



MASTER THESIS

The effects of (dynamic) capabilities on the level of servitization, moderated by market dynamics.

Rick Oosterveld (S2098512)

University: University of Twente
Master: Business Administration
Faculty: Behavior, Management and Social Sciences
Track: Entrepreneurship, Innovation and Strategy.

Examiners: Dr. R.P.A. Loohuis
Dr. P. Bliet

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UNIVERSITY OF TWENTE.

Preface

Before you lies the research “The effects of (dynamic) capabilities on the level of servitization, moderated by market dynamics”. This research is the final assignment upon graduation of the Master of Business Administration at the University of Twente in Enschede.

Innovation, service and marketing have always been my topic of interests. Therefore, together with my first supervisor, we came up with this research question. It was a true learning experience, and although it was challenging at times, I never lost the interest in finding the right solutions.

I would like to thank my first supervisor, Raymond Loohuis, for his guidance and support during the process. Despite the uncertain times due to Covid-19, I am grateful for his online effort and support. Subsequently, I would like to thank my second supervisor, Patrick Bliet, for his feedback. This research has been conducted in collaboration with STEM Industry Marketing Centre. Therefore, I would like to express my appreciation for Willem de Vries (STEM) who supported me with constructive feedback, tips and ideas. To conclude, I would like to appreciate all companies who have participated in the online survey. Without their participation, this research would have been negligible.

I do hope you find pleasure in reading this research.

Rick Oosterveld

Enschede, October 16, 2020

Abstract

There is a growing body of literature interested in the success factors that drives companies to servitize their offerings. However, less scientific interest is devoted to the role of dynamic organizational capabilities on the levels of servitization. For instance, Neely (2008) is considered as the only large empirical study with regard to servitization. Many authors have described how to transit to servitization, and what they believe are key factors for success. However, emphasis has been placed on theories rather than empirical evidence. This research attempts to gain new empirical insights with regard to which key factors have an effect on the level of servitization. In this quantitative research, emphasis has been placed on customer capabilities, organizational capabilities, strategy capabilities, dynamic capabilities and market dynamics. An online survey has been conducted to recruit manufacturers in the Netherlands, resulting in 142 participants. This research also provides, a measurement scale for the level of servitization. A decision tree is conducted to measure the different categories of servitization.

Analysis has shown that service strategy and long-term based relationships with customers have the strongest effect on the level of servitization. Moreover, interfunctional coordination, customer linking, decentralization and storage data have also a significant effect on the level of servitization. In contrast, responsiveness to customers needs are found not to have an effect on the level of servitization in this research. Subsequently, analysis has shown that dynamic capabilities and market dynamics have no significant effect on the level of servitization. Hence, the core capabilities have an effect on the level of servitization. Based on these results, we draw implications for theory and practice.

Keywords: Servitization, customer capabilities, interfunctional coordination, strategy capabilities, dynamic capabilities, market dynamics, quantitative research.

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1. Introduction

Back in the day, the world seemed simple, manufacturers made things and service organizations did things for us. Vandermerwe and Rada (1988) first introduced the notion of servitization in their study of organizations which is defined as a bundle of products and services to add value to their business offering. In the last twenty years, more and more organizations are trying to innovate through ways to integrate product with service. 60 percent of the United States industrial production in 2001 durable manufactured products require added services as they advance through their life cycles (Federal Reserve 2002), while the servitization in manufacturers enterprises in China increased from one percent in 2007, to twenty percent in 2011 (Neely, 2007). Many studies have described the benefits of servitization, since it offers additional consistent and reliable revenue (Oliva and Kallenberg, 2003). However, manufacturers are challenged in finding the right tools to transform to expand their service offerings. Moreover, manufacturers at large seem to struggle to make steps towards servitization while knowing the potential benefits of it. As Gebauer, Fleisch, and Friedli (2005) points out, service growth is far from easy. Hence, the Rolls Royce ‘power of the hour’ service system and their responsibility to operate customer operations, is to this date, scarce.

Servitization in manufacturer industry has become one of the most active service research domains (Ostrom, Parasuraman, Bowen, Patrício, & Voss, 2015). The amount of servitization-related research has rapidly increased over the past 15 years (Kowalkowski, Gebauer, Kamp, & Parry, 2017). Management literature is almost unanimous in suggesting to product manufacturers to integrate services into their core product offerings (Bowen, Ledford, & Nathan, 1991). However, although many studies have highlighted the importance of certain capabilities in the context of servitization, there is no empirical evidence available to support the claim which specific capabilities are required at which level of servitization (Oliva & Kallenberg, 2003; Ulaga & Reinartz, 2011; Storbacka, 2011).

Since the potential benefits of servitization are known, the trend is that manufacturers are changing to a more service-oriented manufacturer in the last two decades. Homburg, Krohmer and Workman (2004) argue: “that due to rapid technological changes, diminishing product life cycles, and fast time-to-market requirements pressure many manufacturers in their efforts to remain competitive and product innovation by itself no longer is sufficient to guarantee business success” (p.42). Quinn (1992) argues the same as Oliva & Kallenberg (2003) that services provide a more stable source of revenue as they are resistant to the economic cycles. Manufacturers are product-oriented companies with assumedly little knowledge of service, therefore it is challenging for companies to change to a more service-oriented manufacturer. Thus, the potential of servitization is well known, however the ‘how’ and ‘what’ questions arises. What capabilities do manufacturers need to acquire, what are the challenges, and how can manufacturers implement degrees of servitization. Several studies have been conducted concerning these questions, however few studies investigated the statistical effect of these (dynamic) capabilities and market orientation in the context of the servitization transition. Therefore, this research wants to explore the effect of market dynamics in the context of (dynamic) capabilities and servitization. The existing literature has neglected the effects of market dynamics to servitization, such as instability and velocity. Therefore, this research seeks to explore the relationship between (dynamic) capabilities and levels of servitization, with market dynamics as moderating function.

The research strategy is to examine this issue deductively. Thereby, the aim of this research is to test hypotheses based on theories. No theory suggests that there is a relationship between (dynamic) capabilities and servitization, moderated by dynamic markets. In this quantitative research, several hypotheses will be tested in order to answer the central research question. The central research question of this research is: *“To what extent do (dynamic) capabilities, moderated by market dynamics, have an effect on the level of servitization of manufacturers in the Netherlands”* This research aims to give manufacturers in the Netherlands (1) the knowledge of the relevant pre-studied literature about the concepts servitization, dynamic capabilities in relation to market dynamics (2) empirical evidence with significant relationships between these topics and (3) knowledge which specific capabilities are required at certain levels of servitization.

In order to guide this research, it is divided in six chapters. The introduction provides the context and goal of the study. This is followed by the explanation and reasoning of the chosen literature. Chapter two describes the conceptualization of servitization, including differences between product and services, types of service, transition to service and challenges to services. Furthermore, it describes the challenges and impact of market orientation and interfunctional coordination. Chapter two is concluded

with the linking of (dynamic) capabilities and market dynamics to servitization. Chapter two consists of only pre-studied literature. The third chapter describes the methodology of this research. This section discusses the research design, which techniques have been used and how the data of the study is collected. The fourth chapter presents the results and analysis of the questionnaire. Chapter five describes the discussion and limitations. Chapter six is the final chapter of this research, which include the conclusion.

1.1 Research goal

The goal in this research is to investigate the effects of (dynamic) capabilities and market dynamics to servitization. Empirical evidence of the relationship between these topics in manufacturing firms is still underexplored. This research provides empirical evidence for manufacturers in the Netherlands. The goal of this research is that the findings will help manufacturers in the Netherlands to understand the concept servitization and support them in acquiring the right capabilities at a specific degree of servitization. This research provides information and capabilities that manufacturers need to gradually move towards a more service-oriented manufacturer.

2 Theoretical framework

In this chapter, the types of service offerings, the transition to servitization and the servitization challenges that companies have to face will be described and analysed. Subsequently, the capabilities, dynamic capabilities and market dynamics are described. Thereafter, the linking between the found (dynamic) capabilities and market dynamics to servitization will be elaborated. The final part of this chapter will be used to describe the hypotheses.

2.1 Difference products and services

In order to conceptualize servitization, it is important to understand the differences between products and services. Tukker (2004) mentions two large differences in product-oriented and service-oriented products. The main difference between these two concepts is the tangibility. Products are tangible and services are intangible, which is complemented by the study (Gauci & Hill, 2003). The second difference is that the value is created with the product while service-oriented adding value is the core product. Tien (2012) argues that products are inventoriable while services are perishable. Both Tien (2012) and Gauci and Hill (2003) agree on the heterogeneity and inseparability of the products and services. Brax (2005) and Raddats et al. (2016) argue the importance of the integration of customers in the service process. They believe that the integration of customers is the most crucial consequence, and thus the greatest difference between service and products. At last, Neely (2008) emphasis that with certain types of servitization the ownership retains with the service provider. In this case, the service provider sells functions of the product instead of the physical product itself. More will be discussed in the next chapter. In table 1 all differences between products and services are shown.

Contrasting goods and services		
	Goods	Services
Intangibility	<ul style="list-style-type: none"> ■ Item is highly tangible ■ Quality can be confidently evaluated prior to purchase. 	<ul style="list-style-type: none"> ■ Item is highly intangible. ■ Quality is difficult to evaluate prior to purchase.
Heterogeneity	<ul style="list-style-type: none"> ■ Item is highly standardised. 	<ul style="list-style-type: none"> ■ The service experience may vary from purchase to purchase.
Inseparability	<ul style="list-style-type: none"> ■ Item is easily customised to meet the customer's needs. 	<ul style="list-style-type: none"> ■ Item requires high quality customer contact personnel.
Perishability	<ul style="list-style-type: none"> ■ Item is easily available in retail stores or shops when needed. ■ Item can be stored. 	<ul style="list-style-type: none"> ■ Customers may need to wait in line or make an appointment. ■ Item cannot be stored in inventory.

Table 1. Differences goods and services.

2.2 Types of servitization

Since the differences between products and services have been defined, the next step is to define the types of service offerings. Therefore, types of service offerings will be divided into different segments. Tukker (2004) defines the concept of product-service systems (PSS). The conceptualization of PSS is arguably the most used concept in the servitization literature. PSS can be defined as consisting of ‘tangible products and intangible services designed and combined so that they jointly are capable of fulfilling specific customer needs (Tischner, Verkuijl, & Tukker, 2002). A PSS business model allows firms to fulfil client needs in an integrated and customized way, build strong relationships with clients, and can innovate faster by knowing the needs of the clients. Tukker (2004) defines eight archetypical models of PSS, however they are categorized in three main categories: (1) product-oriented, (2) use-oriented and (3) result-oriented. The main and subcategories are shown in figure 2.

Product-oriented services

In product-oriented services, the core business activity is still the sale of products however with additional extra services for instance, maintenance contracts or advice and consultancy.

Use-oriented services

In use-oriented services the organization shifts more to the service continuum. In a use-oriented organization the core activity is leasing, renting and pooling. The provider is responsible for maintenance, control and repair. The ownership of the product stays with the provider, however the product is shared in some occasions.

Result-oriented services

In result-oriented services the provider and client agree on a result rather than a pre-determined product. Examples are outsourcing, pay per unit and functional result. Functional result is considered as the most service-oriented version of PSS, where the provider is completely free to deliver the result. In this system, not solely a strong relationship with the client is required, but also in-depth knowledge about the needs of the client.

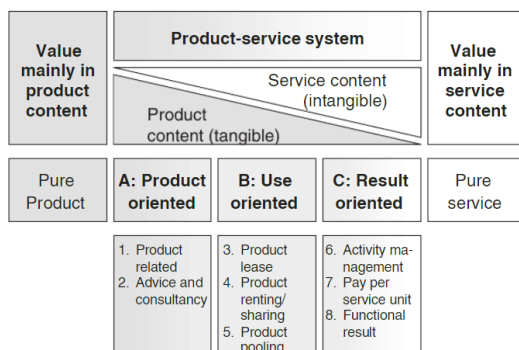


Figure 2: main and subcategories product-service system (Tukker, 2004)

While PSS is arguably the most common concept, many other authors have tried to conceptualize service offerings. However, multiple studies use different concepts with similar meanings. For instance, Visnej, Ringov and Arts (2019) define two types of services: product-oriented services and customer-oriented services. The customer-oriented service is comparable with the result-oriented type of service of Tukker (2014). In both studies, they state the importance of the relationship between the provider and the client. In addition, Oliva and Kallenberg (2003) make a distinction between product-oriented services and end user’s process-oriented services focused on either transaction-based service or relationship-based services. Baines, Lightfoot, Benedettini, and Kay (2009) describe a clear distinction between ‘protective services’ and ‘proactive services. According to Baines et al. (2009), protective services are closely related to the product, for instance training, delivery spares and repairs. These are according to Baines et al. (2009) basic and simple services, added by manufacturers to protect themselves for the loss of orders. By contrast, proactive services are distinctive and include system integration, monitoring, consulting, and financing. Same as Tukker (2004), Mathieu (2001) describes three types of services, namely customer service, product services and services as a

product. Also, as illustrated in figure 3, Lightfoot, Baines, & Smart (2013) define three types of services consisting of base services, intermediate services and advanced services. This is in line with the conceptualization of Tukker (2004).

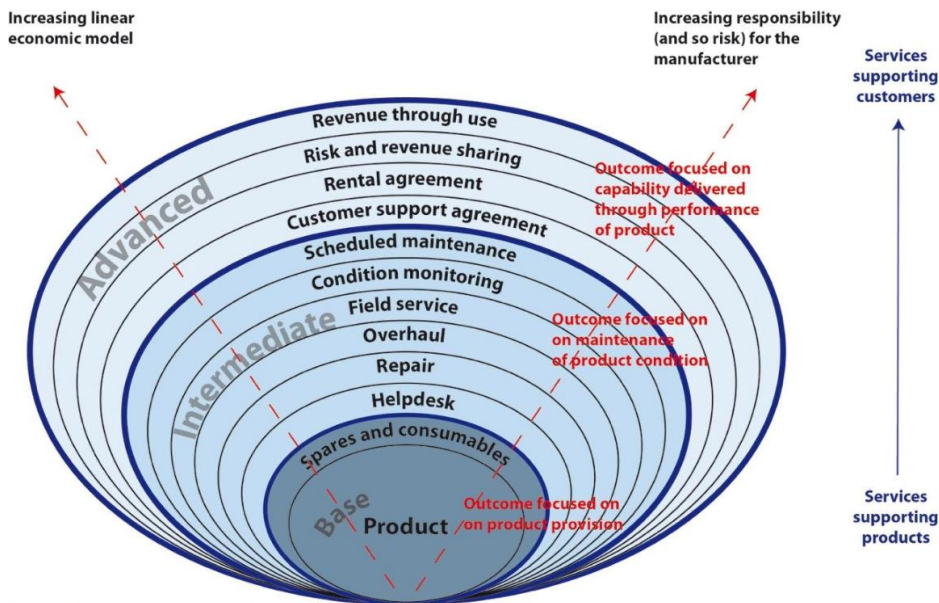


Figure 7 Advanced services (Baines & Lightfoot, 2013)

Figure 3. Base, intermediate and advanced services (Baines and Lightfoot, 2013).

All studies have in common that product-related services are added to add extra value to the product, whereas service-oriented services tend to create value beyond the product function. To illustrate, product-related services such as spares, and consumables add more value to the product because the customer can continue to use the product. In a service-oriented culture, the product function might be extended. For instance, Rolls-Royce's 'Power by the Hour' business model is a product-service business model where the aircraft industry pays for the use of thrust rather than the purchase of engines. This concept is considered to be advanced services Baines and Lightfoot (2013), or as Tukker (2014) would describe result-oriented services. Nevertheless, the majority agree that going up the service continuum, the greater the responsibilities, risks and the more outcome-focused to the customer it will become.

2.4 Transition servitization

Manufacturers are transitioning towards servitization for several reasons, such as economic, strategic and environmental (Bauer & Neely, 2012). Economic motivations are often central for manufacturers to servitization (Reinartz & Ulaga, 2008). According to Kowalkowski et al. (2017), under pressure from market maturity and globalization, many manufacturing firms are looking to services as a means of increasing revenue and profits. Substantial revenue can be generated from an installed base of products with a long-life product cycle (Neely, 2008). Fang, Palmatier, and Steenkamp (2008); Gebauer et al. (2005) also emphasize that services generate more stable payment flows, for example through maintenance or leasing contracts. However, Neely (2008) argue that the best thing is to make a transition to services which are related to the core product business, because services that are not related to the product business may decrease firm value.

The transition to servitization is a difficult process and also with high level of risk and major challenges. Despite the potential of a stable revenue stream services may provide, as discussed previously, the list of manufacturers that have successfully made the transition is beside few exceptions rather short. The service transition concept, as established in Oliva and Kallenberg's (2003) path-defining study, assumes that firms undertake a unidirectional repositioning along a product-service continuum. This implicates from basic, product-oriented services towards more customized, process-oriented ones, ultimately leading to the provision of solutions. This means that, as illustrated in figure 4, the further manufacturers move along the continuum, the greater the volume and importance of service increase, the less the importance of tangible products becomes. As a result of this transition, customer relationships become long-term and more intimate, instead of short-term and transactional based.

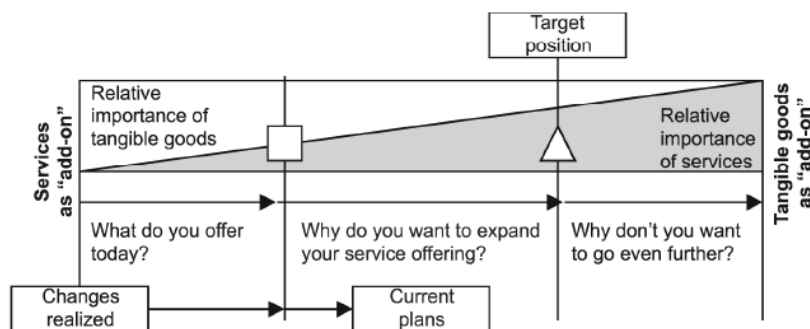


Figure 4. Service continuum (Oliva and Kallenberg, 2003).

With the knowledge of the types of servitization in mind, services at the start of the continuum, as illustrated above, are considered to be simple add-on services such as aftersales and spare parts. The further manufacturers move along the continuum the more the physical product will be considered as an add-on. As discussed earlier, this is in line with the business model of Rolls Royce where the actual engines are becoming relatively less relevant.

Oliva and Kallenberg (2003) raise the question on how the change towards services should take place. This can be gradually or in large leaps (Oliva and Kallenberg, 2003). Since the literature is scarce in defining paths to servitize, only suggestions can be made. Oliva and Kallenberg (2003) suggest that service development should start with product-related service as first step. For instance, spare parts, installation, transportation and repairments. The second step is initiated by entering the installed base service market. This means setting up structures and processes to exploit service opportunities. The third step is to change the transaction-based relationship with customers to long-term relational-based relationships. The fourth and final step is creating end users' solutions. This means that the manufacturer is a 'pure service manufacturer' and takes full responsibility of the end users' processes. Moving towards this step takes high level of risk and should be taken when the manufacturer is active in the maintenance and professional service market (Oliva and Kallenberg, 2003). Gebauer and Friedli, (2005) state that the path toward services is challenging and does not always allow manufacturing companies to realize the expected profits. This process contains three stages: (1) the company sells

goods; (2) goods and services are combined in offerings; and (3) offerings are complex bundles of goods, services, information, support, and self-service elements (Vandermerwe and Rada, 1988 p. 314).

Martinez, Bastl, Kingston, and Evans (2010) model which can be found in figure 5, illustrate the change of relationship with customers and suppliers. In this study, the broadening of usage, delivery, support and design of the product is explained. The transition to servitization is completed in four stages. As discussed by Oliva and Kallenberg's (2003), low levels of servitization are accompanied with transactional relationships with customers as with simplified additional services. In this stage, the physical product is the main focus and is considered to be the main way to create value. In the second stage, delivery of extra services should provide more usage value, however still the product is the main focus. In the third stage, customization is the main focus, where the needs of the customers need to be met. In the final stage, design and end-of-use are bonded together in order to customize and implement the needs of the customers.

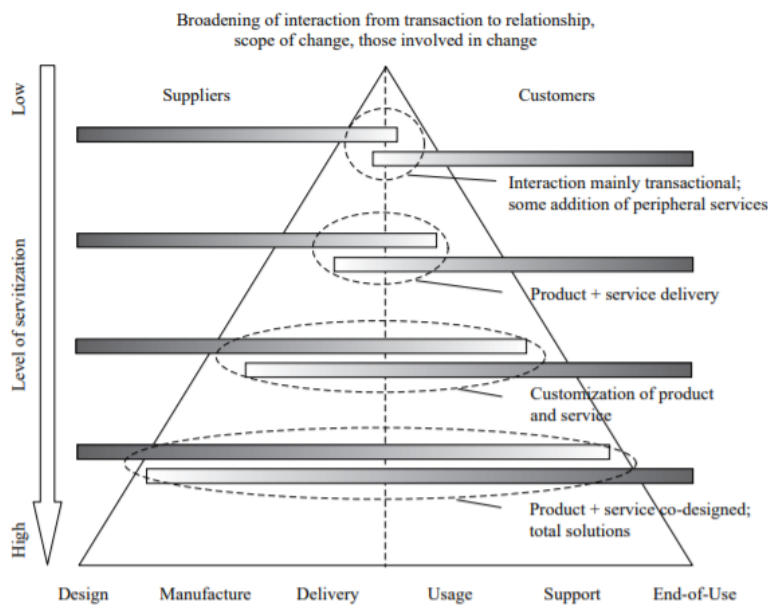


Figure 5. Broadening of interaction between customer and supplier (Martinez, Bastl, Kingston & Evans, 2010).

2.5 Challenges to servitization

The existing literature has discussed various challenges that are associated with the transition to servitization. However, much previous research has been solely theoretical, prescriptive or based on a limited amount of case studies. Servitization presents challenges for manufacturers as it creates high levels of uncertainty (Kreye Melanie, 2017). Companies have to keep in mind that its adoption to servitization presents not solely on structural challenges, but also challenges with regard to strategy formulation, translation, measurement, translation of market demands, service design, capabilities, service-related processes and policies (Ahamed, Inohara, & Kamoshida, 2013; Alghisi & Saccani, 2015; T. Baines et al., 2009; Martinez et al., 2010). As the challenges are endless, it is important to focus on specific challenges. Hence, this research focus on three subtopics in order to define the challenges of servitization: (1) customer challenges, (2) organizational challenges and (3) mindset and commitment challenges.

Customer challenges

Arguably one of the challenging factors in servitization is the focus of the customer. Product-oriented organizations shift from selling a product to selling and maintaining service in the long-term. Previously, the transaction of the product was the final phase, whereas now the service is the first phase of the business. One of the biggest challenges connected to becoming an integrated solution provider concerns the adoption of a market orientation and increased customer focus (Ames, 1970; Brown, 2000; Mathieu, 2001; Oliva & Kallenberg, 2003). Oliva and Kallenberg (2003) describe two challenges concerning the focus of the customer. The first challenge is changing the focus of customer interactions from transaction-based to relationship-based and the second challenge is changing the focus of the value proposition from product efficiency to end-user process efficiency. Shah, Rust, Parasuraman, Staelin, and Day (2006) also describe the main challenge in changing from being product centric, to being customer centric. In addition, Galbraith (2002) argues that a customer centric orientation needs to be created. According to this study, organizations should focus on the best solution for the customer instead of the best solution for the product, which is challenging for the entire organization in terms of structure, mindset and culture. It is this change that is challenging because the entire business structures and individuals are focused on finding the best solution for the product. Brady et al. (2005) support this by describing how providers need to become solution-focused through the eyes of the customer. It is in this solution-focused environment crucial to acquire the knowledge about the customers' needs. However, in order to acquire the customers' needs, it is also important for the customer to acquire knowledge about the organization offerings. Organizations need to rethink how they create customer awareness Kindström, Kowalkowski, and Brashear (2015) and deliver offerings. Customers need to understand the new offerings and what kind of value it adds in order to ensure better customer engagement. Gebauer and Friedli (2005) support this by mentioning the need to establish value added employee service awareness to change the role of the employee in understanding the change from selling a product to providing long-term services. As a result, product providers must involve in long-term relationships instead of single transaction-based (Galbraith, 2002). Also, the combined product/service offering creates pressure on organisations to fulfil contractual obligations to customers who have extremely diverse and unpredictable requirements (Baines et al., 2011; Davies, 2003; Grönroos, 2000; Gummesson, 1994; Oliva & Kallenberg, 2003).

Organizational challenges

The effect of the transition to servitization is noticeable in the organizational structures. It is no question that product-oriented organizations endure great challenges in changing its structure from a product-oriented to a service-oriented structure.

Major organizational changes are needed to create flexible modes of delivery to enable the customer to realise the maximum value from the offering (Brady et al., 2005). As Nuutinen and Lappalainen (2012) describe: "A typical way of organising in manufacturing firms is independent units reflecting the management paradigm in the mass production phase, while a typical way of organising in servitized firms is the exact opposite, changing the separated and function-based development to common, integrative and cross-functional development" (p. 142). However, the changes to the organizational structures depend on the level of servitization in an organization. With the product service continuum taken into consideration (figure 1), the position of organization on the continuum

change line will determine the level of structural challenges – meaning that the further organizations follow the changing line, the more complex and incremental the changes and challenges to structures will become. To put in perspective, providing after-sale services such as helpdesk or spare parts require less organizational changes than offering integrated advanced solutions. Shah et al. (2006) support this by mentioning that offering more advanced services and combined product/service solutions relate to internal organisational issues.

Several authors claim that in order to servitize successfully, organizations need a separate R&D function (Oliva & Kallenberg, 2003), while others take a more conservative statement, arguing that a separate service organisation can ensure benefits in service orientation (Gebauer & Fleisch, 2007). Gebauer, Edvardsson, and Bjurklo (2010) emphasize that it on the other hand produce some challenges in overall performance and customer relations. Ulaga and Loveland (2014) opt for a middle ground, stating that organizations should establish a sales team to interact with key customers. Galbraith (2002) argue that manufacturers need to implement a hybrid model of front and back office functions that enables responsiveness to customer needs.

It is important that a service orientation is accepted in all the relevant business units or departments (Gebauer and Fleisch, 2007). Windahl and Lakemond (2006) are one of the few studies to address this issue. According to them, developing integrated solutions relates to cooperation between internal business units and departments. Cross-functional and integrating practices and tools are important in order to be able to effectively share the existing and developing knowledge (Windahl & Lakemond, 2006). Also, the manufacturer must be able to process the new customer needs.

Systems integration is claimed to be a core capability (Davies, 2003; Ahmed, 2010). This capability rests on a broad system engineering expertise and on organizational structures that facilitate integration of products and services. Especially when various departments need to collaborate. Systems integration includes design services that integrate components into a functioning system. the biggest challenge will be developing the capabilities to integrate different pieces of a system provided increasingly by an external network.

The individuals in an organization need to acquire the knowledge and technological capabilities in order to successfully transform to a servitized manufacturer. Potential changes need to be made in organizational structures, systems but the individuals at operational level have adapt to new work routines. The individuals are equally important, if not more important, than any potential changes because they not alone need to provide the new services, they also need to deliver the new services. Baines et al. (2013) and Rothenberg (2007) support this by mentioning that people within the organisation need to have the appropriate skills and knowledge to provide the customer services and/or solutions effectively and efficiently. This includes technical knowledge as well as personal skills for interacting with the customer, building the relationship and adapt work routines based on customer needs (Baines et al., 2013).

To conclude, service development, sales, and delivery are three processes critical for the success of service innovation initiatives (Kindström & Kowalkowski, 2014). Many manufacturers fail to overcome the challenges in commercializing their novel ideas with insufficient resources, knowledge, skills and commitment.

Mindset and management commitment challenges

According to Neely (2008), shifting mindset is the first challenge of servitization. No matter if the motivation behind servitization of manufacturers is financial or strategic, it implies a change in long-term visions. The challenge lies in the shift of marketing, sales and customer functions. For marketeers, the challenge is the mindset shift from a transactional to a relational marketing. For the sales department, the challenge is from selling superior multimillion-dollar products to selling service contracts. For customers, the challenge is shifting from owning a product, to be satisfied with the service. Vladimirova, Evans, Martinez, and Kingston (2011) also emphasize that the challenge is the changing mindsets within the company in its supplier and customer network. Raja Jawwad, Chakkol, Johnson, and Beltagui (2018) also state the need to change employee mindsets and continuously adapt human resource management policies to the dynamic strategy of servitization.

Commitment by the top management is critical in order to successfully implement servitization. Jaworski and Kohli (1993) confirm the long-standing belief that top management commitment is essential. The second challenge according to Neely (2008) is timescale. Service requires long-term

commitment, which implicates that organizations must manage and deliver multi-year partnerships with their customers. This commitment for manufacturers could be disruptive, because instead of selling the product manufacturers have to offer service after the product has been sold. In addition, the organizations must understand the new cost and profitability implications of long-term partnerships.

Many authors argue the importance of strong leadership to translate the strategic vision into the organization (Gebauer, Fleisch, and Friedli 2005). Translating this servitized vision is difficult, because managers need to learn a completely new way of doing business (Gebauer & Fleisch, 2007). Without a long-term vision and commitment, individuals in the organization might lose belief in the transition to servitization. It is the managers' critical task to understand how they want to manage the individuals. Vandermerwe and Rada (1988) emphasize the same idea that servitization has a critical impact on the way managers think, act, and do business in the future. It is challenging, because when mistakes occur at management level, it is the individuals in the organization that follow-up these mistakes. Structural mistakes could potentially lead to less value creation to the customer. Thus, as Svensson and Grönroos (2008) and Payne, Storbacka, and Frow (2007) perfectly summarize: "the driving force of the management has to be changed from inside-out to outside-in; enable personnel to recognise changing needs and potentials in the customers' activity, connect them to the company's technological and business potential on the horizon and build the best possible fit between supplier and customers value creation processes" (p.75)

2.6 Market Orientation and Interfunctional Coordination

Market orientation and interfunctional coordination are according to Gebauer and Fleisch (2007) and Windahl and Lakemond (2006) important factors in the context of servitization. In order to understand interfunctional coordination it is important to first define market orientation since market orientation cannot be implemented without interfunctional coordination.

There are two mainstream studies concerning the concept of market orientation, both published in 1990 by Narver and Slater (1990) and Kohli and Jaworski (1990). Kohli and Jaworski (1990) state that the ability of the organization to generate, disseminate, and use superior information about customers and competitors while Narver and Slater (1990) claim that the coordinated application of interfunctional resources to the creation of superior customer value. A market-orientation, particularly identifying customer needs is required for developing new and successful services (de Brentani, 2001).

Narver and Slater (1990) state that market orientation consists of three behavioural components (1) Customer Orientation, (2) Competitor Orientation and (3) Interfunctional Coordination. Customer orientation and competitor orientation include all of activities involved in acquiring information about buyers and competitors. Customer orientation is basically to be able to create superior value for the buyer. According to Day and Wensley (1988), a customer orientation requires that a seller understand a buyer's entire value chain. Narver and Slater (1990) define competitor orientation as short-term strengths and weaknesses understanding combining with long-term capabilities and strategies of potential competitors. Interfunctional coordination is the third behavioural component and Narver and Slater (1990) define this as the coordinated utilization of all resources in the organization in order to create superior value to the customer. According to Porter (1985), any individual in any function can contribute in creating value to the customer.

Kohli and Jaworski (1990) state that market orientation consists of three antecedents, (1) senior management factors, (2) interdepartmental dynamics and (3) organizational systems. The role of senior management is regarded as one of the most important factors within market orientation. Based on empirical evidence, Kohli and Jaworski (1990) argue that the intelligence dissemination between senior and junior management in terms of communication and commitment is crucial to market orientation. The second antecedent is interdepartmental dynamics, which could be defined as formal and informal interactions and relationships among an organization department. In other words, the dissemination of information between departments. The last antecedent, organizational systems, are the characteristics of an organization structure such as formalization, centralization and departmentalization.

Overall, both Narver and Slater (1990) and Kohli and Jaworski (1990) define the concept market orientation extensive based on large qualitative and quantitative research. Both studies agree that in order to successfully apply market orientation, businesses should focus on (1) customer focus,

(2) coordination and dissemination between departments and (3) responsiveness to changes in the market and organization. Market orientation has received the attention of researchers since the late 1990s. In particular the components customer orientation and competitor orientation have been investigated extensively. However, the third component, interfunctional coordination, has received fewer attention (Lambert & Enz, 2012)

The first academic study about interfunctional coordination dates to the late 1960s. Lawrence and Lorsch (1967) defined IFC as an integration of the quality of sale and collaboration among departments. Earlier studies stated that any individual can potentially contribute to the creation of value for buyers and that effort is the focus of the entire business and not of a single department (Porter, 1985; Webster, 1988). In addition, according to Anderson (1982) developing effective interfunctional coordination, marketing or any other advocate department must be extremely sensitive and responsive to the perceptions and needs of all other departments in the business. One crucial aspect is the responsiveness in order to capture the new information. Market-driven organizations want to know the needs of the customer which can change rapidly, and it is there where the organizations' responsiveness is tested. Kohli and Jaworski (1993) state that responsiveness to changing market needs often calls for the introduction of new products and services to match the evolving customer needs.

Interfunctional coordination challenges

The integration of interfunctional coordination comes along with barriers and difficulties. Cultural difficulties are common with the integration of interfunctional coordination. Narver and Slater (1995) describe these cultural difficulties as interdepartmental dynamics. These dynamics are the formal and informal interactions and relationships among an organization's departments. The first dynamic is according to Slater and Narver (1995) conflict. Interdepartmental conflicts are tensions between various departments. These conflicts are detrimental and inevitable due to natural desires of individual departments to be more powerful. Conflicts between various departments and employers can limit the dissemination of information. In the sample study of Kohli and Jaworski (1993), they confirmed a significant inhibit between interdepartmental conflict and intelligence dissemination as well for responsiveness in the organization. However, collaboration among various departments without conflicts can create long-term value for the buyer.

The second interdepartmental dynamic is the connectedness. This dynamic implies the degree of formal and informal direct contact between employers across various departments. Several studies suggest that connectedness facilitates interaction and exchange of information, as well as the actual utilization of the information (Cronbach and Associates 1981; Deshpande and Zaltman 1982; Patton 1978). For instance, the sales and marketing department do collaborate, however with little resources, capabilities and information because the connectedness between the departments is at a low level. In both dynamics, management is the vital role in avoiding these cultural difficulties.

Top management is one of the antecedents of market orientation. Many authors suggest that top managers play a critical role in shaping an organization's values and orientation (Felton 1959; Hambrick and Mason 1984; Webster 1988). It is the top management that must convince individuals about the importance of the dissemination of resources, capabilities and information in order to achieve well-structured collaboration between several departments. Without strong leadership individuals might not believe the top management strategic direction, which could cause conflicts or lack of motivation. Day (1994) also argue that senior management leadership is needed to reshape the culture, through such actions as proposing a challenging vision of the future.

In order to implement interfunctional coordination, organizations are might forced in changing several organizational structures and systems. Kohli and Jaworski (1993) define three structural variables: (1) formalization (2) centralization and (3) departmentalization. Formalization represents the degree to which rules define roles, authority relations, communications, norms and sanctions, and procedures (Hall, Haas, and Johnson, 1967). It is the variability that is required in order to successful implement interfunctional coordination, without formalized roles and authority relations. Centralization refers to the inverse of the amount of delegation of decision-making authority throughout an organization (Aiken & Hage, 1968). In a centralized organization, few have the authority to make decisions, while in a decentralized organization decision making is in control of multiple individuals. Departmentalization refers to the number of departments into which organizational activities are segregated and compartment.

2.7 Capabilities

In all industries, organizations try to obtain and maintain a superior competitive position. A superior product quality could be the reason to have a competitive position in the market. Another way to obtain a superior competitive position is to build distinctive core capabilities in an organization. Every organization has many capabilities that enables it them to carry out the activities that are needed to move the product or service through the value chain. It is not possible to describe all possible capabilities, because every organization develops its own configuration of capabilities. However, certain types of capabilities can be recognized in all organizations. According to Day (1994): “capabilities are complex bundles of skill and knowledge, using organizational processes that enables them to carry out activities to make use of their assets” (p.38). Others defined firm capabilities as socially complex, combinations of interconnected resources that are deployed to achieve a desired end (Helfat & Lieberman, 2002; Madhavaram & Hunt, 2007). In both cases, assets are the resources in an organization, while the capabilities are the ‘glue’ that brings together the assets.

Capabilities are deeply embedded in the organization, which makes it hard to identify (Day, 1994). However, it is for this reason that capabilities are a way to create distinctiveness. Not only is it difficult to identify, it is also difficult to imitate. According to Leonard (1992), capabilities are obscured because much of the content is tacit and dispersed. They define four separate dimensions, knowledge and skill, technical systems, management systems and values and norms.

Many authors have defined capabilities. According to Day (1994): “the most defensive test of capability is whether it makes a disproportionate contribution to the provision of customer value” (p.39). Ultimatum, the goal is to create more value for the customer. From the outside, there is no clear distinction between capabilities and core capabilities. However, capabilities that can be used in different ways in multiple departments are called core capabilities (Day, 1994). According to Day (1994) distinctive capabilities are based on superiority in process management, integration of knowledge and diffusion of learning. Since the broad spectrum of capabilities, Day (1994) classifies three different types of distinctive capabilities, (1) the outside-in processes, (2) spanning processes and (3) inside-out processes. The types are shown in figure ().

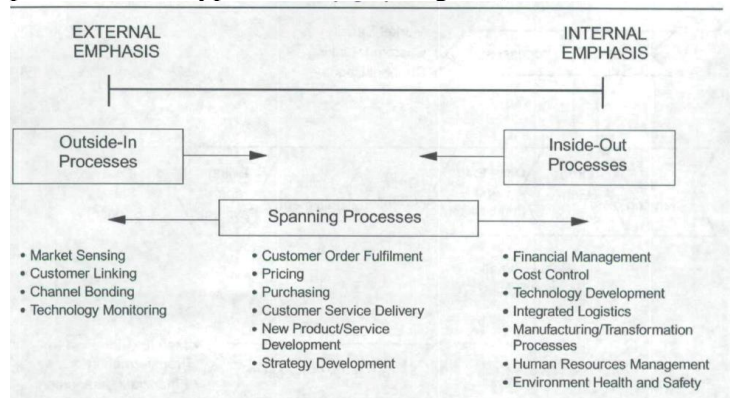


Figure: 6. Classification of distinctive capabilities. Source: Day (1994)

With outside-in processing, the approach is to understand the organization through the perception of the external factors. For instance, from the perspective of the customer, the focus should be designing inside-out processes in order to improve the customer experience. The inside-out processes are internal capabilities. These inside-out processes are necessary to enable organizations to carry out activities through the value chain. However, these inside-out processes could be activated by external opportunities, for instance changing customer needs. Inside-out processes are required to carry out outside-in processes. Spanning capabilities are required to integrate these outside-in and inside-out processes. Examples are strategy development and service development. Spanning capabilities are the critical role between the internal and external processes. An organization could have superior market sensing in terms acquiring new customer needs but lack the capability to connect these needs through the spanning processes to the internal processes. Also, organizations could have perfectly designed tools and systems for new customer needs but lack the capability to sense and deliver these needs to the organization. The better the internal processes are connected to the spanning processes and external

processes, the better the organization can anticipate and respond to the changing customer needs. All three categories of capabilities are required for optimal use.

Day (1994) emphasizes that market-driven organizations have superior capabilities in market sensing, customer linking and channel bonding. All these capabilities are outside-in processes. Kohli and Jaworski (1990) describe market sensing capability as collecting and acting on the customer needs with the influence of technology and environmental forces. Day (1994) highlights again that superior market sensing requires the utilization of all company resources to create customer value (Narver & Slater, 1990). Superior market sensing organizations are distinguished by acquiring the capability to sense events and new trends and can anticipate, respond and translate this new trend to the organization utilizing all resources. Day (1994) argues that this is achieved better when there is an open-minded inquiry: scanning, imitation, direct experience and problem-solving inquiries. In addition, he believes synergistic information distribution is required to optimize market sensing. To conclude, accessible memory is also important, to prevent that information that has been learned or failed get lost. Databanks that is accessible through the entire organization could prevent valuable loses.

Relationships with the customers seem to become increasingly important. The constant changing customers' need requires closer customer relationships in order to understand their desires. Therefore, customer linking is a capability that organizations need to obsess. Customer linking requires a change from a transactional-based relationship to a relational-based relationship. This requires high level of purposeful cooperation aimed at maintaining a trading relationship over time (Frazier, Spekman, & O'Neal, 1988). Day (1994) defines customer linking into two spanning capabilities, close communication and joint problem solving and coordinated activities. Close communication is required in order to continuously exchange information about the needs and emerging problems. Development processes between the customer and the organization is the key to success in responding to the changing needs because it solves or detects potential problems. Also, the sales function changes to a more relational-based function in building credibility and trust.

Overall, customer linking and market sensing are the underlying capabilities of an organization to enable processes, beliefs and values to create a deep and shared understanding of the customer values and needs. It is the commitment, shared understanding and joint process development between the organization and customer that makes the capability distinctive and extremely difficult to imitate by competitors.

2.8 Dynamic capabilities

Early statements about dynamic capabilities (DCs) can be found in D. Teece, Pisano, and Shuen (1997), and Teece and Pisano (1994) however the underlying basis of DCs started with the resource-based view (RBV). RBV addresses that organizations can achieve competitiveness by accumulating valuable, rare, inimitable and no substitutable (VRIN) resources (Barney, 1986); (Dierickx & Cool, 1989); (Peteraf, 1993). The VRIN resources are the main components of RBV according to Barney (1986). As earlier mentioned, resources are the assets while the capabilities are the 'glue' that brings together the assets. VRIN organizations are specialized in acquiring the best know-how in resources, however achieving resource advantages tend to be difficult in changing environments (Lin Tom, Lu, & Wu, 2012). In addition, Wang and Ahmed (2007) argues that obtaining VRIN resources alone cannot persist over time and cannot create sustainable competitive advantage due to the dynamic market environments. Also, Eisenhardt and Martin (2000) state that long-term competitive advantages is not frequently achieved in dynamic market with competitive resources alone. Therefore, to respond to the dynamic markets, Teece et al. (1997) extended the concept RBV to dynamic capabilities. In order to potentially persist competitive advantages over time in dynamic markets, VRIN resources and dynamic capabilities are required.

(Teece, 2012) makes a clear distinction between ordinary capabilities (OCs) and dynamic capabilities. OCs are also called operational capabilities or 'zero order' capabilities. Wang and Ahmed (2007) name OCs 'first-order' capabilities. Teece (2012) emphasises that OCs are operational, administrative and governance capabilities. These OCs are simple capabilities to allow an existing product or service to be made sold and serviced. In other words, "earning its living by producing and selling the same product, on the same scale and to the same customer population over time" (Winter, 2003, p. 992). Potential issues with OCs, is that competitors can imitate it the capabilities relatively easy (Teece, 2012). Hence, when capabilities can be imitated relatively easy, it is difficult for organizations to achieve competitive advantages with it since the gained advantage will diminish by replication. According to Teece (2012), OCs will not support long-term competitive advantages under normal economic circumstances but will pursue a given production program and necessary value.

Wang and Ahmed (2007) argue that in between OCs and DCs capabilities are called core capabilities (CC) or 'second-order' capabilities. Core capabilities are a bundle of an organization resources and capabilities that are strategically important to its competitive advantage (Wang & Ahmed, 2007). They emphasize the integration of resources and capabilities to its strategic direction is crucial for success. For instance, Zara is known for its excellent responsiveness to customer needs derived from several CC such as advanced information systems or just-in-time production. However, the integration of CC might ensure Zara a high degree of responsiveness, while it should sense the needs in the first place. CCs lack the ability to sense environmental changes – meaning that the presence of these strong OCs might be sufficient for (temporary) competitive advantages until external conditions change (Wang & Ahmed, 2007). Leonard (1992) highlights this issue, mentioning that even CC can become irrelevant in environment changes. Hence, the 'third-order' dynamic capabilities are the 'ultimate' organizational capabilities to obtain.

The underlying basis of DCs is the same as OCs, namely they are undergirded processes and resources in an organization. However, the difference is that DC rely on 'signature' practices and VRIN resources instead of ordinary resources (Wang & Ahmed, 2007). DCs enable organizations to upgrade its OCs and direct these towards long-term high-payoff endeavours (Teece, 2007). The strength of DCs is determined by the speed and degree of aligning the organizations resources to the customers' needs. In achieving this, organizations must continuously sense and seize opportunities, and eventually transform aspects of the organization in order to capture the new opportunities (Teece, 2007). DCs are also strong capabilities because, unlike OCs, they are difficult to imitate. DCs are deeply embedded in the history-honed routines, idiosyncratic characteristics, and the culture of the organization (Teece, 2014). Even when the capabilities are replicated by a competitor, success is not guaranteed since cultural aspects or routines are not generalizable or applicable to all organizations. These inapplicable capabilities create potential competitive advantage for organizations.

The 'third-order' capabilities, as illustrated in figure 7, are the highest and most dynamic level of capabilities that can exist in an organization. Strong dynamic capabilities can serve as foundation for competitive advantage, however as Teece (2012) mentioned, it is the alignment and integration of all resources and capabilities that determine competitive advantages. As Pisano and Teece (2007) mention,

strong dynamic capabilities are built to renew of resources and assets that lie within the organization to reconfigure needed innovations and respond to changes in the market. Furthermore, the core of dynamic capabilities, is undergirded by three sets of organizational processes (Teece et al., 1997): (1) coordination/integration, (2) learning, and (3) reconfiguration. Dynamic capabilities integrate resources. For instance, product development routines by which managers combine their varied skills and functional backgrounds to create revenue producing products and services (C. E. Helfat & Raubitschek, 2000). Hence, strong ‘third-order’ DCs are not strong without the ‘second-order’ core capabilities – meaning that capabilities on its own do not create competitive advantages but that all capabilities need to be connected in order to create competitive advantage. According to Teece (2007), dynamic capabilities are necessary, but not sufficient, conditions for competitive advantage. Thereby, in fact, not DCs are the foundation for competitive advantage, but the lower-order elements are the foundation in creating competitive advantage.

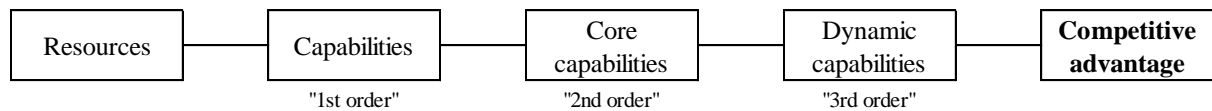


Figure 7. Based on Wang and Ahmed (2007). Source: own source

Principles	Ordinary capabilities	Dynamic capabilities
Purpose	Technical efficiency in business functions	Achieving congruence with customer needs and with technological and business opportunities
Mode of attainability	Buy or build (learning)	Build (learning)
Tripartite schema	Operate, administrate, and govern	Sense, seize and transform
Key routines	Best practices	Signature processes
Managerial emphasis	Cost control	Entrepreneurial asset orchestration and leadership
Priority	Doing things right	Doing the things right
Imitability	Relatively imitable	Inimitable
Result	Technical fitness (efficiency)	Evolutionary fitness (innovation)

Figure 8. Differences ordinary capabilities and dynamic capabilities (Teece 2014a).

2.8.1 Definition dynamic capabilities

Many authors have defined and conceptualized DCs in the last decennia (Helfat et al., 2007). Arguably two of the most prominent authors are Teece (1991; 1997; 2012; 2014) and Eisenhardt and Martin (2000). Whereas Teece is mainly focused on organizational processes, business models and managerial skills, is Eisenhardt and Martin (2000) more focused on the definition of organizational routines and managerial rules. Despite differences between the two authors, the definitions of dynamic capabilities are similar. Teece et al. (1997); Teece (2007) defines DCs as:

“Dynamic capabilities, which are underpinned by organizational routines and managerial skills, are the firm's ability to integrate, build, and reconfigure internal competences to address, or in some cases to bring about, changes in the business environment” or “the ability to integrate, build, and reconfigure internal and external competencies to address rapidly-changing environments “ (Teece, 1997, p. 40).

Eisenhardt and Martin (2000) define DCs as:

“The firm’s processes that use resources—specifically the processes to integrate, reconfigure, gain and release resources—to match and even create market change. Dynamic capabilities thus are the organizational and strategic routines by which firms achieve new resource configurations as markets emerge, collide, split, evolve, and die” (Eisenhardt and Martin, 2000, p. 1107).

Many other authors have defined DCs afterwards, however as Di Stefano, Peteraf, and Verona (2014) describe, many definitions are related to the original definitions of either Teece (1997; 2007) or Eisenhardt and Martin (2000). Both authors agree that strong DCs requires processes or routines using internal capabilities and resources to respond to rapidly changing environments.

Teece (2007) segregates DCs into three capacities: (1) to sense and shape opportunities and threats, (2) to seize opportunities and (3) to maintain competitiveness through enhancing, combining, protecting and reconfiguring the business enterprise’s intangible and tangible assets.

Sensing capacity

In fast-paced environments, customer needs, competitor activity and technological are constantly changing (Teece, 2007). In this highly changing environment, both newcomers and incumbents have the chance to sense potential opportunities. However, as Teece (2007) notices, in order to sense new opportunities investments in research and related activities is required. Opportunities get detected by two factors. First by accessing existing information Kirzner (1973), and second by acquiring new information and new knowledge to create opportunities (Schumpeter, 1934). In order to identify and shape opportunities, organization need to scan, search and explore across technologies and markets (March and Simon, 1958; Nelson and Winter, 1982). Teece (2007) describes: “this activity not only involves investment in research activity and investigating customers’ needs and technological possibilities, it also involves understanding latent demand, the structural evolution of industries and markets, and likely supplier and competitor responses” (p. 1322). Therefore, Teece (2007) emphasize that organizations should possess analytical systems and individual capabilities to learn and to sense, filter, shape and calibrate opportunities (p. 1325). The sensing capacity of Teece (2007) is in line with the concept market orientation of Kohli and Jaworski (1990) as earlier mentioned: "the organization-wide generation of market intelligence, dissemination of its intelligence across departments, and organization-wide responsiveness to it" (p. 6).

Seizing capacity

When the opportunities in a dynamic environment have been sensed by an organization, new investments in for instance development are required in order to sustain these new opportunities. The seizing capacity is the capability to commit the organization’s resources to design or redesign business models in order to seize the new opportunities (Teece, 2007). In this stage, service development is important. Teece (2007) describe it as: “the mobilization of resources to address opportunities and to capture value by making unbiased decisions, managing boundaries, communicating goals, building loyalty and commitment” (p.1342).

Transform capacity

The transform capacity refers to the continuous alignment and realignment of specific tangible and intangible assets by enhancing, combining and reconfiguring assets and structures, overcoming constraints and managing knowledge (Teece, 2007, p. 1342). In order to successfully transform the organization to capture new opportunities, Teece (2007) believes that an organization should have strong governance, decentralization, co-specialization and knowledge management. These elements are also known as micro-foundations.

Overall, the connectedness between the capacity elements are relatively similar to the dynamic capabilities – meaning that strong sensing capacity is favourable, but not sufficient. Although DCs are multi-facets according to Teece (2017), strong sensing capacity does not lead to strong seizing capacity. Thus, all elements of DCs combined are required in order to build sustainable organization success. Teece (2007) emphasize this: “the enterprise will need sensing, seizing, and transformational capabilities to be simultaneously developed and applied for it to build and maintain competitive advantage” (p. 1341). Thereby, Teece describes that “the need to sense and seize opportunities, as well as reconfigure when change occurs, requires the allocation, reallocation, combination, and recombination of resources and assets” (p. 1341).

2.9 Market dynamics

In this research, the focus has been mainly on internal processes. However, the patterns of environmental dynamics in the market can be as important. In this chapter, the focus will be on environmental dynamics in order to minimize certain risks for organizations.

Market dynamics and dynamic capabilities are to some extent related to each other. Eisenhardt and Martin (2000) argue that dynamic capabilities in organizations achieve competitive advantages only if they match the environmental dynamics. However, the environment changes constantly and it is without the control of organizations. Floricel, Michela, and Piperca (2016) view that dynamic environment consists of three levels: strategic actors, such as organizations; meso-level, such as industrial sectors; and broader socioeconomic systems such as international and national. In order to deal with these changes, organizations have to face risks of change in their environment. Risk are future events that might have negative consequences for organizations because it lacks control, knowledge and time to determine the solution. However, Floricel and Ibanescu (2008) argue when facing patterns of environmental change, organizations come to expect patterns of evolutions to this risk. Hence, this risk is called dynamic risk (Floricel and Ibanescu, 2008). Dynamic organizations find specific ways to prepare and react to the expected risks. S. Floricel and Ibanescu (2008) define four types environmental dynamics to face dynamic risk, namely velocity, turbulence, growth and instability.

Velocity

Velocity refers to intensity of directional change in meso-levels systems, such as functionality, performance and costs by technological innovations (Moore, 1965; Eisenhardt, 1989). Organizations in high velocity markets have a constant threat of obsolescence to their competitive advantages. In these high velocity environments, there is constant novelty and the uncertainty is high. Organizations that are dynamic will learn flow of decisions that help them to neutralize uncertainty and change.

Turbulence

Turbulence refers to the extent of discontinuity in environmental change. Thus, past trends and directions are no guarantees what the future might bring. Competitive advantages gained in the past have become irrelevant in the new context. According to Floricel and Ibanescu (2008), typical causes are on macro-level, such as globalization. Globalization might create unexpected competitors or substitutes. Organizations will have to learn certain criteria and actions to understand that they cannot predict and prepare all turbulent events.

Growth

Growth refers to the increasing resource in meso-level systems. It is difficult to define growth since it is reproduced between meso-level systems (Floricel and Ibanescu, 2008). Growth shares a sense of stable direction with velocity. These provide new opportunities, for instance more output at lower prices. Growth requires a constant flow of decisive actions to act on new opportunities.

Instability

Instability refers to a steady and diverse range of competitive moves by other strategic actors. For instance, new competitors with cheap or substitute products. Also, product imitation could be a competitive move from strategic actors. Instability has no pace and it is difficult to predict. High industrial rivalry and high substitutable products reduce the profitability of an organization. Thus, organizations in high instability environments have a constant threat of competitors that fight your gained competitive advantage.

The five forces of Porters (1985) are to some extent similar to the concept of market dynamics since it also discusses the rivalry and uncertainty against competitors. Three of Porter's (1985) model have similarities with the framework of Floricel and Ibanescu (2008), namely the threat of existing competitors, entrants and substitutes. Whereas Porter (1985) wants to determine the market attractiveness, Floricel and Ibanescu (2008) want organization to become dynamic to face unexpected risks.

2.10 Linking capabilities to servitization

The relationship between capabilities and servitization have been investigated by numerous studies. Many authors emphasize the importance of having certain capabilities to deal with the difficulties and challenges that servitization brings (Matthyssens, Vandenbempt, & Weyns, 2009); Oliva and Kallenberg, 2003). Ulaga and Reinarts (2011) concluded that there were five capabilities that an organization should possess while Holmström, Brax, and Ala-Risku (2010) developed a framework. Turunen (2012) and Storbacka (2011) also identify 15 and 64 management capabilities that are necessary to enable servitization. Some studies have discussed the capabilities that enable the development and implementation of all levels of services while others focused primarily on capabilities that are required with advanced services (Story, Raddats, Burton, Zolkiewski, & Baines, 2017). However, many of the studies are based on qualitative research – meaning that the required capabilities are based on perceptions and experiences of individuals. Thereby, the statistical relationship between certain capabilities and servitization remain underdeveloped. There are some studies that investigate the relationship between capabilities and servitization. However, most of these studies are limited because they focus primarily on specific capabilities. For instance, Valtakoski and Witell (2018) investigate the statistical relationship of front office service capabilities and back office service capabilities on firm performance. Front office capability has a significant effect on firm performance, while back office has not. While this information is useful, it does not explain which specific capabilities are required for servitization. Therefore, multiple studies are used to determine which capabilities are required for servitization. Since capabilities is such a broad concept, it is divided into several subcomponents: behavioural/managerial capabilities, customer capabilities, organizational capabilities, strategic capabilities and system capabilities.

Behavioural/managerial capabilities

Kindström (2010) found in their case study consisting of seven manufacturers that an organization should possess six managerial capabilities: (1) the ability to promote and explain advanced service-intensive value propositions, (2) relation building competencies, (3) more conscious of customers processes – meaning that the value proposition continuous after the sale, (4) dynamic portfolio – meaning that this portfolio should enable managers to segment their customer without being biased, (5) creation of service infrastructure and (6) developing new revenue mechanism. To continue, Gebauer and Fleisch (2007) found a significant positive relationship between the level of managerial motivation and behaviour patterns. Implying that behaviour patterns are so deeply embedded and recurrent that they are displayed by most members of the organization (Garvin, 1995). In addition, Donaldson (1995) found that if managers are not committed to customer services, the implementation will not be executed accordingly throughout the entire organization. Kindstrom (2010) found that senior management and other key decision makers also should be champions for service infusion and innovation and define clear, measurable, service-related targets. Also, Neu's and Brown's (2005) found that decision-making authority as a key for business-to-business service development. Gebauer, Fleisch, and Friedli (2005) mention that top level management commitment is essential, because in the servitization transition there need to be a change in the mindset of employees.

Customer capability

Customer capabilities are arguably one of the most critical capabilities for an organization to possess. According to Van der Merwe and Rada (1988), customers are the drivers of servitization. Organizations that possess all possible distinctive capabilities but fail to succeed in enhancing the customers relationship and acquiring the needs of the customer will not be successful. The customer capability can be divided into several elements, customer knowledge, customer value, customer relationship. The customer needs change over time. Therefore, Tuli et al. (2007) highlight customer counselling and adaptiveness as key factors for successful customer solutions. Also, to increase the embeddedness, firms should have the ability develop close, long-term relationships, which is necessary for many services (Kohtamaki et al., 2013). Customer interaction stability facilitates the development of strong customer relationships on both firm and personal levels (Tuli et al., 2007). Galbraith (2002) found that organizations should have the ability to become more customer-centric through offering customized

solutions, managing customer portfolio and empowering people with in-depth knowledge on customer business. Parida and Ola (2015) found in their study, that continuous customer interaction is required for service offering. One of the most important aspects of customer capability is the ability to respond fast to the ever-changing needs of customers and thereby find customized solutions for the customer.

Organizational capabilities

With the scarcity of empirical data and theoretical constructs, it is difficult to link specific organizational designs/structures to servitization. To date, there are no specific organizational designs that are found to be successful in servitization. However, previous literature suggests that manufacturers that want to implement servitization must adapt organizational structures and processes (Baines et al., 2009, 2017; Gebauer, Edvardsson, Gustafsson, et al., 2010; Mathieu, 2001). For instance, Gebauer, Edvardsson, Gustafsson, et al. (2010) highlight the importance of service orientation and human resource management, while Salonen (2011) highlights the importance of the mindset and service culture. Overall, most literature agree however that servitization is a collaborative process between customers and manufacturers (Gebauer, Edvardsson, Gustafsson, 2010; Valtakoski, 2017; Vargo & Lusch, 2008; Zhang & Banerji, 2017). As Böhm et al. (2017) argue “there are no ideal set of organizational characteristics” and there is no “one best way” to servitize (p.3).

The relationship between interfunctional coordination and servitization has also barely been investigated throughout the years, which is strange because several authors claim that collaboration of all departments is required to implement servitization. However, as mentioned earlier, it is important that a service orientation is accepted in all the relevant business units or departments (Gebauer and Fleisch, 2007). Cross-functional and integrating practices and tools are important in order to be able to effectively share the existing and developing knowledge on for instance customers (Windahl & Lakemond, 2006). Also, Neu and Brown (2005) found that collaboration among individuals across functional groups, business units, and geographic locations benefits servitization. There is no empirical evidence to support that cross-functional is benefitting servitization, however Webster (1988) mention that any individual in any function can contribute in creating value to the customer.

Galbraith (2002) found that flexibility and increasingly flat organizational forms with fewer hierarchical levels have more success in servitization. For instance, product development tends to be managed centrally and driven by technology, service development often takes place locally in interaction with key customers (Kindström and Kowalkowski, 2014). As earlier mentioned, service development, sales, and delivery are three capabilities critical for the success of service innovation initiatives. Decentralization not only allows but also encourages communication and teamwork among staff members meaning that everybody can interact more easily. Oliva and Kallenberg (2003) also found that firms are successful in increasing service revenue when running decentralized organizational structures.

Davies, Brady, and Hobday (2006) found in their study that in order to have success in servitization, organizations must build organizational structure around their customers’ current and future needs. They argue that the ‘three-part organizational structure’ is the best way to servitize. This structure should have the collaboration between front-end customer-facing units, back-end capability providers and strong strategic centers. “A strong corporate center is required to forge effective links between the front and back organizations to enable a speedy and rich flow of knowledge and information” (Davies, Brady, and Hobday, 2006, p. 44). In addition, Valtakoski and Witell (2018) found that specifically front-office service capability is positively related to firm performance in servitization. Kindstrom and Kowalkowski (2009) also found that successful new service development projects need to be focused front-end and must develop the service concept and ensure its implementation. It is crucial for manufacturers to have the ability and capability to be ready and rapidly engage on these changing needs with the right knowledge.

Strategy capability

Gebauer, Fleisch, and Friedli (2005) found that manufacturers should have a clear service strategy. For instance, when manufacturers know how to differentiate itself from competitors with services or developing a service strategy to create comprehensive understanding of the customer current and future needs. Service strategy affects possibly also all departments, meaning that acceptance, commitment and believe in the service is necessary. As Neely (2008) describes, manufacturers should acquire the right mindset with implementation of a service strategy. Homburg et al., (2003) argue that managers should invest effort in formulating a service strategy. Neu and Brown (2005) also found that successful organizations decentralize their decision-making authority during the formation of service strategy.

As mentioned by Homburg et al. (2003), corporate culture aimed at services is something not to underestimate. Gebauer et al. (2010) found that service orientation of corporate culture is focused on the values and behaviours of managers and employees. These managers will be motivated to develop a service business if they understand the value of services. Managers and employees should develop a service culture that is based on the willingness in solving customers' need instead of product technologies (Zhang & Banerji, 2017; Vargo & Lusch, 2004). When changing a service culture, a service leadership capability is required. Manufacturers often are unwilling to change their prevailing product-centric practices, norms, and values (Kindström and Kowalkowski, 2014). This change in mindset should not be taken lightly, since it may be difficult for employees to get motivated or excited by selling services worth a fraction compared to the physical product. As Oliva and Kallenberg (2003) mention in their study, it is difficult for employees that are used to design and deliver complex products, and now need to get excited of repairing it. To illustrate, Oliva and Kallenberg (2003) found in their qualitative research: "Our daily business is selling multi-million Euro equipment. It was difficult for us to get excited about a maintenance contract worth €50.000 "(p.16). As long as product-centric firms consider services merely as add-ons to the core product instead of value-add, it is difficult to get excited (Kowalkowski, 2008; Robinson et al., 2002).

System capability

System capabilities refers to the ability to increasingly rely on new information and communication technologies (Gago and Rubalcaba, 2007; Holmstrom et al., 2010; Rust and Thompson, 2006). Ceci and Masini (2010) found two capabilities that are required for servitization, hardware and infrastructure manufacturing. These include software development, system integration, post-sales support and customer portfolio. For instance, WS Atkins, a service-based engineering consultancy firm became a provider of bundled systems by launching manufacturing operations and developing new capabilities in systems integration (Davies, 2004). Brusoni, Prencipe, and Pavitt (2001) found in their study, based on empirical research, that system integration is by far the most difficult capability to develop. System integration is crucial, because different technological platforms must communicate to ensure flow of data and information. In addition, products, subsystems and services must be fully integrated in order to respond to the changing needs of customers and markets. A successful system integration means that all individuals across all departments have access to the required information, understand it and are able to use the information or data effectively to enhance the customers' need.

Other capabilities

Pricing capability is needed to determine how to charge for new services and possibly change the revenue model of existing services, such as moving from free to fee ((Pauwels & Weiss, 2008); (Witell & Löfgren, 2013).

Risk assessment and mitigation capability is required (Ulaga and Reinartz, 2011) to manage the risks associated with service provision, particularly when a manufacturer move further up the service continuum.

2.10.1 Linking dynamic capabilities to servitization

The literature has mainly focused on operational capabilities, including customer centricity (Tuli, Kohli, & Bharadwaj (2007); Ulaga and Reinartz (2011); Vandermerwe and Rada (1988), managerial behaviours Kindstrom (2010); Gebauer and Fleisch (2004), organizational structures Galbraith, (2002) Neu and Brown (2005); Kindström & Kowalkowski (2009) service strategy Gebauer, Fleisch, and Friedli (2005), service culture Neu and Brown (2005) and system integration Davies (2004). However, all these concepts fail to contribute to the dynamics of the market needs. Thereby, as environmental conditions change, core capabilities can become irrelevant (Leonard-Barton, 1992). As a result, manufacturers create a competency trap, in which they become better at less relevant set of processes (Tallman, 2003; Teece et al., 1997). To prevent this competency trap, manufactures need operational capabilities that enable them to carry out their present business, but manufacturers also need dynamic capabilities to ensure future business needs (Teece, 2007).

As mentioned, Teece (2007) describes dynamic capabilities into three elements: sensing, seizing and transformation. Developing these dynamic capabilities is difficult, because all three dynamic capabilities must be connected with each other. Seizing is not possible without sensing and sensing without seizing is a waste of time and effort.

The difference between the resource-based view approach and the dynamic approach is that dynamic capabilities are capabilities that enable manufacturers to adapt, integrate and reconfigure skills, resources and functional competences in a dynamic environment. Thus, instead of a unique set of core capabilities or resources, the ability to adapt and innovate in a changing environment is the key to create competitive advantages (Hobday, 1998; Roberts, 1998; Quinn, 1985).

In contrast to the concept core capabilities, there is not much evidence to support that dynamic capabilities have an effect on the level of servitization. However, there are some studies that found aspects of dynamic capabilities related to servitization.

Fischer, Gebauer, Gregory, Ren, and Fleisch (2010) found in sensing and identifying the need for change that service strategies provide strong differentiation, because they are more labour-based and difficult to imitate. Also, the complexity of customer needs drive manufacturers to identify need for change (Neu and Brown, 2005). Fischer, Gebauer, Gregory, Ren, and Fleisch (2010) find that the role of managers in sensing opportunities is essential to adapt levels of servitization. Kindström, Kowalkowski, and Sandberg (2013) found four main activities in sensing new opportunities, customer-linked, service system sensing, internal sensing and technological exploration. (Ulaga and Eggert, 2006) points out that potential customers' needs differ from traditional products, meaning that manufacturers need to develop new capabilities and resources to detect them.

The sensing of potential opportunities is only the first step towards capitalization of these opportunities. The second step is, realizing these potential opportunities by seizing it. Fischer, Gebauer, Gregory, Ren, and Fleisch (2010) found that system integration, operational services and business consulting are service strategies to seize potential service opportunities. Kindström, Kowalkowski, and Sandberg (2013) found that service interactions, managing the service delivery process, structuring the service development process, and adopting new revenue mechanisms are strategies to seize potential service opportunities.

As third and last step, reconfiguring capability means the matching and managing the dependence between service strategy and organizational design to achieve strategic fit (Teece, 2007). The literature about how to achieve this strategic fit is scarce. Gebauer et al., (2010a) found that managers have to learn how they position organizational structures and processes with different service strategies. According to Fischer, Gebauer, Gregory, Ren, and Fleisch (2010) reconfiguring consists of corporate culture, human resource management, organizational structure and service development process. Kindström, Kowalkowski, and Sandberg (2013) found that it should consist of orchestration of the service system, balancing product- and service-innovation related assets and the development of a service-oriented mental model.

In summary, literature about dynamic capabilities in context to service orientation is very limited. This is not strange since dynamic capabilities are in a way an evolution of ordinary capabilities which are discussed in previous chapter. Any ordinary capability can transform in a dynamic capability, if the manufacturer is able to adapt, innovate and integrate the capability.

2.10.2 Linking market dynamics to servitization

The literature is mainly focused on linking internal processes to servitization. As discussed, many authors have tried to determine relevant capabilities to servitization. However, the literature is scarce when it comes in the context of environmental dynamics, which are also called market dynamics. In all named literature in this research, none have defined external factors that might affect the organization in the process to servitization. Thus, the ways to determine which market dynamics are affecting servitization is very limited. However, there are few studies that investigated external factors to servitization. For instance, Benedettini and Neely (2010) have investigated the relationship between reputation/image and servitization. They found that insufficient image led to more bankruptcy than pure manufacturers. Benedettini, Neely, and Swink (2015) found that servitized manufacturers are not more exposed to environmental failure risk than pure manufacturers. Although these relationships can be relevant, it is not the direction this research wants to address. This research wants to address certain instability, uncertainty and novelty in relationship with servitization. According to Fan, French, Duray, and Stading (2017), the role of environmental uncertainty has been studied largely, however it has been neglected in the context of servitization. They tested to what extent environmental uncertainty has a direct negative effect on operational capability of total time. Total time is the perceived time to respond to an uncertain event. Fan et al. (2017) found that uncertainty has a significant negative effect on total time, however the study was a one case study only. It is difficult to generalize a one case study to other organizations in different industries.

There are no relevant studies that tested market dynamics to servitization.

2.11 Hypothetical model

All (dynamic) capabilities and market dynamics which have been discussed in this research, are merged into a hypothetical model. These constructs will be tested through online survey. The relationship between these (dynamic) capabilities and servitization will be investigated through hypothesis testing, whereas market dynamics will function as moderating effect. The hypothetical model is illustrated in figure 9.

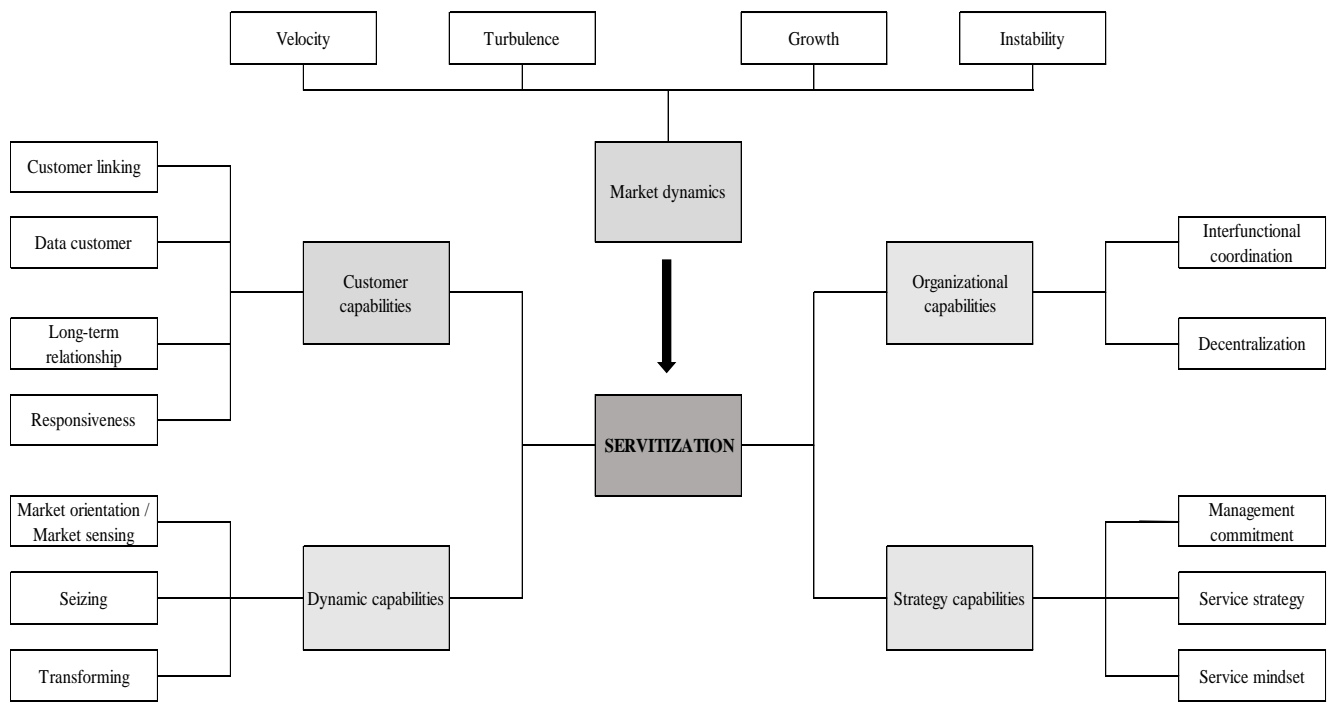


Figure 9. Hypothetical model

2.11.1 Hypotheses testing

H1a. The better the firms' interfunctional coordination, the higher the level of servitization

H1b. The better the customer linking, the higher the level of servitization

H1c. The longer the relationship with customers, the higher the level of servitization

H1d. Service strategy has a significant positive effect on the level of servitization

H1e. The better the responsiveness to customers' needs the higher the level of servitization

H1f. Decentralized organizations have higher levels of servitization

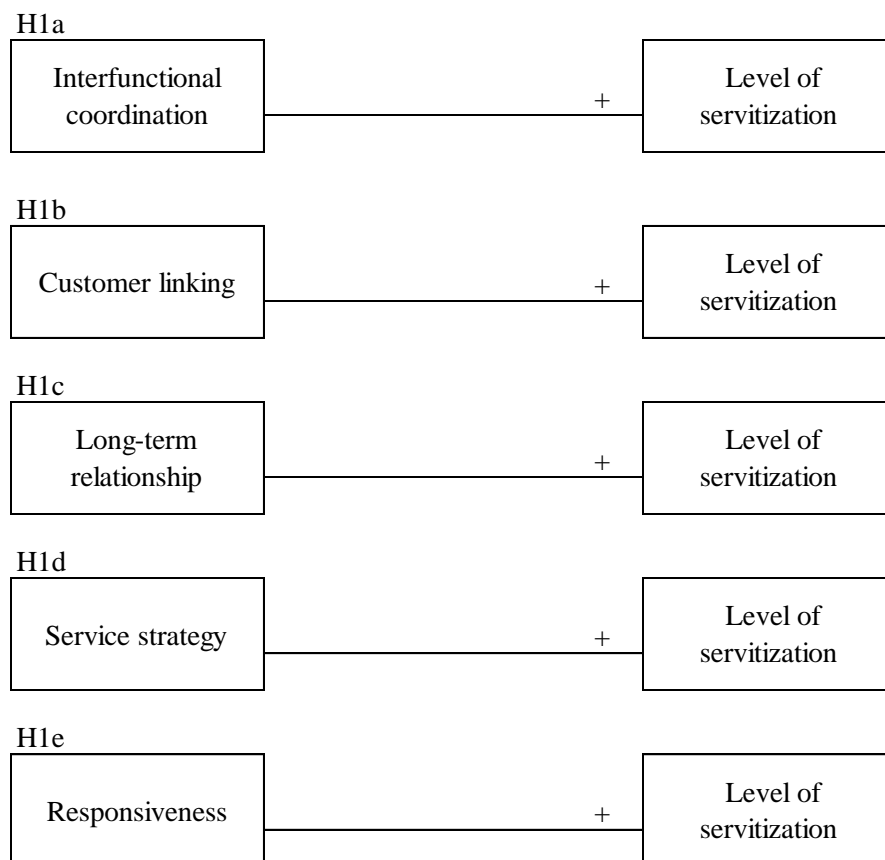
H1g. The more storage of customers data, the higher the level of servitization

H1h. Core capabilities have a significant positive effect on the level of servitization

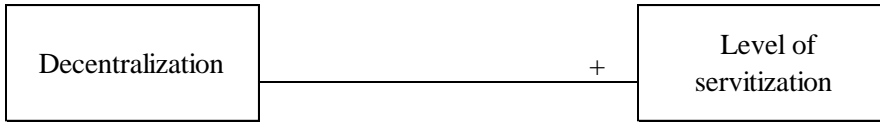
H2. The higher the level of dynamic capabilities, the higher the level of servitization

H3. The market dynamics moderate the relationship between core capabilities and the level of servitization

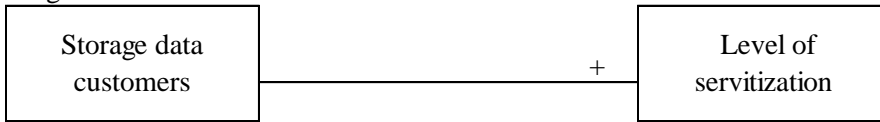
H4. Market dynamics moderate the relationship between dynamic capabilities and the level of servitization



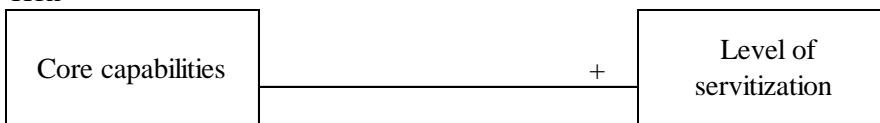
H1f



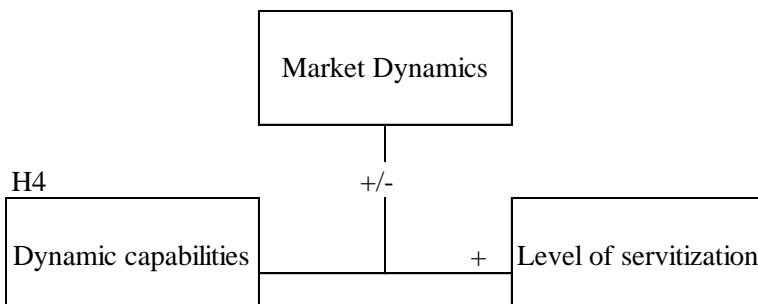
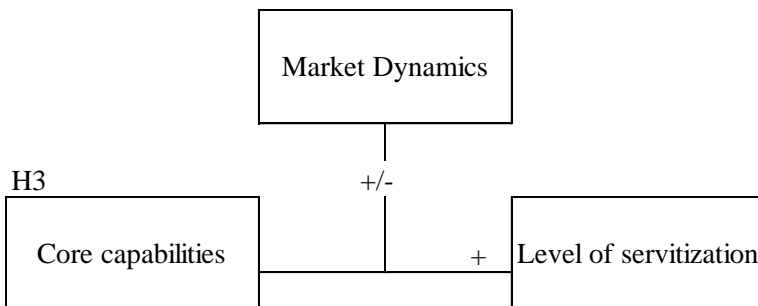
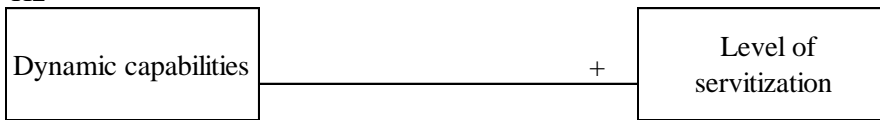
H1g



H1h



H2



3 Methodology

3.1 Research objective

The research objective is to explore the relationship between specific (dynamic) capabilities and market dynamics to the extent of servitization through hypothesis testing.

3.2 Research design

This research is based on a quantitative research. As mentioned above, this quantitative research explores the relationship between (dynamic) capabilities and market dynamic in the context of servitization. Hence, the research consists of an online survey. This research design has been chosen because it is an effective way to test the statistical correlation between multiple constructs, such as capabilities and the level of servitization. As Ponto (2015) emphasize, an online survey helps to describe and explore variables and constructs. With this research design, it is possible for the researcher to obtain relevant data from manufacturers all over the Netherlands.

3.3 Data collection

In this research, primary and secondary data has been collected. Primary data is collected from the online survey. The advantage of online surveys is that it is cheap and quick. In addition, surveys are flexible, many variables can be asked, and they have a great accuracy in measurement (Babbie, 2007). In achieving accuracy, it has to meet some requirements such as high response. In this research secondary data has been collected through the existing literature. All existing theories have led to the hypothetical model in chapter 2.11. All data from the survey is collected from Qualtrics.

3.4 Data operationalization

The data collected from the online survey consists of 65 questions. The first eight questions are introduction questions, which are all measured in multiple choice scale levels. The following questions are described below and illustrated in table 2.

Level of servitization

In determining the measurement level of servitization, the researcher investigated the databases of Web of Science and Scopus. However, the researcher has not found a validated measurement scale model for servitization. This is no surprise since servitization is still underexplored, especially in the context of empirical research. Neely (2008) is to date still one of the few large empirical studies to investigate servitization. In order to determine the degree of servitization two mainstream studies have been found. Tukker (2004) defines three types of services, namely product-oriented, use-oriented and result-oriented services while Baines and Lightfoot (2013) also define three types of services, base services, intermediate services and advanced services. Different terms with the same meaning.

The researcher has chosen to combine both Tukker (2004) as Baines and Lightfoot (2013) to determine the level of servitization. Tukker (2004) based the categorization of the level of servitization on classifications of multiple studies (Behrend et al., 2003; Brezet et al., 2001; Zaring et al., 2001). The model of Baines and Lightfoot (2013) is a further elaboration from the model of Tukker (2004) and is considered as a general approach to define service offerings. Although both models have similar meanings, the more general approach is chosen. Base, intermediate and advanced services is better to interpret than product-oriented, use-oriented and result-oriented. As mentioned, there is no measurement scale available in the literature to determine the level of servitization. As a result, the level of servitization is determined based on multiple questions to specify servitization. In order to prevent bias, the companies are forced to answer multiple questions after selecting the type of service. The type of service is categorized on the basis of Baines and Lightfoot (2013) and is measured in a 5-point Likert namely, Base Service, Intermediate Service and Advanced service. Other questions include a 6-point Likert, to what extent manufactures are paid to execute the services and to what extent the services are communicated to its customers. One extra Likert point 'no opinion' is added for questions of the level of servitization. Furthermore, service offer compared to their revenue is asked. At last, companies are asked to what extent they have a service strategy. All together, these questions should prevent bias in which manufactures consider servitization as simple unpaid add-on service.

Since there are no measurement scales available to determine the level of servitization, the researcher is forced to find new ways to measure servitization. Due to the complexity of servitization, there is no one best way to measure the level of servitization. After analysing multiple options, the researcher has chosen to determine the level of servitization on a decision tree based on thresholds. These thresholds are created by the researcher. To limit the influence of the researcher in determining the thresholds, three different thresholds measurement scales are created. By doing so, the results are not solely depending on single thresholds. The thresholds are based on the five questions mentioned above.

According to Baines and Lightfoot (2013), the categories of servitization are no servitization, base servitization, intermediate servitization and advanced servitization. Therefore, the level of servitization is based on the following questions:

Q1. To what extent do firms offer service compared to their revenue?

Q2. To what extent does your company offer services such as Base Services.

Q3. To what extent do you get paid for the above services?

Q4. To what extent are the above services involved when communicating / selling your product / service offering to the market?

Q5. To what extent has your company a clearly defined service strategy?

Questions Servitization	Reference	Scale
Q1. To what extent do firms offer service compared to their revenue?	None	7-point Likert scale None 1 - 10% 11 - 25% 26 - 50% 51 - 75% 76 - 100% No opinion
Q2. To what extent does your company offer services such as Base Services.	Tukker (2004) Baines and Lightfoot (2013)	5-point Likert scale Strongly disagree Disagree Neutral Agree Strongly agree
Q3. To what extent do you get paid for the above services?	Parida, Vinit & Sjödin, David & Wincent, Joakim & Kohtamäki, Marko. (2014).	6-point Likert scale Never Seldom Sometimes Often Always No opinion
Q4. To what extent are the above services involved when communicating / selling your product / service offering to the market?	Oliva and Kallenberg (2003).	6-point Likert scale Never Seldom Sometimes Often Always No opinion
Q5. To what extent has your company a clearly defined service strategy?	Oliva, Gebrauer and Brann (2012)	5-point Likert scale Strongly disagree Disagree Neutral Agree Strongly agree

Table 1. Questions measurement level of servitization.

Thresholds

In determining the thresholds of the questions, the researcher is aware that it is sensible for interpretation. However, literature can help determining the thresholds. Parida et al. (2014) mention that servitization is more than only an add-on service, whereas Baines and Lightfoot (2013) mention that servitization should be a part of its business and communication to its customers. Unpaid services are considered as a favour instead of core business. Servitization is the process whereby the company is proactive in giving service an important role in the business model (Oliva & Kallenberg, 2003). Therefore, companies should be active and committed to its services in order to be considered as a level of servitization. In terms of measurements, 'often' on the Likert-scale will be the benchmark to measure the level of servitization. 'Sometimes' is situational and will not be considered 'proactively' as described by Oliva and Kallenberg (2003). As a result, the main thresholds in this research are that companies should at least:

Q1. Offer services larger than 1 (none).

Q2. Base service equal or more than 4 (often)

Q3. Paid for services equal or more than 3 (sometimes)

Q4. Communication services equal or more than 3 (sometimes)

Q5. Clear service strategy equal or more than 3 (sometimes)

To prevent confusion, the other thresholds and different levels of servitization can be found in appendix 7.3, since they will not be analysed in the main research.

No servitization

The threshold for no servitization deviates from other categories. When companies offer no services in its business (Q1, 'none'), they are categorized as no servitization. In addition, when companies offer little services (Q1, '1 – 10%') and score lower than 3 (sometimes) in Q2, Q3 and Q4, they are categorized as no servitization. The foundation of these thresholds is that services should be at least an active business activity regardless of the proportion of the services. This means that companies can have low percentage service while being categorised as no servitization. A low service offer in combination with low communication about the services in its business and not getting paid for the services is not sufficient to be considered as a category of servitization.

Base/Inter/Advanced level of servitization

The thresholds are equal for the categories base servitization, intermediate servitization and advanced servitization. In this case Q2 is the main service question about the type of service. This must be equal or larger than 4 (often) in combination with equal or larger score than 3 in communication and paid services.

Exceptions

As mentioned earlier, servitization is complex and the thresholds are not applicable to all companies. A company can have a low score on paid service, while having a high score on communication. Therefore, the remaining companies will be analysed by the researcher with service strategy as control function. When companies fail to meet the thresholds, service strategy can help categorize the level of servitization. For instance, when a company fail to meet one base service level criteria, service strategy can help the researcher determine the level of servitization. It should be equal or higher than 4 (agree) in order to meet the threshold.

Central tendency capabilities

Likert-type scales are frequently used in research. Developed in 1932 by Rensis Likert, it is an ordinal scale to measure for instance attitudes or to rate the degree to which respondents agree or disagree. In an ordinal scale responses can be rated or ranked, however the distance between these responses is unknown. The differences between the responses 'never' 'seldom' or 'sometimes' are not measurable and equal. As Jamieson (2004) state: "the response categories in Likert have a rank order, but the intervals between the values cannot be presumed equal" (p.1217).

In this research, the Likert scale is used. Therefore, in determining the central tendency to measure the capabilities, it is important to note that ordinal scales are non-parametric statistics. Hence,

descriptive statistics, such as means have less meaning when applied to Likert scales. For instance, what is the average of 'never' and 'sometimes'. Does 'never and a half' have a useful meaning? Furthermore, when the responses have high and low extremes, the mean will most likely be centred in the middle. The middle is in most cases the most 'neutral' or 'no idea' response. As illustrated in Appendix 7.2, the means of multiple capabilities are clustered around the middle, which indicates a neutral response. Also, a mean of 3.25 has no useful meaning as it is not on an interval scale. The median is often used as appropriate central tendency for ordinal data (Sullivan & Artino, 2013). Therefore, in this research the median will be used as central tendency to measure the capabilities.

Capabilities

The concept capability is broad. Since the required capabilities have been found through extensive literature research, there is no one validated measurement scale to operationalize all capabilities. Therefore, multiple measurement scales need to be used. In order to determine the right measurements, the capabilities are divided into categories.

Several capabilities such as, interfunctional coordination, customer linking, and responsiveness are part of market orientation. Kohli, Jaworski, and Kumar (1993) measurement method is called MARKOR and uses 32 items with a 5-point Likert (Kohli et al., 1993). The measurement method of Narver and Slater (1990) is called MKTOR and uses a 7-point Likert scale. Both studies want to measure the market orientation of companies.

Service strategy is also difficult to measure since it is a specific capability. Oliva, Gebrauer and Brann (2012), which have published numerous articles in the context of servitization, use 6 items with a 5-point Likert scale to measure service commitment.

The questions about capabilities are namely based on two theories. The service commitment is based on the theory of Oliva, Gebrauer and Brann (2012). Their 6-item measurement scale is reduced to a 4-item scale. Two questions found not to be relevant for this research. The other capabilities, including customer capabilities, strategy capabilities and organizational capabilities are based on the theory of Kohli and Jaworski (1993), MARKOR.

Dynamic capabilities

Teece et al. (2007) and Eisenhardt and Martin (2000) are the two mainstream studies about dynamic capabilities and agree in many regards. Both studies did not develop a standard scale to measure dynamic capabilities. Many authors have developed a measurement scale based on Teece (1997) and Teece (2007) model. However, many authors used only several capacities of Teece (2007) model. For instance, Hawass (2010) measures transforming capacity but not sensing and seizing. Naldi et al. (2014) include sensing and seizing, but not transforming. Therefore, only five scales remain that uses the capacities sensing, seizing and transforming (Kump et al., 2018). Hence, Nedzinskas et al. (2013); Wilden et al. (2013) Shafia et al. (2016); BabelyteLabanausk Nedzinskas (2017); Lopez-Cabrales, et al., (2017); Nedzinskas et al. (2013) measure dynamic capabilities based on all of Teece (2007) capacities.

The questions about dynamic capabilities are based on the theory Kump et al. (2018). Kump et al. (2018) elaborately tested the measurement scale during three phases with five experienced researchers. In the first phase formulated indicators that would reflect each of the three DC dimensions. Phase two is to ensure content validity, enhance comprehensibility, and minimize perceived redundancy (Kump et al., 2018). Phase three is rephrasing and reducing the items based on two top-level managers' feedback.

Market dynamics

Florice and Ibanescu (2008) found four elements, namely velocity, turbulence, growth and instability in order to test how dynamic an environment is. Porter's (1985) model is more focused on the attractiveness of a market. Therefore, as this research want to test the uncertainty and its effect on servitization, the model of Florice and Ibanescu (2008) will be used to determine the environmental dynamics. This measurement scale has been tested and have high factor loadings, which indicates that the correlation coefficient for the variables and factor is strong. The market dynamic section consists of eleven questions about market dynamics and is measured is the same scale as the dynamic capability.

Constructs	Indicators	Reference	Scale
Level servitization	No servitization Base servitization Intermediate servitization Advanced servitization	Tukker (2004) Baines and Lightfoot (2013)	6-point Likert scale Never Seldom Sometimes Often Always No opinion
Core capabilities	Interfunctional coordination Responsiveness Customer linking Long-term relationship Data customer Decentralization	Kohil and Jaworski (1993)	5-point Likert scale Strongly disagree Disagree Neutral Agree Strongly agree
Service strategy	Management commitment Service strategy Service mindset	Oliva, Gebrauer and Brann (2012)	5-point Likert scale Strongly disagree Disagree Neutral Agree Strongly agree
Dynamic capabilities	Sensing Seizing Transforming	Kump et al. (2018)	5-point Likert scale Strongly disagree Disagree Neutral Agree Strongly agree
Market dynamics	Velocity Turbulence Growth Instability	Florice and Ibanescu (2008)	5-point Likert scale Strongly disagree Disagree Neutral Agree Strongly agree

Table 1. Constructs and indicators of references.

3.5 Sample

This research is executed at manufacturers in the Netherlands. Only manufactures in the Netherlands are allowed to participate the online survey. There are no restrictions in terms of in which branch the manufacturers have to operate. However, pure-service companies are not allowed to participate since they are not representing the concept of servitization. The sample distribution is executed by STEM industrial marketing centre. Previous research indicates difficulties with recruiting participants, therefore the researcher will use his LinkedIn network to recruit additional participants. Furthermore, the researcher will contact his business partners of STEM to obtain more participants.

The desired sample size is difficult to determine since the total population is unknown. Statistics show that the industry branch alone is well over tens of thousands of companies (CBS, 2020). Therefore, with a population larger than 5000 companies, an estimate of at least 100 participants is required to represent the population. Based on previous researches of STEM, the aim is also to recruit a minimal of 100 participants in order to represent the population (Ophof, 2020; Mollering, 2019).

To recruit participants, the researcher contacted more than 1000 companies in the manufacturing industry by mail. Out of 1000 only 72 companies responded. Also, 350 people have been contacted via LinkedIn which led to an extra response of 23 participants. STEM recruited 70 participants by magazines and journals. The remaining participants are recruited by personal business

contacts. The low response ratio is possibly caused by the novelty of the topic, recruiting during the vacation period and the consequences of the pandemic Covid-19. In total, 144 companies have responded and completed the survey.

3.5.1 SPSS analysis

Ordinal logistic regression analysis will be used to test the hypotheses. The level of servitization is the dependent variable and the measurement level is ordinal. Ordinal data means that there is an order between categories, however the distance might be unclear. Ordinal logistic regression is used to predict an ordinal dependent variable given one or more independent variables. Therefore, the hypotheses try to predict and test which independent variables have a large effect on the level of servitization.

4. Results and findings

4.1 Reliability test

The reliability of the questionnaire has to be tested before the researcher tests the hypotheses. The reliability of the questionnaire is tested with the Cronbach's Alpha. This method measures the internal consistency. As illustrated in table 1, the questionnaire consists of multiple constructs and indicators. Therefore, the reliability test is divided in several groups to maintain a high level of reliability. A minimum score of .70 is considered to be acceptable, whereas .80 is good and .90 is excellent (Cronbach). The construct 'level of servitization' is excluded because another method is used to test the reliability.

At first, all 41 items of the questionnaire are tested. Combining these 41 items, score a Cronbach's alpha of .930. This is an excellent reliability score.

Secondly, all medians of the indicators are extracted to test the reliability of the concerning constructs. The first construct 'Core Capabilities' consist of the indicators 'MED_IFC', 'MED_Linking', 'MED_Longterm', 'MED_Response', 'MED_Data' and 'MED_Decentral'. This results in a N of 10, and a Cronbach's Alpha of .856. Construct Strategy consist of the indicators 'MED_Commitment', 'MED_Strategy' and 'MED_Mindset'. This results in a N of 5 and a Cronbach's Alpha of .877. The third construct 'Dynamic Capabilities' consist of 'MED_Sensing' 'MED_Seizing', 'MED_Transform'. This results in a N of 15 with a Cronbach's Alpha of .925. The last construct 'Market Dynamics' consists of the indicators 'MED_Growth', 'MED_Velocity', 'MED_Turbulence', 'MED_Instability'. This results in a N of 11 and a Cronbach's Alpha of .832. All constructs score good on the Cronbach's Alpha, meaning that reliability can be assumed.

At last, the remaining constructs are tested for reliability. This results in a N of 4 and a Cronbach's Alpha of .769. This score is sufficient.

Reliability Statistics All Items		Reliability Statistics Core Capabilities		Reliability Statistics Strategy	
Cronbach's Alpha	N of Items	Cronbach's Alpha	N of Items	Cronbach's Alpha	N of Items
.930	41	.856	10	.877	5

Reliability Statistics Dynamic Capabilities		Reliability Statistics Market Dynamics		Reliability Statistics All Constructs	
Cronbach's Alpha	N of Items	Cronbach's Alpha	N of Items	Cronbach's Alpha	N of Items
.925	15	.832	11	.769	4

Table 3. Reliability Cronbach's Alpha constructs.

4.2 Decision Tree

The level of servitization is determined by a decision tree. This led to the following tree:

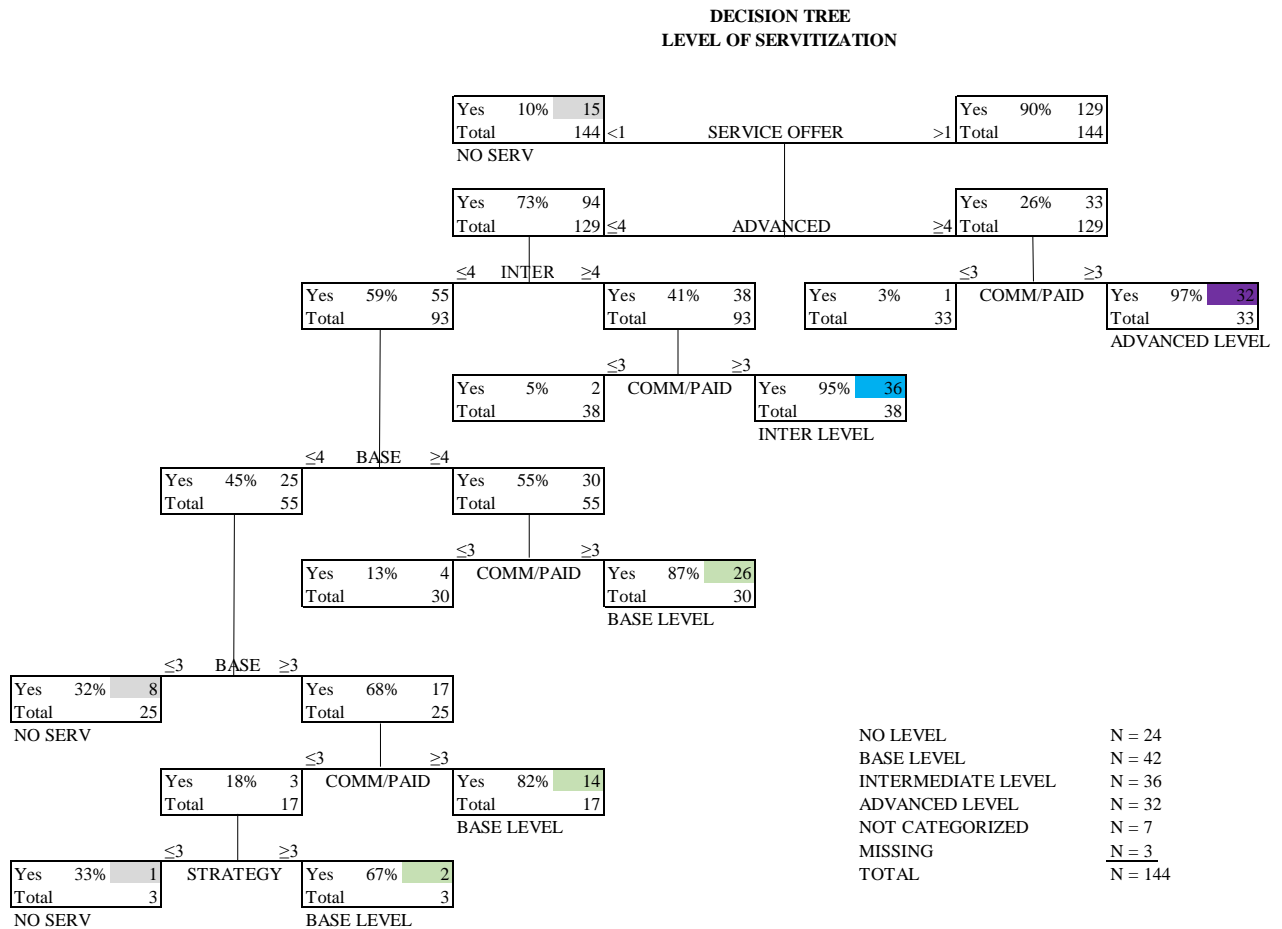


Figure 10. Decision tree level of servitization.

Out of 144 companies, the decision tree categorized 134 companies, equivalent to 90.1 percent. More importantly, the decision tree has correctly predicted the categories in 82.6 percent of the cases. Some errors have been found. In 25 cases, the researcher had to make some corrections due to the complexity of the answers of the respondents. This complexity consists of too many unexplainable variations in the answers to the questions. The specific corrections can be found in Appendix (). Alternative thresholds and levels can also be found in Appendix () as they will not be discussed in this chapter.

As illustrated in figure 10, Q1 ‘Service Offer’ is the first decision. This resulted in the elimination of 15 companies. These companies offer no services and are categorized in the level no servitization. Q2 ‘Advanced’ is the second decision. Companies who offer services often or always are categorized in advanced when the communication (Q3) and paid (Q4) threshold have been met. This resulted in 33 advanced servitized companies. The third decision is on intermediate level. 36 out of the remaining 93 companies have met the threshold and are categorized as the intermediate level of servitization. The fourth decision is on base level. Out of 55 companies, 26 companies have met the thresholds and are categorized as base level servitization. Multiple companies fall between categories with medium to low scores on various questions, therefore the base level threshold is changed to 3 (sometimes) for these specific companies. This resulted in an additional 14 companies in the category base level. The other companies are categorized as no servitization since they have not met the thresholds for communication and paid services. At last, service strategy is asked to determine the remaining 3 companies. This led to an additional 2 company in base level and 1 company in no servitization. 7 companies have not met the threshold for various reasons and will be analysed by the researcher.

4.3 Descriptive analysis

Before analysing the extracted data, the dataset has to be checked for missing values and errors. The data is automatically extracted from Qualtrics, which is an online survey tool. In order to check the dataset, a descriptive analysis of all questions have been executed. This results in a clear overview of the answered questions. The complete statistical analysis of all questions can be found in Appendix 7.2.

The first check is to determine whether the range values of the questions are correct. In most cases, the range varies from minimum 1 to maximum 5, whereas 1 stands for strongly disagree and 5 strongly agree. As mentioned, several questions' range is extended to a maximum of 6, which stands for not applicable. The range of introduction questions varies from minimum 1 to a maximum of 34. No errors have been found.

The goal was to achieve at least 100 participants who completed the survey. As mentioned in section (), only participants that completed the survey or for a minimum of 50 percent are included in the analysis. This resulted in a N of 144. Checking the data from the statistical analysis, the researcher has not identified meaningful errors. Since all questions are required to be filled in, there should not be many variations in the number of participants. This is confirmed in the descriptive analysis.

The descriptive statistics of the levels of servitization after the corrections which have been discussed in Appendix 7.5 are presented in Table 4.

ALLLEVELSORD					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO SERVICIZATION	27	18.8	18.8	18.8
	BASE	43	29.9	29.9	48.6
	INTER	42	29.2	29.2	77.8
	ADVANCED	32	22.2	22.2	100.0
	Total	144	100.0	100.0	

Table 4. Levels of servitization.

The descriptive of all questions can be found in Appendix 7.2.

To illustrate that there are differences between the groups, table 5 is shown. The mean of the four levels of servitization are presented. As mentioned, in this research the median will be used as central tendency. However, the mean can present useful information to illustrate differences between groups.

TABLE 1 Descriptive Statistics of the Sample and Comparison of Firms with the levels of servitization												
Variable	Total sample (N = 143)		Firms with no servitization (N = 26)		Firms with base servitization (N = 42)		Firms with inter servitization (N = 42)		Firms with advanced servitization (N = 33)		Statistical Test	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	F	P-value
Interf. coordination	3.23	0.85	2.85	1.05	3.15	0.85	3.25	0.73	3.62	0.66	4.504	0.00 ***
Customer Linking	3.37	3.37	2.87	0.87	3.30	0.78	3.42	0.78	3.80	0.65	7.392	0.00 ***
Decentralization	3.11	1.11	2.65	1.09	3.00	1.19	3.43	1.02	3.21	1.02	2.979	0.03 **
Longterm	4.10	0.98	3.69	1.19	3.79	1.07	4.33	0.72	4.55	0.67	6.786	0.00 ***
Responsiveness	3.72	0.87	3.58	1.18	3.68	0.86	3.64	0.69	3.98	0.78	1.410	0.24
Data	2.94	1.17	2.35	1.02	2.82	1.20	3.00	1.19	3.50	0.98	5.320	0.00 ***
Strategy	3.80	0.88	3.17	1.13	3.75	0.73	3.97	0.78	4.18	0.68	8.151	0.00 ***
Sensing	3.76	0.85	3.55	1.17	3.59	0.74	3.85	0.70	4.02	0.80	2.245	0.09 *
Seizing	3.87	0.91	3.70	1.09	3.78	0.90	3.84	0.74	4.14	0.97	1.379	0.25
Transforming	3.59	0.90	3.38	1.03	3.52	0.98	3.61	0.80	3.25	0.98	1.228	0.30
Growth	3.02	0.87	2.64	0.87	3.07	0.88	2.90	0.90	3.42	0.67	4.370	0.01 ***
Velocity	2.92	0.97	2.57	1.07	2.89	0.94	2.91	0.87	3.25	0.98	2.321	0.08 *
Turbulence	3.11	0.80	2.97	0.95	3.17	0.73	3.00	0.80	3.28	0.74	1.043	0.38
Instability	2.87	0.73	2.84	0.93	2.98	0.76	2.85	0.62	2.75	0.64	0.622	0.60

*P-value <.10, **p-value <.05, ***p-value <.01

Table 5. Differences in means levels of servitization.

As presented in table 5, various variables have significant differences between groups. Interfunctional coordination, customer linking, decentralization, long-term relationship, data customers, service strategy and growth have significant differences between groups.

4.4 Testing hypotheses

Before testing the hypotheses, several regression assumptions have to be met in order to continue with the analysis. The measurement of the construct level of servitization is ordinal. Therefore, the appropriate regression analysis is the ordinal logistic regression. The four assumptions are:

- Dependent variable is ordered
- One or more of the independent variables are continuous, categorical or ordinal.
- No multi-collinearity
- Proportional odds

In all cases the level of servitization is the dependent variable. The independent variables are continuous, based on the median. The third assumption is the multicollinearity. This implicates that the independent variables may not be correlated higher than .8. As illustrated in the table 6, there are no correlations higher than .8 between the independent variables. No multi-collinearity can be assumed. The final assumption, proportional odds means that the relationship between each pair of the outcome group has to be the same. If this assumption is violated, different models are required to describe the relationship between each pair of the outcome groups. SPSS tests this assumption with the test of Parallel lines. It must be non-significant. As illustrated in table 7, the test is non-significant. The assumption of proportional odds is met.

Table X
Descriptive statistics and correlations independent variables

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Interf. coordination	1													
2. Customer Linking	.640**	1												
3. Decentralization	.292**	.385**	1											
4. Longterm	.390**	.435**	.252**	1										
5. Responsiveness	.365**	.425**	0.087	.470**	1									
6. Data	.434**	.585**	.256**	.303**	.468**	1								
7. Strategy	.424**	.504**	.235**	.407**	.511**	.507**	1							
8. Sensing	.480**	.466**	.297**	.385**	.404**	.423**	.263**	1						
9. Seizing	.457**	.414**	0.142	.349**	.547**	.476**	.433**	.577**	1					
10. Transforming	.412**	.467**	.222**	.309**	.426**	.436**	.361**	.561**	.668**	1				
11. Growth	.224**	.265**	0.040	0.084	0.163	.344**	.208*	.190*	.395**	.308**	1			
12. Velocity	.179*	.290**	0.037	0.015	.190*	.230**	.203*	0.127	.314**	.212*	.546**	1		
13. Turbulence	0.162	.201*	0.064	-0.009	0.092	0.162	0.125	0.082	.204*	0.144	.420**	.472**	1	
14. Instability	-0.044	0.036	0.055	0.092	-0.129	-0.014	0.029	-0.015	-0.024	0.005	0.072	0.075	.283**	1

*P-value <.10, **p-value <.05, ***p-value <.01

Table 6. Correlations independent variables.

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	58.644			
General	56.144	2.500	2	.286

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

Table 7. Proportional odds assumption.

Hypothesis 1a



All assumptions have been tested and met. To test hypothesis 1, variables SERV_LEVEL and MED_IFC are used. Hypothesis 1 is “The better the firms’ interfunctional coordination, the higher the level of servitization”.

Case Processing Summary

		N	Marginal Percentage
SERV_LEVEL	NO SERVICIZATION	26	18.3%
	BASE	42	29.6%
	INTER	42	29.6%
	ADVANCED	32	22.5%
Valid		142	100.0%
Missing		2	
Total		144	

The categories of the dependent variable ‘Level of servitization’ as described in the methodology.

Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	70.450			
Final	58.644	11.806	1	.001

Link function: Logit.

The model fit information indicates that the final model gives a significant improvement over the baseline intercept-only model. In this case, interfunctional coordination significantly improves the fit of the model (Chi-Square 11.806, p 0.001).

Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	14.270	11	.218
Deviance	17.561	11	.092

Link function: Logit.

These statistics are to test whether the observed data are consistent with the fitted model. The null hypothesis is that the fit is good. This means that the test should be non-significant. The proposed model is a good fit to the model since we cannot reject the null hypothesis.

Pseudo R-Square

Cox and Snell	.080
Nagelkerke	.085
McFadden	.030

Link function: Logit.

Nagelkerke is the most used Pseudo R-Square. It indicates that 8.5 percent of the variance in the level of servitization is explained by interfunctional coordination. This is a relatively small proportion. This low proportion indicates that a model consisting only out of interfunctional coordination is a poor predictor of the outcome of the level of servitization.

Parameter Estimates

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test			95% Wald Confidence Interval for Exp(B)			
			Lower	Upper	Wald Chi-Square	df	Sig.	Lower	Upper		
Threshold	[SERV_LEVEL=1.00]	.133	.5228	-.892	1.157	.064	1	.800	1.142	.410	3.182
	[SERV_LEVEL=2.00]	1.618	.5349	.570	2.666	9.151	1	.002	5.043	1.768	14.386
	[SERV_LEVEL=3.00]	3.011	.5736	1.887	4.136	27.562	1	.000	20.316	6.601	62.530
MED_IFC	.537	.1598	.224	.850	11.288	1	.001	1.711	1.251	2.340	
(Scale)	1 ^a										

Dependent Variable: SERV_LEVEL
Model: (Threshold), MED_IFC
a. Fixed at the displayed value.

Interfunctional coordination is a significant positive predictor of the level of servitization. For every one unit increase on interfunctional coordination, there is a predicted increase of .537 in the log odds of a company being in a higher level of servitization. Furthermore, the odds ratio indicates that the odds being in a higher level of servitization increases by a factor of 1.711 for every unit increase on interfunctional coordination. This indicates that a firm scoring higher on interfunctional were more likely to being in a higher level of servitization (p=0.001). Hypothesis 1a “The better the firms’ interfunctional coordination, the higher the level of servitization” is **supported**.

Hypothesis 1b



The first three assumptions have been checked and tested. The fourth assumption proportional odds of all hypotheses can be found in Appendix 7.3. The fourth assumption has been met with a non-significant p-value of .432. To test hypothesis 1b “The better the customer linking, the higher the level of servitization”, variables MED_CUS and SERVE_LEVEL are used.

Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	93.535			
Final	73.621	19.913	1	.000

Link function: Logit.

The model fit information indicates that the final model gives a significant improvement over the base-line intercept-only model. In this case, customer linking significantly improves the fit of the model (Chi-Square 19.913, p <.001).

Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	22.170	23	.510
Deviance	20.212	23	.629

Link function: Logit.

The proposed model with customer linking as independent variable is a good fit to the model since we cannot reject the null hypothesis (p =.510).

Pseudo R-Square

Cox and Snell	.131
Nagelkerke	.140
McFadden	.051

Link function: Logit.

Nagelkerke indicates that 14 percent of the variance in the level of servitization is explained by customer linking. This is also a relatively small proportion. This low proportion indicates that a model consisting only out of customer linking is a small predictor of the outcome of the level of servitization.

Parameter Estimates

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test			Exp(B)	95% Wald Confidence Interval for Exp(B)		
			Lower	Upper	Wald Chi-Square	df	Sig.		Lower	Upper	
Threshold	[SERV_LEVEL=1.00]	1.313	.6949	-.049	2.675	3.571	1	.059	3.718	.952	14.517
	[SERV_LEVEL=2.00]	2.772	.7231	1.354	4.189	14.692	1	.000	15.985	3.874	65.949
	[SERV_LEVEL=3.00]	4.173	.7676	2.669	5.678	29.555	1	.000	64.918	14.420	292.253
MED_CUS	.847	.2077	.440	1.255	16.642	1	.000	2.334	1.553	3.506	
(Scale)	1 ^a										

Dependent Variable: SERV_LEVEL

Model: (Threshold), MED_CUS

a. Fixed at the displayed value.

Customer linking is a significant positive predictor of the level of servitization. For every one unit increase on customer linking, there is a predicted increase of .847 in the log odds of a company being in a higher level of servitization. Furthermore, the odds ratio indicates that the odds being in a higher level of servitization increases by a factor of 2.334 for every unit increase on customer linking. This indicates that a company scoring higher on customer linking are more likely to be in a higher level of servitization ($p < .001$). It can be concluded that customer linking is a better predictor in comparison to interfunctional coordination. Hypothesis 1b “The better the customer linking, the higher the level of servitization” is **supported**.

Hypothesis H1c



All assumptions have been checked and have been met. The fourth assumption has been met with a non-significant p-value of .271. To test hypothesis H1c “The longer the relationship with customers, the higher the level of servitization”, variables MED_LONG and SERV_LEVEL are used.

Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	67.140			
Final	49.925	17.215	1	.000

Link function: Logit.

The model fit information indicates that the final model gives a significant improvement over the baseline intercept-only model. In this case, service strategy significantly improves the fit of the model (Chi-Square 17.215, $p < .001$).

Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	12.907	11	.299
Deviance	13.867	11	.240

Link function: Logit.

The proposed model with long-term relationship as independent variable is a decent fit to the model since we cannot reject the null hypothesis ($p = .299$).

Pseudo R-Square

Cox and Snell	.114
Nagelkerke	.122
McFadden	.044

Link function: Logit.

Nagelkerke indicates that 12.2 percent of the variance in the level of servitization is explained by long-term relationship. This is also a relatively small proportion. This low proportion indicates that a model consisting only out of long-term relationship is a small predictor of the outcome of the level of servitization.

Parameter Estimates

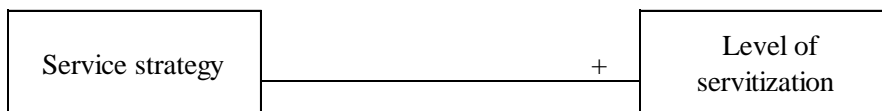
Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test			95% Wald Confidence Interval for Exp(B)			
			Lower	Upper	Wald Chi-Square	df	Sig.	Exp(B)	Lower	Upper	
Threshold [SERV_LEVEL=1.00]	1.042	.6543	-.241	2.324	2.535	1	.111	2.834	.786	10.217	
	[SERV_LEVEL=2.00]	2.593	.6856	1.249	3.937	14.304	1	.000	13.369	3.488	51.245
	[SERV_LEVEL=3.00]	4.029	.7282	2.602	5.456	30.615	1	.000	56.214	13.490	234.252
MED_LONG	.658	.1626	.339	.977	16.367	1	.000	1.931	1.404	2.655	
(Scale)	1 ^a										

Dependent Variable: SERV_LEVEL
Model: (Threshold), MED_LONG

a. Fixed at the displayed value.

Long-term relationship is a significant positive predictor of the level of servitization. For every one unit increase on long-term relationship, there is a predicted increase of .658 in the log odds of a company being in a higher level of servitization. Furthermore, the odds ratio indicates that the odds being in a higher level of servitization increases by a factor of 1.931 for every unit increase on long-term relationship. This indicates that a company having longer relationship with its customers are more likely to be in a higher level of servitization ($p < .001$). Hypothesis 1c “The longer the relationship with customers, the higher the level of servitization” is **supported**.

Hypothesis H1d



All assumptions have been checked and have been met. The fourth assumption has been met with a non-significant p-value of .454. To test hypothesis H1d “Service strategy has a significant positive effect on the level of servitization”, variables MED_STRAT and SERV_LEVEL are used.

Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	85.852			
Final	62.192	23.660	1	.000

Link function: Logit.

The model fit information indicates that the final model gives a significant improvement over the baseline intercept-only model. In this case, service strategy significantly improves the fit of the model (Chi-Square 23.660, $p < .001$).

Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	26.441	17	.067
Deviance	25.781	17	.079

Link function: Logit.

The proposed model with service strategy as independent variable is a decent fit to the model since we cannot reject the null hypothesis ($p = .067$). However, it is close to being significant.

Pseudo R-Square

Cox and Snell	.152
Nagelkerke	.162
McFadden	.060

Link function: Logit.

Nagelkerke indicates that 16.2 percent of the variance in the level of servitization is explained by service strategy. This is also a relatively small proportion. This low proportion indicates that a model consisting only out of service strategy is a small predictor of the outcome of the level of servitization.

Parameter Estimates

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test			Exp(B)	95% Wald Confidence Interval for Exp(B)		
			Lower	Upper	Wald Chi-Square	df	Sig.		Lower	Upper	
Threshold	[SERV_LEVEL=1.00]	1.539	.6821	.202	2.875	5.087	1	.024	4.658	1.223	17.733
	[SERV_LEVEL=2.00]	3.053	.7193	1.643	4.463	18.014	1	.000	21.182	5.172	86.750
	[SERV_LEVEL=3.00]	4.448	.7576	2.963	5.933	34.473	1	.000	85.462	19.360	377.249
MED_STRAT	.791	.1750	.448	1.133	20.416		1	.000	2.205	1.565	3.106
(Scale)	1 ^a										

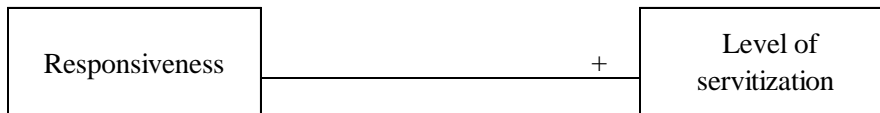
Dependent Variable: SERV_LEVEL

Model: (Threshold), MED_STRAT

a. Fixed at the displayed value.

Service strategy is a significant positive predictor of the level of servitization. For every one unit increase on customer linking, there is a predicted increase of .791 in the log odds of a company being in a higher level of servitization. Furthermore, the odds ratio indicates that the odds being in a higher level of servitization increases by a factor of 2.205 for every unit increase on service strategy. This indicates that a company scoring higher on customer linking are more likely to be in a higher level of servitization ($p < .001$). It can be concluded that service strategy is a better predictor in comparison to interfunctional coordination. Hypothesis 1d “Service strategy has a significant positive effect on the level of servitization” is **supported**.

Hypothesis H1e



The assumptions have been checked and have been tested. The proportional odds have a non-significant p-value of .293. To test hypothesis H1e “The better the responsiveness to customers’ needs the higher the level of servitization”, variables MED_RES and SERV_LEVEL are used.

Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	88.331			
Final	85.836	2.496	1	.114

Link function: Logit.

The model fit information indicates that the final model gives a significant improvement over the baseline intercept-only model. In this case, responsiveness does not significantly improve the fit of the model (Chi-Square 2.496, p .114).

Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	24.431	23	.380
Deviance	30.074	23	.147

Link function: Logit.

The proposed model with responsiveness as independent variable is a good fit to the model since we cannot reject the null hypothesis (p =.380).

Pseudo R-Square

Cox and Snell	.017
Nagelkerke	.019
McFadden	.006

Link function: Logit.

Nagelkerke indicates that 1.9 percent of the variance in the level of servitization is explained by responsiveness. This is a very low proportion. This very low proportion indicates that a model consisting only out of responsiveness is a very poor predictor of the outcome of the level of servitization.

Parameter Estimates

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test			Exp(B)	95% Wald Confidence Interval for Exp(B)	
			Lower	Upper	Wald Chi-Square	df	Sig.		Lower	Upper
Threshold [SERV_LEVEL=1.00]	-.442	.6960	-1.806	.922	.403	1	.526	.643	.164	2.515
[SERV_LEVEL=2.00]	.982	.6954	-.381	2.345	1.995	1	.158	2.670	.683	10.434
[SERV_LEVEL=3.00]	2.318	.7171	.912	3.723	10.444	1	.001	10.150	2.489	41.390
MED_RES	.290	.1839	-.070	.651	2.492	1	.114	1.337	.932	1.917
(Scale)	1 ^a									

Dependent Variable: SERV_LEVEL

Model: (Threshold), MED_RES

a. Fixed at the displayed value.

Responsiveness is not a significant positive predictor of the level of servitization. For every one unit increase on responsiveness, there is a predicted increase of .290 in the log odds of a company being in a higher level of servitization. Furthermore, the odds ratio indicates that the odds being in a higher level of servitization increases by a factor of 1.337 for every unit increase on customer linking. However, this increase is not significant with a p-value of .114. Hypothesis 1e “The better the responsiveness to customers’ needs the higher the level of servitization” is **rejected**.

Hypothesis 1f



The assumptions have been checked and have been tested. The proportional odds have a non-significant p-value of .202. To test hypothesis H1f “Decentralized organizations tend to have higher levels of servitization”, variables MED_DEC and SERV_LEVEL are used.

Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	68.120			
Final	62.974	5.146	1	.023

Link function: Logit.

The model fit information indicates that the final model gives a significant improvement over the baseline intercept-only model. In this case, decentralization significantly improves the fit of the model (Chi-Square 5.146, p .023).

Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	16.386	11	.127
Deviance	16.915	11	.110

Link function: Logit.

The proposed model with customer linking as independent variable is a good fit to the model since we cannot reject the null hypothesis (p =.127).

Pseudo R-Square

Cox and Snell	.036
Nagelkerke	.038
McFadden	.013

Link function: Logit.

Nagelkerke indicates that 3.8 percent of the variance in the level of servitization is explained by decentralization. This is also a small proportion. This low proportion indicates that a model consisting only out of decentralization is a small predictor of the outcome of the level of servitization

Parameter Estimates

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test			95% Wald Confidence Interval for Exp(B)			
			Lower	Upper	Wald Chi-Square	df	Sig.	Exp(B)	Lower	Upper	
Threshold	[SERV_LEVEL=1.00]	-.556	.4648	-1.467	.355	1.430	1	.232	.574	.231	1.426
	[SERV_LEVEL=2.00]	.905	.4709	-.018	1.828	3.694	1	.055	2.472	.982	6.222
	[SERV_LEVEL=3.00]	2.254	.5002	1.274	3.234	20.304	1	.000	9.525	3.573	25.388
MED_DEC	.312	.1390	.040	.585	5.054	1	.025	1.367	1.041	1.795	
(Scale)	1 ^a										

Dependent Variable: SERV_LEVEL
Model: (Threshold), MED_DEC

a. Fixed at the displayed value.

Decentralization is however a significant positive predictor of the level of servitization. For every one unit increase on decentralization, there is a predicted increase of .312 in the log odds of a company

being in a higher level of servitization. Furthermore, the odds ratio indicates that the odds being in a higher level of servitization increases by a factor of 1.367 for every unit increase on decentralization. This indicates that decentralized companies are more likely to be in a higher level of servitization ($p=0.025$). Hypothesis 1f “Decentralized organizations have higher levels of servitization” is **supported**.

Hypothesis 1g



The assumptions have been checked and have been tested. The proportional odds have a non-significant p-value of .678. To test hypothesis H1g “The more storage of customers data, the higher the level of servitization”, variables MED_DATA and SERV_LEVEL are used.

Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	66.996			
Final	53.611	13.385	1	.000

Link function: Logit.

The model fit information indicates that the final model gives a significant improvement over the baseline intercept-only model. In this case, storage data significantly improves the fit of the model (Chi-Square 13.385, $p < .001$).

Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	8.121	11	.702
Deviance	9.290	11	.595

Link function: Logit.

The proposed model with storage data customer as independent variable is a good fit to the model since we cannot reject the null hypothesis ($p = .702$).

Pseudo R-Square

Cox and Snell	.095
Nagelkerke	.102
McFadden	.036

Link function: Logit.

Nagelkerke indicates that 10.2 percent of the variance in the level of servitization is explained by storage data customers. This is also a relatively small proportion. This low proportion indicates that a model consisting only out of storage data customers is a small predictor of the outcome of the level of servitization

Parameter Estimates

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test			95% Wald Confidence Interval for Exp(B)			
			Lower	Upper	Wald Chi-Square	df	Sig.	Exp(B)	Lower	Upper	
Threshold	[SERV_LEVEL=1.00]	-.077	.4274	-.915	.760	.033	1	.857	.926	.401	2.139
	[SERV_LEVEL=2.00]	1.344	.4364	.488	2.199	9.477	1	.002	3.833	1.629	9.016
	[SERV_LEVEL=3.00]	2.723	.4807	1.781	3.665	32.090	1	.000	15.225	5.935	39.058
MED_DATA		.492	.1372	.223	.761	12.850	1	.000	1.635	1.250	2.140
(Scale)		1 ^a									

Dependent Variable: SERV_LEVEL

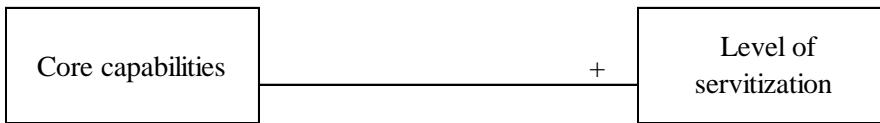
Model: (Threshold), MED_DATA

a. Fixed at the displayed value.

Storage data customers is a significant positive predictor of the level of servitization. For every one unit increase on storage data customers, there is a predicted increase of .492 in the log odds of a company being in a higher level of servitization. Furthermore, the odds ratio indicates that the odds being in a higher level of servitization increases by a factor of 1.635 for every unit increase on storage data customers. This indicates that companies who have a better customer data storage are more likely to be in a higher level of servitization ($p < .001$). Hypothesis 1f “The more storage of customers data, the higher the level of servitization,” is supported.

Hypothesis 1h

All assumptions for have been checked and have been tested. Proportional odds have a p-value of .973. To test hypothesis 1e “Core capabilities have a significant positive effect on the level of servitization”, variables MED_CAP and SERV_LEVEL are used. MED_CAP consists of the capabilities interfunctional coordination, customer linking, decentralization, long-term relationship, responsiveness and customers’ data.



Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	361.147			
Final	333.147	28.000	6	.000

Link function: Logit.

The model fit information indicates that the final model gives a significant improvement over the base-line intercept-only model. In this case, core capabilities does significantly improve the fit of the model (Chi-Square 28.000, $p < .001$).

Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	359.299	375	.711
Deviance	326.216	375	.967

Link function: Logit.

The proposed model with core capabilities as independent variable is a very good fit to the model since we cannot reject the null hypothesis ($p = .711$).

Pseudo R-Square

Cox and Snell	.189
Nagelkerke	.201
McFadden	.076

Link function: Logit.

Nagelkerke indicates that 20.1 percent of the variance in the level of servitization is explained by the core capabilities. This is considering the amount variable still a low proportion. This low proportion indicates that a model consisting out of core capabilities is still a small predictor of the outcome of the level of servitization.

Parameter Estimates

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test			Exp(B)	95% Wald Confidence Interval for Exp(B)		
			Lower	Upper	Wald Chi-Square	df	Sig.		Lower	Upper	
Threshold	[SERV_LEVEL=1.00]	1.616	.9115	-.171	3.402	3.142	1	.076	5.032	.843	30.032
	[SERV_LEVEL=2.00]	3.163	.9419	1.317	5.009	11.278	1	.001	23.646	3.733	149.802
	[SERV_LEVEL=3.00]	4.646	.9809	2.724	6.569	22.435	1	.000	104.183	15.235	712.458
MED_IFC	.068	.2014	-.326	.463	.116	1	.734	1.071	.722	1.589	
MED_CUS	.444	.2940	-.132	1.020	2.280	1	.131	1.559	.876	2.774	
MED_DEC	-.013	.1571	-.321	.295	.007	1	.932	.987	.725	1.343	
MED_LONG	.486	.1936	.106	.865	6.297	1	.012	1.626	1.112	2.376	
MED_RES	-.358	.2267	-.803	.086	2.498	1	.114	.699	.448	1.090	
MED_DATA	.320	.1693	-.012	.652	3.564	1	.059	1.377	.988	1.919	
(Scale)	1 ^a										

Dependent Variable: SERV_LEVEL

Model: (Threshold), MED_IFC, MED_CUS, MED_DEC, MED_LONG, MED_RES, MED_DATA

a. Fixed at the displayed value.

It seems that the variable long-term relationships with customers is the only variable with a significant positive effect on the level of servitization when the core capabilities are merged into one model. For every one unit increase on long-term relationship, there is a predicted increase of .486 in the log odds of a company being in a higher level of servitization. Furthermore, the odds ratio indicates that the odds being in a higher level of servitization increases by a factor of 1.626 for every unit increase on long-term relationship. This indicates that a company scoring higher on long-term relationships are more likely to be in a higher level of servitization (p=.012). Storage customers' data is close to being significant with a p-value of .059. Hence, since only one of the core capabilities is significant, hypothesis 1h "Core capabilities have a significant positive effect on the level of servitization" is **partly rejected**.

Service strategy can also be considered as a core capability (see table below). After the addition of service strategy to the model, it is clear that service strategy is still strongest predictor of the level of servitization (P=0.002). After the addition of service strategy, there is change in significance in responsiveness. Responsiveness has now a significant negative effect on the level of servitization (P=0.14). This implicates that a higher level of responsiveness leads to lower level of servitization. Long-term relationships with customers remains more or less the same.

Parameter Estimates

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test			Exp(B)	95% Wald Confidence Interval for Exp(B)		
			Lower	Upper	Wald Chi-Square	df	Sig.		Lower	Upper	
Threshold	[SERV_LEVEL=1.00]	2.359	.9754	.448	4.271	5.851	1	.016	10.584	1.565	71.591
	[SERV_LEVEL=2.00]	4.011	1.0150	2.021	6.000	15.612	1	.000	55.177	7.547	403.417
	[SERV_LEVEL=3.00]	5.534	1.0568	3.463	7.605	27.425	1	.000	253.209	31.911	2009.166
MED_DEC	-.018	.1574	-.327	.290	.013	1	.908	.982	.721	1.337	
MED_DATA	.229	.1752	-.114	.573	1.711	1	.191	1.258	.892	1.773	
MED_IFC	.023	.2025	-.374	.420	.013	1	.911	1.023	.688	1.521	
MED_CUS	.327	.3045	-.270	.923	1.150	1	.284	1.386	.763	2.518	
MED_LONG	.474	.1955	.091	.857	5.884	1	.015	1.607	1.095	2.357	
MED_RES	-.594	.2421	-1.068	-.119	6.012	1	.014	.552	.344	.888	
MED_STRAT	.650	.2097	.239	1.061	9.616	1	.002	1.916	1.270	2.890	
(Scale)	1 ^a										

Dependent Variable: SERV_LEVEL

Model: (Threshold), MED_DEC, MED_DATA, MED_IFC, MED_CUS, MED_LONG, MED_RES, MED_STRAT

a. Fixed at the displayed value.

Hypothesis 2



All assumption have been checked and have been tested. Proportional odds has a p-value of .857. To test hypothesis 2 “The higher the level of dynamic capabilities, the higher the level of servitization”, variables MED_SES, MED_SEI, MED_TRS and SERV_LEVEL are used. These variables consists of the three categories of dynamic capabilities sensing, seizing and transforming.

Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	243.034			
Final	237.180	5.854	3	.119

Link function: Logit.

The model fit information indicates that the final model gives a non-significant improvement over the base-line intercept-only model. In this case, dynamic capabilities do not significantly improve the fit of the model (Chi-Square 5.854, p. 119).

Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	170.759	153	.155
Deviance	170.493	153	.158

Link function: Logit.

The proposed model with dynamic capabilities as independent variable is a decent fit to the model since we cannot reject the null hypothesis (p =.115).

Pseudo R-Square

Cox and Snell	.041
Nagelkerke	.044
McFadden	.015

Link function: Logit.

Nagelkerke indicates that 4.4 percent of the variance in the level of servitization is explained by the dynamic capabilities. This is considering the number of variables a very low proportion. This low proportion indicates that a model consisting out of dynamic capabilities is a small predictor of the outcome of the level of servitization.

Parameter Estimates

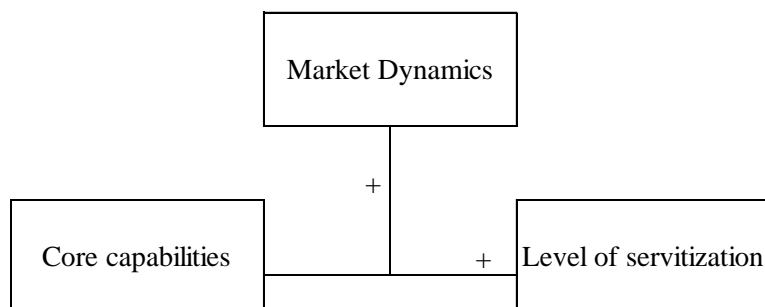
Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test			Exp(B)	95% Wald Confidence Interval for Exp(B)		
			Lower	Upper	Wald Chi-Square	df	Sig.		Lower	Upper	
Threshold	[SERV_LEVEL=1.00]	.113	.7159	-1.290	1.516	.025	1	.875	1.120	.275	4.554
	[SERV_LEVEL=2.00]	1.571	.7246	.151	2.991	4.699	1	.030	4.810	1.162	19.904
	[SERV_LEVEL=3.00]	2.925	.7565	1.442	4.408	14.950	1	.000	18.632	4.230	82.069
MED_SES		.224	.2228	-.213	.660	1.007	1	.316	1.251	.808	1.936
MED_SEI		.069	.2314	-.384	.523	.090	1	.765	1.072	.681	1.687
MED_TRS		.166	.2302	-.285	.617	.520	1	.471	1.181	.752	1.854
(Scale)		1 ^a									

Dependent Variable: SERV_LEVEL
 Model: (Threshold), MED_SES, MED_SEI, MED_TRS

a. Fixed at the displayed value.

Dynamic capabilities are not significant positive predictors of the level of servitization. For every one unit increase on sensing, there is a predicted increase of .224 in the log odds of a company being in a higher level of servitization. Furthermore, the odds ratio indicates that the odds being in a higher level of servitization increases by a factor of 1.337 for every unit increase on sensing. As well seizing and transforming have no significant impact on the level of servitization. Hypothesis 2 “The higher the level of dynamic capabilities, the higher the level of servitization.” is **rejected**.

Hypothesis 3



All assumptions have been checked and have been tested. Proportional odds is non-significant with a p-value of .455. To test hypothesis 3, “The market dynamics moderate the relationship between core capabilities and the level of servitization”, variables MED_CAP and MED_MARK and SERV_LEVEL are used. MED_MARK consists of the category’s growth, velocity, instability and turbulence.

Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	212.392			
Final	190.596	21.795	2	.000

Link function: Logit.

The model fit information indicates that the final model gives a significant improvement over the base-line intercept-only model. In this case, market dynamics and core capabilities do significantly improve the fit of the model (Chi-Square 21.795, $p < .001$).

Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	147.155	124	.076
Deviance	121.456	124	.548

Link function: Logit.

The proposed model with core capabilities and market dynamics as independent variables are a decent fit to the model since we cannot reject the null hypothesis ($p = .076$).

Pseudo R-Square

Cox and Snell	.138
Nagelkerke	.148
McFadden	.054

Link function: Logit.

Pseudo R-Square

Cox and Snell	.148
Nagelkerke	.158
McFadden	.059

Link function: Logit.

Nagelkerke indicates that 15.8 percent of the variance in the level of servitization is explained by the core capabilities and market dynamics. Market dynamic seems to have little impact on the level of servitization since the variance with only core capabilities is 14.8 percent. This low proportion indicates that the model consisting out of core capabilities and market dynamics is a small predictor of the outcome of the level of servitization.

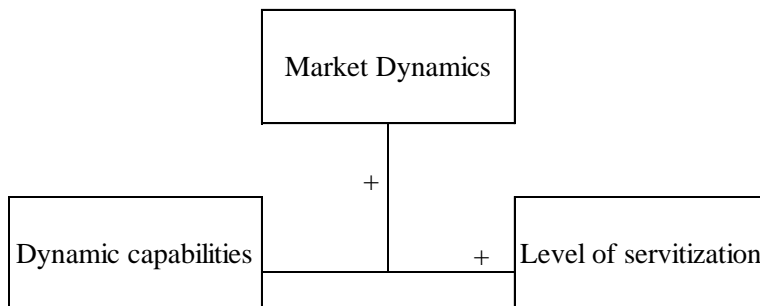
Parameter Estimates

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test			95% Wald Confidence Interval for Exp(B)		
			Lower	Upper	Wald Chi-Square	df	Sig.	Exp(B)	Lower	Upper
Threshold [SERV_LEVEL=1.00]	1.574	.7458	.112	3.035	4.451	1	.035	4.824	1.118	20.811
[SERV_LEVEL=2.00]	3.104	.7811	1.573	4.635	15.796	1	.000	22.297	4.823	103.072
[SERV_LEVEL=3.00]	4.481	.8248	2.864	6.097	29.513	1	.000	88.312	17.536	444.735
MED_CAP	.709	.2765	.167	1.251	6.567	1	.010	2.031	1.181	3.492
MED_CAP * MED_MARK	.074	.0564	-.037	.184	1.714	1	.190	1.077	.964	1.203
(Scale)	1 ^a									

Dependent Variable: SERV_LEVEL
 Model: (Threshold), MED_CAP, MED_CAP * MED_MARK
 a. Fixed at the displayed value.

As discussed earlier, core capabilities is a significant positive predictor of the level of servitization. In this model every unit increase on core capabilities, there is a predicted increase of .709 in the log odds of a company being in a higher level of servitization. Furthermore, the odds ratio indicates that the odds being in a higher level of servitization increases by a factor of 2.031 for every unit increase on core capabilities. This indicates that a company scoring higher on core capabilities are more likely to be in a higher level of servitization (p=.010). Market dynamics as moderator has no significant impact on the level of servitization (p=.190). Therefore, hypothesis 3 “The market dynamics moderate the relationship between core capabilities and the level of servitization” is **rejected**.

Hypothesis 4



All assumptions have been checked and have been tested. Proportional odds is non-significant with a p-value of .231. To test hypothesis 4, “Market dynamics moderate the relationship between dynamic capabilities and the level of servitization”, variables MED_DYN and MED_MARK and SERV_LEVEL are used. MED_MARK consists of the category’s growth, velocity, instability and turbulence. MED_DYN consists of the categories sensing, seizing and transforming.

Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	116.974			
Final	112.337	4.637	2	.098

Link function: Logit.

The model fit information indicates that the final model gives a non-significant improvement over the base-line intercept-only model. In this case, market dynamics and dynamic capabilities do not significantly improve the fit of the model (Chi-Square 4.637, p = 098).

Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	50.378	49	.419
Deviance	51.494	49	.376

Link function: Logit.

The proposed model with dynamic capabilities and market dynamics as independent variables are a decent fit to the model since we cannot reject the null hypothesis (p =.419).

Pseudo R-Square

Cox and Snell	.034
Nagelkerke	.036
McFadden	.012

Link function: Logit.

Pseudo R-Square

Cox and Snell	.030
Nagelkerke	.032
McFadden	.011

Link function: Logit.

Nagelkerke indicates that 3.6 percent of the variance in the level of servitization is explained by the dynamic capabilities and market dynamics. Market dynamic seems to have close to zero impact on the level of servitization since the variance with only dynamic capabilities is 3.2 percent. This low proportion indicates that the model consisting out of dynamic capabilities and market dynamics is a small predictor of the outcome of the level of servitization.

Parameter Estimates

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test			Exp(B)	95% Wald Confidence Interval for Exp(B)		
			Lower	Upper	Wald Chi-Square	df	Sig.		Lower	Upper	
Threshold	[SERV_LEVEL=1.00]	-.308	.6382	-1.559	.943	.233	1	.629	.735	.210	2.567
	[SERV_LEVEL=2.00]	1.154	.6424	-.105	2.413	3.230	1	.072	3.172	.901	11.172
	[SERV_LEVEL=3.00]	2.465	.6712	1.150	3.781	13.493	1	.000	11.767	3.158	43.849
MED_DYN	.220	.2257	-.222	.662	.949	1	.330	1.246	.801	1.939	
MED_DYN * MED_MARK	.036	.0487	-.059	.131	.549	1	.459	1.037	.942	1.140	
(Scale)	1 ^a										

Dependent Variable: SERV_LEVEL

Model: (Threshold), MED_DYN, MED_DYN * MED_MARK

a. Fixed at the displayed value.

Dynamic capabilities are not significant positive predictors of the level of servitization in this model (p. 330). In addition, market dynamics do not have a significant moderating impact on this relationship between dynamic capabilities and the level of servitization (p. 459). Therefore, hypothesis 4 “market dynamics moderate the relationship between dynamic capabilities and the level of servitization” is **rejected**.

Hypotheses H1 - H4		Conclusions
H1a	The better the firms' interfunctional coordination, the higher the level of servitization	Fully supported
H1b	The better the customer linking, the higher the level of servitization	Fully supported
H1c	The longer the relationship with customers, the higher the level of servitization	Fully supported
H1d	Service strategy has a significant positive effect on the level of servitization	Fully supported
H1e	The better the responsiveness to customers' needs the higher the level of servitization	Fully rejected
H1g	Decentralized organizations have higher levels of servitization	Fully supported
H1f	The more storage of customers data, the higher the level of servitization	Fully supported
H1h	Core capabilities have a significant positive effect on the level of servitization	Partly rejected
H2	The higher the level of dynamic capabilities, the higher the level of servitization	Fully rejected
H3	The market dynamics moderate the relationship between core capabilities and the level of servitization	Fully rejected
H4	Market dynamics moderate the relationship between dynamic capabilities and the level of servitization	Fully rejected

Table 8. Overview conclusions hypotheses.

4.5 Alternative thresholds

The alternative thresholds and different categorization of the level of servitization can be found in Appendix 7.5. The thresholds for the type of service have been changed from ‘often’ to ‘sometimes’ which led to a larger difference in the group distribution. Thresholds for communication and paid services remained the same. Category three consists of high, medium and low servitization. Category two consist of high and low. This led to following categorization of the level of servitization:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO SERVITIZATION	15	10.4	10.4	10.4
	BASE	24	16.7	16.7	27.1
	INTER	52	36.1	36.1	63.2
	ADVANCED	53	36.8	36.8	100.0
	Total	144	100.0	100.0	

MAIN THRESHOLD ≥ 4				
	Categories	4	3	2
H1a	Significance	0.001	0.009	0.042
	Variance	8.5%	7.8%	5.8%
H1b	Significance	<.001	0.001	0.001
	Variance	14.0%	11.8%	10.2%
H1c	Significance	<.001	<.001	0.001
	Variance	12.2%	14.6%	15.8%
H1d	Significance	<.001	<.001	0.001
	Variance	16.2%	11.5%	11.9%
H1e	Significance	0.114	0.251	0.501
	Variance	1.9%	1.7%	0.8%
H1f	Significance	0.025	0.047	0.016
	Variance	3.8%	3.2%	5.6%
H1g	Significance	<.001	0.001	0.04
	Variance	10.2%	9.2%	8.4%
H1h	Significance	>.05	>.05	>.05
	Variance	20.1%	20.9%	23%
H2	Significance	>.05	>.05	>.05
	Variance	4.4%	5.2%	5.2%
H3	Significance	0.19	0.388	0.778
	Variance	15.8%	15.8%	12.8%
H4	Significance	0.459	0.623	0.943
	Variance	3.6%	3.6%	3.1%

ALTERNATIVE THRESHOLD ≥ 3				
	Categories	4	3	2
	Significance	0.004	0.003	0.0645
	Variance	7.9%	8.7%	4.9%
	Significance	<.001	<.001	0.01
	Variance	11.2%	12.0%	8.2%
	Significance	0.091	0.077	0.079
	Variance	3.1%	3.6%	5.1%
	Significance	<.001	<.001	0.01
	Variance	12.6%	12.6%	11.6%
	Significance	0.309	0.321	0.61
	Variance	1.4%	1.5%	0.5%
	Significance	0.307	0.346	0.234
	Variance	0.8%	0.7%	1.5%
	Significance	0.001	0.001	0.017
	Variance	9.2%	9.3%	6.5%
	Significance	>.05	>.05	>.05
	Variance	14.2%	15.6%	12%
	Significance	0.21	>.05	>.05
	Variance	1.8%	1.7%	3.3%
	Significance	0.33	0.669	0.944
	Variance	10.1%	10.2%	8.6%
	Significance	0.779	0.816	0.95
	Variance	1.2%	1.2%	0.5%

Table 9. Different thresholds and different categories level of servitization.

As shown in table 9, no substantial differences have been found between the original and alternative thresholds. In addition, the conclusion of the hypotheses would be the same in all cases except H1c long-term relationship and H1f decentralization. Furthermore, in most cases, the variance was the highest in the original used model. Therefore, the researcher is confident that the decision tree has accurately predicted the categories of the level of servitization.

5. Discussion and implications

5.1 Discussion

In this study, the relationship between (dynamic) capabilities and the level of servitization have been tested, as was the role of market dynamics. In doing so, Dutch manufacturers from various branches have been asked to participate the online survey. The research question of this research was: *“To what extent do (dynamic) capabilities, moderated by market dynamics, have an effect on the level of servitization of manufacturers in the Netherlands”?* This research question included four of such capabilities namely, core capabilities, dynamic capabilities, market dynamics and its effect on the level of servitization. Core capabilities are, as Day (1994) mentioned: “complex bundles of skills and knowledge, using organizational processes that enables them to carry out activities to make use of their assets” (p.38). Dynamic capabilities are the alignment and integration of all resources and capabilities that determine competitive advantages (Teece, 2012). Moreover, S. Floricel and Ibanescu (2008) define four types of market dynamics to face dynamic risk, namely velocity, turbulence, growth and instability. These four elements have been translated to multiple hypotheses in order to answer the research question.

Previous research on servitization in the context of core capabilities have been investigated by several studies as illustrated in Appendix 7.1. This resulted in two subcomponents of core capabilities namely customer capabilities and organizational capabilities. In addition, strategy capabilities can be considered as a core capability.

Customer capabilities are arguably the key to servitization. Previous research such as Merwe and Rada (1988) highlight that customers are the drivers of servitization. Although many studies have published key endlessly customer capabilities, we found that customer capabilities should be divided into four elements, customer linking, data customer, long-term relationship and responsiveness. Galbraith (2002) found that organizations should have the ability to become more customer centric while Kohtamaki et al. (2013) found that firms should have the ability develop close, long-term relationships. Also, Parida and Ola (2015) found in their study, that continuous customer interaction is required for the changing needs’ of the customers. In this research, we found significant evidence that customer linking (H1b) and long-term relationships (H1c) with the customer do benefit the level of servitization. Both hypotheses are in line with the literature. Furthermore, we found evidence that decentralization (H1f) and data storage (H1g) have a significant effect on the level of servitization. However, the effects of decentralization is very low.

We found no significant evidence to support that a better responsiveness to the customer needs (H1e) benefits the level of servitization. This result contradicts the study of Parida and Ola (2015) and Gebauer and Kowalkowski (2012), in which they believe responsiveness is an important factor to servitization. This result suggests that responsiveness has no effect on the level of servitization. Although this is an unexpected result, I believe, as many other authors, that responsiveness is an important factor to servitization, because the influence of the customer increases when companies are transitioning to higher levels of servitization (Gebauer & Kowalkowski, 2012; Oliva & Kallenberg, 2003). In higher levels of servitization, manufacturers should focus on the best solution for the customer instead of the best solution for the product, and responding to customer needs’ could be key in this situation (Galbraith, 2002). Neglecting the needs of customers could also potentially cause the loss of customers when manufacturers for instance fail to deliver the desired product or service.

It has been found that previous research on organizational capabilities in the context of servitization is limited. Although studies highlight the importance to adapt to changing organizational structures and processes, it lacks the guidance that manufacturers need in the transition to servitization (Baines et al., 2009, 2017; Gebauer, Edvardsson, Gustafsson, et al., 2010; Mathieu, 2001). We found no specific ideal set of characteristics that manufacturers should have obtain to servitize. There is simply no ‘one best way’ to servitize (Böhm et al, 2017). However, interfunctional coordination is one specific characteristic that has been highlighted by certain studies (Gebauer and Fleisch, 2007; Windahl & Lakemond, 2006; Neu and Brown, 2005). Collaboration between individuals across functional groups, business units, and geographic locations benefits servitization, however it lacks the support of empirical evidence. In this research, we found a positive significant relationship between interfunctional coordination and the level of servitization (H1a). Therefore, hypothesis 1a the higher the level of interfunctional coordination, the higher the level of servitization is supported. Galbraith (2002) found

that flexibility and increasingly flat organizational forms with fewer hierarchical levels have more success in servitization, while Oliva and Kallenberg (2003) found running decentralized organizational structures increase service revenue. In this research, we found no evidence that flexibility and decentralization benefit the level of servitization.

Theory suggest that service strategy capabilities consists of management commitment, service mindset and a service strategy. These capabilities are key elements to servitization (Kindström, 2010; Neu's and Brown's, 2005; Gebauer, Fleisch, and Friedli, 2005). This research also found a strong relationship between service strategy and the level of servitization. Therefore, this research supports the theory that a strong service strategy does lead to a higher level of servitization and is in line with hypothesis H1d.

Combining both customer capabilities and organizational capabilities to servitization, we found that only long-term relationship with customers have a significant effect on the level of servitization (H1f). All other capabilities are not significant predictors of the level of servitization. This result suggest that having long-term relationship with customers is the strongest predictor of the level of servitization. Therefore, we partly reject hypothesis H1f, since only one of the capabilities is significant.

Instead of a unique set of core capabilities or resources, dynamic capabilities have the ability to adapt and innovate in a changing environment (Hobday, 1998; Roberts, 1998; Quinn, 1985). As servitized manufacturers have to adapt quickly to changes, we hypothesized that dynamic manufacturers should lead to a higher level of servitization (H2). However, we found no evidence to support this statement. In this research, dynamic capabilities have no significant effect of the level of servitization. This result indicates that being a dynamic manufactures does not lead to a higher level of servitization.

Ironically, the key finding of market dynamics is that there are no key findings in the context of servitization. Many studies investigated key internal factors as discussed above while external factors have played a minor role (Gebauer and Fleisch, 2007; Gebauer, 2008). There are to date no studies available that have investigated environmental dynamics to servitization. One could argue that environmental dynamics are difficult to measure, or that authors want to focus on internal factors first. Also, external factors are arguably difficult to generalize across industries and countries. Finally, companies that have strong internal capabilities or resources have the ability to respond accordingly to unexpected external factors. With that approach in mind, it is more logical to focus on internal organizational factors rather than uncontrollable external factors.

5.2 Theoretical implications

Servitization is in the academic world a hot topic, particularly in the manufacturing industry. Since Merwe and Rada (1988) first highlighted the importance of servitization, many studies have been published. However, as discussed, empirical evidence of servitization in the academic literature is very limited. Little to no studies have investigated a large group of servitized manufacturers to test relationships between constructs. Therefore, this research's aim was to investigate servitization with an empirical approach. The difficulty is that the results cannot be built on existing evidence since it has barely been tested before. However, it can be built on existing theory. Thus, this research provides new empirical insights between various constructs based on existing theories. Hence, this research contributes to (1) the understanding, challenges and transition of servitization, (2) to scientific knowledge and providing empirical evidence about (dynamic) capabilities with regard to servitization, (3) to the role of market dynamics and (4) to the measurement of the level of servitization.

As illustrated in Appendix 7.1, the capabilities with regard to servitization are almost infinite. As is the literature in determining which capabilities are required for servitization. Therefore, to narrow the scope in this research, we focused on the customer capabilities, organizational capabilities, service strategy capabilities and dynamic capabilities. The literature lacks empirical evidence with regard to servitization. Therefore, this research provides empirical evidence for these capabilities in relationship with servitization. To the best of my knowledge, this research is the first to test these constructs. Thereby, this research contributes to the closure of the research gap. In more detail, as there is no empirical evidence to suggest that these capabilities do have an effect on the level of servitization. In turn, there is theoretical evidence to suggest that these capabilities have an effect on the level of

servitization (Galbraith, 2002; Oliva & Kallenberg, 2003; Gebauer and Fleisch, 2007; Windahl & Lakemond, 2006; Neu and Brown, 2005).

In this research, I found that service strategy has the strongest effect on the level of servitization. The service strategy consists of three elements. A service strategy implicates having (1) a service mindset with a clear vision, (2) management commitment to the employees and (3) acknowledging the potentials of servitization. Subsequently, interfunctional coordination has also a significant effect on the level of servitization. This implicates that manufacturers need to accordingly generate, disseminate, and use superior information about customers and competitor's coordination between departments if they want to be in a higher level of servitization (Kohli & Jaworski, 1990). In addition, based on empirical evidence, customer linking, long-term relationship have been found significant predictors of the level of servitization. In contrast, we found no evidence to suggest that dynamic capabilities benefit servitization. One could argue that dynamic manufacturers could deal easier with dynamic environments, however no empirical evidence have been found to support this statement.

This research also provides a method to measure the level of servitization. Measuring servitization is a complex process since manufacturers' services can fall between several stages of servitization. Also, basic and free services should not be considered as servitization. Baines and Lightfoot (2013) highlighted three levels, namely base, intermediate and advanced. I added one extra level, namely no servitization. This approach allows to see the differences between manufacturers without servitization as well. The decision tree is built on the existing theoretical findings.

5.3 Practical implications

This research will help manufacturers to gain a better understanding of specific capabilities that will help manufacturers to transit to higher levels of servitization. This research has combined theoretical insights with empirical evidence in order to provide a list of capabilities that have an effect on the level of servitization. Here are some practical implications.

First, when transition to higher levels of servitization, managers need to expand their knowledge about servitization. Manufacturers that want to servitize, need to be aware of both the challenges and possibilities. Thus, in order to tackle the challenges and utilize the possibilities, we believe that it is crucial to develop a service strategy that lies within the shared values and believes of the manufacturer. As change in the company might cause resistance, it is important to create a service mindset believed throughout the whole company. Strong management commitment in sharing this mindset to the company is key. Fast change is unadvisable, since it could cause unexpected negative effects (Schein, 2004)

Second, when transitioning to the advanced levels of servitization, the role of the customer must gradually change from a short-term transactional-based relationship to a long-term relational-based relationship. Therefore, the customer linking between the manufacturer and the customers need to be strengthened. Hence, it is key that manufacturers acquire the knowledge about the needs of the customers in order to build a strong relationship. Perhaps meetings every month with key customers to discuss important factors will help build a strong relationship. In a long-term relational-based relationship, manufacturers want to be on the same page with the customer, therefore strong communication about the service strategy between the manufacturer and the customer could also benefit the relationship.

Third, as the influence of customers increases in the servitization transition, the pressure on organizational structures also increases. For instance, the customer needs' need to be translated from the sales department to the development department or production department. In order to translate the needs, manufacturers need strong coordination and dissemination between departments. Manufacturers have to find ways to create strong coordination between departments through for instance decentralized decision-making. However, the more people with authority, the more likely problems might occur such as conflicts between departments. As well, the more departments are connected, the more likely conflict of interest occur. Therefore, it is key to be able to fall back on the service strategy and proposed mindset that has been accepted throughout the company. Also, cross-functional meetings with the managers to identify items that require strong coordination between departments could benefit interfunctional coordination.

Finally, it turned out that the storage of the customers' data is an important factor in the process to servitization. The correct use of data might enable manufacturers learn skills required to identify initiate, develop and maintain customer relationships. For instance, customer relationship management (CRM).

5.4 Limitations

First, arguably the biggest limitation of this research is at the same time also the biggest challenge. Existing literature about servitization is as mentioned extensive and in abundance. However, existing literature with regard to the discussed constructs is very limited. Empirical evidence is even more scarce. Therefore, it was difficult, if not impossible, to elaborate on existing theories and existing empirical evidence. Hence, comparing existing relationships between the discussed constructs was not possible.

Second, arguably the results are limited by the fact that the scope of the research is too large. Considering the lack of existing literature, the scope of this research should have been narrowed down to one or two constructs. As a result, the online survey consisted of too many questions. Therefore, questions about the constructs dynamic capabilities and market dynamics have been neglected by participants. The extremely low variance of these constructs could be a valid explanation for this issue.

Third, as discussed, the decision tree to determine the level of servitization is sensitive to interpretation. Since the level of servitization has not been measured before, the researcher was challenged to find new ways to measure servitization. In turn, alternative thresholds have been created to prevent the sensitivity of bias however future research might suggest other ways to measure the level of servitization.

Fourth, not all branches are included in the sample. In order to recruit as many participants as possible, thousands manufacturers have been contacted regardless of the branch. Therefore, the sample has a skewed distribution of branches.

Finally, the categories of servitization are not equally distributed. 26 manufacturers have no servitization, 42 have base and intermediate servitization and 32 have advanced servitization. In total 142 participants completed the survey, which is a decent amount to generalize the results.

5.4 Future research

As mentioned in the limitation section, the measurement of the level of servitization could be further developed. The decision tree has been chosen as measurement scale, however future research could determine an alternative, more validated method to measure the level of servitization. Developing a validated scale level measurement is recommended since it provides more possible statistical analyses. Thereby, further development on the questionnaire might be useful for future research to measure the level of servitization more precisely and accurately.

Further research could be conducted to elaborate the capabilities that have a significant effect on the level of servitization. Rather than focus on multiple capabilities, focus on one specific capability such as service strategy. Thereby, provide a guideline to manufacturers how to implement this capability.

Also, an opportunity for future research is finding and specifying constructs to create new empirical evidence about servitization. Since the existing literature is scarce in providing studies with empirical evidence, future research should focus on creating more quantitative studies. To date, Neely (2008) is the only large empirical study.

This research is limited to manufacturers in the Netherlands. Including manufacturers all over the world increases the participants substantially. Also, business performance indicators with regard to the level of servitization could be valuable for future research.

6. Conclusion

The goal of this research was to investigate the relationship between (dynamic) capabilities and the level of servitization, moderated by market dynamics. The research question “*To what extent do (dynamic) capabilities, moderated by market dynamics, have an effect on the level of servitization of manufacturers in the Netherlands*” can be answered based on the hypotheses. According to the findings, it can be concluded that certain core capabilities do have an effect on the level of servitization. The results indicate that interfunctional coordination and customer linking have a significantly positive effect on the level of servitization. The higher level of interfunctional coordination and customer linking, the higher the level of servitization. In addition, as we combine all core capabilities, service strategy and long-term relationships with customers have the strongest effect on the level of servitization. Therefore, it can be concluded that having a strong service strategy consisting of a service mindset and management commitment are important factors to consider when climbing the ladder of servitization. Also, the transition from short-term based relationships to long-term based relationships with customers is an equally important factor. In contrast, this research indicates that decentralization and the responsiveness to customers’ needs are not important factors to the level of servitization.

Furthermore, according to the findings, it can be concluded that dynamic capabilities have no significant effect on the level of servitization. This indicates that dynamic manufacturers are not more likely to climb the ladder of servitization. To continue, the moderating role of market dynamics cannot be proven. Market dynamics have no significant effect on the level of servitization.

Overall, for manufacturers this research confirms that interfunctional coordination, customer linking, service strategy and long-term based relationship with customers have a strong effect on the level of servitization. The strongest predictors of the level of servitization are service strategy and long-term based relationships.

7. Appendix

7.1 Literature capabilities servitization

Author	Number of capabilities	Definition
Brax (2005)	3 capabilities	Ability to (1) shift positions in the value chain and (2) transform the total offering from manufacturing-focused to service-focused, (3) manage
Davies et al. 2006	4 strategic capabilities	marketing, delivery, product-design, communication, relationship and production challenge
Ceci and Masini (2011)	2 capabilities	Capabilities related to hardware and infrastructure manufacturing, software development, consulting, financing, delivery, postsales support, and system integration
Fischer, Gebauer, Gregory, Ren, and Fleisch (2010)	3 capabilities	Exploration of service opportunities, Exploitation of service opportunities
Gebauer et al. (2017)	3 capabilities	financing such services, aligning costs with equipment usage, and collaborating with customer.
Gebauer, Fleisch, and Friedli (2005)	5 service capabilities	establishing a market-oriented and clearly defined service development process, focusing service offers on the value proposition to the customer, initiating relationship marketing, defining a clear service strategy, establishing a separate service organization, and creating a service culture.
Gebrauer (2011)	3 capabilities	innovating, selling, and delivery.
Huikkola and Kohtamäki (2017)	7 strategic capabilities	fleet management capability, technology-development capability, mergers and acquisitions capability, value quantifying capability, project management capability, supplier network management capability, and value cocreation capability.

Kindström and Kowalkowski (2014)	8 capabilities	Offering:, Revenue model, Development process, Sales process, Customer relationship, Culture
Kindström, Kowalkowski, and Sandberg (2013)	3 dynamic capability	Sensing, Seizing and Transforming
Lenka, Parida, and Wincent (2017)	3 capabilities	intelligence capability, connect capability, and analytic capability.
Neu and Brown (2005)	4 group capabilities and 11 subgroup capabilities	Human resources, Structure, Measurement and rewards and Processes of strategy formulation
Paiola et al. (2013)	4 types of capabilities	selling after-sales services, integrating after-sales solutions, selling life-cycle solutions, and orchestrating total solutions.
Parida et al. (2014)	4 capabilities and 15 capability dimensions	business model design, network management, integrated development, and service delivery network development.
Parida, Sjödin, Lenka, and Wincent (2015)	4 global service innovation capabilities	develop global customer insights, integrate global knowledge, create global services offerings, and build a global digitalization capability.
Raddats et al. (2017)	4 capabilities	knowledge development, service enablement, service development, and risk management.
Sjödin, Parida, and Kohtamäki (2016)	2 capabilities	mass service customization capabilities or service development capabilities.
Storbacka (2011)	64 capabilities	Capability categories: value research, value proposition, value quantification, value verification, solution development, solution availability, solution configuration, solution delivery, strategy planning, management system,

		infrastructure support, and human research management
Story et al. (2017)	9 capabilities	Manufacturer-specific, Intermediary-specific capabilities and Customer-specific capabilities
Ulag and Reinartz (2011)	5 distinctive capabilities	service-related data processing and interpretation capability, execution risk assessment and mitigation capability, design-to-service capability, hybrid offering sales capability, and hybrid offering deployment capability.
Valtakoski and Witell (2018)	2 capabilities	FO service capability are the collection of organizational routines that directly influence the firm across the firm-customer interface, such as service customization and adaptation. BO service capability are the collection of organizational routines related to BO service activities, including the management of service demand and capacity, service operations, and human resources management.
Wallin, Parida, and Isaksson (2015)	7 capabilities	Need phase: Continuous customer interaction, establishing innovative PSS climate. Solution-seeking phase: Promoting cross-functionality, involvement of network partners. Solution development phase: Building PSS competence, establishing PSS business case.
Baines et al. (2009a, 2009b)	3 capabilities	Ability to engineer tools or techniques that companies can help in service design, organizational design and organizational transformation
Cohen et al. (2007)	6 capabilities	Ability to (1) identify which products to cover, (2) create a portfolio of service products, (3) select business models to support service products, (4) modify after-sales organizational structures, (5) design and manage an after-sales services supply chain, and (6) monitor performance continuously.
Homburg et al. (2003)	2 capabilities	Service orientation of corporate culture (corporate values of the company and employee behavior) and service orientation of human resource

		management (personnel recruitment, personnel training, personnel assessment/ compensation).
Martin and Horne (1992)	3 capabilities	Ability to develop, sell, deliver and control services
Oliva and Kallenberg (2003)	3 capabilities	Ability to (1) enter the installed base (IB) service market, (2) expand the IB service offering, and (3) take over the end-user's operations
Sacchani et al. (2007)	3 capabilities	Ability to configure after-sales service networks in terms of the degree of vertical integration, the degree of centralisation, and the decoupling of activities (i.e. how activities are decomposed and separated organisationally).
Windahl and Lakemond (2010)	2 capabilities	Ability to balance elements of both goods- and service-logics, as well as manage the increased customer-supplier interdependencies that integrated solutions entail.
Tuli et al. (2007)	4 capabilities	Abilities for (1) customer requirements definition, (2) customization and integration of goods and/or services and (3) their deployment, and (4) postdeployment customer support
Galbraith (2002)	1 capability	Abilities to make organizations more customer-centric (e.g., customizing solutions, managing customer portfolio and profitability, tailoring solution packages in terms of service, support, education, and consulting, empowering people with in-depth knowledge on customer's business

7.2 Descriptive analysis

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
SERV_LEVEL	144	1.00	4.00	2.5486	1.03660
1. Wat is het totale aanbod services ten opzichte van de totale omzet?	144	1	7	3.43	1.741
A1a. In hoeverre biedt uw bedrijf diensten aan zoals after-sale service, het op voorraad houden van reserveonderdelen, transport/logistiek en installatie bij klanten. - .	129	1	5	3.70	1.087
A1b. Diensten zoals reserveonderdelen, transport/logistiek en installatie. - 1. In hoeverre krijgt u voor de bovenstaande services betaald?	120	1	6	4.07	1.136
A1b. Diensten zoals reserveonderdelen, transport/logistiek en installatie. - 2. In hoeverre krijgt u voor de bovenstaande services kostendekkend betaald?	120	1	6	3.86	1.140
A1b. Diensten zoals reserveonderdelen, transport/logistiek en installatie. - 3. In hoeverre wordt er winst gemaakt op de bovenstaande services?	120	1	6	3.79	1.152

A1b. Diensten zoals reserveonderdelen, transport/logistiek en installatie. - 4. In hoeverre komen bovenstaande services ten sprake tijdens het communiceren/verkopen van uw product/dienstenaanbod richting de markt?	120	1	6	3.96	1.072
A2a. In hoeverre biedt uw bedrijf diensten aan zoals preventief onderhoud/reparatie/inspectie, het hebben van helpdesk (advies) en serviceverlening rondom procesoptimalisatie van de klant. - .	128	1	5	3.37	1.203
A2b. Diensten zoals preventief onderhoud/reparatie/inspectie het hebben van helpdesk (advies) en serviceverlening rondom procesoptimalisatie van de klant. - 1. In hoeverre krijgt u voor de bovenstaande services betaald?	117	1	6	3.67	1.225
A2b. Diensten zoals preventief onderhoud/reparatie/inspectie het hebben van helpdesk (advies) en serviceverlening rondom procesoptimalisatie van de klant. - 2. In hoeverre krijgt u voor de bovenstaande services kostendekkend betaald?	117	1	6	3.63	1.270

A2b. Diensten zoals preventief onderhoud/reparatie/inspectie het hebben van helpdesk (advies) en serviceverlening rondom procesoptimalisatie van de klant. - 3. In hoeverre wordt er winst gemaakt op de bovenstaande services?	116	1	6	3.64	1.288
A2b. Diensten zoals preventief onderhoud/reparatie/inspectie het hebben van helpdesk (advies) en serviceverlening rondom procesoptimalisatie van de klant. - 4. In hoeverre komen bovenstaande services ten sprake tijdens het communiceren/verkopen van uw product/dienstenaanbod richting de markt?	116	1	6	3.84	1.060
A3a. In hoeverre biedt uw bedrijf diensten aan zoals afrekening per geproduceerd product/dienst, totale beheer van operaties inclusief uitvoeren van onderhoud, vernieuwing en consultancy bijvoorbeeld in abonnementsvorm. - .	128	1	5	2.35	1.326
A3b. Diensten zoals afrekening per geproduceerd product/dienst, totale beheer van operaties inclusief uitvoeren van onderhoud, vernieuwing en consultancy bijvoorbeeld in abonnementsvorm. - 1. In hoeverre krijgt u de bovenstaande services betaald?	77	1	6	4.00	1.405

A3b. Diensten zoals afrekening per geproduceerd product/dienst, totale beheer van operaties inclusief uitvoeren van onderhoud, vernieuwing en consultancy bijvoorbeeld in abonnementsvorm. - 2. In hoeverre krijgt u voor de bovenstaande services kostendekkend betaald?	78	1	6	4.03	1.441
A3b. Diensten zoals afrekening per geproduceerd product/dienst, totale beheer van operaties inclusief uitvoeren van onderhoud, vernieuwing en consultancy bijvoorbeeld in abonnementsvorm. - 3. In hoeverre wordt er winst gemaakt op de bovenstaande services?	78	1	6	3.99	1.400
A3b. Diensten zoals afrekening per geproduceerd product/dienst, totale beheer van operaties inclusief uitvoeren van onderhoud, vernieuwing en consultancy bijvoorbeeld in abonnementsvorm. - 4. In hoeverre komen bovenstaande services ten sprake tijdens het communiceren/verkopen van uw product/dienstenaanbod richting de markt?	78	1	6	3.85	1.368
STR1	125	1	5	3.36	1.035
STR2	144	1	5	3.92	.997
STR3	144	1	5	4.02	1.027
STR4	144	1	5	3.88	1.064
STR5	144	1	5	3.90	1.013
IFC1	142	1	5	3.05	1.020

IFC2	142	1	5	3.41	1.039
IFC3	142	1	5	3.23	.950
CUS1	142	1	5	3.28	.910
CUS2	142	1	5	3.46	.965
DEC1	142	1	5	3.11	1.109
LON1	142	1	5	4.10	.977
RES1	142	1	5	3.94	.893
RES2	142	1	5	3.49	1.023
DAT1	134	1	5	2.93	1.171
SES1	139	1	6	3.65	1.122
SES2	139	1	6	3.95	1.024
SES3	139	1	6	3.45	1.064
SES4	139	1	6	3.64	.963
SES5	139	1	6	4.08	1.149
SES6	139	1	6	3.76	1.189
SEI1	139	1	6	3.78	1.186
SEI2	139	1	6	3.73	.990
SEI3	139	1	6	4.02	1.265
SEI4	139	1	6	3.92	1.155
TRS1	139	1	6	3.37	.964
TRS2	139	1	6	3.37	1.078
TRS4	139	1	6	3.47	1.017
TRS5	139	1	6	3.75	1.204
TRS6	139	1	6	3.99	1.340
GRW1	136	1	5	2.96	.938
GRW1	136	1	5	3.08	1.033
VEL1	136	1	5	2.99	1.119
VEL2	136	1	5	2.76	1.071
VEL3	136	1	5	3.00	1.116
TUR1	136	1	5	3.26	.974
TUR2	136	1	5	3.06	.987
TUR3	136	1	5	3.01	.996
INS1	136	1	5	3.12	.943
INS2	136	1	5	2.63	.876
INS3	136	1	5	2.85	1.003
1. Wat is uw functie?	141	1	4	2.29	1.018
2. Wat is uw hoogst genoten opleiding - Selected Choice	141	1	5	2.43	.795
3. In welke branche is uw bedrijf actief? (alfabetische volgorde) - Selected Choice	141	1	34	22.09	9.217

4. Wat is de rol van uw bedrijf in de keten? Geef een indicatie van de functie, rol en positie van de belangrijkste sector waarin uw organisatie in de waardeketen opereert. - Selected Choice	141	2	14	8.87	3.529
5. Uit hoeveel werknemers bestaat uw bedrijf?	141	1	7	3.21	2.120
6. Hoeveel jaar bestaat uw bedrijf?	141	1	5	4.23	1.017
7. Is er een aparte marketing afdeling binnen uw bedrijf?	141	1	4	2.61	1.269
8. Hoeveel mensen zijn werkzaam op de marketing afdeling?	51	1	4	2.63	1.148
MED_IFC	142	1.00	5.00	3.2042	1.00734
MED_CUS	142	1.00	5.00	3.3697	.82229
MED_DEC	142	1.00	5.00	3.1056	1.10901
MED_LONG	142	1.00	5.00	4.0986	.97711
MED_RES	142	1.00	5.00	3.7113	.86566
MED_DATA	134	1.00	5.00	2.9328	1.17107
MED_STRAT	144	1.00	5.00	3.9271	.99820
MED_SES	139	1.00	6.00	3.7734	.97286
MED_SEI	139	1.00	6.00	3.8921	1.01397
MED_TRS	139	1.00	6.00	3.4892	.98810
MED_GRW	136	1.00	5.00	3.0221	.87107
MED_VEL	136	1.00	5.00	2.9118	1.07821
MED_TUR	136	1.00	5.00	3.0882	.94650
MED_INS	136	1.00	5.00	2.8382	.82750
MED_CAP	142	1.00	5.00	3.4261	.77573
MED_DYN	139	1.00	6.00	3.7482	.97128
MED_MARK	136	1.00	5.00	2.9632	.84685
Valid N (listwise)	21				

7.3 Corrections decision tree

The researcher had to make several adjustments in order to categorize the levels of servitization. In 25 cases the threshold was not powerful enough to categorize the company. In several cases the Likert scale was the reason for the error. Other errors were found in strange variation in the answers. Also, one high score is not sufficient to be categorized in a specific level of servitization. Service strategy is as mentioned the control function to categorize the remaining companies. The following adjustments have been made:

- 7. Service offer too high to categorize as no servitization. Sometimes on Q1, Q2 and Q3 in this case sufficient. Base level justified
- 16. Clear intermediate level. (Q1 4, Q2 4, Q3 3, Q4 5, Q5 5)
- 24. High strategy compensates score 3 on Inter. Both high on comm/paid
- 30. 4 on Base, low on comm/paid. High strategy. Base level is justified.
- 31. High strategy compensates score 3 on Inter. Both high on comm/paid
- 52. Score 7 (no opinion) results in errors. Justified as no servitization.
- 54 and 55. Just enough points on base level. Variations on comm/paid created errors.
- 63. Low base level. Low on both comm/paid. High on service offer. Base is justified.
- 68 and 69. Score 7 (no opinion) results in errors. Justified as no servitization.
- 70. All <3 scores. No strategy. No servitization
- 71. Too high on service offer to be categorized as no servitization. Inter justified.
- 74. Base level justified. Low on comm/paid.
- 76. No servitization, no strategy and barely service. Sometimes is not sufficient.
- 82. Clearly no servitization. Unknown error. Offers no servitization. Due to one high score.
- 101. Clearly no servitization. Low on all elements.
- 111. Not getting paid yet but communicates with customer about the services which is sufficient.
- 114. Very low on communication, however clearly base level.
- 126. Seldom paid, however does communication and often base services.
- 134. Low on communication, however high on paid and base service.
- 144. Sometimes inter, however high strategy and high comm/paid. Inter justified.

7.4 Proportional odds assumptions

Linking

Test of Parallel Lines^a

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	73.621			
General	71.944	1.678	2	.432

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

Long-term

Test of Parallel Lines^a

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	49.925			
General	47.311	2.615	2	.271

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

Service strategy

Test of Parallel Lines^a

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	62.192			
General	60.614	1.579	2	.454

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

Responsiveness

Test of Parallel Lines^a

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	85.836			
General	83.398	2.438	2	.296

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

Core capabilities

Test of Parallel Lines^a

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	333.147			
General	320.997	12.150	12	.434

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

Dynamic capabilities

Test of Parallel Lines^a

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	47.829			
General	47.521	.308	2	.857

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

Market dynamic core capabilities (mod)

Test of Parallel Lines^a

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	190.596			
General	186.942	3.654	4	.455

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

Test of Parallel Lines^a

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	112.337			
General	106.907 ^b	5.430 ^c	4	.246

The null hypothesis states that the location parameters (slope coefficients) are the same across response categories.

a. Link function: Logit.

b. The log-likelihood value cannot be further increased after maximum number of step-halving.

c. The Chi-Square statistic is computed based on the log-likelihood value of the last iteration of the general model. Validity of the test is uncertain.

Market dynamic dynamic capabilities (mod)

7.5 Alternative levels and thresholds level of servitization

Since the decision tree is sensitive for interpretation, multiple scenarios have been created to prevent incorrect conclusions. Therefore, the level of servitization is changed from four categories to three and two categories to investigate differences. The three categories consist of high, medium and low. The two categories consist of high and low. The same hypotheses will be tested as in the main research.

H1a. The better the firms' interfunctional coordination, the higher the level of servitization.

Three levels: High Medium and Low.

Pseudo R-Square

Cox and Snell	.068
Nagelkerke	.078
McFadden	.034

Link function: Logit.

Parameter Estimates

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test			Exp(B)	95% Wald Confidence Interval for Exp(B)	
			Lower	Upper	Wald Chi-Square	df	Sig.		Lower	Upper
Threshold [THREELEVELS=1.00]	1.356	.5790	.221	2.491	5.483	1	.019	3.880	1.247	12.071
[THREELEVELS=2.00]	2.658	.6125	1.457	3.859	18.830	1	.000	14.268	4.295	47.396
MED_IFC (Scale)	.455	.1732	.115	.794	6.894	1	.009	1.576	1.122	2.213
(Scale)	1 ^a									

Dependent Variable: THREELEVELS
Model: (Threshold), MED_IFC

a. Fixed at the displayed value.

Two levels: High and Low

Pseudo R-Square

Cox and Snell	.044
Nagelkerke	.058
McFadden	.032

Link function: Logit.

Parameter Estimates

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test			Exp(B)	95% Wald Confidence Interval for Exp(B)	
			Lower	Upper	Wald Chi-Square	df	Sig.		Lower	Upper
Threshold [TWOLEVELS=1.00]	1.084	.5995	-.091	2.259	3.271	1	.071	2.957	.913	9.575
MED_IFC (Scale)	.364	.1794	.012	.716	4.116	1	.042	1.439	1.012	2.045
(Scale)	1 ^a									

Dependent Variable: TWOLEVELS
Model: (Threshold), MED_IFC

a. Fixed at the displayed value.

H1b. The better the customer linking, the higher the level of servitization

Pseudo R-Square

Cox and Snell	.103
Nagelkerke	.118
McFadden	.052

Link function: Logit.

Parameter Estimates

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test			Exp(B)	95% Wald Confidence Interval for Exp(B)	
			Lower	Upper	Wald Chi-Square	df	Sig.		Lower	Upper
Threshold [THREELEVELS=1.00]	2.385	.7590	.897	3.872	9.873	1	.002	10.857	2.453	48.060
[THREELEVELS=2.00]	3.729	.8005	2.159	5.298	21.692	1	.000	41.617	8.666	199.846
MED_CUS	.736	.2186	.308	1.165	11.345	1	.001	2.088	1.360	3.205
(Scale)	1 ^a									

Dependent Variable: THREELEVELS
Model: (Threshold), MED_CUS

a. Fixed at the displayed value.

Two levels: High and Low

Pseudo R-Square

Cox and Snell	.077
Nagelkerke	.102
McFadden	.058

Link function: Logit.

Parameter Estimates

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test			Exp(B)	95% Wald Confidence Interval for Exp(B)	
			Lower	Upper	Wald Chi-Square	df	Sig.		Lower	Upper
Threshold [TWOLEVELS=1.00]	2.067	.7914	.516	3.618	6.820	1	.009	7.898	1.675	37.251
MED_CUS	.636	.2285	.188	1.084	7.741	1	.005	1.888	1.207	2.955
(Scale)	1 ^a									

Dependent Variable: TWOLEVELS
Model: (Threshold), MED_CUS

a. Fixed at the displayed value.

H1c. The longer the relationship with customers, the higher the level of servitization

Pseudo R-Square

Cox and Snell	.128
Nagelkerke	.146
McFadden	.065

Link function: Logit.

Parameter Estimates

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test			Exp(B)	95% Wald Confidence Interval for Exp(B)	
			Lower	Upper	Wald Chi-Square	df	Sig.		Lower	Upper
Threshold [THREELEVELS=1.00]	2.955	.8662	1.257	4.652	11.638	1	.001	19.199	3.516	104.846
[THREELEVELS=2.00]	4.312	.9044	2.540	6.085	22.735	1	.000	74.606	12.675	439.130
MED_LONG	.739	.2029	.342	1.137	13.278	1	.000	2.094	1.407	3.117
(Scale)	1 ^a									

Dependent Variable: THREELEVELS
Model: (Threshold), MED_LONG

a. Fixed at the displayed value.

Two levels: High and Low

Pseudo R-Square

Cox and Snell	.118
Nagelkerke	.158
McFadden	.091

Link function: Logit.

Parameter Estimates

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test			Exp(B)	95% Wald Confidence Interval for Exp(B)	
			Lower	Upper	Wald Chi-Square	df	Sig.		Lower	Upper
Threshold [TWOLEVELS=1.00]	2.852	.8930	1.101	4.602	10.198	1	.001	17.315	3.008	99.660
MED_LONG	.713	.2105	.301	1.125	11.477	1	.001	2.040	1.351	3.082
(Scale)	1 ^a									

Dependent Variable: TWOLEVELS
Model: (Threshold), MED_LONG

a. Fixed at the displayed value.

H1d. Service strategy has a significant positive effect on the level of servitization

Pseudo R-Square

Cox and Snell	.101
Nagelkerke	.115
McFadden	.051

Link function: Logit.

Parameter Estimates

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test			Exp(B)	95% Wald Confidence Interval for Exp(B)	
			Lower	Upper	Wald Chi-Square	df	Sig.		Lower	Upper
Threshold [THREELEVELS=1.00]	2.750	.8322	1.119	4.381	10.923	1	.001	15.648	3.063	79.947
[THREELEVELS=2.00]	4.099	.8691	2.396	5.803	22.244	1	.000	60.285	10.975	331.136
MED_STRAT	.711	.2012	.317	1.106	12.495	1	.000	2.037	1.373	3.021
(Scale)	1 ^a									

Dependent Variable: THREELEVELS
Model: (Threshold), MED_STRAT

a. Fixed at the displayed value.

Two levels: High and Low

Pseudo R-Square

Cox and Snell	.090
Nagelkerke	.119
McFadden	.068

Link function: Logit.

Parameter Estimates

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test			Exp(B)	95% Wald Confidence Interval for Exp(B)	
			Lower	Upper	Wald Chi-Square	df	Sig.		Lower	Upper
Threshold [TWOLEVELS=1.00]	2.804	.8836	1.072	4.536	10.070	1	.002	16.508	2.921	93.286
MED_STRAT	.724	.2153	.302	1.146	11.314	1	.001	2.063	1.353	3.147
(Scale)	1 ^a									

Dependent Variable: TWOLEVELS
Model: (Threshold), MED_STRAT

a. Fixed at the displayed value.

H1e. The better the responsiveness to customers' needs the higher the level of servitization

Pseudo R-Square

Cox and Snell	.015
Nagelkerke	.017
McFadden	.007

Link function: Logit.

Parameter Estimates

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test			Exp(B)	95% Wald Confidence Interval for Exp(B)	
			Lower	Upper	Wald Chi-Square	df	Sig.		Lower	Upper
Threshold [THREELEVELS=1.00]	.750	.7422	-.705	2.204	1.020	1	.313	2.116	.494	9.063
[THREELEVELS=2.00]	2.007	.7596	.518	3.495	6.978	1	.008	7.438	1.678	32.964
MED_RES	.223	.1941	-.158	.603	1.318	1	.251	1.250	.854	1.828
(Scale)	1 ^a									

Dependent Variable: THREELEVELS
Model: (Threshold), MED_RES

a. Fixed at the displayed value.

Two levels: High and Low

Pseudo R-Square

Cox and Snell	.006
Nagelkerke	.008
McFadden	.005

Link function: Logit.

Parameter Estimates

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test			Exp(B)	95% Wald Confidence Interval for Exp(B)	
			Lower	Upper	Wald Chi-Square	df	Sig.		Lower	Upper
Threshold [TWOLEVELS=1.00]	.424	.7637	-1.073	1.921	.309	1	.579	1.528	.342	6.829
MED_RES	.134	.1990	-.256	.524	.453	1	.501	1.143	.774	1.689
(Scale)	1 ^a									

Dependent Variable: TWOLEVELS
Model: (Threshold), MED_RES

a. Fixed at the displayed value.

H1f. Core capabilities have a significant positive effect on the level of servitization

Pseudo R-Square

Cox and Snell	.183
Nagelkerke	.209
McFadden	.096

Link function: Logit.

Parameter Estimates

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test			Exp(B)	95% Wald Confidence Interval for Exp(B)	
			Lower	Upper	Wald Chi-Square	df	Sig.		Lower	Upper
Threshold [THREELEVELS=1.00]	3.132	1.0887	.998	5.265	8.274	1	.004	22.909	2.712	193.515
[THREELEVELS=2.00]	4.580	1.1250	2.375	6.785	16.573	1	.000	97.506	10.750	884.408
MED_RES	-.473	.2576	-.978	.032	3.368	1	.066	.623	.376	1.033
MED_LONG	.726	.2437	.249	1.204	8.881	1	.003	2.067	1.282	3.332
MED_IFC	.076	.2206	-.356	.509	.120	1	.729	1.079	.701	1.663
MED_CUS	.268	.3079	-.336	.871	.756	1	.385	1.307	.715	2.390
MED_DEC	-.089	.1747	-.431	.254	.259	1	.611	.915	.650	1.289
MED_DATA	.387	.1927	.009	.765	4.029	1	.045	1.472	1.009	2.148
(Scale)	1 ^a									

Dependent Variable: THREELEVELS
 Model: (Threshold), MED_RES, MED_LONG, MED_IFC, MED_CUS, MED_DEC, MED_DATA
 a. Fixed at the displayed value.

Two levels: High and Low

Pseudo R-Square

Cox and Snell	.172
Nagelkerke	.229
McFadden	.136

Link function: Logit.

Parameter Estimates

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test			Exp(B)	95% Wald Confidence Interval for Exp(B)	
			Lower	Upper	Wald Chi-Square	df	Sig.		Lower	Upper
Threshold [TWOLEVELS=1.00]	2.846	1.1392	.613	5.079	6.241	1	.012	17.217	1.846	160.566
MED_RES	-.639	.2941	-1.216	-.063	4.724	1	.030	.528	.296	.939
MED_LONG	.804	.2623	.290	1.318	9.389	1	.002	2.234	1.336	3.736
MED_IFC	-.026	.2435	-.503	.451	.012	1	.914	.974	.604	1.570
MED_CUS	.191	.3390	-.474	.855	.317	1	.573	1.210	.623	2.352
MED_DEC	.031	.1956	-.353	.414	.024	1	.876	1.031	.703	1.513
MED_DATA	.462	.2210	.029	.895	4.375	1	.036	1.588	1.030	2.448
(Scale)	1 ^a									

Dependent Variable: TWOLEVELS
 Model: (Threshold), MED_RES, MED_LONG, MED_IFC, MED_CUS, MED_DEC, MED_DATA
 a. Fixed at the displayed value.

H2. The higher the level of dynamic capabilities, the higher the level of servitization

Pseudo R-Square

Cox and Snell	.046
Nagelkerke	.052
McFadden	.022

Link function: Logit.

Parameter Estimates

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test			Exp(B)	95% Wald Confidence Interval for Exp(B)		
			Lower	Upper	Wald Chi-Square	df	Sig.		Lower	Upper	
Threshold	[THREELEVELS=1.00]	1.585	.7789	.059	3.112	4.142	1	.042	4.880	1.060	22.460
	[THREELEVELS=2.00]	2.871	.8060	1.291	4.451	12.690	1	.000	17.660	3.638	85.721
MED_SES		.279	.2204	-.153	.711	1.607	1	.205	1.322	.858	2.036
MED_SEI		.063	.2368	-.401	.527	.071	1	.790	1.065	.670	1.694
MED_TRS		.105	.2429	-.371	.581	.187	1	.666	1.111	.690	1.788
(Scale)		1 ^a									

Dependent Variable: THREELEVELS
 Model: (Threshold), MED_SES, MED_SEI, MED_TRS
 a. Fixed at the displayed value.

Two levels: High and Low

Pseudo R-Square

Cox and Snell	.039
Nagelkerke	.052
McFadden	.029

Link function: Logit.

Parameter Estimates

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test			Exp(B)	95% Wald Confidence Interval for Exp(B)		
			Lower	Upper	Wald Chi-Square	df	Sig.		Lower	Upper	
Threshold	[TWOLEVELS=1.00]	1.397	.8179	-.206	3.000	2.919	1	.088	4.045	.814	20.093
MED_SES		.363	.2373	-.102	.828	2.339	1	.126	1.438	.903	2.289
MED_SEI		-.028	.2501	-.518	.463	.012	1	.912	.973	.596	1.588
MED_TRS		.062	.2549	-.438	.561	.059	1	.809	1.064	.645	1.753
(Scale)		1 ^a									

Dependent Variable: TWOLEVELS
 Model: (Threshold), MED_SES, MED_SEI, MED_TRS
 a. Fixed at the displayed value.

H3. The market dynamics moderate the relationship between core capabilities and the level of servitization

Pseudo R-Square

Cox and Snell	.148
Nagelkerke	.158
McFadden	.059

Link function: Logit.

Parameter Estimates

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test			Exp(B)	95% Wald Confidence Interval for Exp(B)	
			Lower	Upper	Wald Chi-Square	df	Sig.		Lower	Upper
Threshold [THREELEVELS=1.00]	2.890	.8571	1.210	4.570	11.367	1	.001	17.987	3.353	96.499
[THREELEVELS=2.00]	4.257	.8992	2.494	6.019	22.412	1	.000	70.588	12.116	411.263
MED_CAP	.722	.3026	.129	1.315	5.691	1	.017	2.058	1.137	3.724
MED_CAP * MED_MARK	.050	.0575	-.063	.162	.746	1	.388	1.051	.939	1.176
(Scale)	1 ^a									

Dependent Variable: THREELEVELS
 Model: (Threshold), MED_CAP, MED_CAP * MED_MARK

a. Fixed at the displayed value.

Two levels: High and Low

Pseudo R-Square

Cox and Snell	.096
Nagelkerke	.128
McFadden	.073

Link function: Logit.

Parameter Estimates

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test			Exp(B)	95% Wald Confidence Interval for Exp(B)	
			Lower	Upper	Wald Chi-Square	df	Sig.		Lower	Upper
Threshold [TWOLEVELS=1.00]	2.839	.9067	1.062	4.616	9.805	1	.002	17.099	2.892	101.092
MED_CAP * MED_MARK	.017	.0620	-.104	.139	.079	1	.778	1.018	.901	1.149
MED_CAP	.800	.3272	.159	1.442	5.983	1	.014	2.226	1.172	4.228
(Scale)	1 ^a									

Dependent Variable: TWOLEVELS
 Model: (Threshold), MED_CAP * MED_MARK, MED_CAP

a. Fixed at the displayed value.

H4. Market dynamics moderate the relationship between dynamic capabilities and the level of servitization

Pseudo R-Square

Cox and Snell	.034
Nagelkerke	.036
McFadden	.012

Link function: Logit.

Parameter Estimates

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test			Exp(B)	95% Wald Confidence Interval for Exp(B)	
			Lower	Upper	Wald Chi-Square	df	Sig.		Lower	Upper
Threshold [THREELEVELS=1.00]	1.052	.6761	-.273	2.377	2.423	1	.120	2.864	.761	10.777
[THREELEVELS=2.00]	2.326	.7006	.953	3.699	11.021	1	.001	10.234	2.593	40.400
MED_DYN	.228	.2371	-.236	.693	.928	1	.335	1.257	.789	2.000
MED_MARK * MED_DYN	.025	.0504	-.074	.124	.242	1	.623	1.025	.929	1.132
(Scale)	1 ^a									

Dependent Variable: THREELEVELS
 Model: (Threshold), MED_DYN, MED_MARK * MED_DYN

a. Fixed at the displayed value.

Two levels: High and Low

Pseudo R-Square

Cox and Snell	.023
Nagelkerke	.031
McFadden	.017

Link function: Logit.

Parameter Estimates

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test			Exp(B)	95% Wald Confidence Interval for Exp(B)	
			Lower	Upper	Wald Chi-Square	df	Sig.		Lower	Upper
Threshold [TWOLEVELS=1.00]	.966	.7155	-.436	2.369	1.824	1	.177	2.629	.647	10.684
MED_DYN	.290	.2593	-.219	.798	1.247	1	.264	1.336	.804	2.221
MED_MARK * MED_DYN	-.004	.0531	-.108	.100	.005	1	.943	.996	.898	1.105
(Scale)	1 ^a									

Dependent Variable: TWOLEVELS

Model: (Threshold), MED_DYN, MED_MARK * MED_DYN

a. Fixed at the displayed value.

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