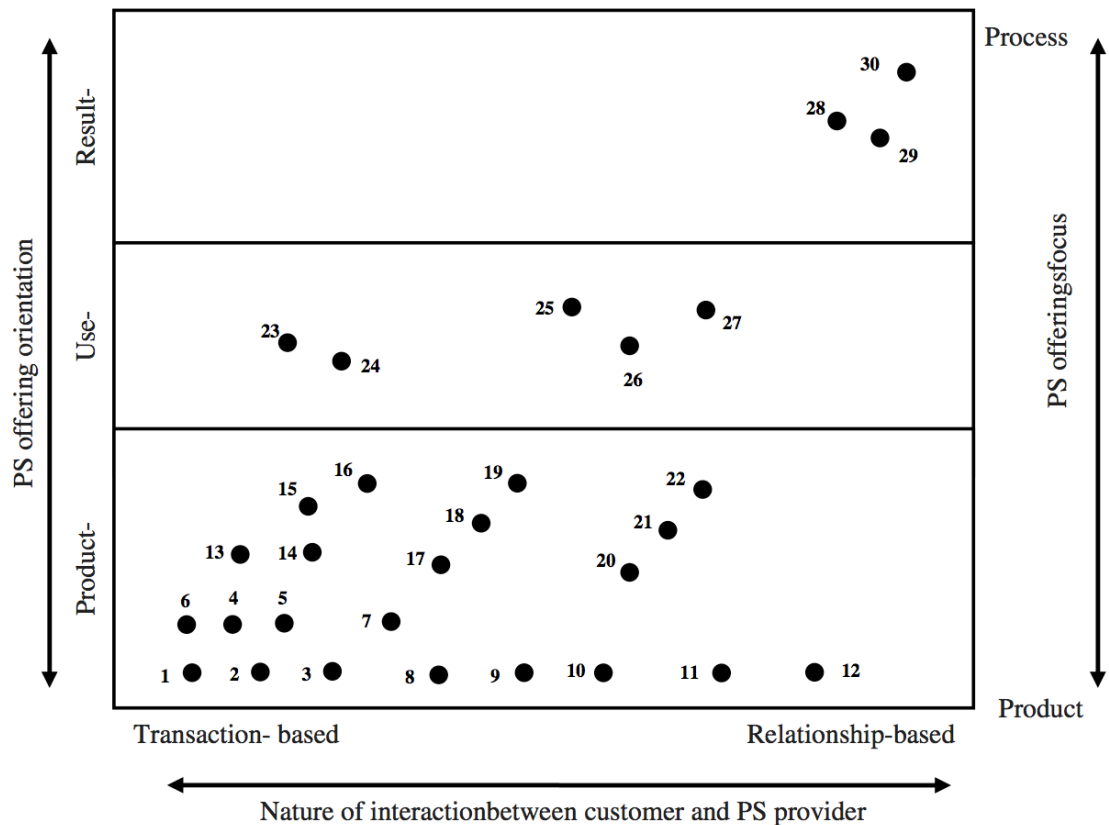
Use-oriented FS offerings		
Nr	Service	Description
Leasing services		
23	Leasing	Lessee pays regular fee for unlimited and individual use of product
Renting services		
24	Short term renting	Customer uses product individually for a predetermined period. Contract can be tailored based on needs and includes costs related to use and repair, insurance etc.
25	Long-term renting	
Sharing services		
26	Sharing	Product is sequentially used by different customers
Pooling services		
27	Pooling	Simultaneous use of a product by different customers

#### Result-oriented PS offerings

Nr	Service	Description
<b>Pay per use services</b>		
28	Pay per use	Provider covers the activities needed to maintain the availability of the function, customer pay for their use.
<b>Outsourcing services</b>		
29	Outsourcing	Provider manages one or more activities for customer, but decision regarding how to perform and control these activities remains customer's responsibility
<b>Functional results services</b>		
30	Functional-based pay-per-result	Provide customers with complete services tailored in-situ, including design, process simulation, and mining support for process optimisation

## B: Classification model

Classification model of Gaiardelli et al. (2014)



## C: Structured interview questions

### Product-service systemen in kaart: Omschrijving Onderzoek

Dit document is bedoeld om alvast inzicht te geven betreffende de gestelde vragen en benodigde informatie voor het onderzoek naar servitiserings. Tijdens het gesprek zal verdere informatie en uitleg gegeven worden.

Tijdens het onderzoek wordt allereerst een korte bedrijfsomschrijving besproken, daarna wordt de strategie van het bedrijf betreffende servitiserings besproken, vervolgens wordt het aanbod van het bedrijf dat gerelateerd is aan servitiserings in kaart gebracht en tot slot worden de prestatie-indicatoren per aangeboden dienst en product beoordeeld. Deze fasen en welke informatie nodig is, worden hieronder in meer detail beschreven.

Algemene Bedrijfsomschrijving	
<b>Bedrijfsomschrijving Intern</b> Geschiedenis Missie / Visie / Strategie Aanbod Structuur	
<b>Bedrijfsomschrijving Extern</b> Markten Partners Klanten Concurrentie	
<b>Servitiserings</b> Visie Ontwikkelingen	

### Fase 1: Strategie Omschrijving

De strategie die het bedrijf heeft betreffende servitiseren vormt een belangrijke leidraad voor de diensten en producten die het bedrijf aanbiedt. De eerste vragen in het onderzoek focussen dan ook op het beschrijven en selecteren van de doelstellingen en strategie die het bedrijf heeft vastgesteld om (verder) te servitiseren.

Wat is de strategie betreffende servitiseren? / Waar streeft het bedrijf naar wanneer het over servitiseren gaat?

Selecteer bij ieder karakteristiek de mate van servitiseren die strategisch gewenst is.  
(Let op: Niet de huidige situatie, maar de gewenste situatie)

Selecteer	Oriëntatie van de diensten	
	Product-georiënteerde diensten	Er is een duidelijk onderscheid tussen de aangeboden diensten en producten. De diensten worden complementair aan de producten aangeboden waarbij de focus ligt op after-sales diensten, zoals reparaties, onderhoud en hergebruik.
	Gebruik-georiënteerde diensten	Het gebruik van het product wordt hierbij via diensten aangeboden, zoals leasing en huren. Door de bundeling van diensten en producten wordt gebruik van het product en contact met de klant gestimuleerd. Het product blijft eigendom van het bedrijf en het gebruik ervan wordt via diensten aangeboden.
	Resultaat-georiënteerde diensten	Het bedrijf richt zich volledig op de behoeften van de klant door het aanbieden van oplossingen. De concepten van diensten en producten zijn vervaagd en het bedrijf biedt een totaalpakket aan waarbij de producten eigendom blijven van het bedrijf.

Mate van relatie met de klant (Geef een cijfer op basis van de schaalverdeling)				
Gebaseerd op transactie			Gebaseerd op relatie	
Korte termijn contact			Lange termijn contact	
Standaardisatie			Personalisatie	
1	2	3	4	5

Mate van focus binnen de productie (Geef een cijfer op basis van de schaalverdeling)				
Focus op product			Focus op proces	
1	2	3	4	5

### Fase 2a: Aanbod selectie

Het model dat gebruikt wordt in het onderzoek beschrijft een dertigtal diensten en producten die gerelateerd zijn aan servitiseren. De tweede fase in het onderzoek draait om het selecteren van de hieronder omschreven diensten en producten die het bedrijf aanbiedt. Daarna worden de geselecteerde diensten en producten verder gegroepeerd om een beter overzicht te verkrijgen, zie hiervoor fase 2b.

Welke diensten of producten biedt het bedrijf aan?

Nr.	Diensten	Omschrijving	Ja / Nee
1	Thuis bezorgen	Levering van het product aan de klant	
2	Product installering en gereedmaken	(Online) Installatie pakket	
3	Leveren van reserve onderdelen en verbruiksartikelen		
4	Updates en Upgrades diensten	Levering van nieuwe hardwaren of software	
5	Hergebruik, Opknappen, Schoonmaken en Bewaring van onderdelen	Diensten gerelateerd aan levensduur van het product	

Nr.	Diensten	Omschrijving	Ja / Nee
6	Hergebruik en terugnemen van onderdelen		
7	Financiële diensten	Financiële steun aan de klant om het product of reparatie diensten aan te schaffen	
8	Inspectie en diagnose diensten	Op aanvraag leveren van inspectie of diagnostische diensten	
9	Reparatie en onderhoud	Direct of op afstand reparerende diensten leveren, voorgeprogrammeerd en/of op aanvraag	
10	Uitgebreide garantie diensten	Voor vast bedrag worden reparaties vergoed door bedrijf	
11	Preventieve onderhoudsdiensten	Onderhoudsprogramma gedefinieerd door standaard, aangepaste of speciale contracten	
12	Volledig onderhoudscontract	Bedrijf is volledig verantwoordelijk voor de prestatie van de producten en diensten binnen het pakket	
13	Documentatie	Met betrekking tot installatie, gebruik, reparatie en demontage	
14	Help desk – lijn op product	Informatie en ondersteuning via communicatie-instrumenten met betrekking tot beheer van het gebruik van het product, onderhoud en reparatie	
15	Help desk – lijn op proces		
16	Help desk – lijn op bedrijfszaken		
17	Product georiënteerde training	Training met betrekking tot het gebruik van het product, verkrijgen van beste prestaties, verbeteren van efficiëntie, het waarborgen van veiligheid en verbeteren van bedrijfsprocessen	
18	Proces georiënteerde training		
19	Bedrijfszaken georiënteerde training		
20	Product georiënteerd advies	Advies met betrekking tot de ontwikkeling en het gebruik van het product, en zakelijke verbeteringen	
21	Proces georiënteerd advies		
22	Bedrijfszaken georiënteerd advies		
23	Product lease	Klant betaalt periodiek voor ongelimiteerd en individueel gebruik van het product	
24	Korte termijn verhuur	Klant gebruikt het product individueel voor een vastgestelde periode. Contract kan aangepast worden aan behoeften en omvat kosten van gebruik, reparatie, verzekering etc.	
25	Lange termijn verhuur		
26	Delen van product	Product is achtereenvolgens gebruikt door verschillende klanten	
27	Pooling	Product is gelijktijdig gebruikt door verschillende klanten	
28	Betalen-voor-gebruik	Bedrijf is verantwoordelijk voor de activiteiten betreffende het gebruik van het product	
29	Outsourcing	Bedrijf regelt een of enkele activiteiten voor de klant, maar de besluitvorming betreffende gebruik en controle blijven bij de klant	
30	Functie-gebaseerde betalen-voor- resultaat	Bedrijf levert alle diensten en product om een resultaat te leveren inclusief ontwerp van processen en optimalisatie.	

### ***Fase 2b: Groeperen van diensten en producten***

Naast het selecteren van het aanbod dat het bedrijf aanbiedt, worden de verschillende diensten en producten gegroepeerd op basis van enkele eigenschappen. Allereerst wordt er gevraagd om die diensten en producten te groeperen welke als een bundel worden aangeboden. Ten tweede wordt er gekeken naar de manier van levering, waarbij onderscheidt gemaakt wordt tussen in- en outsourcing. Ten derde worden de diensten en producten gegroepeerd op basis van verschillende klantgroepen die het bedrijf mogelijk identificeert.

Bij iedere geselecteerde dienst of product worden de volgende vragen gesteld om hierover meer details te verkrijgen:

- Welke diensten en producten worden als een bundel aangeboden aan de klant?
- Welke diensten en producten worden vanuit het bedrijf geleverd en welke worden door externe partners aangeboden?
- Welke diensten en producten behoren tot welke klantgroepen?

### Fase 3: “Waarde” bepaling

Wanneer er een volledige lijst is van de geselecteerde en gegroepeerde diensten en producten, wordt deze beoordeeld met een zevenpunt schaal op een aantal prestatie-indicatoren. Hiermee wordt de waarde met betrekking tot prestatie per dienst of product voor het bedrijf bepaald. Deze waarden worden vervolgens vergeleken met de strategie van het bedrijf, zodat er geanalyseerd kan worden in hoeverre het aanbod bij de strategie aansluit.

Weging van de diensten en producten aan de hand van de volgende prestatie-indicatoren.

#### Financiële indicatoren

*Winst*

1	2	3	4	5	6	7
Laag						Hoog

*Verkoop (Hoe vaak wordt dienst of product verkocht aan klanten?)*

1	2	3	4	5	6	7
Weinig						Veel

#### Organisatorische indicatoren

*Strategische synergie (Is er overeenstemming met de servitiseringsstrategie?)*

1	2	3	4	5	6	7
Weinig						Veel

*Toekomstige mogelijkheden (biedt de dienst of product verdere mogelijkheden / uitbreidingen?)*

1	2	3	4	5	6	7
Laag						Hoog

#### Klant-gerelateerde indicatoren

*Klanttevredenheid*

1	2	3	4	5	6	7
Laag						Hoog

*Hoeveelheid nieuwe klanten*

1	2	3	4	5	6	7
Weinig						Veel

## D: Performance scores for PS offerings

### Performance indicator scores for PS offerings of Alcast

Nr.	PS offering	Profit	Sales	Customer Satisfaction	New customers	Future potential	Strategic fit
1	Home delivery	1	7	7	7	2	7
3	Spare parts and consumables delivery	1	7	7	7	2	7
8	Inspection and diagnosis	1	1	7	2	2	5
13	Documentation	2	2	5	4	4	7
14	Help desk – Hot line on product	1	2	5	1	2	3

### Performance indicator scores for PS offerings of Nedap

Nr.	PS offering	Profit	Sales	Customer Satisfaction	New customers	Future potential	Strategic fit
3	Spare parts and consumables delivery	2	2	6	2	2	3
4	Updates / Upgrades	7	7	6	7	7	7
8	Inspection and diagnosis	1	2	4	2	3	5
9	Repair and Maintenance	1	4	6	5	2	2

12	Full maintenance contract	5	7	7	7	5	6
13	Documentation	5	7	5	5	5	7
14	Help desk – Hot line on product	1	7	5	7	4	3
15	Help desk – Hot line on process	1	7	5	7	4	3
16	Help-desk Hot line on business	1	7	5	7	4	3
17	Product-oriented training	1	3	3	3	2	2
18	Process-oriented training	1	3	3	3	2	2
19	Business-oriented training	1	3	3	3	2	2
20	Product-oriented consultancy	-	-	-	-	-	-
21	Process-oriented consultancy	-	-	-	-	-	-
22	Business-oriented consultancy	-	-	-	-	-	-
23	Leasing	7	7	6	7	7	7
27	Pooling	7	7	6	7	7	7
28	Pay per use	7	7	5	7	4	7
29	Outsourcing	7	7	5	7	7	7

#### Performance indicator scores for PS offerings of TMSi

Nr.	PS offering	Profit	Sales	Customer Satisfaction	New customers	Future potential	Strategic fit
1	Home delivery	2	7	5	1	2	7
2	Product installation / start-up commissioning	3	4	6	4	7	7
3	Spare parts and consumables delivery	3	4	4	1	6	6
4	Updates / Upgrades	3	3	5	6	7	5
6	Recycling and take back	3	2	5	4	3	3
8	Inspection and diagnosis	2	5	6	3	6	7
9	Repair and Maintenance	1	3	4	2	5	4
10	Extended warranty	7	2	6	5	6	7
	Help desk	1	7	7	4	6	7
17	Product-oriented training	2	5	7	3	5	6
	Product- and process-oriented consultancy	1	3	5	3	5	5
29	Outsourcing	5	2	3	5	4	2