

**Conceptualizing  
the Transition to Servitization  
in the  
Capital Goods Industry**

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## **Abstract**

During the past two decades the manufacturing industry has consistently tried to transition from a position as traditional goods supplier to a provider of solutions by means of the integration of goods and services. This integration phenomenon is called servitization. Transition triggers are forces such as economic pressure, gaining competitive advantage and increasing customer demands. In spite of the evident gains identified in the literature, the major part of the industry either advanced hesitantly, or stalled after the first steps. Only a few “hidden champions” succeeded.

The status of servitization as an academic field has reached maturity. During the past years, published servitization research papers grew exponentially compared with the early years of this century. The extant literature offers an extraordinarily broad range of researched themes such as servitization avenues, benefits and barriers, bundling, product design, contract models and sales process. What is missing, however, is a conceptualization that focuses on the practical implementation aspects of servitization to guide practitioners to apply servitization sustainably.

The findings of my servitization research contribute to knowledge in several ways. They provide a novel understanding about the crucial first step in a traditional product manufacturer’s customer re-orientation. The unique principle of functional arrays facilitates the understanding of the terms “the customer” and “solution”. It permits the identification and collection of specific customer solution requirements by unusual functional disaggregation of entire companies. The creation of customer service demand categories enables a correlation with customers’ functional arrays that consequently leads into the formation of particular service competencies and specific service delivery platforms. For the first time, manufacturers, through these platforms, may proactively address individually and specifically customers’ service demands across the entire customer’s company structure. A final contribution constitutes the conceptualization based on the progression principle of service delivery platforms.

The study tackled a business problem through a constructivist research philosophy, employing an inductive approach and adopting a case study strategy. In-depth interviews in real life settings revealed how a traditional product manufacturer should re-orientate its capabilities and progress on a servitization transition.

Author's Declaration

I declare that the work in this thesis was carried out in accordance with the regulations of the University of Gloucestershire and is original except where indicated by specific reference in the text. No part of this thesis has been submitted as part of any other academic award. The thesis has not been presented to any other education institution in the United Kingdom or overseas.

Any views expressed in the thesis are those of the author and in no way represent those of the University.

Signed ..... Date .....

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# Chapter 1

## Introduction

### 1.1. Research Overview

The structure of this study outlines several separate chapters. Each chapter can be read independently in its own right, according to the theme treated. However, the interlinking of individual chapters will possibly facilitate an inter-dimensional structured interpretation of this research. The introductory chapter therefore focuses on the objective of understanding the major influences, in the sense of a thread, to obtain a holistic overview of the individual chapter interrelations. Finally, I hope that the reader will be able to follow the details of this study while still maintaining track of the overall aim.

The introductory chapter of this study begins with an explanation of a transformation that the manufacturing industry, and in particular the capital goods industry, has tried to undergo during the course of the past two decades. The term servitization implies transforming traditional manufacturers from being product providers to solution providers. By adding services to their products they would meet customer demand and relieve economic pressure, support growth targets and gain competitive advantage. However, with the exception of a few hidden champions, the number of economically successful transformations achieved within the German capital goods industry is still very low. The chapter aims to outline the relevance of my study for the developing field of servitization and to focus on the identification of inherent problems faced by the manufacturing industry, which prevent a successful transformation. The chapter closes by establishing two research questions that guide my further research.

The main purpose of chapter two is to serve as a common information platform that covers the area of servitization transformation. The amount of literature on the practical implementation of servitization as nascent research can be regarded as reasonably manageable when compared with the amount of existing literature dealing with academic “legacy” disciplines. The majority of literature regarding servitization has appeared since 2002. Therefore, the review spans the timeframe 2003 – 2013. I mapped the literature against the service continuum of Oliva and Kallenberg (2003) and the six transformation factors of Baines and Lightfoot (2013) in order to identify resistance factors, barriers,

challenges and promoting opportunities. In general, servitization is characterized in the extant literature as a grand strategy. Transformation advantages are highlighted and emphasized and risks, perils and changes are cited by many studies. However, literature that guides individual manufacturers how to approach and implement servitization in order to achieve a servitized state seems to be missing.

The core of chapter three addresses the design of my research. It provides the research scenario and research strategy applied in this study. Besides Yin (2009) who declares the case study approach as the preferred research strategy, Saunders, Lewis and Thornhill (2007) regard case studies as particularly suitable for managerial practices such as organizational transformations and operational processes. In order to obtain a deep understanding of the under-explored field of servitization and based on my constructivist research philosophy I chose exploratory comparative study as my research strategy due to the unique opportunity to inquire twelve senior services executives. In addition to informing the reader about my methodological approach that suited the research I also explain the case selection as well as the acquisition of the related data. The chapter ends by outlining the quality criteria and ethical considerations that accompany my entire research as well as a description of my reflexivity as a novice researcher.

The analysis of evidence builds the main part of chapter four. Encouraged by the opinions of Boyatzis (1998) and Braun and Clarke (2006), I chose Applied Thematic Analysis as proposed by Guest, MacQueen and Namey (2012). By analysing the derived results obtained from my fieldwork, empirical information is established in order to prepare a conceptualization. The empirical material collected is categorized in a theoretical and systematic manner into relevant four major themes and a varying number of sub-themes appertaining to each individual major theme. Resulting ramifications and consequences are discussed and evaluated. Customers' perceptions and requirements guide the discussion in respect of the servitization orientation of a traditional product manufacturer. This chapter concludes with an integrative summary.

The development of a conceptual framework as a transformation model towards servitization that could be applied in the manufacturing industry covers a broad span of considerations within chapter five. This conceptualization is thought to be of special interest for reactive service delivery functions of traditional product manufacturers to re-direct their business orientation from product-oriented services to solution-based services. The chapter begins with a description of the current status of customers and manufacturers.

It focuses on customers' business structure and service requirements that result from their operational and production processes phases. The alignment of customer service requirements with customer functional arrays aims to provide an answer to research question RQ1 in the first part of this chapter. Superimposing this alignment with service delivery platforms could lead to identifying exemplary required service delivery capabilities. The second part concerns research question RQ2. By applying the answer to research question RQ1 and assuming the posture of a reactive service delivery function, a servitization conceptualization could be established that could serve as guidance from the initial stages of a servitization journey to the delivery of solution-based services.

The purpose of the closing chapter is to bring together the relevant findings and particular evaluations that were derived during the course of this research and place them in relation to the literature gap described in section 1.4. In addition, the implications of this research will be taken into account. Suggestions for further possible field research are also parts of this study.

The extant literature offers a variety of avenues for traditional product manufacturers to embark on a journey of transformation towards servitization. Unfortunately to this day however, neither theoretical underpinnings that could be generally applied nor correlations that are established on a sound empirical basis exist to achieve a successful transformation, as pointed out by Gebauer and Saul (2014). This study suggests a conceptualization whose successful implementation could be established by means of a combination of three perspectives. First, the customer perspective, in order to understand the service requirements and demands throughout the customer enterprise structure; secondly, the service perspective to recognize the relevant service delivery activities and related service capabilities, and thirdly, the selection perspective by which a traditional product manufacturer selects the best-positioned function within the company in order to commence the journey towards servitization.

## 1.2. Background of the Study

This study addresses servitization in the German capital goods industry as part of the entire German manufacturing industry. This is one of the largest sectors of the German economy and encompasses a business volume of more than 200 billion Euros. Generally, according to Meffert (1998), the business of the capital goods industry can be divided into the business for products, systems and plants. This industry is characterized by an unprecedented complexity and demand for sophisticated marketplace offerings compared

to industries for consumer durables or commodities. The business for products encompasses the offering of individual products and plant offerings aimed at providing a specific solution for generic customer problems by combining products to complete plants. The systems business extends plant offerings by comprehensive software packages to form complete problem solution systems. The related transaction processes are, according to Backhaus (1999), divided into individual transactions and routine transactions. This is where, as a rule, individual transactions are characterized by client-specific, complex negotiation processes and routine transactions that possess a high repetition rate and strong tendency towards habituated behaviour. Its main businesses are represented in the sectors of light and heavy machinery, automotive construction, electro-technical industry, precision engineering, the optical industry and iron and steel working industry.

In contrast with other sectors in the industrial goods industry, such as the industry for consumer goods, the capital goods industry differs substantially in relation to the development of products, their sales and the relationship with customers. The development and the production of capital goods are characterized by high technology content and relatively low production volumes. The steadily increasing trend towards product individualization and customization in combination with an increasing product complexity results in new challenges for customers. In addition, the implementation of intersectoral technologies together with the emergence of completely automated processes results in high order values and substantial financial risks – both for customers and suppliers. These financial risks might lead to a certain hesitancy in buying decisions and result in a mutual dependency, interaction and co-operation in the creation of new production lines and systems for example. This, together with unprecedented requirements for continuous operation of customers' operational and business processes, lead to an increasing demand from customers that manufacturers assist in project planning and operation of their production and business. Resulting from this, the capital goods industry appears to be an ideal candidate for servitization. Besides the economic importance, I also selected the capital goods industry as I have some business connections within the industry that facilitated the access to important decision makers and service executives

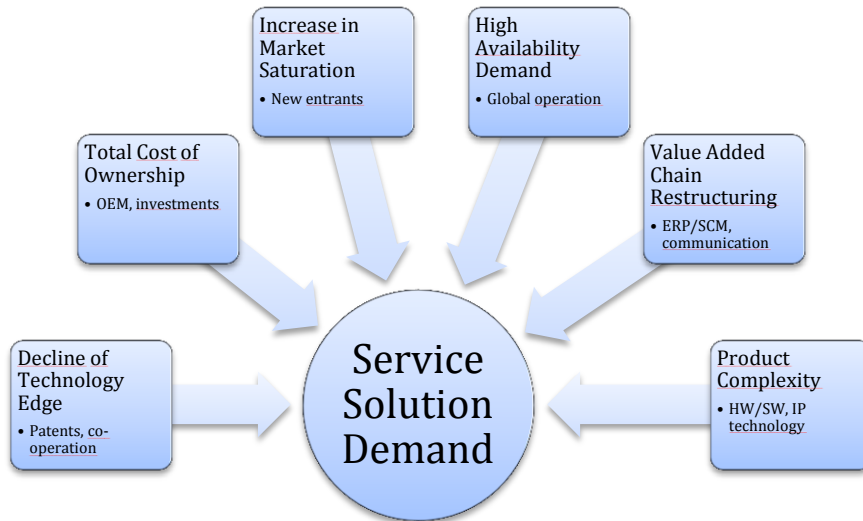
In the past, German manufacturers, and in particular the German capital goods industry, achieved a competitive edge and favourable differentiation positions through the focus on product attributes, such as quality and technology. Saturated markets, globalization, new market entrants and advanced information technologies render these potential differentiation practices less advantageous. Product functionalities have become

increasingly similar, and price and quality experience are of no particular advantage any more. As a consequence, revenues and margins have been eroded and fierce competition has grown (Baines *et al.*, 2007; Peschl, 2010).

During the past two decades, customers increasingly demanded support, for example, in the management of capacity and risk, in the time to market reduction, the restructuring of cost or in the concentration of their core business. Therefore, customers have increasingly expected manufacturers to assist with solving their particular business problems rather than just providing products and goods (Reckenfelderbäumer, 2004; Kleine, Lay and Schneider, 2009; Woisetschläger, Backhaus and Michaelis, 2009). This demand may happen already during the early phases of the sales cycle when customers, for example, may demand to include services in the product sales price, or at any time during the operational phases. It is considered that a combination of customer demand (Mathieu, 2001; Neu and Brown, 2005, Neeely, 2008, Baines *et al.*, 2009) and the profound shift in the customers' definition of value for availability, capability and operability (Ward and Graves, 2007) leads to a move from product-oriented services to solution-based services, as Mathieu (2001, p. 458) points out:

*“Clients want more value and this value is connected to the use and performance of systems; they want solutions more than just products or services; they want to take advantage of their suppliers' know-how and not just their product; they want an integrated and global offering and are reluctant to do business with several suppliers; finally, they want customized relationships.”*

This, paired with a global economic situation of slower growth, commoditization and core products under profitability pressure further offers a traditional manufacturer the opportunity to respond accordingly to growing customer demands by a transition to servitization (see Figure 1).



**Figure 1 - Source: Duschek (2013) Customer Demand**

This dynamic forced manufacturers in Germany to consider a strategic re-positioning of their past legacy tactics and seek new, innovative directions in order to compete directly with product competitors. One avenue constitutes a re-orientation from being a traditional product provider to a provider of business solutions for customers (Antioco *et al.*, 2008). This transition aims to create value by integrating goods and services (Scheer, Grieble, Klein, 2003) and establishes new customer relationships. The product itself is assumed to be no longer the prime factor in the exchange of goods (Vargo and Lusch, 2004). This transition is characterized as a strategy moving from a goods-dominant to a service-dominant direction, providing and selling solutions (Lusch, Vargo and Wessels, 2008) - Figure 2 illustrates this move. It also implies that material products have to be complemented by immaterial services in order to form an individual and customized problem solution (Neu and Brown 2005; Sawhney 2004; Vargo and Lusch 2004), as epitomized for example, by the companies Alstom: “Total Train-Life Management”, Ericsson: “Turnkey solution to design, build and operate mobile phone networks” and Thales: “Training solutions on a pay-as-you-train basis”.



**Figure 2 - Source: Duschek (2013) Transition over Time**

More than two decades ago Vandermerve and Rada (1988) defined this trend as “servitization”. During the subsequent years, the number of academic studies relating to the transition “from product to solution” rose progressively after a sluggish start, explaining the rationale and motivation (Henard, 2001). Various transition expressions have been created over time as a result - partly mirroring the advances in research, partly mirroring the aspired direction. Examples of the terms for the very same idea of transformation include ‘new manufacturing’ (Marceau, Cook, Dalton and Wixed, 2002), ‘product service system’ (Goedkoop *et al.*, 1999), ‘integrated solutions’ (Davies, Brady and Hobday, 2007) and many more (Bowen, Siehl and Schneider, 1989; Oliva and Kallenberg, 2003; Vargo and Lusch, 2007).

There are two basic beliefs motivating this move:

1. Economy. Solution selling will create considerable service revenues that carry appealing gross profits (Mathieu, 2001; Neu and Brown, 2005; Oliva and Kallenberg, 2003)
2. Competitive advantage. Products enhanced and complemented by services will be differentiated since the immaterial service will be difficult to emulate and thus obtain a unique differentiation potential (Baines *et al.*, 2007; Baureis, Neuman and Minguez, 2010; Eden and Ackermann, 2011). This is underpinned by Fang, Palmatier and Steenkamp, (2008); Spohrer and Maglio, (2008) and Vargo and Lusch, (2004).

The extant literature offers as further rationales a range of business and operational benefits: higher service margins versus product margins (Anderson, Fronell and Rust, 1997); considerable, stable revenue streams by installed-base service (Knecht, Leszinski and Weber, 1993; Potts, 1988); service supporting an increased sale of products (Mathe and Shapiro, 1993); improve customer satisfaction (Burger and Cann, 1995), strengthening the manufacturers’ brands (Hawes, 1994) and providing a competitive edge thanks to the difficulty in copying immaterial services (Anderson and Narus, 1995; Oliva and Kallenberg, 2003).

However, Greenberg (2002, p. 1) hints that servitization can be accompanied by pitfalls. He points out:

*“The economies certainly seem superior – a recurring revenue stream, less fixed capital and higher margins. A service business can build on the firm’s products, brand image and existing customer base, while simultaneously attracting new customers. It sound like an ideal path to enhanced profitability. Unfortunately, the*

*transition from a product-centric company to a services-oriented one is not straight, even, or easy”.*

In their quest to improve shareholder value by new, unique service offerings many manufacturers have set out to achieve the state of servitization and have experienced that the organizational move towards servitization presents a remarkable challenge (Visnjic and Van Looy, 2011). In parallel with a distorted vision resulting from an insufficient understanding and misinterpretation of the transition antecedents and requirements (Shankar, Berry and Dotzel, 2007) the majority of traditional product manufacturers, as Gebauer, Friedli and Fleisch (2006) and Reinartz and Ulaga (2008) point out, still struggles to improve services revenues and resultant earnings.

Against this background, the purpose of this chapter is to outline the relevance of this research for the developing area of servitization. It identifies the inherent problems faced by the manufacturing industry.

### 1.3. Relevance for Manufacturing

Underlying this transformation is the customers' increased demand to focus more on the value generated by the product manufacturer in the context of the acquired product, rather than on the sole physical properties and functionalities of the product itself, as posited by Tan, Matzen, McAloone and Evans (2010). Accompanied by this phenomenon is the transformation of the market: Schreiner (2003) affirms that the seller markets will convert into buyer markets as customers face increasing challenges from restructuring, time to market requirements, increased risk, concentration on core business and shortage of required skills. A number of advantages will result from the integration of products and services for the internal and external stakeholders involved. Baines *et al.* (2007) point out that customers benefit from factors such as a distinct customization capability of the delivered solution-based services or the degree of services flexibility to provide new functionalities in a rapidly changing customer business environment (Baureis, 2013). Thus, solution-based services providers open up new opportunities for differentiation, new markets and revenue potentials. Market analyst Forrester Research (Radjou, Ross and Shey, 2007) augments this view by forecasting a profound change in traditional services towards a business services industry (value-added services). Furthermore AMR Research (Burkett and Ruggles, 2008) also shows in its study a services gross profit of 50-70% in the manufacturing industry. This indicates that the strategic importance of the service business may outpace the product business by far (European Commission, 2001).



Similarly, the Harvard Business Review (Cohen, Agraval and Agraval, 2006) suggests an evolving global service revenue potential of more than one trillion USD.

Surprisingly however, in spite of all the business opportunities and competitive advantages promised by the prevailing literature during the past two decades, the reality sees only a few “hidden champions”. As previously stated, the majority of the manufacturers either advances hesitantly or stall after the initial steps (Woisetschläger, Backhaus and Michaelis, 2009).

This requires clarification about the actual achievements and penetration of the solution-based service market. In 2001, the services revenue of International Business Machines surpasses hardware revenue for the first time as one of the very few solitary examples. According to Booz Allen Hamilton, 63% of the Fortune 100 companies already operate as solution sellers (Sharma, Lucier and Molloy, 2002). In contrast however, the study by the University of Mannheim (Klimmer, 2010) reveals a gap between aspiration and reality: services in the German capital goods industry achieve 14.8% revenue and 15.8% profit (2009). Although the majority of manufacturers claim a broad spectrum of services, the largest proportion is tagged as traditional services such as repair and maintenance. Service contracts, monitoring of operational parameters (Davies, 2001) and a service such as lending and leasing equipment are available only from a minority of manufacturers. Klimmer’s work (2010) indicates that 25% of manufacturers have no distinct service-marketing concept and, even if such a concept exists, it rarely contains specific service revenue and product specific service properties in order to gain competitive advantage. A mere 23% of the manufacturers state that they generate customer value. Furthermore, according to Stanley and Wojcik (2005), there are only a few solution-oriented companies who perform better in terms of revenue and gross profit growth than their traditional product-oriented rivals - 25% of them even operate at a loss. In addition, Fang, Palmatier and Steenkamp (2008) note that a firm’s service success can only be achieved if its service sales have reached a critical mass of 20-30% of total sales. Baveja, Singh and Ledingham (2004) describe this transformation as being problematic and obviously accompanied by a number of obscured conceptual challenges, barriers and limitations, as pointed out by Zahn (2010). Evidently still quite a substantial number of manufacturers’ service organizations endeavour to attain the status of business and profit contributor (Gebauer, Pütz, Fischer, Fleisch, 2009, Marks *et al.*, 2011). Numerous articles provide evidence of economic disappointment or failure. These challenges are primarily induced by the emergent complexity caused by the integration of products and services compared with the sole

provision of products and matching historic services, such as repair and maintenance, as shown by Baureis (2013). As Zahn (2010) pinpoints, this can be attributed to manufacturers addressing these increased complexity challenges in an unsystematic and non-strategic manner, resulting in insufficient readiness. Oliva and Kallenberg (2003) reason that, by building on their past functional and economic success of historic product-related services, manufacturers plan and develop solution-based services only in an ad hoc manner and thus do not meet customer requirements. Thomas and Nüttgens (2010), argue that in order to avoid the loss of service opportunities, the planning for solution-based services requires stringent and integrative development and operational processes. The nature of the causes is demonstrated in related literature to be manifold. Baureis (2013) concludes exemplarily that the internal structures of manufacturers obstruct the holistic re-orientation and new formation of development and management processes for the entire manufacturing company. Kawohl, Evanschitzky, Woisetschläger and Ahlert (2009) point out a number of prerequisite transformation conditions. Moreover the foundation of a re-orientation constitutes a paradigm change that ought to result in the re-structuring of the past manufacturer's operation as a pre-condition for solution-based services. In reality, however, as Rau, Lienhard and Opitz (2002), Zahn, Foschiani, Lienhard and Meyer (2004) and Baines *et al.* (2007) reveal, manufacturers frequently do not implement elementary planning and development functions for solution-based services. Currently however, a clear strategic understanding of how to approach the solution-based service market, which the manufacturers' function is best positioned to start, how to set out to form the necessary competencies and capabilities and how to develop a strategic service infrastructure in order to proceed further after the initial start are apparently lacking in the industry.

The emerging era of "Industry 4.0", the fields of the application of 3D printing in conjunction with the Internet of Things will result in an unprecedented demand on the operational overall equipment effectiveness and continuous operation of customers' business and production processes, as put forward by Mittelhäußer (2013). This evinces a certain urgent relevance for manufacturers in their re-orientation towards servitization. As Peschl (2010) indicates, there is a lack of understanding of what servitization involves and how the practical transformation to servitization should take place. This lack is addressed by this research.

#### 1.4. Academic Gap

Judging by extant literature, servitization seems to be a rapidly growing trend among the manufacturing industry and one of its foremost strategic challenges is to be implemented with the prime aim of not having to compete on price and cost. This strategy seems to be gaining growing popularity among scholars and industry executives. However, Neely (2008) claims, there is limited empirical evidence about practical implementation within the industry. There are on one side, as Baines and Lightfoot (2013) describe, convincing commercial benefits yielded through servitization. For example, Rolls-Royce Plc. achieves approximately 50% of their earnings by services. Contrary to this observation, Neely, Benedettini and Visnjic (2011, p. 9) state: “we still find that around 30% of manufacturers have servitized, and with individual firms service revenues are relatively stable. The fact that the proportion of revenues that manufacturers receive from services has not shifted significantly in the last few years is interesting”. Greenberg adds (2002, p. 4) cited that “Despite a few impressive turn-around stories, most manufacturing firms have struggled to succeed in the service realm. Strategy design flaws and poor execution are prevalent, leaving many businesses trapped in a seemingly inescapable maze.” Vandermerve and Rada (1988) conceptualized the term “servitization” in order to underpin the relative importance of service in a product offering where the interpretation of the central statement remained quite general. Since then there has been a steadily growing number of academic papers on many different aspects based on the launching, introduction and deployment of the concept of servitization in industrial business environments.

A review of this literature reveals that the implementation of servitization constitutes a substantial challenging undertaking – affected by prior success, lack of information about customer preferences, and misunderstood or underestimated basic requirements and expectations (Oliva and Kallenberg, 2003; Baines *et al.*, 2007; Neely, Benedettini and Visnjic, 2009; Thomas, Bayard and Evans, (2012). In order to succeed, manufacturers concentrated on service approaches such as the re-setting of the mind-set regarding value creation for customers through services (Heinonen *et al.*, (2010), or understanding the value perception of customers (Matthyssens and Vandenbempt, (2008). In addition, establishing networks with service partners and intermediaries was highlighted by Ulaga (2003), balancing and matching product-related and value-based services to support customer’s actions as described by Mathieu (2001) and exploiting the entire width of related activities between the customer and the manufacturer as pointed out by Grönroos (2011). In a transformation environment like this it is of no surprise that Hou and Neely

(2013) assert in their investigation that manifold barriers arise that result, for instance, from internal functional communication conflicts and externally from customers' lack of acceptance. Mont (2002) and Neely (2009) focus on the service paradox, a situation where investments in new service offerings lead to higher cost but do not accordingly generate service revenues. Furthermore, problems co-ordinating and co-operating with different partners, as claimed by Mont (2002), or the inability to achieve control over customers' behaviours, as argued by Heiskanen and Jalas (2003), failed to detect or even find a route to respond to customer demand by the ability to innovate, as shown by MacDonald, Wilson, Martinez and Tossi (2011).

Time to implement as a scarce resource is a further mitigating factor in a durable, long-lasting transformation. "IBM has finally accomplished the change from a hardware provider to a technology and services company - a process which lasted more than ten years", and "that previously services were a part of the product whereas products are now a part of services" elucidated Volz (1997, p.2). This list could be continued, since numerous studies focus on the investigation into barriers and challenges in the context of servitization. When reading contemporary management literature as well as various studies it becomes evident that the greater part of it addresses varying issues and challenges - there is very sparse evidence of studies about the actual, operative implementation of a transformation to servitization.

This is more than surprising since product-oriented services have a long, successful, economic history. The major part of servitization revenues is generated through product-oriented services such as maintenance and repair and according to the Verband Deutscher Maschinen- und Anlagenbauer e.V. VDMA (1998), the association of German equipment manufacturers, equipment generates a profit margin in the order of 1% while according to Gao *et al.*, (2011) servitization profit margins yield more than 10%. Multiple studies in the 2000s established deeper interpretations (Baines *et al.*, 2007) and some authors entered into discussions regarding by which nature servitization should be approached: as an evolutionary path as Desmet, van Dierdonck and van Looy (2003) and Neely (2008) suggest, a step approach or as a prudent consideration to employ existing skills to enhance long-term goals as suggested by Slack (2005). Finally, as Viitamo (2013, p. 4) argues, that "a strategic re-orientation with real changes in the firm's offering and business involves more than service-oriented marketing tactics" where "the aim is mainly to enhance brand loyalty through a servitized image."

Summarizing the literature leads to the conclusion that a re-orientation of a traditional product manufacturer towards servitization is more easily suggested than turned into reality (Marks *et al.*, 2011). There is actual demand to comprehend the changes and developments that manufacturers have to carry out to attain a servitized status, as pointed out by Baines *et al.*, (2007) and Neely (2008). The actual practical servitization status in the literature, as well as the relevant discussions, can be regarded as fairly nascent. Through this, the status of the under-researched academic field of servitization and the status of the current literature had been disclosed.

The state of the existing literature regarding the maturity level of the practical servitization implementation conceptualizations is considered to be nascent and poorly understood. Most of the servitization implementation contributions either centre on the “maiden” state of a manufacturer or recommend an entirely isolated services function. The actual business and operational state as developed and grown during previous years is hardly taken into consideration. Therefore this study will be carried out in order to attain knowledge that will support the manufacturers’ endeavours to achieve a servitized state through the integration of products and services.

#### 1.5. Research Purpose, Aim and Objectives

The purpose of this study is determined by the previous annotations and explanations in order to provide a conceptualization for practitioners in the capital goods industry in Germany as well as to address the theory gap in the literature. Instead of just generalizing on a seemingly “ubiquitous” traditional product manufacturer or on “starting-from-scratch” situations, the study centres on the transition processes of product-centric manufacturers for transition to servitization who have already successfully carried out product-oriented services. Therefore, this study aims first to expand the existing understanding of the transformation process of traditional product manufacturers when they set out with the goal of servitization, and next, how they position their present capabilities and competencies in order to meet customers’ demands and align them with the entire functions of the company. The further aim of this study is to progress the prevailing theories by gaining deep insight into the transformation strategies and processes in order to accomplish a shift from product-oriented services to integrated, solution-based services with the objective of conceptualizing a transformation model to be used by industry practitioners.

## 1.6. Research Questions

To contribute to this growing research field, the purpose of this study is to provide a holistic understanding of the service-transformation process in the capital goods industry. The research was guided by the research questions RQ1 and RQ2.

RQ1	How could product-oriented service delivery functions of traditional product manufacturers enable their transformation into solution-based services?
RQ2	How could product-oriented service delivery functions of traditional product manufacturers accomplish a transition from product-oriented services to solution-based services?

**Table 1 - Research questions RQ**

The research was carried out in order to clarify, in

RQ1, of how a service organization should position, evolve and progress its competencies and capabilities in order to transform itself effectively.

RQ2 should provide the strategic orientation and the specific positioning on the basis of a manufacturer's actual operational setting – according to the customers needs.

In the face of all positive transformation examples cited in the literature, present-day manufacturing is still not yet in a position to have servitization in economic terms successfully launched or even implemented on a broad base as Neely, Benedettini and Visnjic, (2011) point out. This is caused by a widespread lack of knowledge of what servitization implies for an individual manufacturer during transition, including how to build upon present-day service competencies, how to implement servitization in practical terms and progress the capabilities of the stakeholders involved. The academic literature as well as the current management literature mirrors a similar situation. As observed from a practical and implementation perspective, research seems to be required to complement present knowledge with a more differentiated understanding of relevant practice scenarios. As the literature indicates, servitization can be approached via several avenues that, however, have to be aligned with the specific needs of each individual company. Since this need exists in the industry, this study focuses on twelve manufacturers (thereof one for the

pre-orientation) in different industries that have already successfully adopted servitization, with the aim of investigating relevant knowledge to conceptualize a model for practical implementation.

### 1.7. Summary

In the face of all positive transformation examples cited in the literature, present-day manufacturing is still not yet in a position to have servitization in economic terms successfully launched or even implemented on a broad base as Neely, Benedettini and Visnjic, (2011) point out. This is caused by a widespread lack of knowledge of what servitization implies for an individual manufacturer during transition, including how to build upon present-day service competencies, how to implement servitization in practical terms and progress the capabilities of the stakeholders involved. The academic literature as well as the current management literature mirrors a similar situation. As observed from a practical and implementation perspective, research seems to be required to complement present knowledge with a more differentiated understanding of relevant practice scenarios. As the literature indicates, servitization can be approached via several avenues that, however, have to be aligned with the specific needs of each individual company. Since this need exists in the industry, this study focuses on twelve manufacturers in different industries that have already successfully adopted servitization, with the aim of investigating relevant knowledge to conceptualize a model for practical implementation.

The next chapter will introduce the extant servitization literature in contrast with transformation. There, the purpose is to identify barriers and challenges that traditional product manufacturers faced in the past on their transition journey to servitization. By analysing the derived apprehensions empirical information will be established in order to prepare a conceptualization for the further research progress, on the basis of major themes.

## Chapter 2

### Literature Review

#### 2.1. Introduction

The literature review in the scope of this thesis is divided into three sections. First, to review the existing servitization literature with the aim of identifying the barriers and challenges traditional product manufacturers have learnt during their journey towards servitization. Particular attention is paid to whether there are any major patterns appearing or changing in importance over time. My literature review will also take further literature into consideration that does not directly address the term servitization but deals with a re-orientation or a new orientation of service for physical products in the sense of customer-oriented services.

Any kind of transition is not only accompanied by resistance and challenges but also by opportunities. Secondly, therefore, the literature review questions the impact of possible success factors and factors of change while attempting the journey to servitization. Again in this section the same examination approach is applied in order to identify major themes, circumstances and gaps in influences that have not yet been dealt with. Thirdly, as with any far-reaching impact on the state of an organization caused by conceptual differences, properties and idiosyncrasies, the transition to servitization can be assumed to be dependent on similar influences. Thus, the literature review will also inquire into the related organizational influences subject to the implementations of servitization and the potential existence of servitization-specific and possible non-generalizable topics.

The literature uses the term “product” in a variety of expressions and constellations such as goods, product, or service as a combination of goods or products and services. Gabler (2010) divides products into material goods, intangible goods (services) and energy provision. For the purpose of this study, “product“ mainly relates to industrial physical products of the capital goods industry that are manufactured by an industrial process as depicted in the introduction and that are used in production and business processes.

The aim of the servitization literature is to identify the governing influences, put them in order of importance and impact, to be able to look into the transition to servitization in its entirety. The review is also carried out with special emphasis given to identifying possible emerging considerations and methods suited for practitioners.



## 2.2. Conceptual Clarification: Servitization

Compared with the amount of existing literature of the academic “classic” disciplines, the literature on the practical diffusion and implementation of servitization as nascent research can be regarded as reasonably manageable. The notion “from products to services” denotes a phenomenon in which traditional product manufacturers attempt a re-orientation of their operation from a product-centric perspective towards a customer-centric perspective. The purpose of the re-orientation is to provide solutions for customers’ business processes by adding value through the provision of solution-based services. The ultimate aim is, by optimally combining and integrating products and services as solution-based services, to achieve a position as a preferred service organization and thus improve the competitive position in the market and increase earnings.

This phenomenon was defined under the notion “servitization” by Vandermerve and Rada (1988, p. 314) as “the increased offering of fuller market packages or bundles of customer-focused combinations of goods, services, support, self-service and knowledge in order to add value to core product offerings.” At the same time they also declared: “services are performed and not produced and are essentially intangible” which underlines the increased potentials for differentiation. This opens a possible train of thought leading to the definition of solution-based services. After a hesitant start, a growing number of concepts, descriptions and studies appeared in academic literature around the definition of a traditional manufacturer’s re-orientation. All definitions however, aim at the same intent. Using the notion servitization as a kind of umbrella term, most concepts branch into certain directions. The most popular servitization frameworks surfaced between 1988 and 2011. They were, listed chronologically and according to their first occurrence in the literature: “bundling” (Eppen, Hanson and Martin, 1991), “product service” (Samli, Jacobs and Willis, 1992), “service package” (Fitzsimmons and Fitzsimmons, 1994), “going downstream” (Wise and Baumgartner, 1999), “product-service system” (Goedkoop *et al.*, 1999), “solution” (Shepherd and Ahmed, 2000), “full service” (Stremersch, Wuyts and Frambach, 2001), “integrated solution” (Davies, 2001), “functional sales” (Lindahl and Ölundh, 2001), “eco-efficient producer” (Zaring *et al.*, 2001), “installed base service” (Oliva and Kallenberg, 2003), “functional product” (Alonso-Rasgado *et al.*, 2004), “industrial services” (Brax, 2005), “winning in the aftermarket, (Cohen *et al.*, 2006), “integrated product and service offering” (Sundin *et al.*, 2006), “new service model” (Antonacopoulou and Konstantinou, 2008), “functional products” (Kumar and Markeset, 2007) and “service imperative” (Bitner and Brown, 2008). These contributions are spread

across a wide variety of publications with the characteristics of academic, professional, industry-related works or case studies, conference proceedings, government briefings and project reports. Although there is still a lack of a common definition and terminology, the common denominator for all of them is represented by an approach for a new service-dominant logic by providing services rather than solely physical goods as a fundamental re-orientation in the exchange of goods as well as a logic that could be applied to any sector, industry or organization (Windahl and Lakemond, 2010). However the notion “traditional product manufacturer” spans the product-manufacturing sector from mass-manufacturing for durable consumer products or mass component provision to mechanical engineering to complex steel and plant construction. Taking this into consideration, the question of a general applicability across the total manufacturing industry remains (Grove, Fisk and John, 2003; Stauss, 2005). Furthermore the literature seems to over-emphasize the view on consumers in preference to the industrial markets (Lovelock and Gummesson, 2004), emphasizing management differences between intangible services and tangible goods (Bowen and Ford, 2002; Vargo and Lusch, 2004) and thus frequently missing the opportunities stemming from an integrative aspect more suited to the capital goods industry (Windahl and Lakemond, 2010). Resulting from this, the insight of how products and services are to be integrated in the capital goods industry, what opportunities and challenges are tied to this transition about the type and nature of provided services as well as the determining factors for resources and service mix, is barely existent (Grove, Fisk and John, 2003; Oliva and Kallenberg, 2003). The aim of this thesis is to explore how product manufacturers in the capital goods industry might apply the concept of servitization, and identify the inherent consequences in order to be able to deliver augmented customer value.

### 2.3. Literature Review Process

Although the interest in servitization as a research area has grown over the past twenty years, the majority of the papers appeared after 2002. Thus this literature review considers the established literature between 2003 and 2013. For this reason, the evaluation of this literature review will be carried out as a realist synthesis according to Pawson, Greenhalgh, Harvey and Walshe (2005, p.22) who suggested an evaluation “what is it about this programme that works for whom and in what circumstances?” in situations of crucial dependency of context and implementation.

. Oliva and Kallenberg (2003) established a framework that encompasses the entire portfolio of service opportunities moderated by potential transition dynamics along a phasing timescale – as a holistic approach for further servitization research. Therefore this approach was chosen and the literature review was carried out according to their principle of the “product-service continuum” (Oliva and Kallenberg, 2003, p. 162) illustrated in Figure 3. While my mindset was guided by the often cited transformation drivers or enablers: “strong leadership, informed and engaged customers, platform for advanced services, people with humanistic skill-set, willingness to exploit technology and willingness to form relationship-based strategic supply partnership” established by Baines and Lightfoot, (2013, p. 230) the literature review aims to identify resistance factors or barriers and challenges, as well as promoting opportunities.

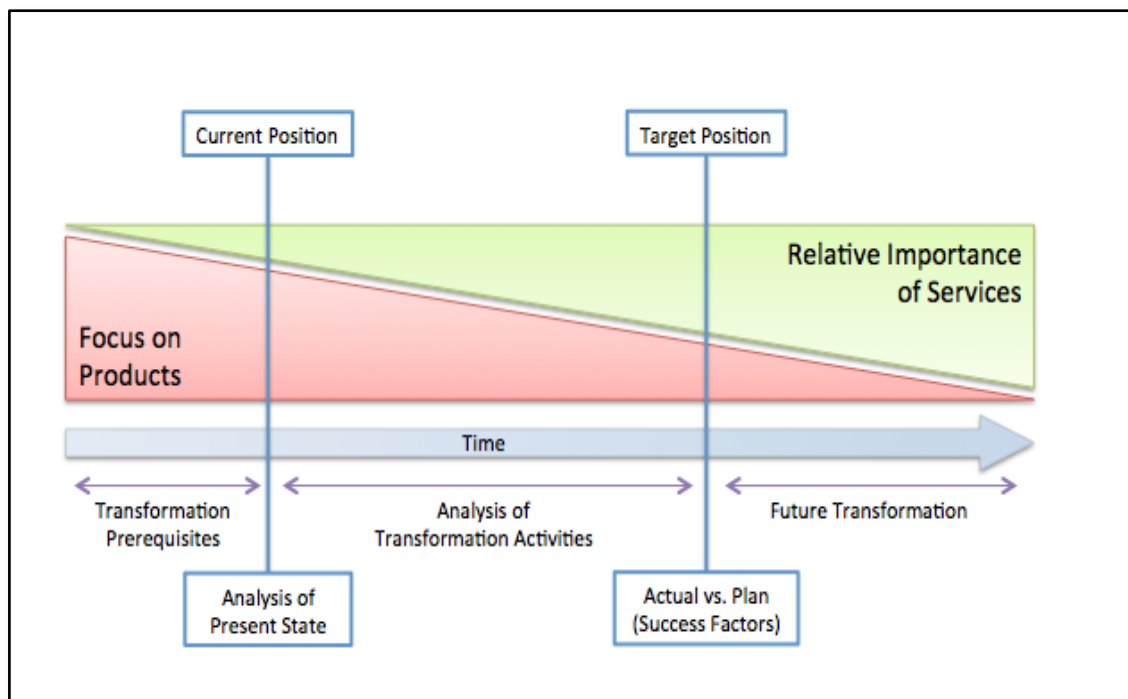


Figure 3 - Adapted from Oliva and Kallenberg (2003) Service Continuum

#### 2.4. Search Aim and Strategy

Based on the actual state of the capital goods manufacturing industry, to gain insight and evidence of challenges, influencing the journey towards the transition and to suggest further research. For an unbiased assessment, as per Hemingway and Brereton (2009, p.4):

*“a search must include all the literature (...) including non-English sources. Furthermore (...) grey literature such as (...) conference papers and other sources,*

*normally not peer-reviewed, complemented by sought expert opinion and hand-search of selected journals.”*

Therefore, my objective was to identify in the extant literature conceptualizations and approaches that guide the navigation towards a practical implementation of servitization by practitioners.

The search took place between November 1 and December 28, 2013.

## 2.5. Transformation Challenges and Drivers

The roots of present-day business transformation as its theoretical foundations stretch back to the work of Lewin (1946) according to the literature. Subsequently numerous contributions illustrated various transformation approaches and multifarious success achievements. Jack Welch became one of the most renowned figureheads of successful business transformation when in the 1990s he moved the General Electric business from manufacturing to financial services. When Kotter (1996), in a widely acclaimed work, published the results of the business transformation results of 100 companies it became evident that only a minority was completely successful in their change efforts. Kotter contributes this to the related length of time and the noncompliance of one or more phases of the transformation plan. Bamfeld and Forrester (2003) tested this view of planning. They state that the majority of the change plans are driven by linear process models whereas the reality is never static. Through his work in the manufacturing industry, Bitici (2007) intensified this view by positing that no transformation plan will ever remain static. Therefore, transformation plans need to be of high level and regularly reviewed at the highest level within the organization in order to keep in line with the reality change. I made use of his business transformation formula as I intended to study the development contents of servitization and expected some change in the years 2003-2013. To reflect the specifics of servitization I adapted the formula's six building blocks and matched them with 52 studies, literature reviews, conference papers and books. The resultant findings should reflect the challenges a manufacturer faces while transitioning towards servitization (Baines et al., 2009) as well as the drivers or enablers of change “that facilitate the implementation of change” and those that necessitate a transformation, as Whelan-Berry and Sommerville (2010) have pointed out. Quintessentially, a favourable or unfavourable transformation result is substantially influenced by these elements. The findings were organized in individual challenges that apply a critical influence on the probability that a transition might be successfully achieved, and in individual drivers as factors, such as a

condition, a process or a resource that promotes and necessitate the future development of the transition. Subsequently, they were categorized and assigned to six larger domains: organization, customer, skill and capability, economic, supply chain and market, and subsequently analysed. In order to obtain a full and detailed overview of the present state of the influencing factors and their history, the findings were listed in the next sections, according to domain, along a timescale rather than in the customary alphabetical order of authors.

The following table 2 reflects the findings. The horizontal axis depicts year, title, author and the larger domains of individual challenge and drivers. The vertical axis represents the year for each title. The meaning of the abbreviations of challenges is: OC for organization, EC for economic, CC for customer, CSC for capability and skill, SC for supply chain and MC for market. Driver abbreviations: OD for organization, ED for economic, CSD for capability and skill, SCD for supply chain and MD for market. The numbers that are assigned to each abbreviation identify each individual servitization challenge and servitization driver. This designation system identifies each individual challenge and driver within the next sections 2.5.1 and 2.5.2 after table 2.

The time interval of this literature review spans the years 2003 – 2013. The practical implementation of servitization during this time frame did not increase noticeably in spite of the often cited and proclaimed servitization advantages. However, there are manufacturers who succeeded in their transformation. Therefore, through the literature review I intended to study the development of servitization year by year within this time frame in order to identify starting points for a servitization conceptualization. This approach was directed by the work of Pawson, Greenhalgh, Harvey and Walshe (2004, p.22) who suggested as an evaluation: “what is it about this programme that works for whom and in what circumstances?” in situations of crucial dependency of context and implementation.

Year	Title	Author	Organis.	Economic	Customer	Skill	Supply Chain	Market
2003 TR	Managing the Transition from Products to Services	Oliva R. Kallenberg R.	OC1	EC1		CSC1		MC1
2003	Solving the solution problem	Johansson J. Krishnamurthy C. Schlissberg H.		EC2	CC1		SC1	
2004	Moving base into high-value integrated solutions: a value stream approach	Davies A.						
2005 TR	A manufacturer becoming service provider – challenges and paradox	Braax S.			CC2 CC3		SC2	MC2 MC3
2005	Behavioural implications of the transition process from products to services	Gebauer H. Friedli T.		EC3				
2005	Overcoming the Service Paradox in Manufacturing Companies	Gebauer H. Fleisch E. Friedli T.		EC4				
2005	From product to total solution: An enriched channel perspective	Matthyssens P. Buyl T.	OC2					
2006	The right service strategies for product companies	Byron A. Harmon E. Pandit V.	OC3					
2007	From goods to service(s): Divergences and convergences of logics	Vargo S. Lusch R.	OC4 OC5			CSD1		
2007	State-of-the-art in product-service systems	Baines T. et al.		EC5 ED1	CC4		SC3	MC4
2008	In search of “product-service”: evidence from aerospace, construction, and engineering	Johnstone S. Dainty A. Wilkinson A.	OC6					
2008 TR	The PSO triangle: designing product, service and organization to create value	Pawar K. Beltagui A. Riedel J.	OC7 OC8					
2008	Effect of Service Transition Strategies in Firm Value	Fang E. Palmatier R. Steenkamp J.		EC6				

Year	Title	Author	Organis.	Economic	Customer	Skill	Supply Chain	Market
2008	The Servitization of Manufacturing: An Analysis of Global Trends	Neely A.	OC9	EC7				MC6
2008	Organizational antecedents to and consequences of service business orientation in manufacturing companies	Antioco M. Moerart R. Lindgreen A. Wetzels M	OC10 OC12 OC13	EC8 EC10 ED4		CSC2		MC5
2008	How to sell services more profitably	Reinartz W. Ulaga W.	OC11	EC9 ED2 ED3	CC5			
2009	The Servitization of manufacturing: A review of literature and reflection on future challenges	Baines T. Lightfoot H. Benedettini O. Kay J.	OC14 OC15	ED5	CC9		SC5 SC6	
2009	Service orientation of organizational structures	Gebauer H. Pütz F. Fischer T. Fleisch E.	OC16					
2010	Integrated solutions from a service-centered perspective: Applicability and limitations in the capital goods industry	Windahl C. Lakemond N.	OC17	EC11	CC6		SC7	
2010	A new approach for conceptual design of product and maintenance	Zhang Z. Chu X.	OC18			CSD2		
2010	Why do servitized firms fail?	Benedettini O. Neely A.		EC13 EC14 EC15 ED6 ED7				MC7
2010	Servitized Experiences: Business and Management Implications	Angelis J. Lima E. Siralióva J.	OC19		CC7		SC8	
2010	Towards Consolidation on Product-Service Systems Design	Müller P. Sakao T.	OC20					

Year	Title	Author	Organis.	Economic	Customer	Skill	Supply Chain	Market
2010	Challenges in transforming manufacturing organizations into product-service providers	Martinez V. Bastl M. Kingston J. Evans S.	OC21	EC12	CC8		SC9	
2010	The Relevance of Service in European Manufacturing Industries	Lay G.					SC10	MD1
2010	The relevance of Service in European manufacturing industries	Lay G. Copani G. Jäger A. Biege S.		EC16				
2011	The formulation and implementation of a servitization strategy: Factors that ought to be taken into consideration	Benade S. Weeks R.	OC22					
2011	Customer orientation as a development driver in manufacturing: the case of “reverse” engineering	Turunen T.	OC23					
2011	Supply chain integration and service oriented transformation: Evidence from Chinese equipment manufacturers	He Y. Lai K.	OC24				SC11 SCD1	MC8
2011	Service transition strategies of industrial manufacturers	Salonen A.	OC25 OD1				SC12	
2011	Servitization, Survival and Productivity	Bascavugsoglu- Moreau E. Tether B.				CSC3	SC13	
2011	Can a product manufacturer Become a Successful Service Provider? In Pursuit of a Business Model that Fosters Complementarity between Product and Service Activities Perspectives	Visnjic I. Van Looy B		EC17				
2011	A solution busines model: Capabilities and management practices for integrated solutions	Storbacka K.	OC26					
2011	Competitive advantage through service differentiation by manufacturing companies	Gebauer H. Gustafsson A. Witell L.			CC10			



Year	Title	Author	Organis.	Economic	Customer	Skill	Supply Chain	Market
2011	The implications of Service-Dominant Logic and Integrated Solutions on the Sales Function	Le Menieur-FitzHugh K. Baumann J. Palmer R. Wilson H.	OC27					
2011 TR	Hybrid-Offerings: How manufacturing Firms Combine Goods and Services Successfully	Ulaga W. Reinartz W.	OC28	EC18		SCD2	SC14	MC9
2012	Providing integrated solutions in the professional printing industry: The case of Océ	Visintin F.	OC29					MC12
2012	The moderating effect of service capability on the relationship between service delivery and business performance of manufacturing companies	Tian Y. et al.				CSC6 CSC7		
2012	Servitization of manufacture. Exploring the development and skills of people critical to the delivery of advanced services	Baines T. Lightfoot H. Smart P. Fletcher S.				CSC4		
2012	Servitization and networking: large-scale survey findings on product-related services	Bikfalvi A. Lay G. Maloca S. Waser B.	OC30					MC10 MC11
2012	Toward integration of products and services: Taxonomy and typology	Park Y. Geum Y. Lee H.	OC31					
2012	Toward Servitization in the Age of Digital Innovation – A Case from Vehicle Industry.	Akram A.	OC32			CSC5		
2012	Organizing servitization: an in-depth case study	Turunen T. Neely A.	OC33					
2012	Understanding complex service systems through different lenses: An overview	Briscoe G. Keränen K. Parry G.	OC34					
2012	Product-service systems: a literature review on integrated products and services	Beuren F. Ferreira M. Miguel P.	OC35		CC13			
2012	The three Value Proposition Cycles of Equipment-based Service	Mauil R. Ng I.		EC20	CC11 CC14		SC15	

Year	Title	Author	Organis.	Economic	Customer	Skill	Supply Chain	Market
2012	Mapping service processes in manufacturing companies: industrial service blueprinting	Biege S. Lay G. Buschak D.	OC36	EC19	CC12 CC15	CSC9	SC16 SC17	
2012 TR	New Service Development in Manufacturing Companies – Insights from the German Manufacturing Sector	Biege S. Jaeger A. Buschak D.	OC37					
2013	Characterizing service networks for moving from products to solutions	Gebauer H. Paiola M. Saccani N.	OC38					
2013	Solution business models: Transformation along four continua	Storbacka K. Windahl C. Nenonen S. Salonen A.	OC39 OC42					MC13
2013	Moving from products to solutions: Strategic approaches for developing capabilities	Paiola M. Saccani N. Perona M. Gebauer H.	OC40				SCD3	
2013	Successfully implementing a service business in a manufacturing firm	Visnjic I. Van Looy B.	OC41					
	Number of challenges	114	42	20	15	9	16	13
	Number of drivers	14	1	7		2	3	1

**Table 2 - Source: Duschek (2015) Transformation Building Blocks**

### 2.5.1. Organizational Challenges by Year

**2003:** Although manufacturers might see the market potential for their services and set out to servitize, they fail, through not applying an appropriate strategy that considers new organizational structures, principles, processes and metrics. Furthermore they do not realize that the transition should be developed in stages along a considerable time frame (Oliva and Kallenberg, 2003), OC1.

**2005:** The required organizational changes have to include the manufacturers' distribution network since a total solution requires external resources to be bundled into a solution - (product) and the provision of products is facilitated through distribution channels (Matthyssens and Buyl, 2005), OC2.

**2006:** Manufacturers find themselves in a situation where they grapple with strategic questions they should have clearly resolved before they entered the market. They must also decide whether the main purpose is to support the existing product business or whether service should act as an independent business unit (Byron, Harmon and Pandit, 2006), OC3.

**2007:** Rethinking and establishing a process of value generation in contrast with focussing on the sale of products to different customers is the overriding, critical theme leading to the transformation of the entire manufacturers' output orientation (Vargo and Lusch, 2007), OC4. The place from the creation of value through products is moved to value co-creation by external factors and the parties involved (Vargo and Lusch, 2007), OC5.

**2008:** There may be a lack of understanding and buy-in among the employees resulting from poor co-ordination and co-operation of the selected function. A long-term view as the new business model is required in particular as the manufacturer gains more insight into customers operation while shifting from product support to customer support (Johnstone, Dainty and Wilkinson, 2008), OC6. The vagueness of operational implications when servitizing can be counteracted by a triangle in which the delivery of value to a customer can be most effectively carried out by establishing networks where partner firms collaborate and service and products are integrated (Pawar, Beltagui and Riedel, 2008), OC7. Increased complexity is added by adding PSO services (Pawar, Beltagui and Riedel, 2008), OC8. A cultural sales change is necessary in order to achieve a shift from transactional short-term thinking to an emphasis of selling services under a long-lasting relationship (Neely, 2008), OC9. In a manufacturing environment, a service-based orientation may not be regarded as the prime competence (Antioco, Moenaert, Lindgreen and Wetzels, 2008), OC10. The implementation of understanding of servitization as a business logic is a managerial responsibility. The formulation of market strategies requires the inclusion of service specificities. The re-orientation of the sales force in order to improve the customer contact level leads to new recruitment criteria, training and new roles for sales (Reinartz and Ulaga, 2008), OC11. Traditional manufacturing management may feel threatened by the unknown change and therefore behave reluctantly and interfere with the generation of considerable service revenues (Antioco, Moenaert, Lindgreen and Wetzels, 2008), OC12. Manufacturing companies should implement servitization by an alternative temporary measure: first, implement services in support of the customer to augment product sales, followed by services in support of the product for the installed base in order to augment the service volume. Alternatively manufacturers could establish a

bundle strategy to combine and bundle services for the customer. For the product, better bundling and customizing can be achieved by an effective cross-functional communication in which research and development, sales and service employees share customer-specific information (Antioco, Moenaert, Lindgreen and Wetzels, 2008), OC13.

**2009:** Traditional manufacturers moving towards servitization face the design of services, the strategy of how to orchestrate a servitization-oriented organization and how to accomplish a servitization process (Baines, Lightfoot, Benedettini and Kay, 2009), OC14. In order to structure and re-structure their organizations, clarify the organizational distinctiveness and support its service orientation role, managers must decide whether the service business should be integrated or run as a separate service unit (Baines, Lightfoot, Benedettini and Kay, 2009), OC15. Since service strategies for customer service and after-sales service no longer guarantee a competitive edge, manufacturers must advance to achieve a status as partner for operational support, development and outsourcing. The change in service strategies requires only a limited adaption of organizational elements rather than across the entire manufacturing organization. Managers moving from after-sales services to customer-support services should

*“emphasize a broad range of operational design elements such as the formality in the service development process, service orientation in corporate values and employee behaviour, service orientation of personal training and personal assessment/compensation, organizational distinctiveness, and proximity to customers”*

as suggested by Gebauer, Pütz, Fischer and Fleisch (2009, p. 124), OC16.

**2010:** The strategy of integrated solutions must include the integration of solutions into the existing main business upon which integrated solutions are highly dependent. Reciprocal interdependencies of supplier and customer structures lead to difficult management complexes. The solution development for customers’ operations and business problems requires cross-organizational co-ordination and dyadic co-operation (Windahl and Lakemond, 2010), OC17. In order to meet functional customer requests, manufacturers have to implement an integrated product and maintenance design where the focus is on the development of methods and tools (Zhang and Chu, 2010), OC18. Manufacturers’ back-offices, touch points and distribution channels have to be acquainted with customer awareness and understanding in order to prevent losses to competitors and improve the customer personalized experience (Angelis, Lima and Siraliova, 2010), OC19. Although

servitization has been exercised at different levels and different characteristics in the industry for quite a number of years, design guidelines and standards for the application in the industry are scarce (Müller and Sakao, 2010), OC20. The profound product technology orientation of manufacturers paired with their lack of organizational responsiveness act as inhibitors towards servitization. A common understanding, mode of communication, terminology, mind-set and internal co-operation within the manufacturer will enable a successful transformation (Martinez, Bastl, Kingston and Evans, 2010), OC21. In order to bridge knowledge gaps and to generate a broad range of servitization knowledge, the implementation process for servitization is facilitated by establishing cross-functional multi-disciplinary tasks or project teams (Benade and Weeks, 2010), OC22.

**2011:** Even when a manufacturer acquires an ideal set of advanced competences, knowledge and skills, such as buying a consultancy company, the transformation takes time (Turunen, 2011), OC23. Although manufacturers take the decision to transit rapidly to servitization the practical procedures are slow-moving due to the ambivalence towards servitization among the personnel (He and Lai, 2011), OC24. The move from a product focus to greater orientation around customers' business processes enables manufacturers to add value besides their technological advantages. This move is painstakingly slow and a resource-intensive process (Salonen, 2011), OC25. Firms wishing to deliver solutions effectively need to secure support from all functions, including product development, marketing, sales, operations, and finance. "The solution business model requires 'platform investments' – investments into new organizational capabilities . . . it is the investment in the solution platform that creates the foundation for a sustainable competitive advantage in solution business" (Storbacka, 2011, p. 709), OC26. Sales need to understand value for customers, co-create solutions with customers to achieve the creation of tailored solutions (Le Meunier-FitzHugh, Baumann, Palmer and Wilson, 2011), OC27. Ulaga and Reinartz (2011. P. 15), OC28 explained that:

*"product life cycle services played a key role by merely enabling sales, in that they were pivotal in establishing the vendor's reputation as a competent service provider. They viewed building trust through product life cycle services as a prerequisite for expanding into adjacent, value-add service categories"*

and stated further that instead of a dichotomized view of services versus goods manufacturers should combine unique resources with distinctive capabilities whereby the move to hybrid services occurs typically gradually.

**2012:** There is no necessity to shift from a standard goods-logic based solution to solely customized service-logic based solutions. The adaption of both to create a different logic to address customers' needs will support the success as a solution provider, whereby the development process requires resources, time and considerable organizational effort (Visintin, 2012), OC29. Servitization is positively linked with increasing intra- and inter-networking activities of manufacturing companies (Bikfalvi, Lay, Maloca and Waser, 2012), OC30. A dichotomous taxonomy enables the classification of integrated product-oriented services into two types: marketing and engineering and also allows the integration of large numbers of products and services (Park, Geum and Lee, 2012), OC31. The logic to approach servitization is not understood internally, resulting in internal resistance (Akram, 2012), OC32. In organizing servitization, manufacturers should not advance the contingency theory but rather establish a separate service unit to keep in line with the changes in customer demand. This unit should be re-evaluated according to the business growth (Turunen and Neely, 2012), OC33. In order to better understand complex service systems, more effective co-creation in research on the basis of inter-disciplinary efforts is required (Briscoe, Keränen and Parry, 2012), OC34. Servitization on the basis of new value-systems and innovative market opportunities requires a strategy of linking long-term goals with existing tendencies resulting in a long-term process (Beuren, Ferreira and Miguel, 2012), OC35. "The newly arising interdependencies of service and production processes need special consideration (Biege, Lay and Buschak, 2012, p. 934), OC36. Moving towards servitization is considered to be a special task for manufacturers (Biege, Jaeger and Buschak, 2012), OC37.

**2013:** It may be beyond the capabilities of a capital goods manufacturer, or it may not make economic sense to master internally all activities in the context of providing services. The adoption of a service network perspective may be a "viable alternative with the potential to replace traditional product-oriented and vertically-integrated customer-supplier relationships to optimize the operational capabilities" (Gebauer, Paiola and Saccani, 2013, p. 43), OC38. A transformation model should not have a static characteristic: rather, it should be carried out according to the individual degree of change (Storbacka, Windahl, Nenonen and Salonen, 2013), OC39. The horizontal enlargement of servitization activities requires a decision concept in order to be able to decide either to develop the required capabilities internally or partner with external service providers or operate on a mixed platform. (Paiola, Saccani, Perona and Gebauer, 2013), OC40. In order that services are accepted as a business, a performance measurement system has to be implemented to be

able to demonstrate value. This also enables capturing the nature of interdependencies and possible conflicting objectives between products and services (Visnjic Kastalli, Van Looy and Neely, 2013), OC41. A change is required in all parts of the manufacturer when moving towards servitization (Storbacka, Windahl, Nenonen and Salonen, 2013), OC42.

Summary: The literature review was carried out under the perspective of a traditional product manufacturer embarking on a journey towards servitization. The literature review revealed 42 challenges that address the organizational sphere. The majority appeared mainly in the second half of the reviewed period. Most of them concentrate on distinct subjects such as the company service orientation and value generation, employee behaviour, interdivisional coordination and cooperation, the approach to the sale of services, organizational structures and the provision of external skill and cooperation with service networks. The commencement to servitization from a reactive service delivery mode surfaced only in four references.

#### 2.5.2. Economic Challenges by Year

**2003:** The transition to servitization may divert financial resources from the production of goods and new product development (Oliva and Kallenberg, 2003), EC1. Cost recovery for extra expenses caused by packing and selling of solutions (Johansson, Krishnamurthy and Schlissberg, 2003), EC2.

**2005:** Extended service business leads to increased service offerings and higher costs, but not to correspondingly higher returns (service paradox), (Gebauer and Friedli, 2005), EC3. The service paradox may be overcome if organizational design elements care for customer involvement in the service design and likewise focus on employee service orientation and their specific selection and training (Gebauer, Fleisch and Friedli, 2005), EC4.

**2007:** Manufacturers may be concerned with the ability to establish adequate pricing processes, absorb risks and the organizational shift requiring time and funds to implement it (Baines *et al.*, 2007), EC5.

**2008:** Transition strategies will only be successful if the service business accounts for a critical mass of 20-30%. A lower share results in negative effects (Fang, Palmatier and Steenkamp, 2008), EC6. Large servitized firms generate lower net profits than pure manufacturers, due to the inability to recover higher costs, working capital and additional investments. Long-lasting partnerships and complex projects bear unpredictable financial implications on service and support contracts caused by fluctuations in the supply of

energy and raw material (Neely, 2008), EC7. Service technology that enables the management of customer relationships supports better time and resource management (Antioco, Moenaert, Lindgreen and Wetzels, 2008), EC8. Idiosyncrasies and performance of the service delivery, service delivery improvements and service interaction impact the transaction success (Reinartz and Ulaga, 2008), EC9. Manufacturers hardly possess experience in billing services in support of the customer due to their long billing legacy for services in support for the products. Service technologies do not lead to higher service volumes since they are primarily directed at the customer (Antioco, Moenaert, Lindgreen and Wetzels, 2008), EC10.

**2010:** Complex management processes resulting from increased interdependencies lead to costly and difficult co-ordination activities (Windahl and Lakemond, 2010), EC11. It is challenging for manufacturers to grow revenue volumes extensively in a short period. They will rather experience positive business results in the longer term (Martinez, Bastl, Kingston and Evans, 2010), EC12. Decreases in product demand and subsequent manufacturers' downsizing, result in extraordinary charges for restructuring and operating losses. The revenues on the installed base do not recover costs incurred. Service development cost is not recovered by the service business (Benedettini and Neely, 2010), EC13. In order to position positively in the provision of services, substantial investments and name recognition is required (Benedettini and Neely, 2010), EC14. Risk estimation of the characteristics of the different services that are offered to customers has to be carried out (Benedettini and Neely, 2010), EC15. The focus on product-related services and price bundling prevents the full development of service strategies (Lay, Copani, Jäger and Biege, 2010), EC16.

**2011:** Firms who transition to servitization ineffectively or too late may face bankruptcy. Increased intensity of customer intimacy by more sophisticated services increases net service volumes. The service paradox may be induced by inadequate plans that disregard the role of economic scale (Visnjic and Van Looj, 2011), EC17. Manufacturers should increase their profitability also through cost advantage approaches in addition to loyalty, satisfaction and willingness to pay (Ulaga and Reinartz, 2011), EC18.

**2012:** The move towards servitization requires an economic reflexion in order to avoid the "service paradox" (Biege, Lay and Buschak, 2012), EC19. A significant sustainability contribution may be achieved by keeping machines longer working (Maull and Ng, 2012), EC20.



Summary: The majority of economic challenges surfaced mainly in the first half of the considered period. Most of them address the area of the “service paradox” and concern the costs that are incurred or related to the implementation servitization. Only one of twenty references engages in improving profitability through increased service volumes by assuming a customer perspective.

### 2.5.3. Customer Challenges by Year

**2003:** Selling solutions rather than mere bundles of products (Johansson, Krishnamurthy and Schliissberg, 2003), CC1.

**2005:** Services need to meet customers’ business contexts to support their business practice and business goals (Braax, 2005), CC2. Communication with customers has to be maintained in order to support the service co-production (Braax, 2005), CC3.

**2007:** There is a fear that customers might not be enthusiastic about ownerless operation of equipment (Baines *et al.*, 2007), CC4.

**2008:** Complex situations cause a high resource demand and bear a difficult supplier relationship process. Furthermore, buyers have difficulties in comparing alternatives and the performance evaluation of individual solution providers. As a result, they tend to objectify and standardize services procurement (Reinartz and Ulaga, 2008), CC5.

**2009:** Manufacturers need to establish an understanding of how customers will value their services (Baines, Lightfoot, Benedettini and Kay, 2009), CC9.

**2010:** Customers determine the criteria for value creation and economic success, thus linking the role of the service supplier to the customer’s processes. By the dependency on the suppliers’ process management success, customers will lose process knowledge of the solution (Windahl and Lakemond, 2010), CC6. Foolproof design in customer operations necessitates the lead to avoidance of negative experiences, the provision of a reduction in customers’ discretion and the maintenance of their sense of occupying a level of control. Customers need to be included right from the beginning of a service project design in order that preferences and perceptions may be taken into consideration (Angelis, Lima and Siraliova, 2010), CC7. Manufacturing-based metrics have to be replaced by performance metrics that demonstrate the effective delivery of servitization offerings (Martinez, Bastl, Kingston and Evans, 2010), CC8.

**2011:** Service providers must react to the rapidly changing strategic choices of customers resulting from their widespread needs and preferences. The understanding of deeply rooted

customer values and beliefs has to complement the usual information-gathering of actual and potential needs in order to cope with the customers' rapidly changing strategic choices (Gebauer, Gustafsson and Witell, 2011), CC10.

**2012:** The risk of losing control over the goals and results in the co-creation of contractual parameters is caused by the interdependent combination of the servitized company and the customer. Since they act simultaneously in different value cycles they have to manage their perspectives. In order to co-create value, the service provider must have the ability and capability to exercise control about the customers' materials, information and employees (Maull and Ng, 2012), CC11. Co-operation with customers is crucial as customers trigger 63% of service innovations (Biege, Jaeger and Buschak, 2012), CC12. Customers are unaccustomed to use products without possessing them and manufacturers are unaccustomed to offering a product while owing it still (Beuren, Ferreira and Miguel, 2012), CC13. The outcome of a value proposition cycle integrates the service provider into the customer's operation (Maull and Ng, 2012), CC14. Customer should be more strongly involved into the process of new service development (Biege, Jaeger and Buschak, 2012), CC15.

Summary: The first half of the review period revealed concerns of manufacturers that customers might not understand the value creation of service offerings. This changed in the second half where the early involvement of customers in the co-creation of solutions is regarded as crucial for the economic success. Based on a profound understanding of customers' values and beliefs, service providers must cope with the rapidly changing business environment of customers by information gathering of future and actual needs.

#### 2.5.4. Capabilities and Skill Challenges by Year

**2003:** A manufacturer may realize the market potential for its services. However, it may see no implementation opportunity due to the failure to consider that the required skills may be beyond the manufacturer's scope (Oliva and Kallenberg, 2003), CSC1.

**2008:** A further factor is the top management's commitment as the prime social influence service business orientation: the influence on employees' behaviour and the employees' belief in top management. Cross-functional communication must span all manufacturers' functions so that norms, values and inputs are utilized when optimizing material, people and processes (Antioco, Moenaert, Lindgreen and Wetzels, 2008), CSC2.

**2011:** The implementation of servitization of manufacturers requires new skills and investments (Bascavusoglu-Moreau and Tether, 2011), CSC3.

**2012:** People with particular behavioural skills who deliver advanced services are pivotal for the successful delivery of advanced services (Baines, Lightfoot and Smart, 2012), CSC4. The required development of core competences for remote support is not in line with the required transformation steps (Akram, 2012), CSC5. Internal competence gaps inhibit servitization and moderate the servitization impact on business performance (Tian *et al.*, 2012), CSC6. Service capability is pivotal to servitization. It “moderates the relationship between service delivery and business performance. When the manufacturer possesses the necessary service capability, the extension of service business will improve the business performance” and conversely, vice versa (Tian *et al.*, 2012), CSC7. R&D of manufacturers is hardly involved in the development of services. The development is “not undertaken in an integrated way but is still performed separately” for products and services (Biege, Jaeger and Buschak, 2012), CSC8.

**2013:** The development of the service business should be arranged in a phased manner, starting with the phase of service presence to capture the customer base business, followed by activities for service development with the goal of achieving the status of service realization while “gradually introducing capabilities that support “service development” and “process” innovation” (Visnjic and Looy, 2013, p. 24), CSC9.

Summary: Although skills and capabilities are regarded as crucial for the solution creation, their lack is generally expressed throughout the entire period. This leads either to the inability to enter servitization or the lack of growth of the service business. In spite of this, there is no tactical approach mentioned to attack this deficiency.

#### 2.5.5. Supply Chain Challenges by Year

**2003:** Recognize the need to rework the selling approach and the establishment of performance metrics for solutions (Johansson, Krishnamurthy and Schliissberg, 2003), SC1.

**2005:** Providing service requires in contrast to transaction-based systems effective information management systems (Braax, 2005), SC2.

**2007:** There is an underlying fundamental concern caused by the grave lack of purposely-designed service tools and processes that support the implementation of servitization (Baines *et al.*, 2007), SC3.

**2009:** Paucity exists in providing guidance and establishing methods and tools (Baines, Lightfoot, Benedettini and Kay, 2009), SC5. Manufacturers need the ability to configure their operations, products and supply chain in order to support services (Baines, Lightfoot, Benedettini and Kay, 2009), SC6.

**2010:** Advanced service processes supported by progressive information technology are prerequisites for achieving cost advantages and the envisaged operational performance (Windahl and Lakemond, 2010), SC7. The differentiation of work roles has to be categorized according to the task discretion to support the specific roles in service provision to be able to make specific decisions (Angelis, Lima and Siraliova, 2010), SC8. Changes in the service supplier's relationship process are not reflected in the relationship with the partners of the service provider. The successful delivery of services is not only assessed by its effectiveness but also by meeting requirements in a timely manner (Martinez, Bastl, Kingston and Evans, 2010), SC9. The ability to co-create value in each interaction with the customer opens the opportunity to deliver services regardless of the service deliverers position in the supply chain, up-stream as well as down-stream (Lay, 2010), SC10.

**2011:** The transition from product-oriented services to action-based services alters the value proposition to the customer necessitating a supply chain re-orientation (He and Lai, 2011), SC11. The manufacturer's external effectiveness at the customer interface requires broad training and particularly chosen persons with specific behavioural characteristics (Salonen, 2011), SC12. The implementation of servitization of manufacturers requires new skills and investments (Bascavusoglu-Moreau and Tether, 2011), SC13. There is a risk of committing to outcomes manufacturers cannot deliver in the execution process or that only can be achieved by adding unforeseen resources (Ulaga and Reinartz, 2011), SC14.

**2012:** The service provider and the customer have to establish optimized resources and structures in order to collaborate successfully and to achieve the agreed results (Maull and Ng, 2012), SC15. Without a supportive instrument for manufacturers who are on the transition from a primary product producer to a solution-based service provider, bundles of

both products and services cannot be achieved (Biege, Lay and Buschak, 2012), SC16. To cope with the new requirements, supply chains need to be reworked (Biege, Lay and Buschak, 2012), SC17.

Summary: The necessity to reconfigure operations, product, supply chain and partner network constitutes the red thread running through this review section. Guidance is needed to provide purposely-designed service tools. Effective information management systems are the prerequisites for productivity improvements. The appropriate staffing with adequate skills, the categorization of work roles will facilitate the ability to provide service at every customer interaction.

#### 2.5.6. Market Challenges by Year

**2003:** Firms might not believe in the market potential for their services (Oliva and Kallenberg, 2003), MC1.

**2005:** The marketing challenge shows that, “as distinct from goods, services require motivating the customer to the service co-production.” All involved parties need to understand the concept of servitization. “The old transaction-focused incentive systems do not support service business” (Braax, 2005, p.151), MC2 Services cannot be merely added on top of the original goods-dominated total offering – a more implicit view of the world in which the company operates is required” (Braax, 2005 p.152), MC3.

**2007:** Despite the opportunity to advance the service activities up the value chain, the concept should not be regarded as universally applicable to all manufacturers (Baines et al., 2007), MC4.

**2008:** By offering services in support of the customer as value-added services, manufacturers will soon lose contact with their traditional advantages, thus facing the risk of direct competition from consulting or professional services companies resulting in a potential severe service volume decrease (Antioco, Moenaert, Lindgreen and Wetzels, 2008), MC5. Seen from a practical viewpoint, there is a lack of service design and management of complex service projects (Neely, 2008), MC6.

**2010:** The inability to fight competition in particular third party competition may be detrimental (Benedettini and Neely, 2010), MC7.

**2011:** In order to gain competitive advantages for manufacturers the integration of internal functions, their strategic alignment as well as the integration and alignment of inter-company processes are imperative. Competitive advantage can be gained by not only

integrating the internal processes and the internal functional strategic alignment of service but also through integration and alignment of inter-company processes (He and Lai, 2011), MC8. Manufacturers must think service must train their development and product personnel and include service as their key competitive market advantage (Ulaga and Reinartz, 2011), MC9.

**2012:** High export rates could moderate the servitization success (Bikfalvi, Lay, Maloca and Waser, 2012), MC10. The servitization success may hardly be influenced by the firm size (Bikfalvi, Lay, Maloca and Waser, 2012), MC11. “Succeeding as a solution provider does not necessarily require . . . shifting from solely providing standardized goods logic-based solutions to solely offering customized service logic-based solutions” (Visintin, 2012, p. 386), MC12.

**2013:** “Having an excellence only in one of the business dimensions may not create a sufficient competitive advantage, if the firm has capability gaps in the other dimensions” (Storbacka, Windahl, Nenonen and Salonen, 2013, p. 713), MC13.

Summary: Nearly all areas are touched, however with a discernable theme development. The old transaction-focused system does not suffice, services merely not to be added to products, servitization not universally applicable, manufacturers will lose contact with traditional advantages and face consulting competition. Moreover, manufacturers must think service and align all cross-company functions, abandoning standardized goods-logic based solutions is not required to gain competitive advantage and possessing competency in one business dimension is not sufficient to achieve a competitive edge. This points to a clearly visible lack of a consistent servitization approach for a manufacturer when abandoning a reactive service delivery business model.

#### 2.5.7. Drivers for Servitization by Year

**2007:** Economic success can be detached from the consumption of material and thus the environmental impact on the economic activity is reduced. The loss of jobs in traditional manufacturing can be offset by increased sales and service activities. The differentiation from other manufacturers can be achieved through value creation for customers according to their needs by a combination and integration of product and service (Baines *et al.*, 2007), ED1. It is important to understand that operant resources are the essential drivers for

servitization. Resources based on associated experiences that act purposefully and beneficially applied to the customer are the main drivers for all value creation (Vargo and Lusch, 2007), CSD1.

**2008:** By concentrating the development for service offerings into two dimensions: the capture of business process integration and the industrialization of the back office, manufacturers have the opportunity to evade the commodity trap (Reinartz and Ulaga, 2008), ED2. Business strategies should concentrate on cost leadership, proper equipment functioning, setting up a unique value proposition through differentiation in products and services, combining products and services to achieve attractive prices and the provision of development benefits for customers through development partnerships (Reinartz and Ulaga, 2008), ED3. Service rewards constitute determining drivers in the deployment of servitization. Thus, working environments, compensation and benefits that are service-related have to be integrated in the drawing-up of an effective service strategy (Antioco, Moenaert, Lindgreen and Wetzels, 2008), ED4.

**2009:** Servitization is frequently driven by opportunities grounded in additional revenues, derived profit margins, prospective competitive advantages and the accomplishment of customer relationships and product differentiation (Baines, Lightfoot, Benedettini and Kay, 2009), ED5.

**2010:** Integrated solutions enable paths for new radical opportunities and “out-of-the box” thinking (Windahl and Lakemond, 2010), CSD2. Market globalization, increased competitiveness of developing countries, intensified awareness of customers and customer demand shift motivate manufacturers to move towards servitization. Manufacturers who offer customized technology products can increase their revenues along the entire supply chain if their strategy concentrates on the design of new ways of services along the total supply chain (Lay, 2010), MD2. The “offering of more advanced services such as design and development or systems and solutions, gives to firms more chances of survival” (Benedettini and Neely, 2010, p. 10), ED6. “Servitized firms are less likely to be affected by the typical factors causing manufacturing firms to fail” (Benedettini and Neely, 2010, p. 10), ED7.

**2011:** If manufacturers have already successfully established a product-oriented service delivery, action-based service might be the logical service augmentation (He and Lai, 2011), SCD1. Servitization starts best proactively from a position of strength (Salonen, 2011), OD1. The ability to recognize the installed base as a strategic asset, implement

smart technologies to collect and process operational data of equipment in customer settings, will provide strategic advantages (Ulaga and Reinartz, 2011), SCD2.

**2013:** Manufacturers must carefully analyse whether they are able to manage, integrate and orchestrate external service partners (Paiola, Saccani, Perona and Gebauer, 2013), SCD3.

Summary: The initial two thirds of the reviewed period are characterized by drivers such as the attainment of cost leadership, proper equipment functioning, unique value proposition through differentiation of products and services and the offering of attractive prices through development partnership benefits. This is based on the recognition that servitization should best be commenced from a position of strength and that the operant resources are essential for the transformation success. During the last three years it can be seen that opportunities related to connectivity, networking and telecommunication technologies are starting to be considered. Integrated solutions will open the path for new, radical opportunities and the design and development of systems will give firms more chance of survival. And the implementation of smart technologies to collect and process operational data will provide strategic advantages. Exploration of this road is more than overdue.

## 2.6. Analysis of Literature Review

In the context of servitization, from 52 useful search hits 128 specific challenges and drivers were extracted and grouped in categories that are shown in Table 2. The majority of the challenges are led by the categories: “organization” (42 occurrences), “economic” (27 occurrences), “customer” (15 occurrences), “capabilities and skill” (19 occurrences), “supply chain” (20 occurrences) and “market” (14 occurrences).

The categories “organization”, “economic” and “supply chain“ seem to have been studied extensively, and their analysis has led accordingly to conceptual recommendations for the theory as well as management, either for single servitization subjects or to address hurdles for individual stages of a transformation. However, more surprising is the sparse occurrence of literature that addresses the entire transformation in five out of 52 papers only. These are the papers of Oliva and Kallenberg (2003), Braax (2005), Pawar, Betalgui and Riedel (2008), Ulaga and Reinartz (2011) and Biege, Jaeger and Buschak (2012). These five papers are marked by capital letters “TR” in the column “Year” at the appropriate title in table 2. The value of these papers is in establishing the basic theoretical foundations and understanding. They also point out the inherent challenges that might arise across an entire implementation journey and issue caveats such as the time needed to



transform into a solution provider. What seems to be missing after all these years is a navigation aid that suggests the practical approach towards a servitization journey.

The review itself has yielded a considerable number of challenges a manufacturer faces when moving towards servitization. There does seem to exist a balanced picture about the very general approach to creating value for customers and what product-oriented manufacturers have to carry out to leverage their capabilities in quite a number of varying approaches. This is clearly mirrored in the categories “organization”, “economic”, “customer” and “supply chain”. The literature however seems to favour a dichotomized view of goods versus services. The resulting transformation recommendations appear all to be straightforward approaches: “need to restructure”, “facilitate cultural change” and “further develop capabilities”. Nonetheless, only sparse research exists that describes and orders competences, capabilities and practical management disciplines that effectively direct and guide the service delivery function of a traditional product manufacturer towards a servitization transition (Storbacka, 2011).

Consequently this creates as Neu and Brown (2005) and Baines (2009) cited quite a number of implications for the transformation process: Should products and services be integrated or operated separately? Focussing primarily on the requirements and the needs of the customers, the apprehended simplification may lead to a situation in which the modalities to integrate product and service and to transform are nowhere nearly resolved enough in the literature. Should the service business operate as: a separate service unit (Turunen and Neely, 2012), an independent business unit (Byron, Harmon and Pandit, 2006), a product-service business unit, a service-product business unit (Neu and Brown, 2005), a “reversed” mode unit starting with advanced services follow later on by after-sales services? Should it even deliver consultancy-type services from the beginning (Turunen, 2011), or in an “alternative temporality” mode by first implementing support services to the customer to enhance the sale of products succeeded by services for the product in order to support the service business? (Antioco, Moenaert, Lindgreen and Wetzels, 2008). As a consequence it is not at all clear who is in control of the transformation process and takes the responsibility for the timely provision of associated service technologies, systems, and resources (Gebauer, 2009).

As a consequence, as Gebauer (2009) argues, service offerings still concentrate on basic services for products while focusing on the installed base. Neither maintenance services nor advanced services are delivered. Additionally a service-based orientation may not be

regarded as a prime competence by manufacturing, their traditional management may feel threatened by the unknown demands and behave hesitantly (Antioco, Moenaert, Lindgreen and Wetzels, 2008) or may even fear that resources are diverted from production and new product development (Oliva and Kallenberg, 2003).

As pointed out by Mathieu (2001), “The new service model, however, requires a long-term view of the business. This is likely to be essential if the organization is to become closer to the customer in order to gain an insight into the world in which they operate”. This is supported by a number of studies that maintain that servitization is not a straightforward move where the expected business results are neither yielded immediately nor obtained automatically. The literature describes several reasons for different approaches and related caution: namely, a stepwise approach due to the many required changes and its long-term dependencies within the organization (Oliva and Kallenberg, 2003; Baines, Lightfoot, Benedettini and Kay, 2009); Gebauer and Friedli, 2005). Oliva and Kallenberg (2003) suggest further that the transition should be developed in stages along a considerable time frame and executed as a “service continuum”, basically considered as an upward move towards higher value services or as Maull and Ng (2012) suggest, as an iso-morphism “three position cycle” augmented by the servitization roadmap from Baines (2013, p. 218) in which all models indicate an upward skill addition path in the direction of higher value-added services while addressing customers’ needs, requiring, however, considerable time and resources (Visintin, 2012). And Turunen (2011, p.14) goes further (with a case where a manufacturer bought an entire professional service consultation company) “though the company brought with it an ideal set of skill, competencies and knowledge to the manufacturer, the transition took time”. Storbacka, Windahl, Nenonen and Salonen (2013) propose a “transformation along four criteria” which installed base service providers are able to almost naturally transform.

Since new competences and capabilities guide and drive servitization, service capability development and improvement play a pivotal role as Tian *et al.* (2012) argue and it ought advance at the same pace as that achieved by the service business itself. Penttinen and Palmer (2007) advocate the acquisition of new competences through networking. Biege, Jaeger and Buschak (2012) point out in their study that in 63% of cases customers were the trigger for new service ideas while only 17% of the service development was generated through the manufacturers’ own research and development departments. Baines (2012) stresses the importance of personal behaviour in particular roles when delivering advanced services and the awareness to establish job roles for the service delivery. The literature

portrays the development of capabilities and skills only marginally and in grand statements although their importance is clearly referred to throughout the broad servitization literature. Moreover, the comparative juxtaposing of service activities starting from repair as a “low end” service delivery that generates no value to customers and reaching the “high end” with consulting services may convey the deceptive illusion that the thrust of value generation for the customer can only be obtained by pushing servitization forward into the “high end”. Since customers determine the criteria for value creation, the service supplier therefore has to align its service processes with the customer’s operational and business processes (Windahl and Lakemond, 2010). Typically, the products of the capital goods industry are integrated in a very long life cycle. In contrast to the consumer goods industry, capital goods customers place quite different service requirements on service organizations. Customers’ demands on, for example, overall equipment effectiveness requires already a high customer intimacy, operational consulting and strong and reliable feedback ties with the manufacturers’ development, production and service departments today. This prevailing situation, supported by initiatives such as BS 5750, ISO 9000, Organizational Learning or Total Quality Management is not taken into consideration throughout the broad servitization literature in spite of 97% of capital goods manufacturers offering product-related services, but barely 30% having reached a servitized status.

To conclude the literature review: overall, most of the suggested approaches seem to pass on an impression as though the researched services were of a static characteristic, although the strategic role of services undergoes an enduring, dynamic change (Davies, 2001; Neu and Brown, 2008). The transformation task is suggested as a straightforward transition and the characteristic of the services is allocated to plain categories, giving the impression that they should be able to be managed in a product-like manner, whereby the required competencies and capabilities are hardly addressed. However, there is on one hand a general understanding about the mental conceptualization of servitization, but on the other hand scarce literature suggesting how service organizations of capital goods manufacturers should navigate, align and adapt their competences and capabilities according to economic and technological trends of their customers and customers’ sectors, rather than focussing on tactical offerings and the development of individual services.

The following core findings represent the concluding reflections that were derived from the literature review:

1.) The tactical dissemination of servitization throughout manufacturing in the capital goods industry does not keep pace with the steadily growing number of published articles in particular during recent years

2.) Only sparse samples of publications guide capital goods manufacturers in orienting and aligning their resources in order to harmonize with the economic and technological trends of their customers, and

3.) Transformation tasks seem to be generally described as straightforward activities where the associated services can be managed in a product-like manner. The required build-up and alignment of competencies and capabilities for a traditional product manufacturer that commences servitization from a reactive service delivery are only sparsely stated.

## 2.7. Research Objectives and Research Questions

The extant literature does not seem to reflect servitization transition either at the strategic level or as a detailed framework. For the capital goods sector in particular it is not clear how to understand and navigate in a practical fashion the servitization process advancing from the present product-related services to more advanced services in support of customers' business processes. These are called solution-based services in this research.

To contribute to this progressively growing research field, the purpose of this study is to provide a holistic understanding of the service-transformation process in the capital goods industry. The nature and extent of any such reorientation will be an essential outcome of this research. The research is guided by the research questions as shown in Table 1.

## 2.8. Summary

In contrast to the manifold studies about servitization itself, the approach to manufacturers achieving the status of provider of solution-based services is little mirrored in the literature – only five papers out of 52 literature search hits reflect a holistic approach. The extant literature characterizes servitization as a grand strategy, highlights and emphasizes the advantages for manufacturers to achieve a servitized state, and describes the various approaches in adapting servitization. Many literature citations and studies address risks, perils and chances. However, studies to guide manufacturers in how to individually approach, assess, implement and progress this, seem to be missing. Generally, the

transition seems to be demonstrated as a straight task in which the related services are ordered in offering categories that could be product-like managed. The strategic orientation juxtaposes product-oriented services as low-end and customer-oriented services as high-end services and thus may impose the conceptual illusion that value for customers may only be created, by pushing the service delivery towards high-end services.

The literature review revealed various potential avenues that could lead to a successful transformation to customer-orientation as generally viewed by a traditional product manufacturer, and highlighted a substantial number of challenges that need to be overcome. However, the majority of the literature keeps almost silent when it comes to practical approaches, methods and recommendations to guide and navigate a transformation. Out of 52 literature hits only five regarded the practical transformation towards servitization. Therefore, chapter four will describe the findings that could be obtained through this work in the field and analyse the key issues while grouping them in major subjects as critical pre-conditions towards servitization.

## Chapter 3

### Research Methodology

#### 3.1. Introduction

This chapter spans the design of this research. It describes the motivation for the research scenario and research strategy that is applied in this study. Also discussed is the researcher's perspective and how it embraces the study. Furthermore, this chapter provides information about the principles of ontology and epistemology and describes the assignment of the methodological research approach to suit the total research problem. This observation is based on the view that research quality is based on an explored and articulated conceptual foundation. In addition, the case study method, the selection of cases as well as the data acquisition methods are described and the total study research process is focussed upon. Finally this chapter concludes with an exposition of the quality criteria and ethical considerations that accompany the whole research process.

#### 3.2. Research Paradigm

Since this research involves the inquiry into organizational realities and human/personal behaviours, fundamental assumptions of social science as well as my personal epistemological position have to be clarified.

This is in particular true for the area of solution-based services since a conceptual service construct seems to be devoid of access across all functions of a manufacturing company e.g. sales, development, production, maintenance, or marketing. It is therefore imperative to comprehend the research philosophy elements, the relationship between the key elements in order to avoid possible misunderstandings and to be aware of different positions and advocate one's own position. These three foci are related and depend on each other: Ontology establishes what can be known, epistemology how it is known and methodology enables systematic knowledge acquisition.

Ontology is regarded in research as an area that addresses reality, the nature of being, of existence and how reality is defined. Its centre focuses on the reality perception of a researcher and his resulting suppositions. Ontology is defined by Kavanagh (1994, p. 38) as "the part of metaphysics which treats the nature and essence of things. In the social sciences its use is generally limited to the nature and essence of the social world and man's existence." In this research it can be applied "as a study of what we know or rather what

we think we know” (Freimuth, 2009, p. 2). This was the view applied to this research, thus leading to the conclusion that although in the capital goods industry there are no formalized and published transformation processes available, nevertheless practical initiatives and steps are carried out by human beings acting in professional and business networks.

Epistemology, expressing the nature between the knower and what can be known, was defined by Kavanagh (1994, p. 37) as “the branch of philosophy which deals with the origin, nature and limits of human knowledge” and better suitably expressed for this study “as the study of how we achieve knowledge or rather how we think we achieve knowledge” (Freimuth, 2009, p. 2). Resulting from this, I had to realize “that we are part of the social worlds we are studying and a researcher’s own interpretative processes and authorial position need to be taken into account” (Somekh and Lewin, 2005, p. 17).

Assumptions of ontology, as the ways the reality is perceived, result in assumptions of epistemology about how the perception of the reality is studied and that in turn influences the methodology, which subsequently leads to the selection of data collection methods and the method of analysis. Therefore choosing the appropriate research method in social science concerns more than just selecting a method: It is based on how the inquirer views the world. Consequently the philosophy and the *Weltanschauung* of the inquirer influenced the selection of approaches as well as the conclusions that were derived from the research.

In order to establish the appropriate research perspective for the investigation of the research problem the selection of an alternative research paradigm was taken into consideration. Regarded as *Weltanschauung* or basic beliefs, in principle researchers are generally guided by one of four research paradigms: positivism, post-positivism, critical theory and constructivism. Lincoln, Lynham and Guba (2011, p. 9) position them in relation to ontology - the form and nature of reality; epistemology - the nature of the relationship between the knower and the known; and methodology - how can the inquirer go about finding out whatever he or she believes can be known, thus forming four theoretical and fundamental perspectives for every research design.

Positivism is also linked with the term ‘scientific approach’ to research and bears the core argument “that the social world exists externally to the researcher, and that the properties can be measured directly through observation” (Gray, 2014, p. 21). This approach implies that reality is available through senses, the inquiry is carried out on scientific observation and common logic and methodological principles share facts rather than values. Hence

only ideas can be incorporated into knowledge if they are empirically tested. This approach disregards the understanding of human phenomena or the nature of human perceptions.

Post-positivism represents a milder form (Willis, 2007) of scientific research for the social sciences. By using additional qualitative methods such as interviews and participant observation as well as survey research, the positivist approach is pursued while allowing more interaction between the research participants (Creswell, 2008).

Critical theory is characterized by its aim trying to change a given situation rather than trying to understand and depict a social situation from a given perspective or “without making critical interpretations from rigid frames of reference” (Howell, 2013, p. 77) as cited in Alvesson and Sköldbberg (2009, p. 144). Due to the focus on (revolutionary) change, critical theory focuses on an inquiry mainly into propositional knowledge and its instrumental value in obtaining social emancipation and disregards the intrinsic value stemming from the practical knowledge of the researcher (Heron and Reason, 1997).

Constructivism in contrast to positivism asserts that truth and meaning are created by the interaction of humans with the world they are interpreting, rather than truth and meaning existing in some external world that must be investigated by rigorous scientific processes (Gray, 2014). Constructivism has proved remarkably fruitful in its diversity in research, with a broad spectrum of methodologies and methods including anthropology, sociology education and management (Holstein and Gubrium, 2008) leading to unique and widely recognized empirical insights (Thomas and Linstead, 2002). Constructivism typically engages in practical working settings in order to inquire how reality is constructed and how processes unfold (Holstein and Gubrium, 2008).

Moreover two predominant approaches support the aim of this research to create new theory and build inherent new knowledge: Deductive and inductive reasoning. Reasoning is regarded as the process of drawing conclusions from available knowledge, establishing predictions or working out explanations. Deductive reasoning, linked with quantitative research, moves from a general rule based on current theory to a specific application that is tested in the real world. The methodological rigidity does not allow for alternative explanations. Inductive reasoning on the other hand considers alternative explanations. The observations in inductive reasoning are specifically, however, limited in scope, followed by subsequent data collection and analysis of the search for emerging patterns, to arrive at a generalized inference (Gray, 2014). Albeit there is no possibility to ascertain that all possible evidence has been completely gathered and no further evidence will appear to



question the inferred conclusion. Due to its value in process exploration and the ability in constructing rich data, social constructivists endorse inductive reasoning (Easterby-Smith, Thorpe and Jackson, 2012).

This under-researched complex real world problem represents by nature the core of this research. The development of understanding becomes generated by real world understandings, and responds to these interactions. New theory has to be generated by the participants in order to progress the academic field of servitization as well as provide the capital goods industry with new knowledge. Constructivism constitutes the ideal choice since various methods such as interviews, observation, documentation and collaboration are applied. Therefore a constructivist perspective as the foundation paradigm was selected for this research and then an inductive approach was applied to empirically analyse the individual's point of view in real world settings.

### 3.3. Research Strategy and Research Purpose

In order to obtain a deep understanding of the underexplored transformation to servitization, the case study approach as laid out by Stake (1995, p. 4) and Yin (2009, p. 17) appears to be the most suitable empirical method. Underpinned by a constructivist paradigm and retaining certain aspects of objectivity, this method “recognizes the importance of the subject human creation of meaning, but (...). Pluralism, not relativism, is stressed with focus on the circular dynamic tension of subject and object” (Crabtree and Miller, 1999, p. 10). This enables researchers to study and analyse data related to a particular context. Yin (2009, p.18) defined the case study as “an empirical enquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used”. Therefore real-life problems of a manageable number of subjects i.e. individuals, groups or organizations can be investigated by analysing their related context and relationship. Case studies are in particular suitable in rare phenomenon situations where large samples of similar phenomena are not available yet provide rich data and greater depth than could be achieved by different methods. I felt this research approach particularly applicable since I planned to visit and study multiple manufacturing sites of entirely different sectors of the capital goods industry in order to obtain rich data and hence allow a cross case generalization about the under-researched practical implementation of servitization.

The selection of an appropriate research strategy was carried out by observing Yin's (2009, p. 8) three selection criteria, consisting of the form of a research question, conditions about the control of behavioural events and the event focus either on historical or contemporary considerations. Characteristically for case studies, research questions within case studies begin with the type "how" and "why" and according to Yin (2009, p. 9) case studies are in particular suited if they represent "how" questions, and questions starting with "what" if used in an exploratory context.

There are three types of research intentions: "descriptive", which allows properly structured accounts of real world problems; "explanatory", i.e. issues and contextual links; and "exploratory", which enables insight into relatively new and unique real world problems.

Case study research is used in many disciplines, where it seems to be attractive to management practitioners due to its ability to provide deep insight into organizational and process-related details, rather than the doubts in theoretical data generated through quantitative strategies (Bryman, 1989, p. 178). The expressiveness of a study is also determined by the suitability of its findings for generalization. The setting of this study is a multiple case study allowing contrast, triangulation and comparison of the findings from each case. Also the multiple case evidence awards the multiple case study a robust distinction (Herriott and Firestone, 1983, p. 14). In this context it is also noteworthy that the researcher's understanding, experience and values cannot be separated from experiences and perceptions of the "others". Qualitative research represents a situated process as Denzin and Lincoln (2011, p. 3) stated, placing the researcher in the investigation:

*"Qualitative research is a situational activity that locates the observer in the world. It consists of a set of interpretive, material practices that makes the world visible. These practices transform the world. They turn the world into a series of representations, including field notes, interviews, conversations, photographs, recordings, and memos to the self. At this level, qualitative research involves an interpretive, naturalistic approach to the world. This means that qualitative researchers study things in their natural settings, attempting to make sense of, or to interpret, phenomena in terms of the meanings people bring to them."*

Also Saunders, Lewis and Thornhill (2007, p. 93) regard case studies as particularly suitable since they are directly connected to the kind of managerial practices,

organizational and operational processes that are subject to constant rework and change over time – which is the case in organizational transformation. I was offered the unique opportunity to access twelve senior services executives of the sample companies. As they were held accountable for the servitization implementation, I had the chance to acquire the information from top executives that span the time from the very beginning to the present service business status. Therefore, based on a constructivist research philosophy, the exploratory comparative study as a research strategy was chosen for this research.

#### 3.4. Sample Selection

The careful selection of cases is a key component of every piece of research. “Sampling is destiny”, posited Kemper, Stringfield and Teddlie (2003, p. 274). Yin (2009, p. 29) also expresses that the selection of the unit of analysis is equally important, and thus supports this view. This research focuses on a company as the unit of analysis. In contrast to single case studies where cases are selected due to their uniqueness or special revelatory characteristics, multiple-case studies are established with the idea that they either should support each other or furnish contrasting results, argues Yin (2009, p. 54). In order to select companies carefully “purposive sampling” as stipulated by Patton (2002, p. 230) was employed in this research:

*“The logic and power of purposeful sampling lie in the selection of purposeful rich cases for study in-depth. Information-rich cases are those from one can learn a great deal of issues from central importance to the purpose of inquiry, thus the term purposeful sampling. Studying information-rich cases yields insights and in-depth understanding rather than empirical generalizations.”*

To be able to build theory in this underexplored field of servitization, the selection of all cases within the capital goods industry was carried out by observing the selection criteria of Kindström and Kowalkowski (2009) who interviewed ten large, internationally operating manufacturing companies and established these selection criteria:

1. The unit of analysis had already embarked successfully towards servitization
2. In order not to be inflicted by industry specifics, each unit of analysis had to originate from different industries

3. In order to reflect the business style orientation the portfolio of investigated organizations should also represent public and privately owned enterprises

4. Transformation means foremost strategy and leadership.

A unit of analysis was only taken into consideration if the service executive who was held accountable for the transition to servitization was accessible – either still in post or available for the interview in case of promotion. The aim of the sample selection was that the units of analysis should represent the main industries within the capital goods industry as well as being located across the main business regions of Germany. A further goal was to verify whether the widespread opinion that small and medium sized enterprises (SMEs) as well as family-owned product manufacturers lack the opportunity to transit successfully to servitization (Seiter, 2014). By this approach, the validity of my study should be upheld and the potential to generalize the results to smaller manufacturing companies should be augmented. The initial plan of scheduled interview samples that mirrored these criteria encompassed twenty-five manufacturers in order to avoid the insight problems resulting from single case studies as Nudurupati, Lascelles, Yip and Chan (2013) have highlighted in their work. During the very first interviews I made a similar observation as Guest, Bunce and Johnson (2006) studied a very homogenous population. No new codes could be returned by the data after the course of the first interviews. When I approached about the ninth interview I noticed the same occurrence. In the sense of my study, my informants also seemed to be a homogenous population due to their senior position and responsibility. After ending the twelfth interview I felt that I had reached a state of saturation. The twelve interviews represent these sectors of the capital goods industry and comprise the base of the final analysis: power distribution, aerospace, mechanical engineering, office automation, printing, energy distribution, information technology, farming technologies, drainage technology, power generation, finance and access control. The profiles of the selected companies that encompass facts and figures, structures and fields of their main activities are aggregated in Table 3 that is ordered in the form of a matrix. The horizontal header indicates the interview number, rank title of the interview partner, interview partner's sector, employees, service share in company earnings and the major company customers. The vertical orientation regards the interview number within the selected sample.

Nr.	Contact	Industry	Employees	Service share < 50%	Service Share > 50%	Major Customers
1	Vice President	Power Generation	> 5000		73	Utilities, Rail Transport
2	Director Services	Environmental Techn.	> 1000	39		Building
3	First Vice President	Aerospace Industry	> 10000	23		Airline, Transportation
4	Managing Director	Power Distribution	> 1000	48		Utilities
5	Director Service	Access Solutions	> 5000	36		Building
6	Service Executive	Switching Equipment	> 5000	47		Across Industries
7	Executive Director	Passenger Transportation	> 5000		52	Building
8	Regional Vice President	Office Automantion	> 5000		55	Across Industries
9	Director Service	Printing	> 5000	42		Large Printing Plants
10	Managing Director	Farming Technologies	> 1000	33		Agriculture
11	Vice President	Information Technologies	> 5000		51	Finance, Banking
12	Director Solution Support	Equipment Controls	>5000	32		Tool & Machinery

**Table 3 - Source: Duschek (2014) Interview Sample**

### 3.5. Interview Selection

In qualitative research of equal importance lies the evaluation and answer to the delicate question: in order to conduct the envisaged research, how many interviews should be carried out or how many interviews are enough for the intended purpose? This question surfaced already during the early phases of the taught part of this research project and resulted in recurrent discussions with my fellow students and even at the doctoral colloquium in Berlin, 11<sup>th</sup> - 12<sup>th</sup> July, 2014. Being an electronics engineer by profession I was somehow surprised that there is a noticeable shortage of evaluations, explanations and unambiguous guidance while I tried to achieve an explicit understanding of how to approach this question in my qualitative study by referring to the current textbooks, scholarly literature and discussions. I assumed that there must be some sort of tacit knowledge to lend support in getting closer to practical questions such as: is there an easily manageable formula for calculating how many interviews? After all, is an answer to this question relevant for qualitative research and are there any dependencies that rely on time, available resources and funds?

In their methods review paper, Baker and Edwards (2012) gather and review the reflections of a number of renowned social scientists representing a spread of epistemological positions and roles. As a summary from their responses they concluded that the answer to

the question of how many interviews should be conducted results in “it depends”. Baker and Edwards (2012, p. 23) summarize a received reflection:

*“Norman Denzin suggests that an interview can be treated as a number of instances and analysed in great depth. He writes that the method of instances takes each instance of a phenomenon, for example an interview, as an occurrence that evidences the operation of a set of cultural understandings currently available for use by cultural members. From this perspective the answer to the question of how many is one”.*

Baker and Edwards (2012, p. 18) also report that Alan Bryman “rather than giving a specific number, ... points to a row of factors to be considered and strongly suggests that there is quite a lot of variety in what is believed to be the minimum requirement, so that it is unsurprising to find the actual sample sizes vary considerable in qualitative research”. Furthermore,

*“the theoretical saturation is described as a process in which the researcher continues to sample relevant cases until no theoretical insights are being gleaned from the data. Once saturation is achieved, the researcher would move on to a research question arising from the data collected and then sampling theoretically in relation to this question. As such, the answer to the question “How large should my sample be?” would be a glib and unhelpful “Whatever it takes (to saturate your theoretical categories)”.*

Julia Brannen states that there is no rule of thumb. “The most important issue in deciding how many interviews are enough concerns the purpose of the research” (Baker and Edwards, 2012, p. 16). Brannen elucidates further, that:

*“cases must be systematically selected based upon a sociological logic. Cases are not only selected for the purpose of the interview but also, most importantly, for the purpose of comparison in the analysis. We must select cases that are not only relevant to specific research questions but should seek out those cases that are likely to prove our assumptions wrong in the analysis”.*

A further response by Andrea Douzet and Kathy Charmaz described by Baker and Edwards (2012, p. 21) suggests, “that students and researchers need to become familiar with their epistemic communities to successfully answer the question of “how many”. And “in similar vein”, Charmaz also advises researchers to learn “what constitutes excellency rather than adequacy in your field” and “conduct as many interviews need to achieve

it". An additional answer is cited in Baker and Edwards, (2012, p. 5) as Charles Ragin "considers the specificities of qualitative research in his research. He compares a quantitative emphasis on statistical validity with a qualitative approach interested in the core features of sharing a category or an outcome". Ragin states, (Baker and Edwards, 2012, p. 34) "from a qualitative perspective, the question that is central to quantitative research: "Is it mere happenstance?" is not relevant in most research situations. Typically, the observed commonalities are overwhelming, and the qualitative research connects different patterns together in order to constitute a portrait of the whole. The key issues for a qualitative researcher are:

- (1) The degree of researcher confidence in the commonalities identified
- (2) The triangulation of a given pattern with what else is known about the category or outcome and also with what else is known about the larger case or whole.

Thus, in qualitative research the answer to the question "How many cases?" is that "it depends", and by paraphrasing Howard Becker (his former colleague) "You should stop adding cases when you are no longer learning anything new". Patricia Adler and Peter Adler (Baker and Edwards, 2012, p. 4) elucidate the position a quantitative researcher assumes versus a qualitative researcher. Adler and Adler suggest, "that quantitative researchers usually have an idea of how many cases they will need in order to test their hypothesis at the beginning of a project. They elaborate on research approaches with a low number of cases and state that "these studies can not claim a scope of those using more subjects, the deep and profound relationship established between the researcher and the respondent can often make up for the lack of varieties of people". And Adler and Adler continue (Baker and Edwards, 2012, p. 8) by pointing out the value of getting access to interview partners in certain research situations:

*"Moving up, a small number of cases, or subjects, may be extremely valuable and represent adequate numbers for a research project. This is especially true for studying hidden or hard to access populations such as ... and elites. Here, a relatively few people, such as between six and a dozen, may offer us insights into such things as the stratification hierarchy of . . . , or corporate boardroom. It may simply be that is as many people to which one can gain access among these types of groups".*

The extant literature does not offer a wealth of information about the operational and practical parameters in transitioning to servitization. However, conferences and workshop

papers seem to offer by and large either grand theories or snapshots of mastered isolated problem cases within the task spectrum of servitization rather than a holistic approach to servitization. Only in very rare situations were the names of companies, the detailed measures as well as the economic success, which was achieved through servitization, mentioned in relevant industry publications. Therefore, during the early phases of this research to establish a conceptualization it was soon apparent that access to service executives held accountable for the transformation to servitization within their enterprise was essential. Consequently, there followed “exploitation” of my professional and business network, approaching fellow members of the service executive associations Kundendienstverband Deutschland e.V., KVD, the European services executive association Experts of Service ExOS and those from the Technology Services Industry Association TSIA. By personally circulating my intentions within these associations a respectable number of interested executives could be obtained. The resulting initial conversations led to a panel of potential interview partners. From this the first interview range of twenty-five companies was selected.

My first intention was to mention the surveyed companies by name as well as the names of the accessed interview partners. This was also the understanding of my interview partners when they were first approached. However, I underestimated the time the interviews needed and the deep sharing of thoughts about the interviewees’ personal experiences, the subsequent activities resulting from the interviews themselves as well as the level of professional intimacy resulting from further communication. The interest in the subject of servitization and the various modes of operation was noticeably pronounced. Each interview overran the planned time frame considerably. Very soon it became apparent to me that a sole, single interview itself was not going to remain the only opportunity of information gathering. What actually happened was a series of interviews that became a conversation over time. During each initial interview visit I collected secondary data such as customer-suited service brochures, customer flyers, annual reports, service marketing manuals, company organograms, service plans. As a member of VDI I searched the association’s databases for relevant industry analyses and complemented them by website information with the intention of using them to complement the personal discussion. As a matter of interest, I was able derive the most valuable information from the secondary information by scrutinizing the current job descriptions and career paths related to the service employees, the training and development processes as well as the development principles for the individual employee’s career paths. Those gave a salient indication of the



long-term servitization strategic company orientation along with the level of employee involvement. When I matched this information with the data that I obtained after the transcription of the respective interview, new questions were sparked that led to further discussions either through additional personal visits, electronic mail or telephone conversations. This also happened reciprocally. Often, informants contacted me subsequently after our meeting in order to deepen and further develop ideas or practical suggestions that were aired during our discussion. I found this open exchange of views and information extremely supportive, as it allowed me to probe deeper into themes that were neither exhaustively studied by the prevailing literature, nor dealt with during each single interview. These discussions also gave the opportunity to obtain additional documents and even some strategic road maps that I had not been given previously. In particular this supplementary material, in combination with the extended discussions, proved to be very advantageous as they enabled me to refine and further develop the initial transformation conception at the early stages of my study and inform and adapt the research questions accordingly. A personal study logbook that I began already during the last part of the DBA taught phase guided and tracked all my activities, notably those that were interview-related, as I regarded them as the most sensitive and important contribution to my study.

Although mentally prepared by the previous taught phase of this study I found myself – to my amazement, during the conversations frequently in the role of learner as well as a sought-after contact in the role of a kind of “sounding board” by my dialogue partners. The semi structured interview plan became generative for a number of discussions. The longer the intimate explanations and communication went on, the greater became the expressed wish from my interview partners not to reveal their company name due to the fear of revealing competitive knowledge as well as mentioning personal encounters within their companies. After seeking advice from supervisors who supported me in finding a solution, for reasons of confidentiality each company was designated with a number instead of its name. The description of my interview partners’ companies of is contained in Table 3.

### 3.6. Method of Data Collection and Analysis

The research process as depicted in Figure 4 was conducted in three distinct phases:

1. Establishment of the groundwork
2. Establishment of the empirical essence of the study
3. Devising a conceptual model

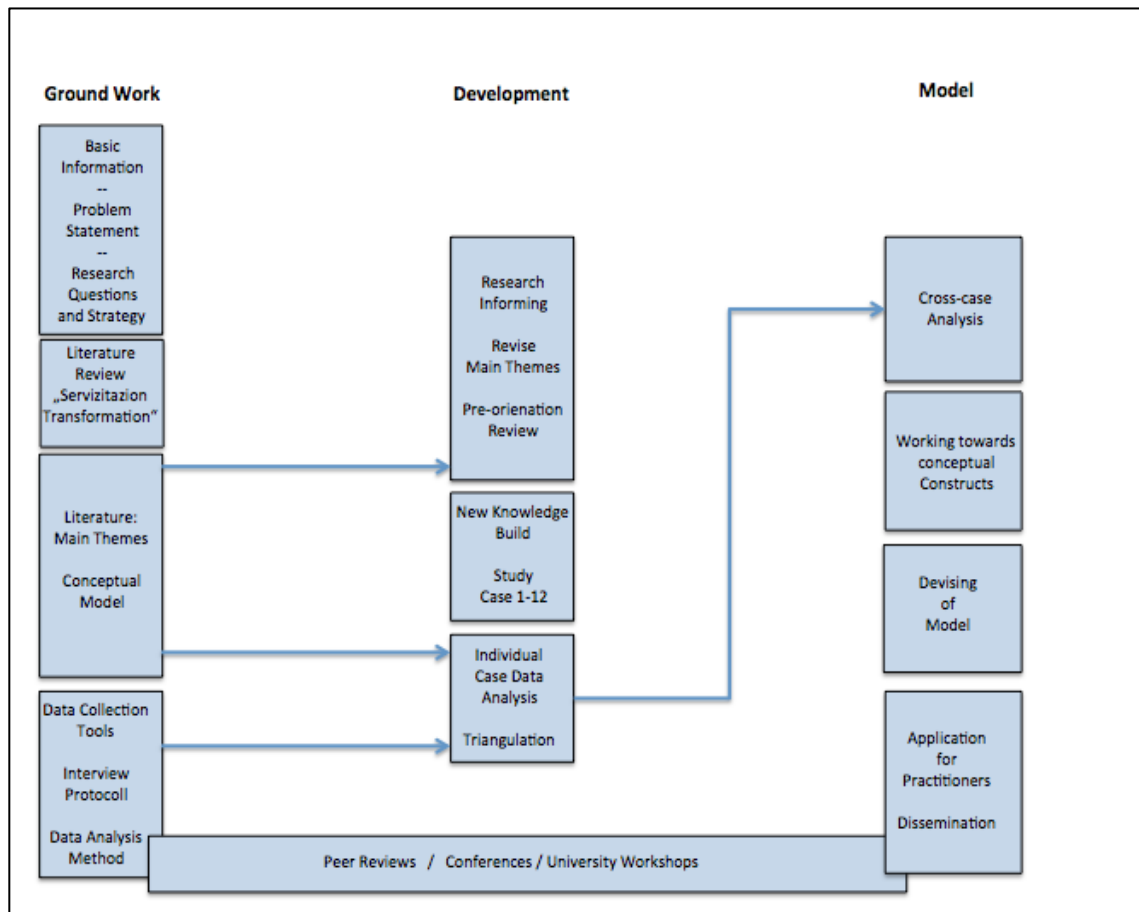


Figure 4 - Adapted from Vladimirova (2013) Research Roadmap

The groundwork of this study was carried out in order to create an early orientation pilot one-to-one interview and to establish the research problem. To investigate the research problem a suitable research strategy was established to cover the fields of servitization, organizational change and transformation. Conclusive themes and issues emerging during the review were identified and related theories and concepts for organizational change and transformation helping to elaborate the issues were defined. These contributed towards the creation of a model, comprising a set of common purposeful constructs for further conceptual and empirical elaboration. The research questions were derived from the established theoretical framework. As the findings from the literature review progressed, the subsequent empirical stage was drafted. Following this, a semi-structured interview questionnaire was set up reflecting the literature key themes, the constructs in the conceptual model and the research questions. Furthermore, different manners of data collection and their analysis were considered and provision was made to collect further evidence, such as direct company documents, service flyers, company websites, service conference proceedings, and archival records of service associations.

In the development phase, the empirical essence was established in two parts. The first part served as information build-up while conducting the literature review. The aim of this step was to extract the key themes and concepts to support the development of the conceptual model and also the research questions. This development in connection with the pre-orientation case-like review revealed further emerging servitization themes that resulted in further rework and differentiation of the emergent concept. The building of this essence was carried out in an iterative/synchronized mode: while the building of the model took place, newly-acquired evidence and new literature review derived themes were integrated into the conceptual model in order to refine and further progress it and continue with the development of the research questions. The second part was dedicated to the gathering of new knowledge that centred around twelve descriptive case studies. This was accomplished by twelve one-to-one interviews conducted in private environments and within each specific business and professional setting. Appendix A depicts the interview invitation letter and appendix B shows the participant informed consent form. The empirical material that was collected during all twelve interviews comprised a data set that established the data corpus of this study. Appendix C depicts the related interview questions. The empirical material analysis was carried out for each individual case, yielding copious descriptions of emergent themes. Peer discussions and workshops where the progress of the work was further discussed, shaped the knowledge. The pre-orientation interview with the service executive of a servitized manufacturer that took place in the first part of the development was an iterative step towards triangulation accompanied by related company documents and so fulfilled the role as an additional refinement as well as addressing possible quality issues.

In the third phase of the study I analysed all twelve cases in a cross-sectional manner. Themes that emerged in all twelve cases were identified and brought into context with the empirical work that had been carried out up to that point. Thus these themes further contributed to the formation of a conceptualization of a transformation model to support the transformation of a traditional manufacturer to servitization. The creation purpose of this conceptualization was that it is to be used by manufacturing practitioners in the capital goods industry.

### 3.7. Research Quality

For assessing qualitative research, Lincoln and Guba (1985), Denzin and Lincoln (2011) suggest the application of two primary criteria: trustworthiness and authenticity, whereby

trustworthiness is composed of four criteria: credibility, transferability, dependability and confirmability – see Table 4.

Aspect	Qualitative Term
Truth value	Credibility
Applicability	Transferability
Consistency	Dependability
Neutrality	Confirmability

**Table 4 – Adapted from Denzin and Lincoln (2011) Core Elements of Assessment**

1. **Credibility.** Leininger (1985) points out the importance of identifying and documenting recurrent features. These could be themes, patterns or values. This ensured prolonged engagement, to be able to check perspectives and allowed the informant and the researcher to become acquainted with each other (Kielhofner, 1982). Furthermore the research was carried out corresponding to the canons of good practice and respondent validation.
2. **Transferability.** This criterion relates to applicability and transferability of the research findings into other environments or contexts. Issues were addressed by the comparison of one case with the available phenomena of the remainder of the cases.
3. **Dependability.** This criterion regards the research process with the dimensions of consistency and reliable stability over time across methods and researchers. Issues are addressed by exposing the results to peer reviews, by determining basic paradigms, by establishing clear research questions and explicitly elaborating the role of the researcher.
4. **Confirmability.** This criterion concerns the relative neutrality, freedom from bias and the study's replicability by others. Issues are addressed by a clear process description, clear establishment of the relationship between conclusions and data and reflection and bias, self-awareness.

Throughout the time span of the study I was aware of each of these criteria during the preparation as well as during the execution of the study. Regular reflection about the quality of the achieved status guided me throughout the research.

Furthermore, peer reviews conducted with members of the professional services associations Kundendienstverband Deutschland and “Experts in Service” as well as being engaged in servitization activities of the University of Hohenheim and the Fraunhofer Institut Karlsruhe ensured quality conduct of this research.

Summarizing, research reliability and validity has been reflected by considerations about methodology and philosophy. Thus, a realistic research methodology could be established for this study. The basis for this thesis is formed by the theoretical knowledge that is derived from the literature review.

### 3.8. Ethical Considerations

The research will follow the ethical rules as described by Kimmel (1988, p. 42) to prevent harm to participants, assure informed consent, prevent invasion of privacy, avoid deception and follows the principles of reciprocity and affiliation and conflicts of interest (Bryman and Bell, 2007, p. 143). Data protection is assured by cloud storing of encrypted data under personal access control. All established data are handed over to the interviewee prior to total erasure.

### 3.9. My Reflexivity as a Researcher

In the previous paragraphs, I concentrated on establishing a state of understanding of the product manufacturers transformation efforts. Increasingly I realized, that the method of defining solutions to problems is probably not be found in the realm of traditional contemporary management practices. Looking back to my start in management in the mid-1970s, the guidance of Drucker (1967) was the road map in management, focussing in particular on the effectiveness of the executive where operations research, critical path and computing systems were regarded as absolutely indispensable (Hein, 1967; Krauss, 1974). In all positions as an electronics engineer and service executive that I took up throughout my working career, and at all locations and places where I had been working, there was always an omnipresent, overpowering denominator: the working atmosphere was marked by a state of intensive hectic activity, executing given targets exactly and in a timely fashion, and delivering planned results reliably. The ideal of management was characterized by the demand and desire to resolve problems immediately and to have instant answers fitting any given situation universally. When browsing through the management books of my personal library I noted that there is a certain management evolution visible: of course, always based on the principles of Maslow and Herzberg and

increasingly orientating towards customers' demands, the management practices evolved and supported the industry (Kreitner and Cassidy, 2011) driven by a series of evolutionary forces. These started in the 1970s with deregulation, followed by sectoring, international standards, the culture of companies, up to the present-day mergers and acquisitions. This evolution of the business climate inevitably caused tighter management objectives culminating in ubiquitous incentives as the ultimate motivation and reward. Subsequently their achievement became the prime goal, killing non-remunerated activities and team spirit and causing problems in particular for cross-functional co-operation. I also noticed a further agonizing problem. Up to some time ago, product-oriented service executives played a valuable and sought-after role in their companies: service as a means to support and augment product sales figures, by swiftly restoring the working conditions of customers' installed equipment through maintenance and repair. However, with the steadily increasing supply of lookalike products, the appearance of fierce competition and the growing request of customers for solutions as their prime demand, repair and maintenance organizations lost their attraction, and were in consequence regarded as a sheer cost factor, undergoing restructuring programs with the aim of being out-sourced as soon as possible. I even observed a further aggravating trend in losing significance as a business factor: the demands of customers for business solutions was translated exclusively into the implementation of technology for product-oriented services in order to lower the service bill for customers by reacting and repairing faster than had been previously done without to the use of information technology and telecommunication devices. I regarded this trend as contra-productive and derogatory since also my stringent literature review that I carried out indicated clearly, that the present manufacturers' product-oriented service function is best positioned to be the nucleus for a transition into solution services (Zhang and Chu, 2010).

So, where do I position myself as an amateur researcher in order to be able to design a conceptualization for a transformation to servitization? I have been shaped by my past as an electronics engineer and service executive, and one of those traditional engineers as characterized by Robbins, (2007, p. 101) who were widely supposed to see "themselves as being appropriate leaders of society, and management of public infrastructure and possessing abilities to solve social problems by using science and logic. Thus engineers' worldview was elitist and hierarchical" and further, that engineers believe "they were more effective leaders because they were precise and accurate, having practical solutions, rather than being guided by idealism and imprecise thinking." Also, as a speaker at services

conferences, a member of the board of service associations and a participant at several university service initiatives, I have been widely occupied with service situations and technologies that demanded change and adaptation. Several times furthermore, I found myself reverting into a mode of co-operation by “knowing an answer for every question or problem”. At this stage I queried my personal position as to whether I could possibly achieve a successful qualitative research journey and how I would embark on a transformation study and mentally be prepared with a mind-set in order to meet the concept of Denzin and Lincoln (2011, p. 593) who state: “We seek, among other things, to understand the nature, process and consequences of social interaction, on the one hand, and how this promotes individual and joint renderings of a definition of a situation, on the other hand.” and further: “The social world and its human actors make and interpret meanings through an interaction process that contributes to the construction, reification, and resistance of social reality.” Reflexivity as a notion in the context of interviewing was neither known to me nor exercised systematically.

The taught phase of my DBA research project brought me into contact with reflexivity, and made me aware of the benefits of reflexivity in research and emphasized that reflection about the entire research process will be necessary in order to be able to interpret the obtained emergent qualitative findings. In addition to reflection about the research process itself, reflexivity also requires the unveiling of pre-determined conceptions as well as the understanding of the awareness about the situational forces that influence the establishment of findings that emerge during the communication and co-construction of meaning between informant and researcher. However, reflexivity comprises a further dimension as stipulated by Hsiung (2010, p. 5):

*“Doing reflexivity entails arriving at a critical turning point where the researcher turns the critical investigative lens away from others towards him or herself. The first and most crucial steps towards this point come when the interviewers become aware of their assumptions and locations as well as their emotional responses in an interview when these are in direct conflict with those of the informant.”*

To prepare and position myself in order to achieve effective communication and co-operation, I had to recognize that trust and rapport are based on the understanding as clarified by Fontana and Frey, (1998, p. 73): “as we treat others as human beings we can no longer be faceless, objective interviewers, but become human beings and must disclose ourselves, learning about ourselves as we try to learn about the other.” I intended to expose

myself directly and immerse myself in this role since in the confines of this study there was no room for “apprenticeship” and learning how to research by participating in adequate research practices. My initial in-depth preparation proved to be beneficial for key questions such as: Will I not be prepossessed with readily available directions and overloaded with preconceptions? Will I be able to establish a personal and trusting rapport? Will my posture and behaviour influence possible preoccupied answers insofar as my interview partners might believe that I like to hear certain answers? Will the questions I ask, my angle on issues as well as the social realities that I consider to be taken up not be influenced by conceptual baggage as Kirby and McKenna (1989, p. 32) express:

*“Conceptual baggage is a record of your thoughts and ideas about the research question at the beginning and throughout the research process. It is a process by which you can state your personal assumptions of the topic and the research process. Recording your conceptual baggage will add another dimension to the data, one that is always present, but rarely acknowledged. By making your thoughts and experiences explicit another layer of data is revealed for investigation. The researcher becomes another subject in the research process and is left vulnerable in a way that changes the traditional power dynamics / hierarchy that has existed between the researcher and those who are researched.”*

Derived from this, as a qualitative researcher I must be interested in establishing meaning and how this meaning is reproduced within a specific context in relation to its social, relational and cultural dimensions. Based on my professional experience and connections within the industry I am aware that I enjoy a unique position to gain access to senior industry informants. Thus I have been able to obtain richer insight than a researcher without those contacts. And I was also aware that I had to keep a definitive distance from my own experience and maintain a neutral stance throughout the entire study.

Having passed the taught phase of the DBA program I feel confident that I exercise critical reflection not only in this study. The approach to reflection has also influenced my way of working and also how I communicate and interact with my family and friends. Today already, I notice my different behaviour in board meetings and conferences – I tend to listen and learn, then issue an answer. I am inspired with confidence that the research will shed light on chances and identify opportunities to bring forward a fruitful transformation and also for me to be able to act as an agent of change and as an influencer.



### 3.10. Summary

The core of this chapter addresses the design of my research and describes the research scenario and research strategy that I have applied in this study. Besides informing the reader about the methodological research approach that was applied to this research, the case selection and the acquisition of data are explained. I concluded this chapter by outlining the quality criteria and ethical considerations that accompany the entire research flow, as well as positioning my research reflexivity in relation to my personal and professional background. In this chapter I pursued providing a holistic picture about the motivation for my research as the mental foundation for the parts that follow.

The next chapter will introduce the extant servitization literature in contrast with transformation. There, the purpose is to identify barriers and challenges that traditional product manufacturers faced in the past on their transition journey to servitization. By analysing the derived apprehensions empirical information will be established in order to prepare a conceptualization for the further research progress, on the basis of major themes.

## Chapter 4

### Analysis of Evidence

#### 4.1. Introduction

The introduction to this research unfolded the perception that services of traditional product manufacturers are increasingly looked upon as providers of constant reliable and profitable revenue sources. In the beginning this develops from an enhancement of their products through the provision of product accompanying services and evolves into the offering of solution-based services as customer specific solutions that are tailored according to customers' needs. The driving force for this re-orientation is based on the needs of customers in the capital goods industry to attain support for their business problems. Consequently, the necessity, the motivation and the resulting benefits for traditional product manufacturers in the capital goods industry to transit to servitization are explained in this chapter.

However, in spite of all observed positive examples of transformations carried out by traditional product manufacturers and that are also being conveyed by the extant literature, still, the practical and operational transition to servitization does not keep pace with the strategic directions of servitization as suggested by the literature. The majority of the manufacturers in the capital goods industry are as of yet not in a position to either have successfully launched or have accomplished a transition to servitization on a broad base in economic terms.

The literature indicates that a transition to servitization can be approached along various avenues and there is a need in the capital goods industry to understand the parameters that lead to a successful transformation – in particular for those traditional manufacturers who already carry out product related service activities in one or other form. This research therefore, has focused on twelve manufacturers from different industries and different approaches to customer relationship that successfully underwent servitization transformation. The aim was to establish relevant knowledge in order to attain a practical conceptualization model to be applied by practitioners on their transition to servitization.

Chapter one set out the design of this research and described the research motivation as well as the applied research strategy in connection with my's perspective and how this perspective embraces the study. In addition, in chapter three, information about the principles of ontology and epistemology were outlined and the assignation of the

methodological research approach suiting the total research process was described. Subsequently the case study method, the selection of cases and also the collection methods of the evidence were particularized and complemented by the description of the entire research process. Finally the chapter concluded with an exposition of the quality criteria and ethical considerations that accompany the entire research process.

In succession, chapter two focussed on the literature review where the juxtaposing of the literature of research and practice revealed that the transition of the capital goods industry to servitization does not keep step with the growing number of research publications, in particular during recent years. The research was carried out with the aim of searching the extant servitization literature in order to identify the barriers and challenges traditional product manufacturers may have learnt on their journey to servitization. Particular emphasis was laid on the identification of the existence of major patterns whose importance appeared or changed over time. To complement the inquiry, further literature that did not directly address the term servitization was also taken into consideration. By consulting relevant literature that dealt with a re-orientation or a new orientation of services from product-oriented services towards a sense of solution-based services, a holistic insight into the present state in connection with the attempt to undergo a journey to servitization could be established. The governing influences were identified and arranged subsequently according to importance and impact in order to obtain an insight into the transition to servitization in its entirety.

The main emphasis of this chapter is upon the examination of the transition to servitization by the generation of evidence through fieldwork.

#### 4.2. Findings

In order to ascertain the foundations of this research I again feel the need to outline the underlying theme at this moment to make clear that the transformation should achieve a business position for the service delivery function of a traditional product manufacturer that is in line with the manufacturer's strategic business orientation and at the same time meet customers' perceptions and requirements by co-creating value together for the customers according to their business requirements and competitive market position. The aim is to demonstrate through this study that a traditional product manufacturer should not operate its product-oriented service function as an isolated part of the company with the main purpose of supporting the sale of products. Quite the opposite, the purposeful positioning of the product-oriented service capabilities and the continuous advancement

and further promotion of their competencies should be intentionally commenced as a transformation with the objective of integrating services as part of the entire enterprise towards customer orientation and a stronger integration into the development and value creation of customers.

This chapter begins by categorizing the collected empirical material in a theoretical and systematic manner into relevant major themes and sub-themes appertaining to each specific major theme. Subsequently, the ramifications and consequences resulting from the major themes and sub-themes are discussed and evaluated. This discussion is guided by a view that represents customers' perceptions and requirements in respect of the servitization orientation of a traditional product manufacturer. An integrative summary terminates this chapter.

#### 4.3. Analysing the Emerged Data

Having obtained a substantial corpus of rich, unstructured data stemming from the interviews and associated material, it did not seem to be analysable in a straightforward manner. By searching the literature about qualitative data analysis, I found myself as a novice researcher, confronted with a bewildering variety and complexity in approaching qualitative analysis (Holloway and Todres, 2003). The given situation, as highlighted by Bryman and Bell (2007, p. 579) that “clear-cut rules about how qualitative data analysis should be carried out have not been developed” did not create more trust in my search and understanding. Braun and Clarke (2006) refer in their paper to Boyatzis (1998) who points out that thematic analysis is a widely applied qualitative analytical method and characterizes it as a tool to be used across different methods rather than constituting a specific method. Braun and Clarke (2006, p. 70-71) continue further: “thematic analysis is the first qualitative method of analysis that researchers should learn, as it provides core skills that will be useful for conducting many other forms of qualitative analysis” and “through its theoretical freedom, thematic analysis provides a flexible and useful research tool, which can potentially provide a rich and detailed, yet complex account of data”. There are a variety of different approaches to thematic analysis that differ distinguishably (Boyatzis, 1998; Braun and Clarke, 2006, Joffe, 2011 and Guest, MacQueen and Namey, 2012).

For my research, encouraged by the opinion of Boyatzis (1998) and Braun and Clarke (2006), I have chosen the approach of Applied Thematic Analysis as proposed by Guest, MacQueen and Namey (2012). Their approach represents an iterative manner of thinking

and acting and leads to the emergence of analytical categories and their evolution while the data is iteratively analysed. Guest, MacQueen and Namey (2012, p. 10) explain, that “Thematic Analyses . . . require more involvement and interpretation from the researcher. Thematic analyses move beyond counting explicit words or phrases and focus on identifying and describing both implicit and explicit ideas within the data, that is, themes.” Codes are then typically developed to represent the identified themes and applied and linked to raw data as summary markers for later analysis. Boyatzis (1998, p.63) referred in his work to these codes as “the most basic segment, or element, of the raw data or information that can be assessed in a meaningful way regarding the phenomenon”. Such analyses may or may not include the following: “comparing code frequencies, identifying code co-occurrence, and graphically displaying relationships between codes within the data set.”

Resulting from this, in order to be able to look for major themes and recurrent patterns, I had to move backwards and forwards within the transcribed text and additional notes that I had jotted during the interviews. Quite often I drew on the voice-recorded parts of the interviews to sense the informant’s mood and atmosphere that related to the spoken or unspoken word. I could clearly see that this was a data-driven process leading by an in-depth analysis to the identification of major themes and their related sub-themes as well as implicit and explicit concepts within the emerging material. I practised this iterative tactic several times within each data set as well as across the entire data corpus in order to be able to refine and question the emerging themes. Although this represented a substantial amount of my available time I saw in it a necessary sacrifice as it allowed me to approach the finest ramifications in order to establish a cohesive and consequential interpretation.

Throughout all the interviews I felt that I was in a very favourable light and atmosphere where I had not only to listen to my interview partners and let the responses go unchallenged. The face-to-face interviews proved for my interview partners and for myself a platform, that was characterized by Burgess (1982, p. 107) in this way: “. . . the opportunity for the researcher to probe deeply to uncover new clues, open up new dimensions of a problem and to secure vivid, accurate inclusive accounts that are based on a personal experience”. While the interviews were carried out on this basis I could take advantage to add my voice during the interview as well as during the analysis of the emerging material, due to an atmosphere in which, as Easterby-Smith, Thorpe and Jackson (2012, p. 158) explain “. . . many individuals find benefit in talking to an independent outsider about themselves or learning something about future changes in the organization. .

.”. And although I tried to take a position as an external observer and to be un-prejudiced and preoccupied as little as possible and to integrate myself as being acquainted with the research topic as feasible, generally I had the impression that my posture and empathy were challenged at times. Very soon during the course of an interview my interview partners not only talked about the very subject matter and their world but also about their work situation and I heard about their feelings, perceptions, fears and hopes in connection with their company career, as has been expressed also by Kvale and Brinkmann (2009).

The field work resulted in an extraordinarily wealth of deep and rich data across the entire activities in which a traditional product manufacturer’s service delivery function is engaged – either product-oriented or solution-based. When I worked out the plan for this thesis into the division of several tasks and sub-tasks I envisaged that with my professional background and the support which I received from my supervisors that the part of the analysis might be a task to be carried out straightforwardly - compared with the modules such as methodology and literature review. I had to learn that this was quite to the contrary. As the development of the analysis of the merging material progressed, I felt initially as though most of the responses would fit as sub-themes into any of the emerging major themes. Concurrently, it also occurred to me that the analysis of each response either appeared as an exclusive theme with the characteristic of a key or major theme or I could allocate them all under the header of one key theme. I tried several tactics, e.g. from word count to labelling sentences, phrases or sections or searched for repetitions in different interviews without, as far as I could determine, achieving any remarkable or worthwhile result. Only when I disciplined myself and mentally left the service arena as seen from the perspective of a traditional product manufacturer and approached the analysis from different angles as seen and experienced by the different functions of a customer’s organization, could I step forward. Now I could collate and match the analysis responses.

By applying thematic analysis I could generate four distinct major or key themes: Operational Readiness, Asset Availability, Business Continuity and Business and Market Strategy. In order to allocate the findings of a major theme I applied the following code. For example, the coding A1F or A1C represent the following: A stands for the key issue A, 1 stands for finding number 1, F represent a finding and C represents my comment to that finding. Accompanied are these themes by the perceived benefits and their related key issues.

For the presentation of the analysis outcome I employed the table view as suggested by Ozuem and Lancaster (2012). These major themes and key issues will be derived from the interview analysis that follows in the next sections.

#### 4.4. Operational Readiness Implications

One of the first themes that derived from my analysis of the interviews was one of operational readiness. The main target of companies is defined by their established strategic mix such as market position, cost reduction, or competitive advancement in order to attain the planned economic success. This is also valid, albeit with different targets and objectives, for the production and manufacturing area. The specified results have to be provided within a preset range, given time and defined quality by using the given production means and resources. Reliability plays a decisive role in this scenario, referring to the basic requirement by which a customer or equipment user intends to effectively utilize the installed company facilities within a pre-defined range of operating capabilities and standards.

This leads to a consideration of when a product fulfils its functional parameters under all operating conditions and all the time then it is regarded to be a very reliable product. This consideration is generally brought into connection with the idea of an excellently designed, developed and manufactured product. In the real world however, quite a number of influencing factors determine actual product behaviour, for example operational load, production parameters, site and environmental conditions, operations, the entire production process but also the way in which product-oriented services are delivered.

A product-oriented service delivery aims to support the operation of equipment and production facilities by the provision of inspection, repair and maintenance. By providing these services the management of customer requests and the response to these requests as well as the communication about the request progress have priority. While proceeding under these parameters a general belief guides the objectives that the time between two failures, the Mean Time Between Failure MTBF ought to be as long as possible, the duration to resolve a failure, the Mean Time to Repair MTTR should be as short as possible and the period in which the equipment is inoperable, the Mean Down Time MDT should also be very short. Therefore a product-oriented service delivery function faces a number of particular professional and business requirements and challenges. Improperly carried out service actions may, in the worst case, incapacitate the entire business process of a customer. Resulting from this the required business orientation of product-oriented

services is two-fold: support the product brand as well as the reputation and image of the product-oriented service delivery function. While analysing the interviews I was not surprised that the area of reliability and its related sub-themes formed a major theme. It also provided me with the insight of how difficult it is for the product-oriented service function of a traditional product manufacturer to relinquish a reactive services position as a mere spare parts seller on request in order to advance the current organization towards servitization.

#### 4.4.1. (A) Culture

The transformation of a traditional product manufacturer towards servitization induces the appearance of far-reaching effects on the various functions of a company. The change on the company culture wins particular importance as it appears hand-in-hand with the re-orientation from a focus on products towards a distinctive service mentality, creating value for customers. Thus, the setup and expansion and the further development of service as a manufacturer's core competence, will only be achieved by re-forming the company culture towards a service culture under the guidance of a service-oriented leadership.

However, there is some doubt as to whether the sole reference to the provision of services in the mission statement of a company is sufficient to actually influence and initiate a profound effect on the company culture. The values of a newly established service culture have to be lived by the executive team and fulfilled with clear targets and binding values. Furthermore, particular attention must be laid upon the integration of the service function into the manufacturer's entire operation in order to prevent a parallel culture of service and the technology areas.

*(A1F) A general manager for services of an international power equipment manufacturer stated that "it took rather a long development time to reach the status of a preferred service supplier. The whole company culture had to be built up in order to leave a reactive state and progress towards services to meet customers and market requirements. When I joined the company as a young university graduate nearly two decades ago, I was asked to sell spare parts solely at customers' requests. The related revenue volume was so small it did not even appear on the various control sheets. If there were repair actions they were pursued by the factory workshop or by the assembly personnel who took care of the installations at new businesses. Even when I wanted to enlarge the spare parts sales volume, I could not proceed successfully since we had no proper data set for the installed base. Quite honestly, our small department had no idea where our products were installed.*



*Even worse, when there were technical questions in relation to the use of spare parts, my request was always given quite a low priority by engineering. Quite often it took weeks before I could return to the customer with an appropriate answer. I felt quite frustrated that I could not respond appropriately to a customer's requirements. As a small department we were not heard or taken seriously in our company that yielded €1bn revenue at this time. However, things changed drastically with the advent of the economic crisis in the mid-90s. This situation also induced the motivation to restructure the company. Spare parts sales together with some engineering and manufacturing functions were phased out with the purpose of establishing a pure service business in the form of a receiving company. Since then however, services have grown extremely positively and currently represent the major part of the company's turnover."*

(A1C) This situation is clearly marked as a case where manufacturers mainly focus their culture on providing the market with products. The entire after sales orientation had been directed towards a reactive mode with dispersed responsibilities for corrective and remedial activities. There was no common strategic and operational structure to approach a thoroughly planned, timely after sales service in order to support neither the company's image nor a process in order to react accordingly to customer requirements. However this devolution may be regarded, the noteworthy impression remains that services were not newly-aligned by the strategic decision of the executive team – they were rather commanded by endogenous forces.

(A2F) *The head of services of a multi-division global provider of access solutions stated that "when I joined the company as a chief service officer, service was solely introduced in one division. Services were carried out on a strict reactive basis in an auxiliary-like function as a supporting role for sales. The mission of the service function was to further enhance and promote the reliability of the premium product. If something had to be corrected it was the service function's responsibility. Greasing, maintenance and repair activities formed the main service delivery contents, complemented by warranty claim fulfilment. Since the products were mainly installed in areas of dense public access, the product-oriented service delivery function had also to oversee that all safety standards and precautionary measures were applied in an orderly manner. The service revenue at this time accrued to a single digit figure. However the chief executive officer and the executive team could see the customer demand for more than only remedial services and envisaged a growing service market potential by concentrating the responsibility for all divisions and countries under one leadership. During the following years the service business grew in*

*consequence. The more the business results grew the more the service function grew in confidence. This even attracted successful regional sales managers to join services. Consequently this infused new industry and customer know-how into services. Their eloquent and convincing appearance was seen as a milestone in achieving a respectable visibility and value of the services function within the enterprise.”*

(A2C) The service culture of this company is clearly based on the mission to support the image of their premium product. The intent is to achieve this partly by remedial product based services and to a smaller extent by the assurance that all safety standards and precautionary measures are applied at their relevant premises and installation sites. The future development of the product-oriented service delivery function was supported by the CEO under the expectation that the growth of the solution-based service business would result in a significant part of the entire business of the enterprise. Resulting from this, furthermore, the direction to build a positive image of services within the company was promoted and the infusion of critical sales and managerial skills as well as industry and customer knowledge could be achieved, thus forming an altogether good basis to exploit the present skills and infrastructure to further orient their services towards servitization.

#### 4.4.2. (B) Brand

Traditional product manufacturers will increasingly have to meet the requirements for the existence of qualified, professional service. Not only remedial service during the warranty period of a product must be provided effectively, but also the apparent reality of the product delivery after the warranty period is increasingly demanded. The service delivery activities encompass a broad spectrum of services that are provided, such as maintenance, repair, spare parts provision and hotline help support. Manufacturers, who regard currently product-oriented services as a valuable business contributor, place a high level of interest in a professional service management that is directed by ambitious targets for customer satisfaction, the achievement rate in the sale of maintenance contracts and the avoidance of service losses to third party maintenance. Those product-oriented services are provided in very close contact with the product and thus play an important role in the customers' perception of the product performance. Also, the customers' attention towards total cost of ownership determines the cost of service in addition to the product cost. Thus, service increasingly assumes the position of a decisive factor in the purchase of products. The future transition to servitization builds upon a professional product-oriented service that

assists customers in achieving reliable products successfully. By this, the brand is supported and a base for a successful transition to solution-based services is established.

(B1F). *The director of service of a global provider of innovative solutions for farming technologies and smart food processing pointed out that “when I joined the product-oriented service function, the company’s thrust was on technology, the manufacturing of the resultant products and their sales. Although we are a leading edge technology provider the company is embedded in a sharply competitive market. Services were carried out in a very reactive mode. The related service revenue resulted nearly entirely from the sale of spare parts. Since the sales activities are led by a multi-tier concept, specialist retailers were intended to carry out the necessary product remedial services. And of course the interest of these specialized dealers lay also in product sales rather than performing services. Although those dealers are supposed to have dedicated service personnel, service activities are first and foremost season-bound. Services are performed mainly during wintertime when the weather does not permit equipment assembly and installation activities. Moreover there existed a further function claiming to be involved in the process of establishing an effective service delivery. It was not at all clear who was the leader and when the applicable results should be available. Due to this lack of exercised responsibility we had to make some very unpleasant observations. Seemingly normal incidents reached the headquarters. Customers’ complaints reached the board of directors. The products involved as well as the entire firm were rated as being inferior due to a perceived persistent product malfunction. When my engineers travelled around the globe in crash mode and in a fire-brigade-like fashion we discovered that basically our product was not the culprit. In nearly all cases, a series of general, or rather specific influencing factors such as environment, operation or utilities in combination with our product were causing these escalations. Nobody possessed sufficient skill to resolve this situation previously. Very soon I realized that no strategy existed that supported the company’s brand with a coordinated customer approach for products and services. In addition a further aggravating factor arose since the company was in the process of undergoing a substantial merger, incorporating several specialized technology firms. All of them came from different global regions, all of them spoke a different language and all of them were oriented towards a different service business strategy. The aim was that all their products, together with our products, ought to be deployed at the same individual farm. My main task was to create a common understanding of what service means, create a common service platform and an infrastructure to enable the entire service delivery to work on*

*common standards, processes and tools, embracing a common service language. I had to establish training programs for service deliveries and service sales and concentrate on the fast resolution of problems. As the service director of a global technology product provider I saw that I had to bridge distances in difficult and severe situations by exploiting modern ICT capabilities in order to support our product image as well as the reliability of our product as perceived by the customer. Some time previously the board of directors had instituted enterprise re-orientation towards a solution-based company. Since then all functions from product management to sales and services within our enterprise mentally internalized this direction and worked very hard to achieve progress. I have the impression that we progressed favourably to act as a team and then, service revenue is accrued from more than just selling parts in a reactive mode.”*

(B1C) This detailed description depicts a case that exhibits the number of challenges resulting from when a manufacturer has to learn that the business emphasis rests solely on the sale of products. This especially threatens the business of a manufacturer that provides high-grade and leading edge products. The characteristics of the equipment and machinery of this nature require thoroughly trained operating personnel, carefully planned installation environments and a service strategy and service delivery that is aligned with all operational and geographical dependencies. A reactive service mode or even just relying on selling spare parts at customers' request will not be sufficient to protect the brand and support, let alone enhance the product reliability as perceived by the customer. An additional observation can be drawn from this description. There is a high probability of involving partners when the normal service delivery reach of a company is extended, e.g. delivering products across borders. A suitable service delivery strategy has to accommodate the dependencies of the partners. It ought to homogenize the problem resolution and service delivery processes with the result that service partners act on customer's premises as though they were direct manufacturers' engineers.

(B2F). *The head of service had experienced quite a different setting when he started his career with an international company providing products for office automation. He brought up the then existing situation for the product-oriented service delivery function in a very positive way. “The standards for the delivery of product-related services were perfectly implemented. Product-oriented service measurements including MTTR, and MTBF, were stringently followed up on, in order to assure product reliability. Those measurements were even compared with customer satisfaction, in a timely fashion and almost religiously surveyed and tracked. All this was embedded in a constant cycle of*

*improvement activities of the service processes. Regular comparisons through market surveys, market intelligence and participation in service conferences indicated that this product-oriented service delivery function was one of the leading service providers in the product-oriented service industry. Everybody was convinced that superior service was the best method of customer acceptance and thus competition prevention. Likewise it was accepted throughout sales that with every product sale a corresponding service contract had to be placed. As a general sales attitude: product sales to the detriment of the sale of service contracts just did not take place. The board of directors had taken the decision to re-align the company as a value generation and solution enabling company. In order to be in adequate delivery position, the intention was to acquire new capabilities and competencies by the acquisition and merger of a number of specialized technology and services firms. Now the challenge arose to ensure the integration into their own operation, establish a common service culture, come up with a solution-oriented service strategy and establish appropriate resources. In addition I noted that although product-oriented service delivery was carried out to a high standard, the mind-set of the managers and team leaders was very much limited to a mainly technical orientation. In the past managers and team leaders had been selected for their technical expertise – the technician who could resolve the most difficult problems would be appointed to a managerial position. Today I may claim that I have overcome these challenges and my service delivery function has attained a status of a preferred service delivery function within our customer set.”*

(B2C) An important point on embarking on the journey to servitization is displayed by this service delivery function through its exemplary degree of service maturity. A highly successful product-oriented service delivery operation, accepted by customers and aligned with the product sales function, autonomously exercises the responsibility for the sale of service contracts. The company is furthermore ideally poised to implement the decision of the board of directors to move towards a solution-based direction by building up the important customer-oriented cultural mind set and consequently arranged the acquisition of the necessary skills and competencies.

(B3F) *The services executive with power of attorney of a family enterprise with global reach that provides drainage solutions took the responsibility to assure customer satisfaction by delivering comprehensive, integral customer support in the after sales phase of their business. “Our service deliveries encompass the assembling of facilities and their commissioning, spare parts sales, repair, maintenance, remote service and the waste management of operating materials. The required industry knowledge and the complex*

*nature of spare parts held the competition at bay. The accompanying measurements were service revenue, earnings results and customer satisfaction. Service delivery was accomplished by the company's own resources for complex installations and through a network of certified service partners as the fulfilment outlet for most of the standard product configurations. Besides the delivery for product-oriented services I assume the responsibility for technical counselling of the pre-sales offerings team in order to ensure the operational readiness. However, a systematic, controlled expansion of the product-oriented services business was hampered due to the lack of knowledge about the installed base. Induced by customer requests and opportunities stemming from customers' operations, the first tests to design solutions such as deliveries soon started successfully. They coincided with the board's decision to align the firm with solutions, as in the terms of the mission statement to create solutions for tomorrow's environmental conditions."*

(B3C) The culture in this firm is insofar remarkable, as the CEO has supported the initial activities in the direction of servitization of the product-oriented service delivery function. In addition, the product sales organization on the one hand assumes the responsibility for marketing the service and maintenance contracts in a sustainable manner, while relying on pre-sales planning of complex offerings depending on the technical expertise of the product-oriented service delivery function. This offers a favourable perspective to move towards servitization by exploiting the product-oriented service delivery function's technical capabilities in order to create solution-based services that directly create value in the operational production processes of customers. Therefore, this approach supports the company's direction in the creation of value through the support of their customers' business. The notable standing and perfect appreciation of the manufacturer's service delivery function are expressed among other things, by the direct reporting line to the executive board of this company. Having noted all this, one more observation remains: All product-oriented services are delivered on a reactive basis only when customers request remedial action.

(B4F) *The general manager of business services of an international corporation delivering power transmission and distribution equipment pointed out "that the nature of our products creates a mental blockage. This blockage makes it hard to accept services as an implicit necessity in supporting customers' businesses. To quote: Basically, our products neither move nor turn – they have no abrasive motion. Everybody understands activities that are forced by wear and tear. However, as laid down in the "Bath Tub Curve" principle, static products also fail by suffering from such factors as temperature, chemical*

*influences, environmental factors or even technological boundaries. This is fundamentally different to the behaviour of products such as engines or turbines. As a result of this, the main task for a product-oriented service function in an environment like this is to anticipate reliability-threatening influences that could cause a possible breakdown, and to initiate activities to prevent failures. It took great efforts to explain this fundamental difference in the service mission and to convey this to customers as well within the company itself. When I started in the early 2000s, the main service activity was strongly focussed on selling spare parts in response to customers' requests and delivering product-oriented services in an unscheduled and thus reactive manner. During the following years, we united the product-oriented service delivery function of the various OEM business units within the company into one service delivery business unit. During this time we could enjoy a healthy growth in turnover to the order of more than 400 percent, which now represents a respectable part of the operating income of the corporation."*

(B4C) This description reveals a different approach to product-oriented services. Generally, the practice of a product-oriented services delivery ensures fast spare parts procurement times, efficient hotlines that manage service engineer activities and escalation echelons to reduce equipment down time. This approach is in contrast with solution-based services that aim at forecasting possible potential malfunctions and initiating preventive action when the least impact on customers' business processes will arise. This approach satisfies all the prerequisites of a very valuable start towards servitization, since the core activities focus on customer requirements for an uninterrupted operation.

#### 4.4.3. (C) Installed Base

The most important source of knowledge for a manufacturer's successful service business is to be conscious about the various sites where the manufacturer's original equipment is installed and operated. Not only is it important to know the location, but also the exact configuration, the characteristics of the installed features as well as the exact status regarding modifications, equipment revision dates and the status of information about operational business processes. Thus, the manufacturing and engineering division are able to initiate technological and functional improvements in order to promote reliability and functionality. The more a manufacturer knows about his present customers and their actual operation, the easier is it for him/her to develop specific services and programs either for individual customers or for clusters of customers, and thus respond appropriately to their characteristic demands. The advantage proves to be two-fold: The present service business

model can be exploited, the installed base enlarged and the potential for service activities leading to servitization prepared. Resulting from this, strict management of the installed base is imperative. That base must list all deliveries of either every aspect of products or any services offering.

(C1F). *“The installation and consequent management of an installed base was one of my prime concerns when I took on the responsibility for services. We only had knowledge of very few customers – a very low single-digit number. For a product-oriented service delivery function a multi-tier marketing approach constitutes a clear disadvantage, if appropriate processes are not established right from the beginning that allow the tracking of the products across different sales channels and project responsibilities. In order to achieve a proactive form of service delivery, I had to work very hard to gain the involvement of several other functions within the company and win their co-operation. I also had to address retroactively the channels, facility management organizations and large planning offices to collect actual data. At first glance it was believed that the lack of an installed base management was only my personal problem until it was realized that it was the base for the company re-orientation towards solutions. Basically, we still did not know where the bulk of our equipment is installed. Today however, we have already been able to achieve tremendous progress and double the volume of maintenance contracts, which is a promising sign for realizing a proactive service posture in the service market.”*

(C1C) In order to leave its reactive service mode and carry out successful service delivery, any product-oriented service function must know exactly where the manufacturer’s original equipment is located and in what business conditions it is operated. In addition, there must be a holistic compilation of all service activities that were delivered for every product and every customer. Thus, proactive procedures can be initiated in order to analyse product behaviour and suggest preventive measures for customers, plan spare parts replenishment according to the installed base and further drive the volume of maintenance and service contracts in order to achieve the targeted growth. Starting with little knowledge about their installed base, this product-oriented service delivery function has now reached a service maturity level that allows progress towards servitization. However, this also demonstrates the significant efforts required to reach that state.

(C2F) *“As far as I can recollect the development phases of the service delivery function during my whole career in this company, we managed the installed base in an almost religious manner. Every specific machine and product with each feature at every location*



*was tracked. We always knew when a product was shipped, when and where it would be installed and who would install it, how long it took until it was commissioned and what happened during installation. This was also the core knowledge base of our help line, connected to all service activities, their duration and the specific activities that were delivered and the timely replenishment of spare parts resting on them. It further formed our base for service pricing because we knew the amount that was spent on each single activity in time and material. Additionally, through this system we managed our human resource planning as well as for the planning of professional skills throughout the entire service division. Resulting from this, two important purposes were supported. First, this enabled us to communicate effectively and directly with our design and manufacturing functions. Through this, early incidents were detected and highlighted and fed into development and manufacturing. Thus, timely preventive activities or the provision of a work-around could be initiated before a situation could possibly appear on the market as a pervasive problem, hampering the reliability of the product and subsequently threatening the brand image. Secondly, without deep and specific knowledge we would only have had a very minor chance to move towards servitization and progress in the range of our service delivery offerings during the past two decades. The more we know about a specific business operation, the more are we able create value with our customers.”*

(C2C) Regarding servitization, this company presents a very good position in terms of profit contribution towards the parent company and at the level of customer satisfaction with the delivery of its service offerings. The early, determined emphasis on the installed base provides the prerequisites for the desired results. In a certain way, this approach could be exemplary in the way it has implemented servitization.

(C3F). *“Regarding the management of our installed base I see that we have more or less everything under control as far as the large facilities with fleets of valuable assets and equipment such as power equipment stations and network-matching devices are concerned. The actual challenge is the build-up of the installed data-base of the equipment that is marketed through our multi-level sales and distribution channels.”*

(C3C) As in a previous case, the management of the installed base for products, distributed by the manufacturer’s sales function seems to be under the control of the product-oriented service delivery function. I feel that there will be some persuasive effort required in order to establish an agreement with the existing product distribution partner channels, and to

control the level of reliability service delivery, agree on the sales approach for service contracts and so build a realistic base to move in the direction of servitization.

#### 4.4.4. (D) Readiness

Readiness represents the ability of a manufacturer's service delivery function to establish a service infrastructure that provides appropriate facilities and tactics in order to fulfil service delivery. This should be executed within the established guidelines that result from the company's strategic direction. The traditional core responsibilities of a product-oriented service delivery function concentrate on product installation and product commissioning phases that lead to the typical product-oriented services in the after sales phase. Increasingly however, its competencies are required within the company itself, also in the phases that take place far ahead of the actual pre-sales cycle, in which sales consulting and sales preparation activities are carried out. The product-oriented service is involved in the design and development of new products from the conceptualization phase to product shipment, in order to contribute its knowledge about customer and service requirements as well as its knowledge about the customers' operational conditions. This involvement is applied product-related either for "off-the-shelf" products or order-specific and customer-related for installations and facilities. The design for reliability and serviceability requirements and the design for the ability to service components, machines or entire facilities according to customers' operation requirements add a further important activity. These activities also serve a dual purpose. First, they are in the very best interests of a product-oriented service delivery function and secondly, they support the achievement of the customer's product expectation by improving product reliability. Improvement in product reliability as well as reduction in service cost is a direct result of the product planning process. If carried out in an orderly manner, a product planning process will yield a service cost decrease in the context of avoiding usage of time and material. The improvement of product reliability is the result of product planning that aims at the decrease of the mean time between failure, the mean time to repair, thus leading to a decreased equipment mean down time. As a consequence, the traditional product-oriented service delivery function acquires specialized skill by this active co-operation, which can be applied either to internal training programs or in project management activities at customer sites. A consultation that is carried out by the service function in the production-planning phase enables the infusion of service requirements into the production process in order to bring about production methods that improve product serviceability in various

customer environments. The consistent implementation of service requirements in the product development process has to be negotiated on equal terms with development and marketing. A sign-off by the service function in order to declare a product to be ready for announcement concludes this process. A systematic, consistent feedback from the field by service engineers about the technical product performance during product use provides fast track information to identify early product life problems that could threaten the product reliability and thus the good will of the company. Last but not least this feedback also serves as a long-time channel for important product and application-oriented information as well as supporting a manufacturer's product liability position.

(D1F). *“ When the decision within the management board was taken to quit the reactive mode and to run the product-oriented service delivery function as a profit centre, my first task was to define what constitutes a profit centre in reality. For example, areas regarding how a service profit centre should be positioned within the company, what the vital functions are, how it should operate in relation to customers, how channel conflicts should be addressed, how the relations and the co-operation with and between the different functions should be established. Furthermore, by taking a proactive service business stance, the basic and vital service functions for product-related services had to be defined, such as tour-planning, route-scheduling, spare parts provision, training and motivation programs, the provision of generally applicable service contracts and the billing process. Then I designed the blueprints for the different product-oriented service delivery functions, for the smallest service operations cell, the required force of skilled service engineers and a structure for the German regions with a perspective for replication within the various countries where the company operated. In addition, I explained and negotiated the entire process with each individual country leadership in order to secure a following. I did it so painstakingly, since I experienced an undesirable situation that nearly forced the entire country organization to slow down when I took responsibility. In accordance with the general implementation of an enterprise resource planning system, a CRM front-end system was implemented while placing emphasis on technology. However neither the tasks, nor the service business offerings nor the different job roles including their templates nor the educational and motivational programs were implemented. The reactive mode offered little leeway in decision-making and individual maintenance contracts were delivered ad hoc on customers' decided requests. An essential business activity that I negotiated is the right to take responsibility in the release process of new products by the merging of our product and service requirements into the development and manufacturing process. In*

*order to facilitate this process, we enhanced our “emergency call” service feature that had already existed, implemented a new interface specifically for this purpose and were so able to feed the necessary information to product development in a structured format and in real time.”*

(D1C) This example of a previous product-oriented service delivery function reveals clearly that a transition to servitization encompasses much more than the establishment of an appropriate mind-set within the service function and the entire company management team. The revision and re-design of all services processes is imperative - the moment the decision is taken to abandon a reactive product-oriented service mode. If the service activities are centred on the achievement of product reliability and useful operating capability as the core service activity, then all service processes have to assume the customers’ operational perspectives. Investments such as the acquisition and collection of data regarding the entire installed base, the real-time monitoring of product failures and performance data as well as the establishment of a capability to analyse and draw conclusions have a very high priority.

(D2F). *“We first had to define the strategic direction of our newly founded service company, with its own profit and loss responsibility, its own business figures and market definition. How would we operate as a profit generating function, how would we determine and achieve our leading edge, how would we build an appropriate business model and how should the customer relationship be implemented? We had to start right at the beginning to gain a proactive ability and leave the reactive spare parts selling mode as the only mode of service operation, without neglecting its economic potential, however. We had to restructure the company resources and leave our “appendix”-like connection to manufacturing whose focus is on the production of new equipment. As a result, we took responsibility for the required parts production resources and started to run our own factory.”*

(D2C) The conceptualization of a re-direction towards servitization bears a number of consequences for a traditional product manufacturer. Besides the investments in processes, training, education and tools, a stable position throughout the entire company has to be established in order to view solution-based services as a new line of business. The model of providing reactive product-oriented service in order to facilitate the exchange of goods – either in the form of product/service bundles or as free of charge services, has to be abandoned.

(D3F) *“Regarding the basic service readiness of my new responsibility, I felt quite confident that the service processes were professionally introduced since the management of product performance, related service processes and operating supplies were in accord with the overall current company strategy and a valuable starting position towards servitization. When I started at the helm I knew that quite a number of recent mergers would require intensive, integrative work. This work related to the re-orientation of the newly incorporated companies towards an overall product-oriented service delivery approach. This work comprised the implementation of new service processes for improved product reliability, the support of the customers’ operations, customers’ asset management and continuous improvement in the customers’ production processes. In order to facilitate these targets and to demonstrate the service brand uniformly and consistently in the market, I concentrated and integrated all service functions of the newly merged companies successively within the headquarters and according to the extent of their service business impact. The introduction of English as the international service language instead of a national language proved to be very valuable for customers as well as my own service delivery function. Luckily, I did not underestimate the rather long time for servitization to be implemented in the heads and hearts of all involved.”*

(D3C) The current customer production sites are characterized by a heterogeneous topography of various machines that are delivered and installed by different manufacturers. In parallel, customers’ investment and decision factors for a services provider are not focussed any longer on single overall criteria such as a very high ranking on the customer satisfaction index. Resulting from this and in accordance with this heterogeneous topography, decisions are increasingly based on the appropriate response to customer demand for, for example, the service infrastructure and logistics, the ability to co-operate with partners, industry knowledge, ability to make decisions according to a given customer situation, the attitude to easily do business with the assurance of a long-term partnership or the ability to take responsibility for the product reliability of the entire equipment or facilities. Resulting from this a holistic servitization approach for all divisions including the acquired companies as well as the service business partners is essential. The change of perspective, from the product view to a view that assists in the establishment of reliability for customers’ products presents a major task in re-designing all relevant service delivery processes as well as a re-orientation in the job roles of service engineers. These changes are bound to take rather a long time.

#### 4.4.5. (E) Materials Management

Materials management as an inherent part of service management and one of the most critical success factors in achieving a profitable service business. It is principally understood as the management of required spare and service parts within the different phases of the product-oriented service delivery process. First, the materials management process must provide the required parts provision level for the company's service force as well as for customers' orders and secondly ensure an economical parts replenishment process in order to satisfy optimal parts stocking levels to satisfy an optimal capital lock-up versus a balanced positive parts delivery and the number of referrals. Further, a process for the materials return of defective, no defect found or erroneously ordered parts – either for reuse and refurbishment or scrapping is included. Generally, the process that assures the maximum demand for reliability provides each required spare and service part within the required time frame at the required place. A growing service business sector is to satisfy the demand of assumed product-oriented service responsibility for Third Party equipment in the form of Third Party Maintenance TPM. A high expertise is required to plan the sourcing of maintenance parts in the form of captive parts that cannot be obtained through independent parts provision channels and for standard parts that are manufactured according to the norms of the DIN Deutsches Institut für Normung.

(E1F) *“Our product-oriented service delivery core activities encompass in principle the classic operating equipment such as load-matching devices, switching gear and all elements and components of switching facilities. Generally, in our spare and service parts business we focus on the customer, mirror his/her operating process and strive to manage the customer's spare parts stock. We offer the planning and optimal customer stocking as well as the proactive sale for those parts that are needed by customer self-service activities and those strategic parts that are needed to support the recovery of the customer's process in order to minimize down time situations. A further significant segment of our product-oriented service aspects is intelligence activities in order to identify third party spare parts re-engineering and the sale of those re-engineered parts. Since nearly all installations are customized and designed to order and thus play a vital role in the reliability of the installed equipment we advise customers' site managers about the possible influences on reliability.”*

(E1C) All logistics requirements and activities seem to be appropriately addressed. They consider the reactive repair component as well as the proactive element of advising

customers in maintaining an effective product reliability level for their production processes. Due to a growing heterogeneous machine topography the controlled management of the spare parts provision of third party vendor products might be more suitable.

(E2F) *“The major part of the product-oriented service business is marked by the usage frequency of individual spare parts, service parts and the operating supplies business. The related revenue grows steadily. It is generated by a continuous increase of our product sales figures. I am aware that a high integration of captive parts accompanied by a low number of standard parts supports my spare and service parts business. Nevertheless, I am aware of the possible future trend that is influenced by the continuous product improvements directed by our total quality management efforts. In addition I carry out spare parts sales promotions and campaigns in order to meet customers’ self-service activities.”*

(E2C) This traditional manufacturer is very well aware of the potential peril that is inherent in the business of spare parts, which can endanger his traditional product-oriented service business. Presently, the revenue volume as well as the related profit margin of spare and service parts present the backbone of the traditional product-oriented service business. In the past, the revenue for spare parts grew with the increasing volumes, since the majority of parts was represented by captive parts, i.e. parts that are hardly exposed to competitive service. On the other hand, the quest for quality improvement as well as supporting the reliability of customers’ products will lead to an overall decrease in required parts. As a consequence, the establishment of a customer database that reflects the entire equipment and rendered services of all customer sites in order to extend and manage the range of service offerings within servitization is an entirely logical, conclusive step.

(E3F) *“I regard the area of spare and service parts as one of the major pillars of my service business. The strategic targets lead to specific service kits that suit the customers’ operational environment and aims at the liquidation of spare parts that are stocked in geographically distant locations and the avoidance of spare part shipments for single requests. The service kits serve a vital role in our concept of “guided troubleshooting”. We introduced this concept for the entire product range with the purpose of offering customer personnel entry points in the diagnosis of problems and for the subsequent identification of the failing part concerned. Through this, the erroneous and sequential initiation of the parts ordering process of parts that were often unnecessarily ordered due to failed*

*problem determination procedures for customers' personnel, is noticeably reduced. Furthermore, the procedures for scheduled maintenance and regular services are synchronized with the contents of the service kits in order to ensure individual parts disposal for every specific service procedure. Thus the product reliability is effectively improved. In order to satisfy a growing customer request to assume the responsibility for product-oriented third party equipment service delivery, I utilize my service function in the maintenance planning of equipment, vital to customers' operations. Cross-border shopping could be a viable source for obtaining reliably captive parts."*

(E3C) This case highlights the importance of the synchronization of spare and service parts in accordance with the problem diagnosis and problem resolution procedures. In order to support the reliability target of "first time fix" FTF (the target that measures whether an incident has been resolved by the first intervention) the contents of service kits, their actual revision level and their physical availability play a central role in remedial activities that are carried out either by service engineers or customers' personnel in the problem identification phase. It is noticeable that this service delivery approach assists in achieving a high degree of product reliability for customers and responds effectively to customers' operational requirements rather than satisfying the internal measurements of a product-oriented service function. As an imperative prerequisite, the co-operation of the service function with development and manufacturing is absolutely recommended, enabling the establishment of a strong foundation as well as an effective entry point into servitized activities.

#### 4.4.6. (F) Problem Resolution

One of the main product-oriented service tasks is constituted by the capability to resolve incidents effectively. The problem resolution process aims to restore an orderly operating condition of failing equipment or a component according to customers' requirements. The problem resolution process is directed towards the ability of a product-oriented service delivery function to apply the specific, relevant service procedures and good practices, to use the appropriate tools and service equipment and to ensure that the operational condition of problem determination and identification processes are implemented and operational. It assumes a two-sided customers' view: implementing processes and procedures for the customers to be able to gather all relevant and specific information of his failing environment and also offering a touch point, in person or digitally, to enable the customers' personnel to address directly the relevant product-oriented service delivery



contact point by using the information gained. Furthermore, problem resolution also leads to the capability for a manufacturer's product development, to design and implement components and systems for failure recognition and diagnosis and analysis of machine elements, in order to enable a systematic, coherent problem resolution process according to customers' operational and business requirements.

(F1F) *“In today's tightly controlled, clocked production processes of customers' business, I am aware that my product-oriented service delivery should not respond any longer to incidents in the manner used in the past. Therefore, we have re-structured our support processes. From the very first moment, every customer call is responded to with the highest expertise for that specific problem instead of a call centre response that dispatches service personnel for onsite travel. A product specialist determines the probable cause, decides on the subsequent resolution activities and then dispatches product-oriented service personnel and related specific spare parts in accordance with the customers' operational dependencies. By this procedure we were able to resolve a high number of severe situations without dispatching service engineers. The resolution of problems as well as the restoration of customers' business processes could be speeded up since, in addition, we could quickly detect that environmental or operational parameters impacted the process flow rather than product malfunctions. To meet the perception of customers I implemented the “follow the sun” principle. My service delivery function can now support customers around the globe through a team of highly skilled specialists on a 24/7 basis.”*

(F1C) The essence in effective assistance for customers to achieve a high level of product reliability is either to avoid any activity that inappropriately causes disruption of the product use or, if an intervention is unavoidable, to carry it out as swiftly and effectively without any further re-occurrence. The problem resolution concept in this case aims at fulfilling two purposes: the internal productivity increase by the avoidance of unnecessary travel time and parts cost as well as sustainable reliability assistance by reducing potential production interventions to the absolute minimum level necessary. This could constitute an exemplary case in achieving the desired level of product availability.

(F2F) *“We introduced customer assistance on the basis of the serial number of each single product in order to identify immediately and without ambiguity each individual customer, product and location. Then we assigned an array of products to every product-oriented service engineer. Furthermore, we track the actual training and skills level of each service engineer. This enables us to dispatch the exact product specialist, should the problem not*

*be resolved on the first service contact. Industry comparisons rate my product-oriented service delivery function as leading in regard to this process.”*

(F2C) A concept, that very favourably suits situations in which “machine parks” or vast logically associated customer sites are to be supported. The assigned product and customer responsibility provides an accurate overview of the customers’ operational conditions, the various dependencies relating to product reliability as well as the technical and service level of each individual machine and product. This approach to product reliability further permits the specially tailored knowledge of the assigned service engineer in respect of the technical product requirements as well as the customer’s operational product use.

(F3F) *“Since the operation of the entire line of our agricultural products is directly affected by the mode of agricultural applications of each farm, we have assigned a local business partner to each customer in every country. This constitutes the first line of customer support based on the industry knowledge of the service personnel of the business partner and the support process initiated by our guided troubleshooting procedures. The training on the guided troubleshooting procedures is imperative, in order to act as a certified service business partner. The country support forms the next line of assistance completed by a number of specified manufacturing and development resources. They will travel to any region of the world, should a problem not be appropriately cleared within the designed support structure. In the interest of continuous product reliability improvement, the entire support line is re-examined and re-trained if the support process was not effective at any stage.”*

(F3C) One of the main customers’ decision criteria in selecting a service delivery function relates to its ability to co-ordinate service business partners effectively according to customers’ requirements. The manufacturer’s service delivery function in this case responds to the customers’ demands by putting a strong emphasis on guided troubleshooting procedures that integrate customers and service business partners as well as the central last level support by manufacturing and development. In combination with the capability to acquire real-time failure data from every complex product, the continuous training and re-training in applying these trouble shooting procedures as well as the their immediate revision in the case of handling or logical failures, an important step forward towards servitization was initiated.

(F4F) *“The highly complex nature of our products and the customers’ demands on their reliability directed me to introduce a worldwide customer support centre that is contacted*

*by a unique worldwide telephone number. Each incident call generates a ticket that is the tracking medium from the opening to the closing of each incident. After the opening of an incident, the appropriate professional expert or responsible function is immediately involved. I based my decision on our study that revealed that more than 30% of all incidents could be resolved via the phone if a competent specialist took the incident call rather than an administrative person. The most important aim for me is to exercise the accountability of this process and enable progress tracking of incidents for customers as well as for my service delivery function related to the status and possible escalations in the resolution of incidents. Through the acquisition of a general, however customizable, software, I took advantage of the service experience of different industries.”*

(F4C) Here again, the immediate response to customer calls by specialists who possess in-depth knowledge about the relevant products, assists in eliminating superfluous interventions and thus leads to the increased reliability of potential product usage.

(F5F) *“The complex variety of our business forms the basis of our entire service business. Large project planning offices, architects, small and large firms, end users, business and maintenance partners guided us to arrange support in the form of a nationwide hotline organized as front office and back office. All touch point contacts are responded to by the front office. Problem determination as well as the direct dispatch of service engineers and/or the shipping of required spare parts is initiated by the front office. Qualified service experts in the back office guide service engineers from certified business partners in the problem resolution process and issue physical support by our service experts and parts provision. In addition, the back office renders consulting services for the entire project planning for the assembly of large facilities.”*

(F5C) A further example of a qualified customer touch point that aims at providing the appropriate remedial activity right at the beginning, in order to resolve any incident under the “first time fix” philosophy. Thus, the customers’ product reliability is operationally supported and for the manufacturer’s service delivery function, unnecessary interventions and spare parts costs are avoided. The front office operation is in particular noteworthy in the light of the complex variety of specialized customer and partner groups that are individually assisted by this approach.

(F6F) *“An important moment arose for my service delivery function when the philosophy and era for a self-learning organization became apparent. In a climate of trust that led to an open dialogue with customers, standards even higher than those that we had practised*

*until then were established. In order to support customers' reliability targets, we had to differentiate our service response to nearly every specific facility location and installation. We had to learn that individual service level agreements rather than standard service delivery procedures brought us in closer contact with the customers' environment and in particular provided us with a deeper industry insight and operating knowledge."*

(F6C) The transition towards solution-based services requires solid investments in technology and processes as well as efforts in achieving the desired attitude in the way in which customers are approached. In this context, the willingness and readiness to engage in an open and honest dialogue plays a significant role. This willingness and readiness has to be displayed by both the manufacturer's service function as well as the relevant customers' functions on the basis of following the principle of a self-learning organization. In contrast to a reactive service delivery, where at the request of a customer a failing product is repaired, the required spare parts are replaced and the incident declared as having been resolved until the next customer request requires high product reliability and a different approach. The principle of a self-learning organization requires the root cause analysis of a failing product part or element, devising an improvement or preliminary work-around and feeding this information back to the customer in order to adapt potential production process improvements. The same is valid for a failing service intervention, when the service process should be revised and the result fed back to the customer with the aim of taking machine reliability to a higher level. A service approach like this facilitates the co-operation between the parties involved and assists in reinforcing the necessary mutual trust.

(F7F) *"We improved the particular manner of how we interacted with the area outside my service function. The reliability service brought us in close contact with different customer departments. While doing so, we found that a closer contact with marketing and project management of our firm could be turned into a more select application of the availability service delivery procedures. In project planning and development phases we are now very quickly involved in order to introduce customer and service requirements. Currently, we are able to combine our understanding about the customer's operation and resultant service requirements in order to prepare a holistic and coherent product and service offering to the customer."*

(F7C) The importance of the acquisition of industry knowledge and in particular the acquisition of specific operational knowledge and the mode of product interaction with the

customers' business processes is clearly explained in this case. The degree of a product's serviceability development and the subsequent integration into a manufacturer's product, determines to a large extent the level of product availability. A traditional product manufacturer will gain a big advantage if customers' service requirements are systematically collected, evaluated as serviceability criteria and, on a sustained basis, applied consistently to the product development process as being equivalent to the criteria of easy and efficient product manufacturing.

#### 4.4.7. (G) Internal Alignment

The same nature of challenges that can be observed during the course of any transformation can also be observed while a transition of a traditional product manufacturer to servitization takes place. Principally these are economic and coercive forces that hamper the internal alignment of the mind-set, the understanding and implementation of a solution-based service delivery approach. These forces are mainly founded on the fear of uncertainty and the tolerance maturity in taking risk. By addressing the transition theme within the executive team, the leadership of a traditional product manufacturer's service function would have to find appropriate arguments, in order to counteract the fears of, for example, a decline in the new product business revenue volume, caused by the prolonged use of the currently installed products. Or the disturbance of the proven reliable customer relations, the creation of additional costs due to investments in service technology and the recruitment of new human resources or the inability to raise new, additional service revenues. Furthermore, product development and the production function might feel inordinately beset and harassed by the forced imposition of serviceability criteria. Besides these business aspects, there are also aspects that concern the personnel involved. Regarding service engineers, they relate their professional identity to their ability to cope with the most intricate and difficult technical product problems, rather than with the customers' mode of operation. The re-orientation towards a customer rather than a product focus accompanied by a potential dissolution of legacy structures, techniques and procedures might lead to a feeling of uncertainty connected with the fear of losing one's job. It is the responsibility of the entire executive team to align all functional strategies with the overall company strategy, establish the understanding and mind-set with all company functions and enable the necessary transformation investments. This transformation responsibility cannot be delegated in order to finalize a process that delivers what has been promised to customers.

(G1F) *“The first and foremost task when I started was to address the area of internal alignment. Soon I noticed that I had to win the morale and the conviction of my service engineers as well as secure my position as a businessman vis-à-vis the board of directors, if I wanted to succeed with servitization and leave the reactive mode. I had to define and design the approach towards a service profit centre, its function and business mode in relation to customers. Also I had to clear the existing channel conflicts with business partners and establish a working relationship with other divisions in the company. The essential service tasks, such as route planning and scheduling, spare parts provision, training, motivation programs for service engineers and a revised leadership structure had to be aligned in accordance with servitization principles. My main aim was to make service visible within the company. I did not mind at all, the way in which the approach was carried out and in what sequence the final steps were taken. Increasingly, every service engineer became aware of the fact that the former product-oriented service delivery function had been regarded as a growing business contributor within the board of directors. Resulting from this, an incredible degree of creativity has been released in quite a number of my employees since then. I very much enjoyed this chance to unleash this degree of creativity and conviction.”*

(G1C) Usually, a reactive service function of a traditional product manufacturer is regarded as a sole cost factor and is business wise considered to be an obstacle rather than a business promoter. Here the willingness and co-operation of the controlling function has to be involved in order to establish all service business related financial and economic processes. Then the service function needs to enable the implementation of service tasks for the re-orientation towards a customer service focus. This case demonstrates clearly the volume internal alignment, prerequisites and accompanying activities in order to move in the direction of servitization.

(G2F) *“The foundation of my service company was induced by economic forces rather than by a smart, clever strategic decision. We all looked forward to being able to master our own destiny and leave the status of a reactive part of the company that was emotionally regarded as the “fifth wheel”. I did not have to invest in intensive motivation efforts and programs. The perspective to act freely and establish our service market was enough to find a new identity within the company. Of course, we had to undergo a number of challenging experiences in order to transit from a position as a reactive spare parts seller to a generally practised business attitude. Today however, after all those years of the*

*development and business progress of my service function, the major income of the firm results from service business activities.”*

(G2C) Being a legal entity as a separate service company among the various divisions within this corporation did not release them from the responsibility to establish all service business processes that are required in order to relinquish the reactive product-oriented service mode of operation. The revision of all service procedures, the investments in tools, service technologies, the re-deployment as well as the hiring of new resources and the acquisition of industry knowledge is not an easy undertaking, if the service delivery resources are to be continuously kept aware of the customers’ demands for reliability and availability.

(G3F) *“There is no doubt that the main emphasis in all change processes should be placed on the dedication to the mind-set of the employees. Talking, speaking, arguing, convincing, distracting from baseless fears, obtaining consent, team building, demonstrating excellent achievements, the setting of consistent directions and being authentic and trustworthy are the principal topics to win the willingness of the service personnel. This must be complemented by a very strong commitment towards the transformation of the entire board of directors in order to institute a realistic change to succeed.”*

(G3C) Any re-orientation right from the very beginning as carried out by this manufacturer, will require an extraordinary emphasis on explanation and reasoning. The focus on services that assist in achieving product reliability and availability while taking responsibility for individual related assignments, represents a major mental step for service engineers that separates their professional identity from their ability to master serious technical product problems.

(G4F) *“When I think of how I achieved approval and internal alignment, I have to admit that I had to consider many more areas than I had thought at the very start. It turned out that I had to take three avenues: to guarantee sound financial results, to ensure business security and to seize business expansion opportunities for the company. I had to reason and rationalize in an honest manner, in order to build credibility and win a reputation. What was needed to achieve my intention, what were the hurdles, where were the stakeholders, what were the must-win battles and where and who would be the main obstacles? Similar considerations are required when negotiating with the co-determination council. There, it is extremely important, to explain the change in business climate. Considering the customers’ expectations, the re-orientation has to be approached in such*

*a way that loss-of-job fears are avoided and the plans and activities that lead to opportunities of a more demanding and thus beneficial job role are demonstrated. Everything that is planned must turn out to have a practical use and must also be successfully applicable by the service engineers. In the eyes of their customers, they are the first line representatives of the company.”*

(G4C) It has to be remarked very explicitly: What was promised has to be delivered. Indeed, investments in funds and technology are important building blocks for servitization. However, job morale and the conviction about the mission of the service function constitutes an equally important role. Therefore, a leadership that argues honestly, explains the consequences trustfully, and acts with a strong determination to succeed, will be a solid foundation for servitization.

(G5F) *“The largest part of the transformation explanation is with regard to the time that is spent together with the service departments and their employees. It is essential to reason the change by the demand influencing our work, stemming from the changing nature of customer requirements rather than by lecturing about GDP and EBIT figures. By pointing out the direct impacts on the traditional work that constitutes the product-oriented service delivery approach and by giving honest and authentic answers, credibility and a positive morale can be gained. The service engineers have to understand the transformation does not lead into a blind business alley, the reason to depart to a new destination and the planned training and education investments enable a successful future job assignment. The conviction and efforts to win the board were different but not less difficult. The service business is by nature an intangible business, compared with the manufacturing of goods. I found it very complex to obtain investments for a service force that cannot be planned for, different from the principle of the planning for materials. It took quite a few sessions, until every member of the board recognized the value of a constant revenue flow that is generated by service contracts compared with the volatile nature of products sales, in addition to the business and revenue opportunities by delivering services in addition to products.”*

(G5C) An approach to servitization as in this case bears the inherent potential, to generate exceedingly intense efforts in winning over the required executive colleagues and “campaigners”. Regarding a bottom-up suggestion by the service function of a traditional product manufacturer, this approach might trigger the impression that the service function intends to unload its problems onto the other company functions. However, a great



emphasis rests on the mind-set of the personnel of the service function since they are one of the main pillars that support a successful transition.

#### 4.4.8. (H) Quality Management

The philosophy and strategy for quality management in services management are very similar to those of the production function of a traditional product manufacturer and represent therefore an important part in the achievement of the overall company goals. The related quality tasks involve all functions across the company. In the sense of TQM (Total Quality Management) these tasks have to be carried out by management and professional employees. In principle, those quality tasks are based on four pillars which are product quality, maintenance quality, internal service quality and external service quality. Product quality focuses on the analysis of product failure information and statistics which must be shared with development engineering and production in order to improve product quality and minimize product disruptions at customer accounts, as well as decreasing the number of product-oriented service delivery interventions. Maintenance quality reflects measures that are based on, for example, the number and type of customer complaints, first time failure fixes, duration of repair action and multiple interventions. The goals aim at the improvement of the product-oriented service delivery processes. Internal service quality focuses on the required level of the internal service processes. They are of central importance since they influence the external service quality as well and may thus be transparent to the customers' operation. Processes include the management of spare parts, call dispatch and contract administration as well as the contents of training material, maintenance documentation and the availability of modern tools and measuring equipment. External service delivery quality is customer-oriented and encompasses the customer and all customer-related service delivery activities that do not originate with repair and maintenance activities. Among these are the call dispatch accessibility, the behaviour of the service personnel, duration of repair action and their service delivery approach as well as empathy and friendliness. The scope and extent as well as the execution quality of the service delivery action determine the service maturity level as seen from the customers' perspective.

(H1F) *“In the interests of brand protection, but also in our own interest in supporting the reliability of our company's products, we focus intensively on the fast, effective reporting of incidents, where a pervasive problem can be taken into account. We have tuned our*

*ticketing tool in such a way that enables us to effectively identify potential highflyers long before they appear in the field as negative impacts on customers' product reliability. In addition we obtain evaluations about the nature of incidents and the nature of part impacts on the current service procedures. These observations and the analysis results are fed directly to research and development or to the purchase department if purchased parts are involved. A further concentrated engagement with R&D takes place, when entire assemblies or service procedures are impaired. Critical business impacts are steered by a weekly quality management committee, in which we participate as the service function. I put further importance on the participation by my service function in all product and project development activities right from their initial stage. Through dedicated service engineers, we can combine our service knowledge, extract special information and data for training, and service documentation and last level support in severe product malfunction incidents. This concept has also proven to be very valuable in bridging and shortening the information flow with our business partners in the various countries in service fulfilment matters."*

(H1C) The key in assisting in the achievement of high product reliability concerns real-time condition monitoring, the stringent collection of product failure data, the analysis of the root cause in a timely manner, the co-operation with development and production in order to create a suitable solution and feed this back into the customers' operations. Based on this, preventive activities can be started in order to avoid pervasive failure impacts at other customer sites. If this approach is sustainably carried out, then noticeable expenditure reductions both in labour and spare parts may be expected as well as positive support of the customers' perception of product reliability. The service function is responsible to take an active part in the product improvement process and product development process, by sharing their service and customer knowledge with these processes.

(H2F) *"Due to the nature of our service and spare parts, my product-oriented service delivery function places special emphasis on parts under a warranty status. We analyse case-by-case in order to distinguish between warranty and non-warranty occurrences, analyse high failure rates, identify failing machine components and assemblies and forward the affected parts together with appropriate reporting. Product management, production management, engineering and the service function meet regularly in order to take the appropriate remedial action and inform the field service functions of our service business partners about a work-around or to issue guidance of how to proceed in the future. Mass produced parts that possess no warranty status are scrapped locally. Due to*

*the high refurbishment process cost we discontinued the refurbishment of captive parts. The highly focused analysis and information processing of service and spare parts represent an additional and effective tool to manage and adjust labour and parts costs of my service function in order to support the profitability target of my service business.”*

(H2C) The benefits for customers as well as for a manufacturer’s service delivery function become evident, in particular, if this approach is compared with the reactive product-oriented service. However, their refurbishment activities are thought provoking. Maybe the attitude stems from the amount of captive parts that are applied in these products. In spite of that, there are servitized companies whose products utilize a similar degree of captive parts and where refurbishment activities are economically carried out.

(H3F) *“For years, the different service functions of the company were in a somewhat challenging, less than respected position in relation to R&D. I had to re-emphasize the working relationship with the R&D function, in order to be able to support in a sustained manner, the brand and the product reliability of the products of my company, along with the entire product life cycle. Ideally, we extract digitally operational and real life data from the machines that are installed at the customers’ premises, in order to filter out reliability information, for example, related to the mean time between failures of the specific equipment of a specific customer’s large facility. A further method is based on the systematic scrutiny and extrapolation techniques of the available maintenance and service reports. In consequence, this information extraction in a structured form grows in importance within my product-oriented service delivery function, since product life cycle management is effectively improved by this approach. In addition it complements the previous preliminary and empirical findings about the entire product-oriented service delivery process and thus allows the provision of inferences about the reliability of a single product as well as of an entire machine park or facility and constitutes a solid base for communication with engineering and research and development and the information feedback to these functions.”*

(H3C) In order to assist in a customer’s reliable product use, a manufacturer’s service delivery function must assume an active role both in product quality management as well as in the development of new products. Resulting from this, customer orientation will result in sustainable product reliability results as well as substantial productivity improvement paired with an improved cost avoidance position.

#### 4.5. Asset Availability Implications

The principles of a reactive product-oriented service delivery stringently follow the requirements that are tied to the product itself. In the sales phase, a reactive product-oriented service should reassure customers that they have chosen the right vendor. Through this, a mental picture of a product/service combination is conveyed that suggests a problem-free product operation. In the after-warranty phase, a reactive product-oriented service function responds to customer requests for maintenance and repair by the standardized and professional fulfilment of a service delivery processes. The responsibility to implement procedures and processes that enable a scheduling for the product operation according to the requirements of the application or business processes remains with the customer. However, due to the operational requirements that arise from the impact of a failing process component on the entire business process, the demand for product availability arises, as the logical next higher stage of product reliability. This customer demand grows continually and consistently in order to progress towards a failure-free operation.

Many studies indicate that product availability bears no mono-causal relationship with low MTBF, MTTR or MDT figures. Quite the contrary: a series of influences and impacts that are caused by, for example, the environment, energy supply, user and operator mistakes, inappropriate procedures, materials flow, co-ordination with other equipment and scheduling parameters contribute to the relative degree of unavailability. In order to meet this growing demand for a new service orientation of the traditional reactive product-oriented services, a revision of the previously executed service delivery methods is overdue. A product-oriented service delivery function of a traditional product manufacturer has to commence with understanding the customer's operation. This is required in order to be able to offer a service delivery that is capable of stabilizing and improving a reliable operation of the company's products. All this starts with an understanding of the business requirements of an individual customer, the acquisition of procedures and methods to achieve a continuous availability improvement. The formal and conclusive implementation of these procedures can solely be co-created with the customer's personnel. Therefore, a product-oriented service delivery function must work towards a mental attitude of its service personnel in order to create a conviction of the meaningfulness of this enhanced approach. Primarily, this leads to a service culture and a service mentality that is oriented towards the achievement of results for the benefit of customers, rather than just returning a product to an operational state.

Resulting from this, a product-oriented service delivery function faces a number of new challenges. In order to support the operational availability of products, the service personnel have to fulfil different roles towards the customer. A service engineer, among other things, occupies a role as a representative of his company and influences customer satisfaction to a large degree by his conduct and behaviour. This influence is of a greater magnitude, since the service delivery to support availability, requires communication and contact with different functions of the customer, rather than taking mere responsibility for an isolated repair and maintenance activity. In principle, the provision of an availability service delivery however, demands the assignment of an individual customer relationship, in order to become acquainted with the customer's operation, the organization and interaction with customer's operating personnel. In this way, the collection of relevant information at the customer's premises and the subsequent conclusion of necessary actions, their initiation into practice and the systematic tracking and follow-up of resulting measures is thus enabled. In view of the foregoing, a change in the management and leadership style of the service function is imperative. Instead of personal control, dispatch and activity direction of the service personnel, the service function leadership of traditional product manufacturers needs to consider a new framework. Coaching and fostering in the sense of attaining business attitudes and self-reliance, as well as granting empowerment and business competencies, are considered to be some of the very important pre-conditions, in order to generate a customer-oriented commitment.

#### 4.5.1. (A) Operational Product Availability

By providing a reactive product-oriented service delivery, a traditional product manufacturer will face severe competition, when bidding for services that assist in the high availability attainment of customers' production equipment and production facilities. For quite some time, there has been awareness and a growing consciousness of the factors that influence and impact the availability of the production equipment. Those impacts are caused by far more influences than just the amount of product failures and the duration of their repair action. Operational parameters, environmental conditions, infrastructure and energy, procedural instructions and working conditions are some of the impacts that cause degradation in the product operational availability. By providing the technology and industry knowledge, by exploiting the knowledge that has been gained in the various customer environments as well as the co-ordination of all production involved functions in a partner-like mode, the foundations for high product availability can be established. The

scheduled implementation of technology amendments, paired with the real-time condition monitoring and the failure prevention programs of a manufacturer's solution-based service delivery will form a service approach that offers the potential of a mutual, continuous improvement.

(A1F) *“Now when I look back to the days when we delivered service on a purely reactive basis, I can remember situations where machines were out of order for more than three days and without any situation escalation to senior management. In the wake of the liberalization of our industry market segment, I was progressively drawn into price discussions, accompanied by customers' demands for activities that lowered their operational costs and improved their efficiency. Increasingly, the demand for high availability of the operating equipment moved to the fore. All service delivery activities were measured on the achievement of availability targets. Cases of non-compliance with the agreed targets led immediately to compensation claims and penalty payments. To give an example of such a strong request: during our scheduled overhaul or equipment maintenance work, energy could not be generated. Since this was a planned activity, the customer was able to buy a certain energy contingent in the market for a fixed price well in advance. That contingent was planned in accordance with our service activities. If we exceeded the agreed target in terms of time and overran the agreed return to operation time, a penalty payment was due, since our customers had to pay extremely high prices due to the unplanned energy purchase.”*

(A1C) A distinctive signal is raised in this case, to highlight the importance of solution-based service offerings to assist successfully in the implementation of service measures, in order to achieve high availability operational product settings.

(A2F) *“After quite a number of very successful years in the reactive product-oriented service business we realized that the customers' concentration on their core business resulted in new service requirements for the availability of our products. Those service requirements were new to us, since they had not been specifically demanded in previous years. We had to learn that the achievement of high availability depends foremost on the regular monitoring of the equipment's operational parameters and the diagnosis of the specific and particular circumstances as well as the careful planning and scheduling of the customers' operational influences. And we learnt how to select and assign dedicated customer contacts, we learnt to co-operate with the customers' operational personnel involved in order to prevent any sort of operational equipment down time. In this way, we*

*gained a remarkable competitive edge compared with our product-oriented service delivery. There, we just reacted to the requests for repair activities that were responded to by a central hotline and that then triggered service actions by a dispatch centre. Since we could identify quite a few engineers within my function's work force, I recruited the complementary resources in other functions of the company and also hired from outside."*

(A2C) This case appears to suggest a very logical sequence in developing and positioning the service capabilities of a manufacturer, setting out a professional product-service delivery function that pursues product-oriented repair targets such as duration of repair action (DRA) and mean time to repair (MTR). Then the build-up of a remote sensing of real-time date and condition monitoring to support the product reliability followed by the development of competencies to co-ordinate the customer and manufacturer resources in order to assist in the achievement of high product availability.

*(A3F) Our solution-based service delivery approach is based on two pillars. The first pillar is represented by a designated local customer co-ordinator, who guides all relevant availability assisting activities as perceived by the customer. The second thrust of our service delivery for availability services proved to be the continuous monitoring and inherent diagnostic activities of the customers' equipment. We operate a permanent 24/7 facility monitored by three centres around the globe, in order to avoid operation interruptions of customers' equipment. One of the major advantages of this concept is based on our expertise and deep knowledge of the OEM equipment. That enables us to issue advice and operational circumventions that result ultimately in the prevention of outages and in improved equipment availability."*

(A3C) Again, this situation emphasizes the importance of the acquisition of industry knowledge as well as the knowledge about OEM equipment. It also demonstrates the effective and orchestrated resource co-operation of a product manufacturer to match the company's deep technology and manufacturing expertise with operational knowledge of the field service resources.

*(A4F) "We generate the greatest customer benefits and value if we succeed in preventing unplanned or unscheduled outages of our equipment and if we are able to keep our machines available and operational. The first and, as I believe, the most important measure, was to establish that the service engineer who is naturally in contact with the customer, acts as the main focus in that re-direction towards customer orientation. My main aim was to develop this person in his present competencies as a product repair*

*engineer in the direction of eventually becoming an operations consultant. His assignment is oriented on his achievement related to the degree of prevented unscheduled down times. His prime target is neither to carry out a considerable number of maintenance activities, nor to master complicated repair situations nor the sale of maintenance contracts, reinforced by a certain quota. In order to achieve such a re-direction, I allocated individual service engineers to specific customers in order to foster a personal, resilient relationship between my service personnel and the customers' operating functions. Resulting from our experience of impact on availability, specialized tools and service kits were created and everything bound into a mandatory training rollout. By the way, I invested time in order to attend, among other re-direction activities, each training session, gave the opening and closing speech and stood up to answer any question that arose as authentically and honestly as I could."*

(A4C) Too often, the emphasis to establish an effective co-operation with customers is placed on investments to facilitate either technological or business processes, such as service technology, service development or the internal process alignment. While these investments are of great importance, there are, of at least equal importance, all activities that educate and develop further the manufacturer's customer-oriented service knowledge and related competencies. The goal is to enable personal co-operation and a dedicated relationship with all related customer personnel involved in the establishment of a high availability operational outcome.

(A5F) *"When I communicated with directors and executive management of the customers, I recognized for quite some time that the theme of availability was a recurring thread running through all discussions with each and every customer. Of course, the initial discussion with them centred on the ability to react faster on repair requests and on the acceleration of the repair process itself. However, the more we involved ourselves with the specific operational dependencies that manifested themselves at each customer location, the more we were able to recognize that there were more dependencies on the availability, than just a fast and professional repair. So we learnt, that the prevention of negative influences on the customers' operations constitutes the core of any measure to achieve the required operational status. Resilient availability results are unthinkable without the commitment of all involved functions to the prevention of negative impacts. And when we consider availability and prevention there is a further important aspect that is inseparably tied to availability: the scope of planning. Each reactive activity causes additional expenditure and unplanned costs either for my service delivery function or for the*



*customers' operations. Therefore, on the first approach, we are required to decrease all unscheduled product-related activities by monitoring and evaluation measures that allow the reconciliation between availability targets and operational risks. We invest intensively in procedures and techniques that enable us to remotely monitor the condition of our products and derive a specific, situation-adjusted diagnosis from the data obtained."*

(A5C) Here once again is a reference to a co-ordinated customer-oriented service approach with the requirements for reliability and availability at its centre. Focal points include a fast and professional response for remedial interventions, the constant condition monitoring and diagnosis of obtained data, the planning for preventive activities in order to protect the target of optimal availability and co-operation with the customers' relevant operational functions.

(A6F) *"Availability has been the most intensive influencing factor on my service function, since our equipment is typically installed in remote places with great distances to the next service location or support station. Naturally, it always took several hours to arrive at the customers' premises after the dispatch of a service engineer. In time we had to learn that a significant portion of the service requests were not caused by our product but rather by influences that stemmed from the area of the customers' responsibility. Although we generally billed those activities due to service activities that were caused by the customer, we were left with an unsatisfactory, defensive feeling. That feeling provoked us - among other technical and service business reasons, to invest in the development of a remote monitoring software tool. This tool exploits the properties of the various sensors and access points to different components and assemblies of our products. Now we are able to carry out a proactive condition monitoring in order to recognize potential future malfunctions as well as a 24/7 incident support. In incidents, we connect the support function of our service headquarters to the impaired product and download the predefined operating parameters and malfunctioning routines. Not only are we able to look at product parameters, we are also able to obtain operating driver settings and adjustments that allow us to advise the customers' operations personnel about any appropriate action to be taken. We even encourage and enable the operating personnel to also use the same access that we use, in order to connect their personal communication devices and thus remotely control the machine. Furthermore, alarm trigger levels can be set, in order to initiate the appropriate action when needed."*

(A6C) This constitutes a further example that demonstrates the benefits of a technically feasible and practically executable involvement of the customers' operating personnel. In this way, all relevant diagnostic, failure recovery and back up measures can be planned, revised whenever necessary and carried out exactly as required in each incident. Thus, a further step is established towards a trusting working relationship that leads to further availability improvement.

(A7F) *“When we set out with remote monitoring activities, we targeted single, specific products, for which we had agreed stringent service level agreements (SLA). Those were mainly stand-alone products. After some time we realized that more and more products had sensors and components as incorporated design features that allowed them to be integrated and operated within networks. So we arranged for interrogation procedures and set up a special service offering that took into account the demands of customers for the continuity of products that were remotely operated from a distant location – guided by a dedicated specialist. So, we acquired new knowledge about the customers' processes and gained new skill in downloading and analysing various operating data that we had not accessed before. This allowed us to offer our services partly in a proactive mode. At present, one of our main service offerings is a health check by which we regularly obtain data from remote sites, analyse, protocol and distribute them to the customers' relevant functions - including recommendations.”*

(A7C) Although the remote monitoring and diagnostic tools were neither planned as a strategic service capability nor placed as service requirement in the product development process, this manufacturer's service delivery function seems to have made the most of this learning situation. It is a further reference that a manufacturer's service function must be sustainably involved in the product development process. This involvement must take place on a strategic level as well as in the day-to-day product development activities. Those manufacturer's service functions that are currently already involved in the development work of interconnecting production systems and ICT systems to “smart factories”, within the framework of the rapidly emerging “Industry 4.0” technologies, will be in a competitive pole position.

(A8F) *“We achieved a further breakthrough in our service delivery for product availability, when we transformed our traditional equipment maintaining approach. Rather than scheduling periodic and cyclical maintenance activities, we initiated maintenance activities according to the condition of each individual product. This*

*condition monitoring enabled an improved state of operational readiness for the customers' machinery and in economic and investment protection terms, enabled extended periods of equipment utilization in respect of the management of assets. While we carried out this maintenance approach, we progressed further in the field of product performance prediction with the aim of forecasting a future operational product state. Our company development and technology knowledge, our industry knowledge as well as the knowledge that we gained at every individual customer site, put us into the position of being able to direct all service activities in order to cause the least impact on the customers' availability. Besides improving product availability targets in a sustained manner, we responded effectively to the availability demand of customers and assisted in their quest to substantially reduce their operational expenditures."*

(A8C) The delivery of real-time online condition monitoring, the subsequent diagnosis and product performance prediction are really inseparable, if services are offered that assist in the management of availability. The strategic co-operation of all functions of a manufacturer is imperative.

#### 4.5.2. (B) Customer Priorities and Requirements

During recent decades, traditional product manufacturers in the capital goods industry came to realize that their reactive product support service delivery had to constitute much more than a fast and efficient reaction to a customer's demand for remedial action. A number of manufacturers understand that one of the major future impacts is the successful transition of their product-oriented service delivery function to servitization. That transition translates the strategy of their company into a day-to-day relation and interaction between the company's customers, and internally between the company's different functions. Ultimately, it is the product-oriented service delivery function of the manufacturer's product support organization that either generates enthusiasm or disappointment for their customers. Leading manufacturers have made intensive investments in their service delivery capabilities, their service competencies and processes that enable the capturing of their customers' requirements. These investments have been accompanied by establishing effective personal relationships, interconnections and communication paths, both internally as well as to all relevant customer functions. At the same time, they have re-defined the perceptions of their customers in order to meet their demand, introduce service innovation in the market and thus produce a powerful competitive edge. While driving in this direction and acquiring experience in the field of

product availability, most of them find that it is imperative to further improve, although they have reached a favourable new plateau in their servitization excellence already. By being aware of this, they are able to further respond to operational, technological or economic challenges.

(B1F) *“In day-to-day practice we have learnt that the legacy processes that we applied to our product-oriented service practices are not sufficient any more. The majority of customers require an operational availability level of more than 99%, in order to meet their production targets. We understand that the previously established activities within the outlined boundaries of the so-called separation of duties between customers’ operating personnel, certified business partners, product-oriented service delivery functions and process applications, do not suffice any longer. Past incidents that led to severe impacts on customers’ production processes suggest that the manufacturers’ service delivery function had to be the owner of all activities that assure the availability of the machinery. Those activities may encompass all duties from scheduled activities to the advice and guidance of the customers’ personnel, in order to carry out specific actions, e.g. the approved utilization of supplies and approved operating material. We took it so seriously that we even carried out a two-day workshop under the guidance of RWTH (the university of research and technology in North Rhine-Westphalia), in order to create trust and also to ease fears that might be generated by this new responsibility.”*

(B1C) This service delivery function of a traditional product manufacturer has indicated that their needs to exist a lead function that co-ordinates all customer related activities in order to guide a seamless service process that is oriented according to customers’ perceptions. All service activities have to be aligned in such a way that the required product reliability goals are effectively supported. The important recommendations to outline the significant structural changes can be obtained by assuming a customer perspective while observing the business and production processes of a customer as well as the dependencies of a customer’s business partners and customers.

(B2F) *“Very soon we found that we could not cope with the dissatisfaction that was expressed by the customers regarding how we delivered the service according to our traditionally established standards. Increasingly, we had to set up task forces in order to understand the source of dissatisfaction. At the beginning, while turning a blind eye to the business activities of the customers, we soon found out that the first step was to focus on three areas. We had to sharpen our analytical capabilities in order to recognize -*

*regardless of their nature - the parameters that guarantee a high availability of the product, rather than focussing merely on a short repair time. We also had to introduce a person responsible to the customers' operations, and we had to blend our acquired knowledge with further product development within our corporation. Currently, we have arrived at a partner-like co-operation with customers and that is expressed for example by long-term service agreements of up to ten years."*

(B2C) Solution-based services can only be successfully delivered, if there is an open and trusting co-operation between the manufacturer's service function and the customer. The basis for the achievement of this state is born by the individual alignment of the service delivery processes, a methodology that assures the precise collection of the customers' demands, accompanied by the support of a dedicated customer contact who is aware of the customers' operational influences and capable of acting accordingly. The challenge will be, to align the customer requirements and the need for standardization.

(B3F) *"There was very often an obscure situation, in which influences that caused unavailability could not be resolved. What was the cause, what was the effect, what triggered the level of unavailability? Since we always arrived after the customers' production had come to a standstill, it was very understandable that the product as well as the product-oriented service delivery was blamed. Hence, we always stood in the firing line for complaints. Although we proved from our statistics that we reacted swiftly, had constantly improved our repair times and had an effective spare parts provision logistics, it was to no avail. Then we engaged in the operational processes of the customers and gained knowledge about the different influencing parameters and the customers' requests and demands that resulted from them. Regular workshops and periodic meetings to track and secure the availability targets were carried out with all involved functions. From there, we established catalogues of tasks and responsibilities – everybody knew in principle how to act, interact and communicate. Customer and user specific service agreements frame this mode of co-operation."*

(B3C) The cultural approach to learning and improving is welcome in the continuous improvement philosophy. Even as this situation could be resolved with a positive result, the stereotypical allegations that were made would overshadow the relationship for quite some time. An open communication and willingness to mutually discuss all root causes that impact availability, will ultimately lead to the management of a resilient customer relationship.

(B4F) *“While my service delivery function was engaged in relationship activities for availability services, I often had the opportunity to talk with customers’ executives. On these occasions it occurred to me that their expressed operations and business problems were not really customer-specific. Quite the contrary, they seemed to be of a pervasive nature. Resulting from this, I invited the executives of the leading customers to my service conference that I instituted especially for them, quite some time ago. The senior management of my service delivery function also participated. The major aim was to listen to their expectations and to demonstrate my orientation towards their requirements. As a result, this proved to be an invaluable source of information and it supported our thrust towards customer orientation and servitization.”*

(B4C) A very fine example that underlines the importance of establishing very good relationships among executives, rather than relying solely on the relationships that are normally established on the working or operating level and are by their nature, normally extremely task oriented. The collection of customer demands and customer service requirements is frequently accomplished on an informal basis through talking among service employees and the service engineers of service business partners or judging from written customer complaints received. Since this feedback potentially resembles current, acute field problems, their achievement to establish a proactive service orientation comes close to guesswork. In order to re-direct the service orientation strategically, the service executives of a manufacturer have to establish personal, resilient relationships with their counterparts - the manufacturers’ most important customers. Thus, they will be able to absorb the business problems of their customers and be able to act strategically to align the service function accordingly.

(B5F) *“The major customer focus within my industry segment largely concerns the fully automated production processes that run without any manual intervention. In addition, this industry segment is characterized by a constant introduction of new technology that results in a constant flux of changes and process modifications. In order to obtain a vivid and current picture that enables us to re-evaluate customer demands on a constant basis, we agreed under my leadership that each customer has to be visited by the service manager, who is responsible for service delivery of the customer’s operation. In non-incident situations and periodically, at least twice a year, discussion with customer management should take place, in order to build up personal relationships and to gather ideas and requirements of future business ideas and potential projects. I do not conceal the fact that I run a service intelligence process together with marketing. This enables me to collect the*

*“customers’ voice” and it provides me with a valuable source of checks and balances in relation to our service delivery activities.”*

(B5C) Again, a presentable example of how to build customer relationships at management level and keep them alive. I can see a situation where top management relationships could yield business benefits. However, the major challenge to be accepted as a business partner on equal terms will be represented by their ability to extrapolate concrete business problems from the customer’s situation and provide workable solutions.

(B6F) *“At times, the build up of a reliable customer relationship can be very challenging in an industry that is marked by different distribution channels and business partners for their products. Products are provided to large planning and project offices, to general contractors, to facility management businesses, to certified business partners, to specialist resellers and to mechanical workshops. Each of them has individual and generic service requirements but also reliability and service requirements that are common to them all. In order to support the company strategy in creating value for and with customers by a joint approach to sales and service towards customers I moved from a reactive repair mode to proactive customer orientation. I needed personal contacts that advised customers on the achievement of availability in accordance with their application demands. The re-orientation of my service engineers aimed at fulfilling the role of consultants in the use of our products was, by the way, also regarded to be a job enrichment that helped to promote further employee job satisfaction.”*

(B6C) Even a traditional product manufacturer that serves a variety of different distribution channels sees benefit in the establishment of a personal contact in order to detect and trace the customers’ service requirements and respond accordingly. The transition to servitization resulted from the understanding that value for customers is created in co-operation with customers.

(B7F) *“The transformation towards servitization can only be achieved if we constantly ask ourselves about relevant customer needs. There is no uniformly shaped customer. Admittedly, all our products possess more or less the same properties and dimensions, either physically or functionally. However, the operational processes in which those products are integrated are often very dissimilar so is also dissimilar the service delivery process that is requested by the individual customer. However, there is one demand in common: the demand for continuous product reliability and availability. The inevitable conclusion was to enhance our reactive service delivery approach, by focussing on*

*condition monitoring, product performance prediction and availability assisting and supporting interventions. We nominated account specific customer service managers that carried the responsibility for leading all interventions that promote the customers' demands for availability.*

*Soon we understood that support for availability requires professional product support to reduce MDT to an absolute minimum as its solid foundation. Building on this, precisely timed interventions and effective operational procedures enhance the array of availability raising measures. The provision of redundant and mobile spare equipment, spare capacity and effective fallback procedures are allocated for those incidents where all previously set-up measures seem to fail. We also built up spare capacity in order to be able to either run a part or the entire operation under remote control, in the case of a catastrophic situation such as a fire or an earthquake.*

*However, that progression towards solution-based services did not evolve smoothly. A fair number of trial and error cases provided us with quite a number of unpleasant experiences and there were service agreements that we had to abandon prematurely. Ultimately, however, we gained considerable knowledge in the field of availability support. Based on this we were able to enlarge our service business influence systematically towards the maximum potential, while building up a powerful competitive edge. We feel that we are poised for the changes ahead of us. These changes are generated by transition of the industry towards "Industry 4.0" and the increasing requirements on service delivery by the IOT, the Internet of Things."*

(B7C) The service enhancement of a traditional product manufacturer in order to address customer requirements for reliability and availability creates a considerable effort for its service delivery function. The redirection of standardized service processes towards an operational customer orientation, systematic collection and drawing of valid conclusions, the internal alignment with all manufacturers' functions, the anchoring of the service requirements into the development and manufacturing process as well as the conscious re-direction from a cost to a profit centre, will often take up a great deal of time.

#### 4.5.3. (C) Competence and Skill

When traditional manufacturers move from a product-oriented position towards servitization, a broad array of services and solutions are offered in consequence. This can take place either in combination with the product during the different phases of the sales cycle or as separate services that are specifically oriented on the various operational



customer requirements during the entire product life cycle. The most complex challenge for traditional manufacturers consists in the ability to detach their communication from the product and re-focus it on the business of their customers. However, resources that are capable of acting accordingly are very scarce. Indeed, traditional manufacturers have successfully driven the development of their product-oriented service personnel towards servitization in line with the requirements for excellence in the product-oriented service delivery. In general, the training comprised the areas of foundations of modern technology, product training in line with systematic troubleshooting and specialized in-depth courses.

Resulting from this, however, the transition to servitization requires new competencies and skills that bear only a remote relation to those that were established by the product-oriented service delivery. New job roles and new skill and competence profiles need to be created, processes implemented to identify and promote talents and training investments introduced that enable the development of the existing suitable service personnel. In principle, these competencies and skill are related to a broad range of non-technical yet professional skills in order to provide services and solutions for the customer's business processes. A second field of at least similar importance regards the areas of interpersonal skills, planning knowledge, computer literacy and commercial processes, management practices and business administration. Relationships and interpersonal skills are in particular challenging for service personnel who interface and deal mainly with technical and product-related situations. Servitization activities are related with and connected to strong and decisive non-technical elements such as negotiating, selling and counselling, explaining, describing, leading and communicating. Indeed, this seems to be a sizeable and imperative investment to be made within a short time frame. However, companies that lead in servitization have realized that the journey to servitization takes a very long time. Thus, they invest thoroughly and sustainably in the development and promotion of competencies and skills.

(C1F) *“How did we succeed in abandoning our reactive service delivery nearly two decades ago and become a solution-based service delivery function? As a first and most important step, we assigned the task to a dedicated senior executive and set in place an entire new service function right from the beginning. The spare parts sales department continued to operate as previously. I hired new personnel who possessed intimate knowledge about the industry in which we are engaged, who knew how the business processes worked and who were able to evaluate the demands and requirements from our customers. This proved to be of particular importance, as not all customers put their cards on the table when stating their requirements. Compared with the product-oriented service*

*business that we customarily used to deliver, I have to state that the requirements for the knowledge for servitization demand an entirely different strategic consideration. On a long-term competency cycle, we plan for a mix of technical versus non-technical resources as well as a mix of hired resources versus the development of our own product-oriented resources. The resourcing activities are guided directly by our strategic intent to penetrate the market. Over the years, I have realized of course, that a constant evolution of knowledge is necessary. Our company university provides retraining and competency development that aim at customer service management, service sales and consulting as well as commercial subjects such as cash flow and financials.”*

(C1C) This is a description of a manufacturer with a long history in maintenance, repair and overhaul activities. The transition to servitization was commenced under the leadership of a change agent with the clear direction to continue the spare parts business without any interruption and to expand it further as it represented a stable base in the previous product-oriented business. In this way, the spare parts business provided a reliable starting point in the efforts to develop all services that were oriented to product reliability which then later were followed by the service delivery offerings for availability services. Sooner or later any product-oriented service delivery function that transits to servitization will reach a point, where the introduction of new knowledge and new personality traits towards customer relationships is recommended. The mix will depend very much on the service maturity level and the strategic orientation. The continuous training and education will have to be carried out at a much higher level than the previous introduction in the technical handling of facilities.

(C2F) *“From the very beginning, when the management team took the decision to transit towards services, we knew that this was going to be a time-consuming process due to the skills bottleneck. I further knew that we had to take off from our successful product related platform and enrich and surround these services by those that are oriented to support product reliability and availability. In consequence, our own talented staff that was already interested in project management, information technology and relationship activities were selected and developed. The complementary part of the required resources was obtained by the acquisition of a specialized services company. Looking back today, I can claim that over the years we have systematically improved our internal training programs. There is a good equilibrium between technical, product, operational and industry knowledge on the one hand and relationship, interpersonal and consultancy competencies on the other hand. The best-qualified youngsters come from our vocational*

*training where periodic practice in customer environments on a rotational basis constitutes an integral part of their entire training.”*

(C2C) A very valuable description that leads to two requirements: First, the requirement for essential time to create the right competency and skills levels. Secondly, the required adequate skills mix during the evolution process from the product to reliability and availability should not be underestimated. Industry knowledge, process optimization and co-ordination and negotiation skills win paramount importance, as they were not really developed on a broad scale while carrying out product-oriented services.

(C3F) *“Besides consulting for the availability of product utilization we need the ability to bill our services and sell service agreements accordingly. In the beginning, when “traditional” salesmen offered services we had to learn that a large number of questions were raised by our customers that could not be answered by the salesmen. Quite simply, they did not understand the intangible nature of service. Their service sale in a product-like manner created more questions than answered customers’ problems.”*

*A significantly better sales performance was yielded when we selected persons with a strong technical and industry background whom we subsequently trained in processes and business-related issues. We needed service consultants to discuss application requirements and production process availability with customers, rather than product properties or pricing flexibility. In order to speed up this selection and promotion process we invested in the competency build-up process by assigning a hired youngster to each experienced service consultant. This assured a culture of discussing availability matters, thinking about solutions and consulting customers with the intention to support the achievement of their business targets.”*

(C3C) Again in this example, we see the necessity to create competencies that meet all availability requirements and the ability to consult and negotiate applicable services successfully. In this case, the gateway to growth was determined by the timely ability to create the level of skills and competencies required.

(C4F) *“At the planning and preparation stage of the transition towards servitization, I anticipated a degree of opposition within my product-oriented service delivery engineers. Their image and self-confidence resulted from their professional approach to remedial service action. Over the years, they acquired a deep knowledge of the most intricate circumstances in which our products were used – most of them in a round-the-clock operation. That knowledge enabled them to successfully tackle any sort of malfunction in*

*any operational complexity. However, they had to pay a price: night work and holiday shifts, stand-by periods and unscheduled call-outs whenever necessary. Far too often, they needed to provide justification about the number of malfunctions and the length of time for repair, which was more than disturbing for them. When we redirected our focus on the support for availability, they recognized the chance to also change their working conditions. By taking the responsibility for the entire availability support and improvement measures, they saw an opportunity to plan, predict service activities, and prevent unscheduled production interruptions. And they could also recognize this, it represented a helpful support towards a positive move to attain an effective work-life balance. Luckily for me, the availability measures had a noticeable affinity with technical parameters and were also operation-laden. Thus, quite a number of my service engineers could reasonably migrate into their new responsibilities and assume a role as an availability consultant. Today I am convinced that this represents the most pragmatic approach for product-oriented service delivery functions that operate in similar structures and support related customer service requirements. The core of success however, is represented by the re-definition of the job role of the service engineer.”*

(C4C) This is a very interesting description by a manufacturer that sets out the path to servitization from the level of a reactive product-oriented service delivery function where spare parts and product repair was the core of their service business. The main activity centred on the reduction of down time and emergency cases. Their customers were equally involved with the handling of severe incidents, escalations and seemingly endless phases of production recovery procedures. In this situation, it seemed to be very logical step for all involved to move into the service field of product reliability support. The hurdles to accepting this approach are not too high for the service engineers, since these service activities are in close proximity to purely product-oriented services, allowing for a refined job description and helping to improve the work-life balance. Customers also welcomed this approach as it enabled an approach to reduce the unproductive time of equipment and facilities.

(C5F) *“We have discussed the development of skill and competencies within the country of product origin quite intensively. The training measures that were set up seem to be effective on the whole. Admittedly, when looking at different countries and their related business partners, a more adapted approach in respect of the various local service requirements is suggested. The revision of the country-specific service operating manuals that are tied to our servitization strategy with the assistance of a national language*

*support will probably align the strategic direction setting with the local establishment of a servitization culture and the development of new profit oriented service capabilities.*“

(C5C) Globalization and market dynamics lead to a high variation in customers' service requirements and thus to a potentially broad variety of service offerings and combinations. Too often, this variety and the combination of service offerings is considered as generating value for the customer. It is noteworthy to see that in conjunction with the increase of service variations and combinations the number of potential customer sites increases. However, the number of customers that make use of these offerings is disproportional, while the complexity of the mix of service offerings increases. In spite of a re-direction, the service function of a manufacturer has to pay close attention to the potential for complexity and resulting sinking costs, while balancing customer requirements with strategic services targets.

#### 4.5.4. (D) Service Infrastructure

The initial stages of a customer's decision-making process are neither marked by a particular interest for solutions nor by a specific interest in products. Today, product manufacturers need to identify business value for customers and participate actively in the improvement of their customers' decision-making processes and thus grow the customers' value chain. Otherwise, the sales process degrades to negotiations that mainly address the price and shortfalls of service offerings. A growing existential importance arises for the manufacturer's service contact or account representative. In order to be involved in the decision-making process, she/he has to attain the image of a "trusted advisor" in the perception of a customer - either for a customer individual or a group of stakeholders within the organization of the customer. This trust is further conveyed to the entire manufacturer's service function that must also be perceived by the customer as a value-creating partner within the wide-ranging value chain. By nature, solutions for the value-creating chain are composed of a number of various service elements and components, some of which require special skills and competencies that need to be sourced by business partners on a make or buy decision. The focus on human resources is of vital importance, in order to import fresh, creative thinking and to develop the required skill and competency level. However, a further effort is required, to assure the appropriate level of competencies, tools, methods and infrastructure that are not within the direct reach of a manufacturer's service function. This becomes clear for instance, when the integration of machine components, electronics, software applications and network components demands

competencies, e.g. in systems engineering, that are naturally not readily available or easily chargeable within manufacturing companies. Resulting from this, customers will evaluate a manufacturer's ability to co-operate with business partners, assess the effectiveness of his/her infrastructure of remote service support systems as well as the effectiveness of the business partner network that integrates seamlessly into the manufacturer's service delivery processes.

(D1F) *“The customers in our industry undergo a considerable change. The industry and business boundaries are currently being redrawn by competition and by the demands of their customers. Increasingly, they fulfil the role of one of the hubs in a greater network that places previously unknown demands on continuous availability of the production flow. In order to comply with requirements, we have to re-position ourselves, and invest in the provision of human resources that are able to understand and evaluate the operational requirements of the applied utilities. Furthermore, I have to ensure the adaptation and further development of appropriate tools, software, algorithms and infrastructure systems that fulfil the service requirements of future communications, predictions and controlling capabilities.”*

(D1C) The success in the transition to servitization starts by viewing the entire service process from the perspective of the customer's production, in particular with the new technologies of “Industry 4.0” in mind, when each product is independently channelled through the production process. This will lead to unprecedented difficulties in analysing failures and root causes. It can be seen that all of a sudden, new questions arise in the area of the availability for production, e.g. what are the appropriate service delivery models, will there be potential new players in the service market and what is the demand on the service infrastructure in order to cope with the demands of prediction and online monitoring, what kind of resources in which time frame will be needed? A certain degree of urgency in the development of the service resources towards servitization is recommended, as the requirements for service topographies will change considerably and faster than previously assumed.

(D2F) *“The production targets that became symptomatic for our agricultural industry required a total re-orientation in the way we managed the service delivery process. I could envisage the great distances between our support locations and various agricultural undertakings. The related extensive travel times would soon not be in harmony with the availability requirements of our customers. Together with a leading group of customers in*

*the industry, we designed and built a system that allows a continuous monitoring of the critical farming processes, while maintaining a record of historical trends. From then on, we were able to initiate corrective interventions or predictive activities in order to prevent unscheduled production down times. In addition to service, business partners are now involved on a common information level – the dispatch of spare parts and service engineers can now be arranged in such a manner that both arrive at the same time at the required farm.”*

(D2C) Here, the investments in a service and support infrastructure have been carried out into the right direction. Product performance monitoring, initiating preventive or corrective interventions when these cause the least production impact and employing a service business partner to decrease production down times represents a consistent and systematic service approach that is guided by the focus on product reliability and availability.

(D3F) *“The timely, practicable provision of required maintenance parts and components poses a tremendous challenge for any product-oriented service delivery function. The production processes of our customers require overnight provision, by next morning at the latest. In complying with these requirements, I initiated the separation of production for spare parts from the production for products and integrated the spare parts production into my service delivery function. Under the consultation of a mathematician for applied statistics, investments in a new parts control system were carried out that led to a new system of stock locations that assures customers of a spare parts provision according to each specific situation. Incidentally, my functional guidance for the spare parts production proves to be an invaluable competitive advantage for my service delivery function.”*

(D3C) There is no magic wand for product reliability or availability. Each element of the chain of impact has to be revised and optimized. The spare part provision constitutes an important core element of this chain.

(D4F) *Our company products are installed on an international basis. The corresponding service support structure that we established incorporates a service network of long term, strategic service business partners, with the purpose of acting as an “extended workbench”. Due to their geographically balanced distribution, we are able to comply with the service levels that we signed with our customers. The service partners are certified by us and respond on our behalf for maintenance and repair. They also serve as the outlet for our service and spare parts. The project planning, consulting and monitoring activities are covered by my service delivery function – we also manage the reporting and*

*billing process for our service partners, carry out the continuous training activities and provide the flow of technical and business related information.”*

(D4C) A service delivery infrastructure that is perfectly aligned with the service demand of customers and responds with their service interventions according to the requirements of customer’s operational and business processes is ideally poised to deliver solution-based services. This service delivery function employs service resources of external service business partners under a strategic approach, instead of selecting them case-by-case, and exerts direct functional guidance in order to provide a seamless, brand supporting service infrastructure. This is particularly helpful in cases of international business expansion, profound technology changes that require a dedication on service tasks, outsourcing or merger and acquisitions. This is a convincing example that a good working relationship and service infrastructure can be achieved, by employing and integrating company external resources as strategic service partners.

(D5F) *“More than ten years ago, the product-oriented service delivery resources were organized in branches and service points across all regions. And each branch carried out all services activities including the administration of service agreements, the offering of maintenance contracts and manning the hotline in order to dispatch service engineers at the request of customers for remedial service activities. During the course of the following years this mode of operation proved to be a two-sided sword. On the one hand, we reacted quickly with short travel times. On the other hand, there were a variety of location specific service delivery procedures that attracted unfavourable attention in particular from those customers who ran a geographically distributed business. At the same time, their service requirements on the availability of their production equipment rose dramatically, when their business processes were shared among different locations and controlled by online systems. Driven by this situation, we had to invest in a SPOC (single point of contact) that operated as an information and incident management hub for all customer calls. Manned by service specialists and engineering resources, the single point of contact aimed to offer for each problem a final solution and direct the relevant activities to resolve the situation. At the same time, we introduced a knowledge system that represents a unique and focal information base for the single point of contact. This system was fed by the information from every service action and complemented by engineering and manufacturing memoranda. Over the course of time, a contract management system was implemented that contained the information of all installed products, and each feature and functionality that was assigned to each single product as well as their service contract and warranty status.”*



(D5C) A very wise decision is to create a knowledge system that avoids the multiple re-discovery of already previously solved problems and incidents. This system evolves into a unique service tool in the struggle to minimize production interruption, the decrease in machine down time and the avoidance of service expenditure, both in time and material, when paired and combined with the inherent product information from development and manufacturing.

#### 4.5.5. (E) Service Sales

The sale of service for products has a long history and originally appeared either in the form of a contract with a fixed duration under pre-agreed terms and conditions or the services were billed case by case. Service contracts were either closed immediately at the moment when the product was installed and declared operational or at the end of the warranty period. Quite often, the contract price as well as its terms and conditions played a leverage role as bargaining counters during the closing stages of contract negotiations in order to win the product bid. Traditionally and as a general observation, the sale of service contracts became a factor in the exchange of goods. With the exception of a very few cases, the responsibility for the sale of services was generally assigned to the customer's function for product sales. With the advent of the first services that were solution-based the situation became apparent that the rather traditional terms and conditions as well as the customary way of selling were not the method of choice. Precise knowledge about the customer's business processes, his/her operational needs, the related inside knowledge and the level of know-how about the potential choices to solve a problem are required. The designed service offering must fit perfectly to the customer's business environment and respond to his/her requirements as well. In the initial stages of the consideration of how to resolve a specific problem, the customer is in principle neither interested in a particular product nor in a distinct solution. He/she seeks the advice of a trusted person or contact, whose prime goal is not to achieve personal sales targets. In situations like this the problem arises that the traditional product sales tactics and methods that are oriented towards knowledge about specific product details, performance parameters and terms and conditions fail for several reasons. Generally the sales contacts of a traditional product manufacturer that grows during the course of the years are normally oriented to the customer's departments that use the offered products and help to solve their specific problems e.g. the shortening of the production cycle of an injection moulding press. Along with the emergence of the considerations in business administration such as TCO (total

cost of ownership) and LCC (life cycle costing) on the one hand the pervasive implementation of ERP systems appeared on the market, paired with the global distribution of manufacturing sites on the other hand. As a result, the need and demand to solve business problems rather than solely selling product and related maintenance and repair became apparent. Circumstances like this present a veritable challenge for traditional product manufacturers and the recognizable vulnerability of the traditional sales tactics and methods have to be compensated for.

(E1F) *“After our dedicated service company was founded, I intended to expand the previous reactive spare parts sale with services that support my intention to move towards servitization. The service delivery strategy had embarked on reactive product-oriented services that were related to the replacement of spare parts and bore a strong affinity to maintenance and repair activities. Taking this as a base to learn the requirements for reliable product performance, the next logical step was the transition towards proactive solution-based service activities. The resulting considerations about the nature and contents of these activities led to the establishment of a kind of a service catalogue. By displaying and explaining pre-conceived service offerings, the intent of this catalogue was to represent a sales base, in order to offer our product-oriented services. Furthermore, we concentrated on those companies with whom we had the most business contacts through the previous provision of our spare parts. However, we had no sales experience and only a faint idea of how to involve the product sales function of our mother company. After some negotiation, product sales took over service sales responsibility, however without any sales quota for services. Generally, this method led to some success, however with varying intensity according to the significance that our service offerings played in the various offerings of product bids. The more the service contract volume grew, the more we were able to get in contact with customers and their operation. Now, we had the chance to learn and get to know the customer’s challenges and the requirements that resulted from his/her operation. We had a very successful start to support the reliability and availability of our installed products. We could even apply our acquired competencies and methods to the OEM equipment. And we noticed that we could sell our services in the function of “consultative seller”, while the traditional sales representatives took a gatekeeping role for relevant customers. The capability of “consultative selling” was built upon the selection of engineers, who possessed strong technical knowledge paired with good interpersonal skills. This sharing in the sales approach also proved to be very effective with customers, with whom we had had no previous business contact through the sale of*

*spare parts. Over time, we introduced an executive visiting program for leading customers in our industry, where my senior management and myself conveyed our servitization potential and garnered the challenges of the market at the same time. Furthermore, during the past decade, the role of the traditional sales representative has also evolved. Today, in respect of the development in their specific industry, key account managers lead customer on a strategic basis and my service function takes responsibility for servitization activities through customer service managers.”*

(E1C) A very practical approach in this case, to overcome the sales challenge in selling service offerings. In the first instance, the manufacturer’s traditional product sales function assumes the responsibility for the sale of services, however without a sales target for service that is tied to the issuance of a personal sales quota. Over time, the service function develops its industry knowledge and interpersonal skills as well as the ability to consult and recommend in applying the appropriate measures to support the customer’s production targets. The traditional sales function acts meanwhile as gatekeeper for the offering of services and overall strategy leader for the customer. Regular contact with the top management of customers by the executive team of the manufacturer’s service function is to be highly commended in order to collect the input for the strategic work towards servitization.

(E2F) *“Today, the company sales function assumes quite a different role, compared with its product sales role of the previous years. Since the board decision to transform the company into a solution enterprise, all functions have responded to this direction accordingly. The sale of solutions is now oriented according to the different tasks within the chain of value-added generation and aligned with a multistage concept for the various customer sets. Solution sales take the responsibility for the entire solution architecture and design, while my function takes on the responsibility for the operational functioning and the availability measures according to the overall solution design. All other solutions that are not an integral part of the overall solution are sold by my function. Also, we take care of the sale of the entire maintenance and service contracts and provide our service business partners with relevant customer orders. Furthermore, I have invested in the design and development for very competitive service capabilities and solutions to be implemented in niches and that are leading in my industry. So my function provides a substantial share of the entire company earnings. Yearly, I personally run a two-day forum with a group of industry-leading customers where we discuss my services’ responses to their service requirements that result from their strategic business direction.“*

(E2C) This manufacturer took a big leap forward as he established an entire service strategy that is subdivided and functions-oriented. Here, the situation is clear. The approach to customer-orientation has been worked out by an overall service strategy that determines the degree of engagement according to the customers' business problems. The previous product-oriented service function assumes sales responsibility for reliability and availability services and the resulting services along with the operational utilization of the products and their interconnection. The direct discussion with top executives of leading industry customers about possible approaches to solve business problems is a pillar for success in this company.

(E3F) *“Since the decision to re-direct the company’s focus from product to solutions, the product sales function also assumed the sale of services. From the start, I had an agreement with my counterpart in sales that I would group a number of my resources and assign them as service representatives on behalf of my function in sales. For this task, I carefully chose service employees with a strong technical and process background as well as particularly marked interpersonal competencies. A certain portfolio of non-product related services that bear no resemblance to the core business of company, however, is sold and distributed by the service representatives of the services function. Service volumes are part of the quota of each sales representative and their service targets are tracked monthly. This combination of sales and services reveals itself in day-to-day life as a very powerful concept. Generally, the concept is accepted absolutely throughout the company and as a consequence, all service offerings are closed as service contracts. When we started, our service earnings were industry average. Today, we approach a volume of service earnings that is comparable with that of the product earnings.”*

(E3C) A further good example of how the service sales task has been solved pragmatically, systematically and service target oriented. Service contracts are billed and accrued as service revenue. Services are offered by a specialized sales force, to which the service function provided the major part of resources originally. This manufacturer has benefitted from the re-direction. The transition is embedded in the manufacturer's strategy and the economic achievement is outstanding.

(E4F) *“Historically, our sales function always had the responsibility for the entire sales of all products and services right from the start of the corporation. Since the products were traditionally represented throughout most of the industries and sectors, the sales function was used to speak with various production, finance and administration areas of*

*companies. Although the sales for our reactive product-oriented service were reinforced with dedicated targets for repair and maintenance contracts, we observed a varying degree of success in service sales volumes. As a consequence, and in line with the growing importance of solution-based services, a dedicated service sales function within the company product sales function was put in place. These dedicated service sales resources were selected for their remarkable project and process skills and previous product-service experience, which they had acquired by working in the environment of large customer sites. This dedication to the product sales function is crucial. Due to our product diversity, we are represented worldwide by services. However, the markets in the various regions are quite different. Although the products are the same, customers require a totally different service delivery approach. There are regions where customers place bulk orders and demand installation and repair during the warranty period and nothing else. Then there are countries, where customers ask for turnkey-solutions, ask for availability guarantees and even demand that we run their entire production process on their behalf. The service requirements could not be differently placed and I believe that our service sales set-up represents an appropriate answer. The previous earnings were industry standard and today however, we have tripled this figure.”*

(E4C) The traditional legacy sales process that handles the sale of products and the sale of after-sales services, leads to this well-known, widespread phenomenon. Within the total sales quote the service quota represents the minor part in favour of product sales. Poor sales in services can easily be compensated by additional product sales. This manufacturer had the conviction to organize the services sales differently and chose the approach of a dedicated service sales force within the product sales function.

(E5F) *”We have had to gain a long series of interesting experiences, since the decision to start our journey towards servitization. All prerequisite tasks were settled successfully, the necessary competencies and capabilities were acquired, missing product lines were integrated through mergers and the whole strategy was rolled out throughout all countries. Our multi-stage sales concept assigned the bulk of the sales volume to the various business partners that are spread throughout a wide array of countries. The strategy behind this direction was based on the disposition to believe that solution-based services are ultimately tied to the special service requirements that result from each individual customer’s operations. Thus, each business partner had his own strategy for carrying out service delivery for non-product related services. The subsequent service business results were just acceptable in terms of figures, however, far from what we thought we could*

*achieve by responding to the demands of the market. By analysing the individual modes of operation we found that there was a multitude of very specialized individual offerings that were also contractually closed by a further variety of terms and conditions. The ensuing complexity could hardly be managed. Resultant from this analysis, the content and business purpose of each offering was collected and subsequently a service structure of solution disciplines established. This structure was also launched as a service catalogue and served as the base for all training programs that we set up in each country and for each business partner. From then on we were on the right track.”*

(E5C) The timely and appropriate response to customers’ demands and service requirements is of paramount importance. In principle, the close proximity to a target-market always seems to be highly desirable due to the potential of customer closeness, the intimate knowledge about the existing business problems and thus the potential of a fast-deal closure. This may work fine in a specialized industry and within one region or country. The moment when different countries, different markets with varying expectations, are addressed, a common applicable service delivery strategy is strongly advised. Resulting investments in a service infrastructure can be placed in such a way that on the one hand the level of complexity can be optimized and the potential for the integration of country or region specific service requirements customized.

#### 4.6. Business Continuity Implications

A traditional product manufacturer that sets out to transform its company towards a solution-oriented company with the aim of performing solution-based services is generally going to find it challenging to progress in a straight, progressive manner. Well-established legacy service delivery processes, decades of successful contributions to the company earnings, a considerable reputation as a company function that re-establishes failing machines back into an operational status any time of the day and backed constantly by high customer satisfaction values, created a unique culture that seemed to require painstakingly intensive efforts to re-direct. In order to set up a new value proposition, a number of factors needed to be adopted, aligned with or had to undergo a deep change. First and foremost are the areas of culture, the right mind-set, and the readiness to learn and develop skills and competencies further. Product-oriented service functions will have to decide, how they will approach servitization and in which manner they are going to change their service approach in order to offer their customers a unique and competitive value proposition. This approach also has to include the decision of what to offer and areas to avoid. So many

present-day product-oriented service functions record, evaluate and use product data locally or by remote interrogation systems, in order to propose availability improvements for machines and production processes. Or they may help to prevent machine or production discontinuances by the installation and operation of early warning devices. The collection of the obtained data may help in the future design of customer processes to avoid unfavourable constellations. These are only a few areas of activity that can be entered into by a traditional manufacturer. A new array of service opportunities appears on the horizon: the Internet of Things is going to cause more rapid increases in innovation, productivity and competitive differentiation, than we have seen in the past.

#### 4.6.1. (A) Internal Competition

The literature review for this research has revealed that there is visible evidence of business disagreement, if a company's go-to-market model is not in line with the business targets of its different functions. For example, product sales may see their sales target of their new products sale as jeopardized, if the product-oriented service delivery function focuses on a successful asset management service that prolongs effective product use. Or vice versa, the service function may set up sales obstacles for new product sales since new warranty periods are introduced that render the maintenance contracts for previous products obsolete. Furthermore, the service function is going to analyse the performance data of a customer's production machine and recommend a competitive product that outperforms its own product. Product sales will not only lose the revenue of this specific product, they will also lose their reputation with this account. Consequently, the future way of thinking and acting in the way of how to offer a value proposition for the various customer's functions and departments requires co-ordination and harmonization between product sales and service function. Failing this, the journey towards servitization is strongly compromised.

*(A1F) "Soon after the early months of the start of our newly established service company, we turned our strategy into service offerings. One of these was the service discipline of asset management, i.e. we should support customers in their more intensive use of their equipment. Generally we observed that customers seemed to like this service approach: asset management aimed at all products that were sold by different divisions of our parent holding company. Although the product sales functions of each division had the sales responsibility for our service offerings, the very first years were characterized by service sales volumes that varied considerably in dependence on a non-uniform service philosophy*

*that was applied in each different product division. In order to overcome this business climate stalemate in service sales, we explained the advantages of our approach for customers and also for the sales opportunities of new product sales and invested in a team of highly specialized service consultants to act on our behalf within the product division sales. This common approach was the foundation of our service business success today.”*

(A1C) If there is not a common company service strategy that is accepted by all functions and that is also reinforced by specific and personal targets and quotas, then a transition is doomed to fail. In particular, the potential rivalry between the sale of services and product sales must be conceptually avoided and the misconceptions that are based on fear need to be addressed. The future approach has to be absolutely understandable, backed by the executive team and a suitable check-and-balance system has to be put in place.

(A2F) *“In particular during the past decade the service business figures of my service function reflected remarkably steady growth. This very positive development reflects also the morale and service business progress of my service delivery function. The personnel believe very much in what we are doing and they see a future in our re-direction. When we decided to relinquish our focus on the mere reactive service and commenced the journey towards customer orientation, not everyone shared my optimism. Some even considered the strategy as a “tightrope walking”. These mixed feelings were also observed in the divisional product sales functions. In the beginning, the servitization approach was regarded by them as a disruptive and disturbing factor that impedes new sales, leads to the confusion of customer relationships and muddies the business climate. Our new self-confidence was severely challenged. Intensive discussions and frequent mutual information sessions aligned us in a common understanding. This common approach was backed up by my investment in dedicated and specialized service sales resources that operate in the sales function in the direction of a common customer approach. This was the key to success but still every now and then, a small fire ensues in one of the countries to which I have to direct my attention.”*

(A2C) The most sensible place for a manufacturer’s business success is constituted by the trust between the manufacturer and the customer. Normally, this trust has been built up very carefully over years. Therefore, it is quite natural that any sales person will feel a potential danger if some other influence might disturb this balance of trust. This peril is especially pronounced, if all of a sudden new players who pursue given service targets appear on the relationship stage. There might even be different sales approaches to the



customer. However, the message and the direction must be clearly agreed and be shared by each function.

(A3F) *“The co-ordinated modus operandi of product sales and services sales can prove to be elusive in a multi-product divisional company that approaches a multi-stage and cross-divisional concept in its go-to-market strategy. The business and service requirements of e.g. important building investors, big architectural offices, facility management companies and business partner that are geographically spread nationwide and that also re-direct their reactive product-oriented services towards customer orientation are by nature profoundly different. Each of these channels represents a specific product sales channel with specific service requirements that need to be fenced, in order to avoid conflicts in the general go-to-market approach for products. This is particularly true for the sale of services, since each of the channels has its special parochial interest in value-creating services. A further problematic constellation was created by the decision to operate the service function as a profit centre for all services across all product divisions. By nature, product-oriented services are impacted by the product reliability parameters such as the intrinsic failure rate, early fall-out rates or types of malfunction during the entire life cycle. This situation is further aggravated, if during the design and development phase, service criteria, such as the ability for concurrent maintenance and repair, are not implemented. Also, this has a direct influence and impact on our profit and loss statement. The resulting customer dissatisfaction could only be partly contained by re-focusing the service delivery methods on availability services for the customer’s operation and in parallel by improving the processes for availability prediction and repair time reduction. However, this form of product performance was entirely different from division to division and it forced me to highlight the specific problem areas that had not surfaced before at board level. These situations were not very supportive in achieving a common understanding about a united go-to-market strategy. Meanwhile, the transition toward servitization has embarked on a successful path – however, as of yet, I have neither entirely overcome some of those mentioned divisional resistances nor succeeded in establishing agreed guidelines as mental guard posts.”*

(A3C) An essential element of every board level’s decision to re-direct towards customer-orientation is based on the precise knowledge of the particular customer and industry groups, the corresponding sales channels and the related go-to-market models. By this, the interaction with customers can be effectively controlled, their awareness raised for latent interests, the request for proposals effectively responded to and service offerings

purposefully put in place. Channel conflicts must be avoided from the start or at least reduced to an absolute minimum. This case illustrates how painful the duration of a service recovery can be, if decisions are not really carried out concurrently and in mutual agreement, but remain as a form of lip service.

#### 4.6.2. (B) Process Availability.

The legacy service business of a traditional product manufacturer is carried out as a reactive service delivery for all remedial activities, caused by failures, malfunctions, installations and discontinuances. Product-oriented services are fulfilled either after installation during the warranty phase as a cost of product factor or in the after-warranty phase, as a service cost where the customer is billed for labour and material. The characteristic element of this service delivery is constituted by a reactive mode after a customer's request. The introduction of enhanced business administration considerations leads to an intensive and in-depth examination of investments, guided by a strong will of "doing more for less". Life cycle costing and the total cost of ownership of production investments rather than the mere direct investment volume, receive swift attention. In combination with the calculation of individual process cost, a climate emerges that strongly suggests an increase in the productive use of equipment. Inevitably, this leads to an increased demand in the customer's requirements. The requirements migrate from the main focus on product repair parameters such as machine down time, mean time between failures and mean time to repair, to production oriented parameters such as production process availability and the percentage of productive use versus the planned production time. In order to respond, a product-oriented service delivery function has to re-orientate its service delivery and re-align all service processes towards the goal of achieving the desired availability of products. First of all, a new level of responsibility has to be assumed, in particular the responsibility for availability according to the customer's perception rather than effective and fast responses for remedial activities.

That induces the need for new competencies in the understanding of the customer's operations, capabilities to be able to either systematically collect operational data locally or remotely, in order to analyse them, release scheduled preventive activities and predict potential interventions. By acting this way, a whole host of new avenues is opened up, to establish a closer relationship with the customer than ever before. By understanding the customer's operations, additional industry and sector knowledge can be acquired that in combination with the proprietary product knowledge, initiates the potential to offer

operational advice and guidance. The trend towards larger production capacities, the installation of large product fleets, the geographically distributed interconnection of production and business sites, elevates the availability focus from the product level to entire networks in combination with a holistic consideration of the complete production processes. Now, an entirely new level of service offering is potentially in reach: a value proposition by assisting customers in achieving their operational targets.

(B1F) *“Very soon we learnt that we could not enhance our relationship with an important customer by improving our reactive, product-oriented service delivery methods. Tuning the repair methods, introducing the most modern tools and setting special support groups only yielded marginal and incremental improvements in customer satisfaction. By assigning account responsibilities through a dedicated customer service manager, we discovered that the main driving force of customer dissatisfaction was the need for product and process availability of the customer’s business operation, although the requirements for process availability were not specifically stipulated. Teams, staffed jointly by customers and my service function were established in order to define activities to raise the customer’s process availability. To our surprise, we discovered that product failures contributed only partially in missing the required availability levels. To our mutual surprise, we discovered that there was a wide-ranging assortment of impacts that originated from, for example, the sphere of operational production control, energy supply, work planning and preparation, materials flow, inconsistent operating instructions and faulty and neglected recovery procedures. As the resulting general feeling of dissatisfaction was naturally connected to the use of our product, of course, this feeling was conveyed to the manufacturer’s service function that bore product repair responsibility. Together with customer specialists, we established planning guidelines and operating instructions as well as task and process responsibilities. In the same way, we negotiated with the customer’s business partners who were concerned in the production processes, about their responsibilities and level of involvement. In regularly recurring status meetings, we tracked the progress and initiated improvement actions. At that moment, when a universally valid availability level was reached, we felt confident enough to adjust the existing service contract with a specific availability target that ensured the requested process availability. Then we exploited this example, created activity and target templates and used them to build a structured availability service offering that we marketed very successfully to other accounts. Today this service offering constitutes the backbone of our service delivery.”*

(B1C) The particular features in this case are very noteworthy. In general, every reactive and product-oriented manufacturer's service function is confronted with allegations of having carried out the remedial activities neither fast enough nor thoroughly enough. Even though as a defensive measure, a service delivery function collects all the data in order to prove that they observed the major repair criteria e.g. MTTR, MDT and DRT, brought them in line and improved them steadily, there is always a repeated implicit question about the degree of appropriate engagement in the customer's needs. Unsatisfactory situations like this will sooner or later lead to serious discussions with the manufacturer's product sales function and top management, as the new product sale is believed to be in jeopardy. Usually in the end, this leads to discounts or reimbursement in relation to service contracts and invokes offerings by third party maintenance organizations. However in this case, it is highly commendable that the manufacturers service delivery function acted jointly with the customer's personnel. They agreed on customer specific tasks and responsibilities, followed them up and in the end reached the desired availability status and thus together established the terms of their applicable specific availability. A previously unexpressed customer demand was converted effectively into a jointly pursued availability target.

(B2F) *“In particular at customer production sites, where large fleets of our products were installed, the demand arose for rapid process availability. There, we acquired the methodology of how to design a service delivery approach in highly complex operational environments. By combining assigning customer service managers with online monitoring and analysing software in co-operation with product experts from engineering, we could control the pure product performance aspect. By building on this base, we were then able to approach the non-product related areas and, in co-operation with the customer's personnel, develop procedures that assured a minimal availability disruption by operational parameters. Our remote monitoring and alerting capabilities allowed us even to predict when operation resources neared their depletion or intervened or initiated preventive or emergency actions, before availability disruption occurred that necessitated an operational recovery. Due to this ability we took over responsibility for the customer's operational process and offered a new service contract that contained specific availability targets. This experience set a positive target for my function as well as for the service market in our industry. Consequently, service offerings for availability and the taking over of operational responsibilities on the behalf of customers became the norm rather than the exception.”*

(B2C) When a manufacturer's expertise and specialist knowledge are teamed up, then there is a good chance of acceptance by the customer as a partner, which positively and effectively assists in creating value. It is important that a manufacturer takes responsibility in the customer's operational environment. By acting in this way, the possibility of conveying the customer's operational aspects into the development of future products may exist, as well as growing into the customer's volume chain. Also, the learning period for becoming acquainted with the customer's production dependencies as well as the subsequent creation of generally applicable new service offerings can thus be remarkably reduced.

(B3F) *“On a steadily growing basis, we have positively and proactively responded to the constantly increasing demand for the availability of customers' productive processes. In particular, we exploit our remote capabilities and offer remote monitoring and facility management services for complex process engineering systems. In addition, we offer preventive services in the form of remote health checks, where data are remotely sensed, analysed and preventive intervention is delivered within the agreed time limits. On the customers' behalf, we actively control the operational production state of complex facilities and provide the timely feeding of operational resources before their potential depletion.”*

(B3C) The customers' demand for process availability bears the implicit requirement for non-disruptive operations. Therefore, it is of paramount importance to implement all known practices and engineering changes that assure product reliability as well as to integrate all production-relevant processes that allow the online data collection of product and process parameters. The concurrent data analysis and resulting prediction of preventive measures or delayed absolutely necessary interventions will assist in achieving a high non-disruptive operational production environment.

(B4F) *“The demand for availability services grew so rapidly that I found it difficult to recruit the necessary resources out of the product-oriented services. In order to sharply increase the solution-based service delivery and invest in further resources, I hired the needed resources from various engineering and development functions within my company. The complex interconnections of our customers' production networks as well as the integration of business partner hardware, software systems and applications and also the network systems of their large customers (by which we mean the customers' customers), has caused a sudden increase in availability supporting requirements. The*

*bulk of our servitization service offerings are arranged around the area of networking and the calculation of the related load and throughput performance dependencies. We have earned a new and positive business reputation within our company as a solution-based service delivery function that contributes favourably towards the company's earnings."*

(B4C) Once the re-direction towards servitization is commenced, a manufacturer's service delivery function needs to be aware of the suddenly growing demand for solution-based availability services. It is quite beneficial if the service delivery function has already embarked on services that support the reliability of products. Competencies such as planning of engineering changes and product improvements, the revision of service delivery processes and the negotiation of service interventions are already assets that can be further employed and developed in order to be applied in availability services. It becomes clear, therefore, that time will be one of the very important gating factors in servitization.

(B5F) *"One of the noteworthy factors that caused some customer dissatisfaction was related to the various modes of our business partners' design and implementation of total agricultural systems at our customers' sites. Although the product standards and installation instructions were created and distributed by headquarters, the installation and the subsequent changeover resulted in a remarkable array of uncoordinated creativity. Quite hefty investments and extensive support and travel expenditure were necessary to rectify these situations and turn them convincingly into a satisfactory operational state. As a first corrective measure, we implemented a specific build-up team that was accountable for single, but complex installations. This team guided the design of the facilities to be installed. Based on the pre-determined operational data, all relevant preparatory instructions for each specific installation were distributed in advance. After travelling to the customers' site, the team guided the installation and stayed on site, until the turnover and into the initial stages of productive use. From then on, a training conceptualization for business partners was established as the base for future design and installation tasks, as well as clearer and more understandable guidelines for the operating personnel of customers regarding implementing and applying the operational procedures according to their process needs. Although this approach resulted in some service revenue loss in the beginning due to the limitations of customer sites, the opportunity to gain operational knowledge about the actual customer operations opened up a new service perspective for us that we actually pursue in a very promising manner."*

(B5C) It is of particular importance for manufacturers to understand the customer's operational requirements especially if discrete product distribution channels are applied. It is all the more important, if, in parallel to the equipment sales and installation, the channels are also commissioned to carry out the service delivery for the manufacturer's products. What seems already to be a challenging task for any traditional product manufacturer's service delivery function, namely to acquire the knowledge and operational standards of the industry, is difficult to accomplish as well as for a geographically widespread dealership. There is no leeway, guesswork or interpretation in the service approach for availability services. The understanding of industry requirements, the early involvement in the definition of the customers' operational dependencies and close co-operation with the various customers' operations and relevant departments involved in the production processes, will be absolutely crucial.

(B6F) *“Since we set out on the journey towards availability and solution-based services, we have developed our service offerings in a direct forward line with the emphasis on operational support. In fact, we offer service contracts that are supplemented by availability targets for facilities availability as well as service contracts that are supplemented by percentages of production achievements. In between, there is a whole variety of considerable demands and ensuing requirements that we address with a wide range of services through our service delivery. Based on the customers' level of maturity in operational expertise, those services can range from specialist stand-by teams to the provision of personnel services and taking the responsibility for availability supporting measures not related to our products, or even assuming the task of running the entire operation.”*

(B6C) This manufacturer's service delivery function has left the sole product-orientation for quite a while. Based on product performance by means of a professional focus on product reliability as the base, product availability and production process availability were the consequential next steps in the development of their service delivery function towards the re-direction to servitization. Then, they further developed their solution-based services in order to create value for customers by assisting in various operating stages of the customers' production processes. Today, they deliver service tasks that bear no resemblance to the manufacturer's products any more, or they even operate entire production processes on the behalf of customers. The focus is on major building blocks that mirror the main operational areas of the customer's production, the evolutionary development of the service delivery strategy while acquiring and recruiting the relevant

service competencies from different sources. The systematic investments in order to build up appropriate competencies, such as online condition monitoring, data collection and analysis capabilities, assist in progressing towards servitization.

#### 4.6.3. (C) Life Cycle Costing / Total Cost of Ownership

Within the notion of “doing more for less” Life Cycle Costing and Total Cost of Ownership have become an important influencing consideration, in providing choice in a number of pre-selected products. The initial capital investment is, however, only a fractional amount of the entire costs that accrue from the use across the entire asset life span. The cost of operation can be considerably impacted by the differences between the various solution offerings. In general, they encompass, for instance, these areas: acquisition cost, design and development cost, downtime cost, production loss, cost of repair and failure remedial activities, spare parts and costs for corrective, preventive and predictive maintenance, modernization, external services, training and administration and report generation for target follow-up. Consequently, customers’ considerations about asset investment protection lead the understanding that every service delivery function of a traditional product manufacturer has to respond appropriately, in order to support these considerations. At least, two directions are suggested for intensive analysis: the cutting of cost in the service functions that do not generate new business, and improving productivity and effectiveness to increase the competitive edge on the one hand; and to respond to the customers’ requirements in order to support the cutting of his operational cost and improve the availability of products and production processes on the other hand.

*(C1F) “The customer’s message in my industry is clear. A growing demand for production availability has prevailed over the last few years. However, a pure focus availability promoting services without prevention is impossible. Of course, I could think of an offer that exchanges the old product with a new one after a certain period of time. Nevertheless, as long as we sell and distribute these electro-mechanical products, will we have to respond according to the customers’ availability requirements that explicitly should be delivered at low cost.”*

(C1C) In order to succeed under the tough competitive conditions in this industry, this manufacturer’s service function will have to concentrate on a profitable product-oriented service business by expanding and exploiting their installed base, partially re-training their service engineers towards availability consultation and move towards services that assist customers in decreasing their operational production cost.



(C2F) *“After the initial steps to manage the availability of products, we place all our efforts on the generation of availability for the customers’ entire production operations. In order to achieve substantial results, I strive to cut the operation related costs to the maximum possible extent. Simultaneously, my service delivery function also benefits from this focus on availability, since predictive activities and prevention also mean less service cost in labour and material. The economic benefits that result from the deep investments in software, remote monitoring and analysis programs undercut by far the capital expenditure of the investments. I will not conceal the fact, however, that this approach requires a clear understanding and co-ordination between the service function and product sales regarding the specific intentional business targets.”*

(C2C) Here again, the overall manufacturer’s strategy towards customer orientation must consider the interaction and impact on new product sales and the re-direction towards solution-based services.

(C3F) *“With a growing momentum, product sales meet a business climate that becomes increasingly challenging. By the same time, the profit share that my function contributes towards the company earnings increases steadily. This is partially owing to the situation where traditional products meet a comparatively steep rise in the occurrence of “look-alike” products or where products become comparable, in their functional and operational properties. In previous years, the conversations with customers circled around specific and detailed product characteristics and product properties. I did notice for quite some time that the essence of the discussion topics moved from these themes to a level of talks about business problems. Those concerned mainly the solving of business problems in the areas of cost cutting, the net present value, life cycle costs and production availability. Technology and products constitute only a minor role. This new attitude also required a new business orientation of our own service practices. Instead of inserting pricing elements such as labour, parts and the allocation of charges, we negotiated and applied now a pricing method that comprises customer paid incentives that varied according to the achieved targets and the amount of cost that could be avoided. That re-orientation has been a very promising approach up to now and it has opened up an entirely new customer set that we may now potentially address.”*

(C3C) In contrast with the usual service delivery offerings that are normally standardized and tuned to reach a high level of the “do once, run once” philosophy, this manufacturer approaches the philosophy of a continuing interplay between the systematic extension and

exploitation of the present service market and the expansion into new solution-based service offerings. To offer service contracts that aim at the achievement of the individual customer's production targets constitutes the satisfaction of very special customer demands. Thus, a manufacturer's service function may be able to fence competition very well by this approach. However, this example demonstrates that a number of conditions have to be met in order to be able to respond to customer requirements at this level. The development of management techniques, the ability to monitor operational production processes, the handling of large amounts of data, their analysis and the implementation of controlling software requires the development of an appropriate experience. This build-up can take around five to ten years, as mentioned in this case.

(C4F) *“The way we interact with customers has evolved quite remarkably at the same pace as the technology. First and foremost, the volume of production capabilities of our products has moved forward. Today, it is very common that in contract negotiation meetings the executives of an agricultural company participate, but also representatives from banks, investor groups, government officials and administrators that complement the buying party. On these occasions, we have to show quite clearly our service delivery advantages through the entire life cycle from the beginning of planning to refurbishment or disposal. Quite clearly, this is not only by providing and demonstrating healthy business figures but also showing the proof and testimonials of our actions on the basis of good citizenship.”*

(C4C) The approach of a customer's requirements regarding investment consideration is constantly evolving. A manufacturer who transits towards servitization will have to take into consideration all his functions in order to achieve a concerted approach to respond appropriately to the requirements and the demands of customers. A big advantage for a manufacturer is presented by the potential role that a re-directed product-oriented service delivery function may play in future. The internal knowledge about production process parameters in combination with knowledge of the industry, and the possible approaches towards constant improvements while managing cost at the same time may be very advantageous to assist customers in addressing and managing total cost of ownership problems and life cycle cost requirements.

(C5F) *“The traditional approach in selling our product-related services underwent a significant transformation, when we re-directed the service approach to customer orientation in relation to the customers' business problems. Of course, this re-direction*

*contained a strong element of promotion. The industry in which we are active is entirely transformed under critical time dependencies and under political and economic conditions that have hardly been noticed in any other industries until today. As a result, it is clearly recognizable that the focus of selling our value propositions as well as the mode by which we deliver services must also change. Today, life cycle costing, total cost of ownership and the cutting or avoidance of operational expenditures represents the core of our service offerings and contract negotiations. At the same time, entirely new participants energetically break into this dynamic transforming market. Large investors or investor groups, facility managers and financial institutions are generally not interested in the mode of operation or the production processes. There is one major requirement: 100 percent of production output. For us this represents a completely new service approach and, at this point at the very latest, the imperative requirement for traditional product manufacturers to transit towards servitization arises.”*

(C5C) The nature and the borders of previously established service requirements change rapidly or diminish entirely. The widespread assumption that a good product-oriented after sales service creates good customer satisfaction that in turn leads to new product sales seems to be on the retreat. Today, customer requirements are based on financial considerations, such as investment protection, aspects of life cycle cost and maximized production output. Therefore, a manufacturer has to change its attitude towards service orientation. The genuine performance of a manufacturer is expressed by its ability to explore adjacent areas that reinforce its traditional business and allow the generation of new revenue sources, rather than producing marketable products with an accompanying after-sales service delivery. By re-directing towards customer-orientation, a manufacturer should systematically think about all the elements of customer experience, develop innovative and generic business components and combine them in order to form a closed integral system. Through this system, a customer relationship can be established that may potentially last during the entire product life cycle.

#### 4.6.4. (D) Refurbishment / Recycling

The entire spectrum of different products in the capital goods industry is quite varied. Today, the total service business success of a product-oriented service delivery function is built on the provision and use of spare and service parts. Indeed, more than 50 percent of the total service business revenue is generated through the sale of spare and service parts. So, they constitute the main single business contributor. In addition, the mix of standard

maintenance parts in combination with captive high priced parts is characterized by a rather low usage rate. This relationship may produce a number of problems. In the interests of high availability, customers are going to demand parts stocks close to their operation in order to avoid extended outages due to long parts procurement times. However, a low usage rate and the proliferation of parts stock locations due to the customers' demands, leads to an annual depreciation of the parts stock value that either reduces the profit margin or encumbers negotiations in the sale of services. A further factor emerges due to the considerable efforts in the design and manufacturing, in order to ruthlessly drive quality management according to the rules of, for example, six-sigma and total quality management. The quality of products and components has improved during the course of the past two decades to unprecedented high levels. Service product-oriented service delivery functions of traditional product manufacturers are required to act at this stage. In order to support the customers' demands for availability, manufacturers are advised to develop and build up capabilities for remote monitoring and diagnosis. Through this they could prevent unscheduled repair actions and prolong the usage of equipment and ultimately decrease the number of replaced spare parts. But also, in their own self-interest, they have to identify ways and means in order to return the used parts to a state of "equivalent to new", rework or refurbish them, in order to be able to recycle those parts according to established quality rules. Besides the potential effects of protecting the environment, service delivery functions are going to win back flexibility and freedom by adjusting their contracts accordingly.

(D1F) *"We dedicated great efforts to the reconditioning and refurbishment of maintenance and service parts as well as with large and valuable machine assemblies and operating equipment. After scrapping replaced parts for years, we started on a very small scale with some reconditioning activities for very large product mechanical components that represented the captive part of our spare parts provision. Due to its exceptionally high commercial and financial success, this approach received such attention and thrust that today, we operate several reconditioning centres worldwide. This again has had at least two positive effects. We could redeploy resources that we partially drew from the reactive product-oriented services and re-skill them to professional status to act as reconditioning specialists. Furthermore, this sharpened our mind-set to change and refine our service processes, since we are "paid by the production hour" and thus are incentivized to cut our expenses in order to maintain the service profit targets. In the interest of production availability, we developed a mobile reconditioning factory that we move together with the*

*relevant reconditioning personnel to the production site of the customer. This way we largely avoid the considerable travelling, transportation and packing times of the parts to be reconditioned.”*

(D1C) This manufacturer displays a fine example of deploying a great deal of refurbishment and reconditioning tasks for the benefit of the customers’ operations as well as for the success of a genuine service business. The implementation of these activities further facilitates a re-assignment of product-oriented service delivery resources in the transition to servitization. The novel approach in moving the reconditioning factory into the customer’s production facility when required, assists the customer in avoiding extended transportation times for captive parts as well as long production down times.

(D2F) *“Reconditioning and refurbishment has been performed in our company as long as I can remember. Every component or assembly that was returned from the premises of customers was reconditioned to a particular state as equivalent to new. This was very helpful in supporting our competitive position.”*

(D2C) This manufacturer’s experience also showed these activities as supportive in maintaining a competitive edge. Refurbishment and reconditioning is generally recommended for all spare parts and assemblies where the associated cost for time and salvage compare favourably to the cost of new. This is of special interest in all “no defect found” situations and when by the replacement of small parts entire assemblies or functional units can be brought back to an equivalent to new state. A close cooperation of the service delivery function with development and manufacturing facilitates the certification process in order to be able to deploy the reconditioned parts as equivalent to new and provide access to detailed design information.

(D3F) *“The sheer value of some of our captive parts and assemblies suggested a commencement of reconditioning activities quite a while ago. During this reconditioning exploitation we achieved some very promising results. The stock value and the variability in contract terms and conditions are positively impacted.”*

(D3C) A further positive example that demonstrates an effective refurbishment of elements and parts that ultimately leads to the achievement of commercial cost advantages. There is a further financial benefit that is rarely mentioned: the opportunity to manage the efficiency in order to free funds for necessary investments in service tools and programs.

(D4F) *“Indeed, we have tested and focussed on a number of effective ways to recondition captive elements and assemblies. Currently the related administrative processes are being completely newly re-designed in order to facilitate reuse options.”*

(D4C) A good opportunity to give a hint that reconditioning and refurbishment activities demand a high level of knowledge in the processes of quality management. Close co-operation with the manufacturer’s production process experts is highly recommended.

#### 4.6.5. (E) Investment

The market in which the products of the capital goods industry are placed is driven by the demand for production productivity and quality, by digitization, by a rapid expansion of networks and by the application and production processes and their standardization. The task of a service function in this industry is first and foremost to ensure a very high degree of business process availability. This process availability may be achieved by scheduled maintenance and proactive prediction and prevention activities that meet the agreed contractual obligations as well as the customers’ perceptions. Ideally, the service activities should result in a very long time interval, where the mean time between failures and the duration to resolve a malfunction ought to be as short as possible. Furthermore, the mean down time is closely linked to the demand for availability, as it determines the time where equipment and facilities are not available for productive use and this loss of productive time should also be as little as possible. This signifies the demand for technical and functional capabilities of a service delivery function is very high, in order to avoid and prevent serious impacts on production or administration processes. However, the aim of transition to servitization also provides the framework for proactive, non-remedial service activities that enable additional services that ensure the full use of technical and performance features and characteristics of the equipment and facilities. This can be achieved for example by consultation of customers, user and operator training programs, possibly accompanied by the upgrading and expansion of machinery and production lines as well as taking over responsibility for partial or entire production processes.

The consequences that arise from this transition are related to the recruiting of new human resources as well as investments for technical and diagnostic tools and software and databases. Those should enable new capabilities to increase the productivity of the product-oriented services in order to free resources for the transition to servitization. That should take place in parallel with the recruitment of new service resources as well as the

streamlining of internal administration processes to facilitate the offering of service proposals and the contract management process.

(E1F) *“When we moved towards services that were oriented to achieving availability, we had one main objective to follow: the ability to monitor production equipment remotely and acquire information about the actual operating status of our product at any time and wherever our product was in an operational state. This was a complete new approach to maintain our products. We could gain development and engineering functions in order to design these capabilities in our products and implement monitoring software that was available on the market. Subsequently, this software was modified according to our needs. This represented one of the major service investments that had been carried out according to our functional service needs and to the benefit of product-oriented services. Now we had a tool that helped us to link directly into the customers’ operations in order to predict performance impacts, forecast production interventions and schedule maintenance activities that did not lead to the interruption of the customers’ productive processes. The resulting decrease in expenditure and cost as well as in productivity gains for the customer and for us was very favourable. Resulting from this positive experience, now, we pursue a holistic approach that connects all products of a customer’s production site. We are right in the central area of the development phase. A further productivity progress is gained by the linking of the monitoring tools to service specialists and customers’ personnel. Through this, they are able to activate and trigger alarms as well as to initiate immediate remedial activities in severe situations. Regarding the contract management process, we replaced the former legacy systems by the most modern enterprise resource planning software, in order to allow for faster and more precise tracking and control of service opportunities and service bid offerings. In addition, now, we can clearly steer the control process and distinguish between revenues that are assigned to the product and those that are generated by services. Since introducing our selection process for service resources for solution-based services, a relatively manageable number of engineers surfaced who had capabilities for planning and restructuring processes and the ability to consult and negotiate with customers. We had to search the market for quite some time in order to identify the right candidates.”*

(E1C) The operational requirements for the customers’ production processes and a manufacturer’s product-oriented service delivery processes differ considerably and are generally incompatible. In order to take partial or entire responsibility for the production results of customers, investments will have to be made. These investments consider new

human resources to obtain rare competencies and the acquisition of industry knowledge as well as investments in tools and software. These software investments should build an enablement platform that allows the fusion of digital monitoring, data collection and the world of analysis with the physical world of production equipment and machinery. A further important requirement results from the demand of the contract management relating to standards of good practice. Frequently, legacy contract management systems are used that date back several decades. Even the best service administration specialists face severe problems when they assist customers in a contract inquiry. A transparent contract management process should provide clear control over the status of opportunities and the filling rate of the contract pipeline as well as the status of offered service bids. The foundations of servitization rely on systematic data base management of all installed products and implemented features in order to be able to expand the installed base in the direction of the company's own and OEM products with the target of generating and securing revenues by product-oriented service delivery activities and also to assist any customer advice centre in accessing the customer's individual and specific information.

(E2F) *"The investment and R&D budget for new tools, software, competencies and skills that was allocated to my function was comparatively rather small when we commenced to transit towards servitization. At this time, the general consideration and image of a product-oriented service delivery function was tied to the widespread opinion within the company, that product-oriented services do not develop products and hence require only a small investment volume. Therefore, I emphatically addressed the increase of productivity of the product-oriented service resources in order to obtain the freedom to be able to learn the customers' environment, educate myself in availability measures and train new resources that I had recruited from other functions within the company and from outside. I invested every amount of money I could get hold of into the transition. In the meantime, we have achieved a very respectable business position internally, we contribute meaningful earnings towards the company's result and I can invest in resources that we have earned through our service function. With hindsight, I may state without any doubt today that I would fight with much more rigor for a re-allocation of investments in the favour of servitization than I did in those years at the beginning. I would immediately build up field resources against any upcoming resistance and position them very close to the customer, in order to control the immediate actions and services that we had to establish in order to increase the local added value in a more sustainable manner."*



(E2C) When deciding to re-direct towards customer orientation, the resulting unavoidable investment phase has to be oriented according to the potential business gains that all specific functions of a traditional manufacturer may contribute, rather than considering the actual image and business position of the present product-oriented service delivery function within the company. It is a rather painful and long-term exercise to completely earn the required funds in order to be able to invest in the necessary service tools and service technology platforms.

(E3F) *“Right from the beginning, I had a clear understanding of how we would logically and systematically disseminate and apply the information that we generated from the data that were obtained by condition monitoring of the customer’s facilities. We understood therefore that major investments were needed for software tools, algorithms and programs, using knowledgeable resources to design and set up these tools, by installing a suitable server topography, by the inter-operability with relevant IT facilities and the means to assist customers to ensure their process availability. We also understood, that we would have to run a similar logical complex setting to those of our customers, in order to be able to recommend conclusive measures to be implemented, in order to assure the availability of production processes. This meant that we also had to invest in and upgrade our service technology platform. However, this approach necessitates a specific preparedness on the part of the customer to co-operate in this manner and required his/her willingness as well in order to invest accordingly.”*

(E3C) The basis of any production process assurance is related to the understanding of the process flow of the relevant processes concerned. This will be enabled by a systematic monitoring of the customer’s production equipment, the closest tracking and tracing as possible of the related data and their consistent storing in specific databases and prompt analysis in a real-time manner. Consequently, this will require investments in areas that are completely new to a traditional manufacturer and novel process work that also constitutes new ground for the customer’s personnel. Eventually, by the re-direction towards solution-based services, the successful application of these investments will assist in reducing the costs for communication and co-ordination and facilitate the degree of implementation of customization and individualization on the one hand. This cost reduction and new capability creation on the other hand enables a manufacturer to more effectively penetrate his traditional market, attain a larger market share and develop new markets more flexibly and faster than previously. At the same time, the traditional market and sector borders that were characterized by their standard product categories play a vanishing role in market

relationships. The manufacturer's growth will be determined by its ability to collect information and intensively work with the industry and customer knowledge that they have gained by engaging in the customer processes of their core markets.

(E4F) *“We found it challenging to recruit the required number of human resources from the actual product-oriented services personnel. The market potential for solution-based services was easily balanced by the customer's demands. In order to respond quickly and effectively to the market demands and assume a leading role in our service industry, the acquisition of particular knowledge was envisaged. The subsequent acquisition of a specialized professional service house was the logical consequence. In addition to the investment in knowledgeable resources and competencies, we had to prepare the build-up of processes and resources that enabled the operation of large customer sites and office agglomerations.”*

(E4C) One of the main parts of servitization tasks that arise in addition to the product-oriented reliability service delivery offerings is characterized by its digital nature. Of course, first, these are the collected data from process monitoring, but also the elements of networking, the implementation and the management of databases, the analysing processes, the establishment and handling of performance reports, the prediction ability as well as the tools and programs in order to carry out the control of processes resulting in the demand for expert knowledge. Executives who bear the responsibility for the transition to servitization should ensure that service personnel who possess exceptional digital skill and know-how are employed in all servitization development phases.

#### 4.7. Business and Market Strategy Implications

Today, a traditional product manufacturer faces strong competition and experiences intricacies to maintain a competitive edge. New technology platforms, IP technologies and manufacturing strategies such as “Industry 4.0” open new paths to success. However they also invite new competition. Adding services to products, often cited as a kind of panacea, is thought to evade the ever-present struggle. This approach however bears the inherent disadvantage of attempting to gain a greater share of the customer's wallet rather than providing solutions to customer business problems.

##### 4.7.1. (A) Solution Orientation

Often, adding services to products is cited as a kind of panacea to evade the resulting struggle. However, the disadvantage of this approach represents the attempt to gain a

greater revenue share of the customer's wallet rather than supporting customers and creating value by doing more business. Instead of operating its service delivery function as an isolated part of the company with the main purpose of supporting the sale of products, traditional product manufacturers should purposefully position their service delivery function's capabilities under the continuous advancement and further promotion of their capabilities. This should be stronger customer orientation of the entire manufacturer and an intensive integration into the development and value creation process of customers, rather than solely implementing servitization as a new strategy to increase revenue growth. This new orientation towards servitization is not an easy task in order to establish an effective position as a value creator for customers. The explicit commitment of the board of directors and the unconditional co-operation of the executives are imperative, as well as investment in adequate resources.

(A1F) *“The explicit commitment of the board is absolutely essential. I would never start any comprehensive process of change if the board members have not clearly endorsed the transformation. If the board does not strongly back the change agent and if the change agent is not provided with a “carte blanche” to cushion and absorb potential repercussions that arise due to the change activities, the whole transformation has no chance and collapses sooner or later like a house of cards. Therefore, never accept tasks and schedules that cannot be kept and deadlines that are theoretical or illusory. It is wishful thinking that a transformation can be ordered. Honesty is absolutely necessary in everything we do. If we promise to provide investments, training and tools, then we must do it. Otherwise our employees will duck and take cover in order to wait until the wave has passed. Constantly, we have to beat the promotion drum, as there is no chance without the management team's support.”*

(A1C) In essence, nothing needs to be taken away from what has been mentioned here. Any transformation needs a strong board commitment and the mental and business back up of the change agent as well as the continuously expressed unconditional will to succeed, accompanied by the consistent completion of the planned tasks.

(A2F) *“When we set out on our company's journey towards servitization I had already set an example in the executive team with the service delivery of my function. For quite some time, we focused on the reliability of our products, and that involved us in a certain degree of customer co-operation. During that phase we also learnt more about the requirements of the agricultural industry as seen from the customers' perspective. Starting from this*

*point it was quite natural for my engineers to embrace the entire product line of our company in terms of the re-direction towards value creation. It came to no one's surprise that the corporate purpose was re-defined as creating value for customers."*

(A2C) The core capability of every solution-based service delivery is the ability to communicate with customers on equal terms and the establishment of a customer relationship that furnishes an open discussion about business problems and endures potential emotional and professional strains. The service delivery function of this manufacturer has facilitated this approach with an early start with the re-direction towards customer-orientation by moving towards product reliability service delivery offerings. Those offerings, although centring on the reliability of the product, aim at the needs of customers and require quite an intensive dialogue and co-ordination in order to carry out the appropriate interventions and activities.

(A3F) *"When the company board took the decision to transit towards servitization, a further decision was taken to re-define the core of the corporation's mission by applying the objective, to create value for customers by assisting in the enabling of solutions. However, with my service delivery function I had already partly commenced towards servitization quite some time previously and the board's new orientation towards servitization offered the opportunity to be engaged in solution-based services in all engineering matters that concerned an installation and implementation background. I even received the required funds to purchase and adapt remote digital monitoring tools as well as my own chemical laboratory. For example, my personnel could take samples of various chemicals and fluids at the customers' premises and analyse them with the objective of negotiating with the relevant administration authority, about the chemical compositions and their threshold values. This relationship with customers as well as the width of our service delivery activity makes us an ideal partner in the planning and pre-sales stages for the engineering and sales functions of my company. Today, so I believe, it is fair to say that services are a recognized partner within the company, and that we have entirely stripped off our previous repair function image. In order to create value for customers, all company functions are combined and directed under a mission umbrella entitled "service chain". This service chain comprises the four building blocks: Train, Design, Support and Care. The Train building block introduces customers by expert symposia to the latest industry knowledge. Design assists architects and planning offices in technology migration and new industry applications. Support embraces all services that assure production process availability and Care assures the brand support by rendering product reliability services."*

(A3C) This is a very fine elucidatory example that explains the advantages that may result from early service involvements towards the understanding of customers' business problems. The service executive committed his service delivery function in the delivery of services that centred on reliability and the effect that this commitment could achieve on the customer's operation. Hence, at quite an early stage customer and industry knowledge can be gained and exploited within the company for the benefit of product and maintenance package improvements. Furthermore, this acquired knowledge is applied to promote the operational availability and carry out services that are neither the core business of the manufacturer, nor that of the customer. Incidentally, in the end the previous product-oriented service delivery function assumed the entire manufacturer's service responsibility.

(A4F) *“As far as I can remember there was neither a discussion about the strategic intent to re-orient towards customer requirements nor about the actual co-operation between all functions in order to reach the desired state. The sales function has become the backbone for selling solutions. The incentive system honours disproportionately the creation of value in relation to the sale of products.”*

(A4C) The ancient dichotomy that prevails in manufacturing companies: the depictions of sales and services, seems to have been sorted out in favour of a common approach towards customer orientation. A further strong indicator of serious re-direction is expressed by the incentive and bonus system that emphasizes the selling of solutions rather than mere product sale. In the past, this manufacturer underpinned its strategic seriousness through the selection of sales representatives for redundancy that did not align with this approach.

(A5F) *“The unrelenting technological progress of our industry, as well as the steadily increasing complexity of the customer's production processes and applications, directed me to continually develop my service delivery function as a strategic process. The traditional reactive service delivery was extended by activities that assured the reliability of products. We analysed all reports of product remedial activities and fed the results back to customers. In combination, we also offered strategic spare parts sets in order to shorten the mean down time of facilities. These service activities represented the first steps towards a process availability consultation, a direction that I welcomed very much. However, while delivering those service offerings, I had to conclude that we had to enlarge our communication platform in two directions: externally, in order to understand the processes of customers and their demands and requirements for service. And directed internally, by establishing an interlocking of our communication and co-operation platform with the*

*other functions of our enterprise. Then, by concentrating on the customers' productive processes, we hired professional and expert resources with software competencies from outside and bought monitoring and analysing software and tools. Those software products were modified and customized, in order to engage with the consultation of network and process work. The objective was to ensure the availability of customers' production goals. At the same time, the traditional product-oriented service delivery function remained largely unchanged in order to exploit its stable, sound technology business. I am convinced that I may only participate in the solution-based service market if the product-oriented service delivery is fulfilled flawlessly. The driving force behind our ideas is always to scrutinize our service activities constantly and reflect on customers' demands and requests. Again and again we have to find out for example how we could speed up the remedial services, whether we ought to provide back-up equipment or if we should take responsibility for customers' business results. Today, we have long since left behind our initial "exotic" image as a product repair function. The present approach of the corporation aims at the combination of all divisional product and professional service functions within the entire corporation."*

(A5C) A further situation is given in this example, whereby a manufacturer's service executive developed his product-oriented service delivery function, considering the customers' requirements in his industry. He derived the strategic development direction from the development of the digital technology that was applied by the customers in their industry sector quite some time in advance. Again in this case, a logical progression process was sustainably initiated, commencing with reliability considerations as viewed from a customer's perspective. At some stage it became obvious that further progress could only be achieved with resources that possessed software skills and software refined competencies. He also advocates retaining and professionally managing the product-oriented service delivery offerings. Still today, they represent the major part of the service business earnings and their successful service delivery forms the entry threshold level for customers, in order to be involved in the delivery of further and additional solution-based services.

#### 4.7.2. (B) Business Process

The times when a sales function of a traditional product manufacturer could sell products solely on the basis of excellent product quality, seem to have vanished a long time ago. The consistent endeavour for quality of the manufacturing industry leads to a levelling out

of technology and products. The more products resemble each other, the more the emotional component of relationships gains in importance. This means that the importance in the relationship is based on the ability of a manufacturer to provide customers with the greatest benefit and create the greatest value, rather than competing on sheer technological competencies. First of all, this ability includes a real interest in the customer, a comprehensive understanding of his/her business situation and an unconditional willingness to enter into a partnership. A solution-based service provider will also be able to conceptualize value as perceived by the customer. An individual, industry-specific and strategic conceptualization focuses on the understanding of the customer's service requirements in order to provide an appropriate and holistic solution to the customer's business problem. Frequently, the provision of products is incorrectly quoted as the provision of a solution. This implies that the product provision itself solves the business problem of a customer as though there were no procedural and system-relevant problem solving dependencies. Therefore, a manufacturer's service delivery function must possess the capability of deep process comprehension and excellent industry knowledge. By recognizing the role of the product, its integration into the production process and the operational and business parameters of the entire business process, the implementation of adequate solution-based services will be enabled.

(B1F) *“If we, as the service function of a traditional manufacturer, offer solution-based services then we have to be clear in our understanding of what we intend to solve, of how deep we are prepared to integrate ourselves into the customer's operation, how prepared we are to drive forward the solution complexity and how deep we interlink the customer into our operation and make him/her dependent on our solution. For example, we have taken responsibility for the operational ground processes of a large international airport. Our branch office there hosts a number of service engineers who are security-cleared for a number of critical areas above and below the ground of the entire airport. For a competitor, it would take months to be able to get to know how to access all locations and how to overcome all operational process dependencies. There the main requirement that relates to all processes is the assurance of process availability. And the assurance of availability is, without the element of prevention, simply unthinkable. All too often, prevention is regarded as a singular technical matter. I extend this thinking towards the prevention of accidents, risks and contingencies. The peace of mind of someone in the executive decision chain is often underestimated insofar as the fear exists to be held liable for health damage and loss of life or infinite regress claims, due failures that lead to down*

*times or loss of production. We have to understand how we could prevent that person from being hit by recourse claims and compensation. This quickly results in a huge documentation task, e.g. for insurance companies and certification agencies. However, this also implies that we have to create an environment in which these tasks can be carried out professionally.”*

(B1C) An excellent demonstration that solution-based services exceed by far the traditional scope of a product-oriented service delivery. There is a spectrum of business, financial and legal aspects that reaches beyond the classical collection of customers’ service requirements. A traditional product manufacturer should develop a strong emotional connection to its customers in order to reach a position of trust in order to be involved in the conceptualization of those business problems. The prerequisite in the establishment of trust is based on the unconditional will to understand the customers’ business problems by their different nature, the involvement of different stakeholders and by their capability to position the entire manufacturer’s functions, to act coherently as a creator of value.

(B2F) *“For years we undertook the sale of spare parts at the request of customers in a reactive mode. Necessary product remedial activities were delivered by several company functions in an uncoordinated manner. In contrast with this, we have made a significant transformation towards servitization since the age when economic development in our industry led to the spin-off of a separate and dedicated service company. The assignment of this newly founded service company was to deliver the entire spectrum of services for all divisions within the entire company group. Technological, environmental and economic considerations drove the entire industry to re-orientate the way it delivered its products in a remarkably short transitional period. This resulted also in a change of our customers’ business requirements. One of the key requirements is related to the availability of the entire production processes. After we gained experience with the service and support for availability after a number of early incidents, we changed our service approach completely. We experienced a “revolution in our heads” and learnt that we created value much more effectively, if we co-operated very closely and interwove with the customers’ personnel in all activities throughout the product life cycle, from the planning phase to the end of product life. Now we study in a mode of close co-operation with the customers’ personnel the relevant production processes, develop specific production considerations and process flow conceptions and interrogate each single component on their suitability for the customers’ production and business targets. Only resulting from this, together with divisional product sales do we establish specific and tailored new plant and facility*



*concepts as service offerings with the ultimate goal of lowering operating costs, simplifying processes and creating competitive advantage for customers. Today, this has catapulted us into a very favourable competitive position. We share the achieved cost saving with our customers and we have gained expert knowledge that enables us to apply this special expertise to other segments in our industry that we could not have reached before.”*

(B2C) This description illustrates clearly the “revolution in the heads” that resulted in an entirely new value-creation approach for customers. Rather than continuing with the successful spare parts sale and their progress of transitioning into a process availability supporting mode, this service delivery function based its re-orientation on its ability to gain industry-specific knowledge and concentrate totally on all phases of the product life cycle in connection with the production processes of their customers. It was further understood that a dedicated and close interaction and co-operation with all involved functions is crucial in building rapport and trust and thus in achieving a position as a preferred service delivery function in order to create value for customers.

(B3F) *“In order to support the mind change of our service engineers towards servitization a catchy slogan was created. Using the motto: “Put on your customer’s shoes” we have reached a state where we consider the entire business process of a customer rather than focussing on a specific product and its influences and dependencies. Initially, I was in a somewhat lucky position. Due to the re-orientation of the entire company towards customers’ demands I neither had to fight for the necessary investments nor justify the funds and expenditure. The acquisition and merger of outside specialist companies helped to recruit a large portion of the required competencies and skills.”*

(B3C) One more instance that underlines the importance that everyone who is involved in the re-direction towards servitization needs to understand the implication of its activities on the customers’ business operations and act according to the customers’ service demands and perceptions. This neither means that the technological features and properties of the products should be pushed to the background nor that the product-related service procedures should be abandoned. Quite to the contrary; the so-called “legacy” service delivery processes should inform the understanding of the customers’ business and production demands, ideally amalgamated with the requirements of the customers’ production processes.

(B4F) *“I started with a typical product-oriented reactive after-sales service as a service delivery function of a typical traditional product manufacturer more than a decade ago. Today, with my service delivery in combination and co-operation with the other functions of my company, I have reached nearly an ideal state of servitization. With my service function I cover all business activities, from the planning phase for the installation of single machines to holistic conceptualizations of entire facilities and all service deliveries until the end of product life. Nearly every offering constitutes a service chain with various and particular service elements. It is my intent to focus on certain strategic tasks and assign the service delivery of those non-strategic elements to service business partners. For this purpose I have intentionally built up a service partner network that delivers services as sub-contractors and operates as an “extended workbench”. This concentration on strategic solution-based services enables my service delivery function to carry out non-product related activities and take process responsibilities on behalf of customers. This may include for example the restoration of facilities, supplementary audits and administrative reviews.”*

(B4C) A very interesting approach to quickly achieve a position as a service delivery function of a product manufacturer who guides its business focus on all activities related to the entire product life cycle in connection with its customers’ business requirements. However, this approach may only yield the desired results if a strategic service business partner has been appointed, a strong service business partner management implemented and continuous communication, co-operation and strategic as well as operational guidance is carried out.

(B5F) *“Along with the company board’s decision to transit from a position as product-oriented manufacturer towards a customer-oriented and business solution company, the consequences became apparent, of how to involve the business partner network in this transition to servitization and how to integrate my service delivery function into their co-operation with customers. We had to build up an entire new chain of cultural, professional and operational elements in order to encompass the potential solutions of the international agricultural market. One of the emerging critical success factors appeared to be the mutual understanding of the term “customer requirement” and the resulting demand that stemmed from the deployment of various operational approaches and standards. Based on the experience of actually delivered reactive services, we reacted as the first line of transformation in three areas to respond to the demand of operational availability. The establishment of an English-speaking specialist response group was the first customer*

*port-of-call for all remedial incidents regarding any type of product at any time. This supported the increase of operational productive time. The creation of a build-up team that planned every new customer process or process modification together with the business partner drastically reduced the potential non-product influences that previously impacted the entire business process. The structuring of an agricultural management consulting team in combination with a continuous training program in connection with the certification and re-certification of business partners at regular intervals assures a sustainable orientation towards business process requirements rather than delivering a product.“*

(B5C) Solutions and value creating activities are generally composed of a number of various services and special skills. Not all of them can be delivered by a product manufacturer's service delivery function. Therefore, the communication and co-operation with service business partners as well as their effective integration into the service operation is essential. The approach of integrating a service business partner illustrates apparently in this situation the importance of establishing a total end-to-end concept that makes no distinctions in the management of the resources involved.

#### 4.7.3. (C) Industry-specific Expertise

Generally, if service delivery functions adhered in their service business to the quotation of an English scientist that “all things are similar”, then they would not be entirely wrong. After all, in each production process, products are being transported, ground, heated, cooled and stocked. And in every organizational unit there are processes that relate to the inter-operation of suppliers, products and employees, true. However, ensuring, for example, continuous production does not end with the provision of the technological expertise of a manufacturer. The installation of remote monitoring tools, the implementation of various analysis programs with the purpose of predicting and preventing outages and the application of general process management procedures are not sufficient by far. Indeed, it is helpful to provide technological expertise and related tools in order to gain and improve the time in relation to quality that is spent with customers. However, in order to appear and act as a business problem solver of the customer's core processes, the service delivery function “must speak the language” of the relevant and specific sector and must ensure an appropriate depth of industry and sector specific knowledge paired with a thorough and detailed comprehension of the process.

(C1F) *“On our journey towards servitization we have walked a long distance. From the simplest reactive sale of spare parts to assisting customers in achieving availability for our installed products and subsequently taking care of the entire production processes. We had the chance to develop and adapt our service delivery and keep pace in accordance with the mighty technological transformation of our entire industry. Also during this period, we have learnt how to interact with customers, engage in projects as well as in strategic planning with customers and create value for and with customers on the basis of an effective customer relationship management with all relevant functions of a customer. Today, we operate entire production sites with operating staff that receive functional guidance from us and we manage the entire licensing and approval procedures with administrative authorities as well as the trading of production capacity at the appropriate exchange. I am convinced that our success is founded on the close relationship that we established with product sales. Although being a separate service company that is held accountable for the service profit targets, we found a way of interweaving our strategic approach and mode of operation with all divisional product sales functions within our corporation. This enabled us to rapidly build up all the decisive industry and sector-specific knowledge as the prerequisite for any consultation and value creation as well as the dissemination of our service offerings to adjoining industries.”*

(C1C) It is not too often that a product-oriented services executive is convinced that a close relationship with the product-sales function represents the cornerstone of transformation success. The active and well-planned constant interaction and communication with the various customers’ personnel requires a strategically aligned co-operation with the manufacturer’s sales function in order to build on existing communication paths and exploit various existing contacts with a particular customer’s function. If this close relationship is established well, a number of potential frictions and pitfalls can be avoided.

(C2F) *“While we progressed from our reactive mode towards the solving of problems, we noted that by means of acquired sector knowledge, we were also able to offer assistance in the resolution of problems that originated from impacts by products of other original equipment suppliers. Why should we only look for example at one gateway, why only our gateway? If we study the gateway operation of a factory or a hospital or of an office building, then we find similarities, we find various product and vendor characteristics. If we then enlarge our question in the direction of particular products that do not look similar but fulfil a comparable function then we will see that the differences result from the different modes of operation. Then we find areas that can only be addressed using*

*industry-specific knowledge. Over time, we have systematically enlarged and extended the legacy product approach of our company and consolidated our image and importance as problem-solver.”*

(C2C) The driving force behind any re-direction towards customer-orientation and solution services has to be the focus on solving customers’ business and operational problems. This manufacturer’s service delivery function not only has grouped all solution-based services around their product technology expertise but has also addressed the customers’ problems stemming from third party original equipment manufacturers. This has helped to start forming a mature customer-oriented platform, extending the service offerings in the direction of value creation through solution-based services. However, in order to be ideally poised, a manufacturer’s service delivery function needs to have reached quite a mature state in order to be able to successfully carry out the necessary service support negotiations with those original equipment suppliers.

(C3F) *“The customers in our market followed the technological migration towards online processing, carrying out their applications in rather large, wide-area networks and running individual workplaces at isolated sites. We recognized in this movement a unique opportunity to progress our services in the direction of consulting and outsourcing that resulted, however, in a considerable demand for new skills. Some of the required software resources were re-deployed and re-trained from our own service function ranks. A rather large number of resources that already possessed the required skills were recruited from outside. Industry and expert knowledge always seemed to me to be vital in order to achieve a competitive edge. In my continuous training and certification programs I steadily raised the bar to spot and identify talents who could be assigned to counselling and consulting services. That approach in combination with the newly recruited skill offered a reliable platform of industry and expert knowledge that enabled me to progress further.”*

(C3C) This manufacturer understood clearly the skill dependencies and the challenges that result from a major change in the industry. A manufacturer who commences initially from a product-oriented service delivery platform will definitely be influenced by the ability of such a change to offer operational and business solutions by its progress, to obtain the necessary application and operation-oriented competencies in order to build up the required service capabilities, such as consulting and application support.

(C4F) *“Due to the widely varying particular fields of business activity, I had to tailor my service delivery response accordingly, in order to meet the different sector and business*

*dependencies. The service business partners had to be trained and re-oriented towards product availability and its resulting requirements. In parallel, I steadily improved their product reliability service delivery in order to bind end-users and business partners permanently to my service delivery. A second group of engineers is teaming up with product sales for the conceptualization of new projects. They also negotiate and consult on equal terms with architects and planning offices, in order to establish the appropriate application solution for companies and investors. A further group addresses outsourcing and completely different tasks that bear no relation to our manufactured products. Indeed, the specific expert knowledge of each group varies in depth and business scope. However, each group exerts a unique, significant influence while focussing on their specific task and sector.”*

(C4C) In contrast with the product-oriented service delivery procedures and processes a solution-based services delivery approach requires a highly concentrated effort in order to collect the customers’ service requirements and to understand the customers’ business needs and dependencies. Compared to a manufacturer’s service delivery function that provides the entire spectrum of product-oriented as well as solution-based services, a manufacturer that mainly co-operates with service business partners, faces the challenge of creating a sustainable overarching education and training concept for all involved external and internal service functions. The aim is to succeed in a service delivery where each of the various service partners acts according to the strategic service intent of the manufacturer’s service delivery function.

(C5F) *“Since the beginning of the last century our industry has displayed the characteristics of a stable, solid and enduring industry. However, in the recent few decades the industry experienced a dramatic transformation that was triggered by a multitude of shock waves sent by changes in technology, environmental considerations, the sharing of resources and economic influences like the direction towards privatization. Service contracts that were considered to be stable for ages required an alternative change in contents as well as in terms and conditions that were caused by the new market rules and requirements within relatively short time frames. We faced an accelerating degree of previously unseen competition from new market entrants. They were invited by the new market requirements in response to the combination of privatization, technology and environmental considerations. In the past, generally all customer contacts and discussions centred on the excellence and detailed knowledge about present and future technology and product functionalities. Now, a wide range of themes dominates the areas of business, e.g.*

*load distribution, sharing of resources, on time production delivery, outsourcing of tasks and operations, profit increase and the avoidance of cost and expense. Since we always maintained a good liaison with all product divisions of our corporation we could draw on their industry knowledge and team up the relevant expert knowledge in order to progress towards servitization by further assisting in creating value for customers and thus boosting the industry and expert knowledge of my function.”*

(C5C) A typical situation of a game change that forces a manufacturer to change its production orientation as well as also forcing the manufacturer’s product-oriented service delivery function to re-orientate its service strategy towards servitization. The execution of its service strategy had been hitherto successful and unrivalled. This service delivery function built on their good relationship with all product divisions inside its corporation in order to obtain a broad spectrum of industry knowledge that could be applied towards servitization through the creation of value for customers by solution-based services. I could learn that this positive momentum was accompanied by a great deal of work towards re-direction of the service culture. The successful product-oriented service experiences so far have led to a certain degree of hesitation in the belief of value creation and solution-based services.

(C6F) *“The company structure of our industry has evolved remarkably during the past decade. More and more very large agricultural companies characterize a market whose participants orientate themselves along a strategic continuum of roughly twenty years, rather than on the dominant popular planning of a four-season cycle. The main interest centres on the uninterrupted availability of their entire production processes and continuous product delivery through their product dissemination network. Service contracts are based on the results of the production processes achieved. We were able to face this new development since we have re-oriented our company for quite some years towards servitization, enabling a steady and systematic build-up, formation and structuring of expert knowledge of our industry. Without it, there would be no chance to be accepted as a total solution business partner by investor groups or banks.”*

(C6C) Any manufacturer’s product-oriented service delivery function that embarks on servitization will meet a major challenge in meeting the customers’ service requirements that emerge from the demands of the customers’ operational and production processes. Product functionalities, operational parameters, production dependencies and service delivery processes cannot be separated any more in customer environments that demand a

continuous business operation. Consequently, the acquisition of customer-specific as well as industry-related knowledge through a systematic and carefully planned skill and competency construction along a time wise continuum facilitates the transition towards servitization extraordinarily.

#### 4.7.4. (D) Innovation

Product related services that were delivered on a reactive basis constituted in the past the legacy backbone of product-oriented services and constituted the main service emphasis in the capital goods industry. Designated as after-sales services, they were characterized by activities that focussed on product installations, the provision of spare parts, repair, maintenance, upgrades/modifications and discontinuances. The traditional major goal of a reactive product-oriented service delivery is to support the sale of products. Through this goal, product-oriented services assume a position as a sales negotiating factor in the exchange of goods. Generally, they are regarded as an additional benefit in the sale of products. Traditionally, these services were not based on competitive differentiation aspects. They rather mirror the technological orientation and product know-how of the product manufacturer. The transition to servitization requires an innovative service delivery approach in the entire re-direction of a former reactive product-oriented service delivery function. Due to the customers' process availability demands, production process outcome and business continuity demands, the entire customers' complex process chain has to be considered. Indeed, this re-orientation implies the assumption of responsibility and co-ordination for the entire customers' business processes. This begins with the definition of customer requirements, includes solution implementation and embraces the end-of-life phase. A further implication in this process is the customers' interaction in two solution design phases: the customer as co-designer in the design and development process and as an external factor in the delivery process. Deep industry and sector expertise and knowledge facilitates the awareness that solution-based services are challenged by the relational understanding of the suppliers' and customers' processes. Additional important solution delivery aspects are the design, implementation and integration of solutions and the degree of operational involvement in order to meet customers' business requirements. The previously practised product-oriented service delivery processes is only partially suitable in the creation of solutions in order to solve customers' business problems. Therefore, a systematic and rapid development of appropriate resources and competencies and the build-up of industry and customer-specific knowledge are of vital importance. The



identification of a manufacturer's inter-company and inter-divisional synergy potentials will further contribute to establishing innovative solution approaches in order to solve customers' business problems.

(D1F) *“For decades, operating as a successful reactive spare parts providing function, the painful transformation of our industry that has taken place during recent years, has catapulted us into a challenging situation. Not only did we have to rapidly adapt our traditional and product-oriented service delivery processes towards the new circumstances. If we wanted to survive, we had to transform ourselves thoroughly and profoundly and acquire innovative approaches in learning new expertise about our industry and customers' business. And as a matter of interest, we discovered that even our customers found themselves in a comparable setting. Entirely new rules and policies were inaugurated within a remarkably short time that induced a game change in the entire industry and adjacent sectors without exception. New key business requirements that had hitherto played a less important role such as total availability, TCO and LCC considerations and production recovery appeared. They caused the emergence of a total new set of interaction rules with customers and of how to position the previous product-oriented services strategically. Only by close co-operation with all divisional company functions could we attain the required knowledge by “learning while doing”. Ultimately, we were able to offer solution-based service bids and engaged in the value creation for customers. These services started as contracting services for the refurbishment of production equipment and resulted in the assumption of the operational responsibility for entire production plants. Today I may claim that we are the preferred solution-based service supplier in our industry. We could even hold the service competition that emerged concurrently on the scene at bay, as new entrants in the service market.”*

(D1C) Very often, the product-oriented service delivery functions of a traditional product manufacturer feel a deep impact on their self-confidence by suddenly emerging company-external influences that challenge their previously successful service business. I have often observed that service delivery functions that were exposed to a game change have accelerated the pace of their legacy service delivery and granted additional discounts rather than adjusting and taking advantage of the new business rules. For this manufacturer, the game change proved to be a lucky opportunity to catapult the product-oriented service delivery function into a new era. All relevant knowledge was collected and value-creating services commenced, closely resembling product-oriented activities. They teamed with

other functions in order to acquire the specific industry and customer knowledge and developed further their portfolio of solution-based services in an onion shape-like tactic.

(D2F) *“An industry that is characterized by a multitude of different customer types, access applications and environmental control processes naturally creates quite a number of different and novel service requirements and hence a variety of diverse and specific services and solutions. Furthermore, since the majority of the customers in my industry are geographically widespread rather than concentrated in a few business regions, a diversity of solution-based services was individually produced in a sort of uncoordinated creativity. I was unable to allocate required resources optimally in order to exploit synergy potentials effectively. Thus, I focused on two areas: the specialization on relatively few but profitable fields of novel service applications and the creation of a service offerings structure in order to approach the market with novel service offerings proactively. In particular, I highlighted exemplary lighthouse cases within the company and rewarded their replication at other customer sites. Then we identified lead users and scanned and compared the services that we delivered to them with all service offerings that were deployed by my function to date. We set up a service offerings structure that could be disseminated. A further completely new demand arose from the energy-saving and environmental protection considerations. The direction towards building automation and remote condition monitoring and controlling enabled me to penetrate and explore adjacent markets that are not part of our traditional industry. Through this I regained the ability to steer servitization again according to strategic requirements.”*

(D2C) Always, after the decision to transit towards servitization has been taken, the task arises of how to commence and how to fill the philosophy of servitization with the accompanying solution-based service offerings. Besides establishing a strategy that covers a service continuum along a certain time line, a service executive will have to produce new earnings through customer orientation and solution-based services right from the beginning. This manufacturer chose to exploit the positive mental and mind-set momentum that could be established and let services be developed on a local basis that were generated by the immediate day-to-day needs of various customer operational problems. By highlighting and rewarding the very first successes throughout the entire manufacturer's service delivery function, stimulating examples were set in order to implement them in similar customer operations. Associated with this creative service offering generation was the building of a service domain structure that enabled the further development of new customer-oriented and solution-based service offerings. An additional key step was the

development of a remote monitoring capability. This capability is one of the service key success factors for a manufacturer's service delivery function. M2M machine-to-machine communication and information enables the interconnection and co-existence of business operation and production environments. These capabilities will be of utmost value especially in the move of the industry towards "Industry 4.0". Manufacturers that possess specific knowledge and an effective mastery will enforce their competitive edge.

(D3F) *"Our industry saw a fast incorporation of software programs, packages and embedded elements as supporting factors in creating products that were characterized by higher production outputs and an extremely extended usability under various modes of operation. I dearly needed to get new, relevant software-knowledgeable resources on board. Partially, I recruited them from various product divisions from inside the company and largely they came from different industries. They brought besides their software knowledge, novel and fresh ideas into my service function. This mixture of inside expertise, industry knowledge and traditional but advanced product-oriented service delivery helped my service function to cope with the challenges that stemmed from the technological advantages produced by networks and interconnectivity as well as by the new customers' business requirements."*

(D3C) The target-oriented and purposeful development and acquisition of professional competencies that can be paired with industry and process-specific dependencies is one of the principal tasks in the transition to servitization. It is a great achievement to be able to recruit urgently-needed resources from other functions inside the company. Generally, this operation should be agreed at board and executive level during the preparatory transition work. Otherwise, the functional and departmental battle to protect talents and valuable resources might overshadow the intended progress.

(D4F) *"We drove our traditional product-oriented service delivery towards product availability services and had them delivered by our service business partner network. The next logical step resulted in a systematic approach towards the creation of customer value through solution-based services. By assuming the operational responsibility for customer's processes in the food industry, we had the opportunity to offer our process services to companies in the disposal and recycling sector. Resulting from this, we developed a service offering that today, in its core, assumes operational responsibility for wet waste collection facilities, pre-processes biological waste and offer it as biological energy raw material to various decentralized biogas generators. This service orientation is unique in*

*our industry since it focuses on the processes and business problems of customers. Also, as it represents an example of a succeeded transition to servitization, it displays the intended support for the sale of products, and the embracing of customers' operational requirements as well as a horizontal expansion of the service business."*

(D4C) This relates to a service delivery expansion that not only establishes a sustainable relationship for the support of the direct production process activities but also generates solution-based offerings from the actual knowledge extraction about the customer's business dependencies. This way they could solve the business challenges of their direct customer base and bridge an existing problem in an energy sector that concentrates on the production of sustainable energy. This constitutes an impressive example of how a manufacturer's product-oriented service delivery function evolves through a transition from the provision of product reliability and process availability service progresses towards solution-based services. This enabled the creation of a new service sales market where its customers were initially not contained in the traditional manufacturer's customer set.

(D5F) *"The application and production topography of our traditional market was not particularly dispersed in its structure up until the past ten years. During this period, the market has undergone a spectacular development, both, in terms of technology and policies. In order to keep pace in the market with my service function, I had to respond firmly to the challenges arising. On one the one hand, in our product-oriented service delivery we were never really challenged by third party maintenance since a major part of our products applied complex technologies where we excelled with our service. Therefore, no TPM organization dared to touch the market. Privatization on the other hand promoted an entire new awareness of business attitudes and entrepreneurship in those business companies that entered the market. The demand for process availability and production performance rose sharply, paired with a demand for cost reduction, TCO and LCC, process management and process re-engineering. Previously, there had been hardly any interest in technological discussions about product functional properties. Now competitors entered the arena, either as consulting companies or competing product firms. We started by offering so-called hybrid products, a fixed-price combination of products and services. Also, we spent an almost infinite amount of energy to learn the market requirements. Furthermore, we also exploited synergies with a number of divisions of our corporation and so we were able to defend our position and expand the market with service activities that we had never carried out before.*

*Of course, honestly speaking, there were quite a number of trials and errors, partly owing to our searching and testing, but also caused by our ignorance of the market practices. For example, we had to reverse an outsourcing contract because the contract partner went into receivership and we had no relevant intelligence to detect this serious business threat in its early stages. Definitely, the trial and error phase, the 'learning while doing' with the assistance of other functions, helped us to advance. However, novel offerings needed the creation of an offerings infrastructure and the continuous, systematic progression and development work by a research and development function for services. Fortunately we have left the initial phase that gave my function such a hard time, as I had had to justify funds for intangible service activities, as services were regarded at that time. As of today, I am able to raise the necessary funds through the earnings of my service function."*

(D5C) In particular the interview with this manufacturer provided insight into the challenges and tasks that a manufacturer's successful service delivery function has to overcome. I was made aware of a mental attitude that expressed the previous mind-set within the company. The service executive was answered when he outlined his strategic evaluation of the service future to come, with a verbal statement like this: "you can't argue about success". That statement quelled any request to change and diminished any investments that were needed to commence an orderly transition. A not-so-rare attitude is expressed by this aim of continuing exploitation of a current successful profit contribution. When all of a sudden, a transition is commenced by a game change in the market, then it is all too natural that the build-up of knowledge and processes will lead to undesired experiences. I was impressed how exhaustively and sustainably the leadership team pursued the transition.

#### 4.7.5. (E) Anticipation

Traditional product manufacturers have to consider quite a number of influencing and driving factors while setting out on a journey towards servitization. These can be, for example, the actual competitive business position, technology and market changes, maturity and position of readiness to accept and deliver solution-based services, available competencies, capabilities and previous experience. This consideration aims basically at two directions: the ability to define complex customer requirements and the resulting demand for services and the anticipation of where this demand might be placed within a typical strategic time frame of around seven years. Furthermore, this consideration is

framed by the actual motivation towards servitization. The start can be either a position of strength, being one of the market leaders, or from a diametrically opposed position, driven by the need to create new revenue sources. Based on these are closely related factors in combination with the imminent endogenous forces that trigger a dramatic and profound change in manufacturing such as “Industry 4.0” and Big Data. In order to anticipate and manage these changes, manufacturers have to establish a systematic and long-term strategic road map that induces and leads the implementation of capabilities and processes that support the identification and solution of customers’ specific business problems, a clear path that indicates future skills and competencies and drives the systematic development of the existing resources and allows the expansion into operational and business responsibilities, based on customer, sector and industry experiences.

(E1F) *“Already, in the early stages of our service offerings for product and process availability, we pursued a long-term partnership with our customers. This was in the interest of gaining a close relationship with the various customers’ departments and functions as well as obtaining a deep insight into our customers’ process and business specifics in order to be able to generally respond to customer demand. However, by pursuing this approach we identified and also created new, innovative service areas, which we successfully implemented systematically at most customer operations sites. Before, customers had not been aware of the need for these solution-based services for their business processes. Based on this experience gained in carrying out our service approach and with the anticipated industry move from production centralization to de-centralization in mind, we saw effective chances for new service opportunities. With the steadily approaching advent of the proliferation of novel production capabilities in our industry, we envisaged an entirely new pattern of customer requirements arising. Novel production methods meant new types of business orientation that focused on output rather than operation. The timely build-up of relevant resources supported the successful extension of our market position as a preferred service delivery function. This market had been barely recognizable twenty years previously and the systematic and sustainable extension of our service capabilities and skills formed a constantly evolving platform whose alignment was always oriented and progressed by a strategic service drive.”*

(E1C) Practitioners employ a number of sales strategies in the sales execution of service offering. One road to pursue constitutes direct sales by visiting customers and explaining the advantages. Another path is to respond to invitations to tender. However, this manufacturer has chosen to move the principle of boundary spanning to the fore. Boundary

spanning provides a wealth of customer information and assists in building a strong relationship with customers' personnel of various departments and functions according to the actual business and production processes. The establishment of a long-term partnership enabled trusting communication that led to a deep insight into the relevant production and business operation processes. A remarkable level of customer and industry knowledge could be built by initially focussing on service delivery processes that ensured product reliability and embarking on measures and activities to support product and process availability. The development of non-product oriented resources was facilitated as a number of product-oriented engineers could further develop their knowledge towards process work through their engagement in reliability and availability services. Thus, this manufacturer's service delivery function succeeded in establishing a service resource platform that progressed its competencies systematically and along a strategic timeline.

(E2F) *“Personally, I do believe that it is a misconception in the services economy to envisage that products and goods do not play an important role any longer. However, what is going to change are the patterns of general material production insofar as products are going to resemble the nature of a platform to which innovative services and service offerings are going to be attached. I envisage that we are going to progressively assume operational responsibility for all sorts of electro-mechanical gateways in buildings and structures. If we do it right strategically, we will always be properly positioned and we do not have to make too much effort since the growth of operational responsibilities is going to evolve, comparable with an organic development. Triggered by legal and administrative requirements, I anticipate the necessity for “peace of mind” services and also for services that cause uneasy situations in the allocation and reduction of cost for operational activities. Of course, the technical qualifications of my service engineers will move towards analytical competencies and the ability to implement and operate remote sensing and monitoring procedures. Already today, I position my service function strategically in such a way, that the development of capabilities and competencies aligns with the mega-trends of the development of large agglomerations with their requirements e.g. for environment, climate and energy efficiency, security, elevators, the movement of individuals and the appearance of tall buildings.”*

(E2C) The shapes, properties and functionalities of products will always be determined by the demands and requirements determined by the purpose and mode of production processes. If this holds true, then the often-postulated notion “from repair (meaning: product-oriented) services to customer-oriented (meaning: solution-based) services” should

be reconsidered. As long as there are products implemented in business and production processes, a manufacturer will have to orientate its focus on the management of production and business problems. Such problems are determined by the entire production and process chains that include all elements, from single products to the definition of processes and the assuming of process reliability and business results on behalf of the customer. Any manufacturer's leadership team acts wisely if it establishes a strategic plan. That strategy should mirror the company technological progress and company advantages as well as the technological infrastructures and consequently involve all functions in order to interlace and co-operate towards servitization.

(E3F) *“What I can see in the company's technological advancement pipeline is related to automation and analysis opportunities. That motivates and triggers us to anticipate a steady, but progressively evolving requirement. The necessary service resources must be directed towards more intensive software, application and network-based orientations than previously. The main thrust branches into the required skills for network management, the ability to implement and tune operational systems and the competencies to assume operational responsibility on behalf of customers for productive processes and operational outcomes. The service strategy is consistent and aligned with company strategy in order to enable a full technological exploitation of the competitive edge of the entire company.”*

(E3C) Besides the focus on the functionalities of a manufacturer's original products and being guided by possible demands that result from their implementation at customers' sites, it is of paramount importance to orientate the service delivery activities also towards the emerging technologies that may not yet have an impact on the actual product provision today. Seen from a customer's perspective, a solution may contain a competitor's products and not be provided by a solution-based service provider company. In spite of that, a customer-oriented service delivery function has to possess the knowledge of the customers' production and business processes in order to provide solutions according to developments that are induced by future infrastructures and technologies. Therefore, it is advisable that service strategies are always aligned accordingly.

(E4F) *“Regarding the particular nature of how the strategic work within my company is carried out, I would like to note that I am very satisfied with how we co-operate at executive level in order to define the future long-term customer and market requirements. In accordance with the company strategy that encompasses the interlacing of all functional divisions in the generation of value-creation, my function focuses on remote monitoring*



*and diagnosis as well as carrying out operational tasks by control of facilities and production sites. In this way we anticipate a growing market demand in automated processes and position. Therefore we proactively build up resources and software and networking capabilities. We started to invest in this area quite some time ago and the experience we gained during this phase as well as the practical results in avoiding the breakdown of customers' operations confirm our conviction that we are moving in the right direction. An important source for continuous strategic revision stems from the daily working contacts with customer site personnel and the feedback from our service business partners' engineers. However, I am really sure, the direct feedback from customer executives bears equally valuable importance. Each year I run a strategic workshop with my top customers in order to collect their direct opinions of future trends in our industry as well as obtain their feedback to improve my service delivery offerings. Sometimes I am taken by surprise when during these workshops customers are inspired and suggest value-creation services they had previously been unaware of. A further beneficial outcome seems to be influenced by good representation of a customer's buying centre rather than solely the presence of the operational executive."*

(E4C) A re-direction towards customer orientation of a traditional product manufacturer's service delivery organization and the delivery of solution-based services requires a strong background in the customer-oriented delivery of reliability and availability services. This orientation must emphasize the importance and the achievement of a close interaction and trusting communication that is always interested in the continuous operation of customers' business and production processes. An approach towards customer orientation that initially focuses on the provision of reliability services followed by availability services enables a service delivery function to grow into the value chain of a customer while developing and exploiting its own skill and competencies.

#### 4.7.6. (F) Transition Time

Generally, the majority of the literature contributions about servitization state that the journey towards servitization means far more than adding a service offering to a product in order to add or create value. The establishment of solution-based service strategies, the valuation of the resultant implications, the definition and alignment of relevant business processes to offer the related capabilities and customer value creation processes are vital preconditions. Included in these are: the development and build up of the necessary competencies, skills and tools, the achievement of effective customer relationships and

implementation of the appropriate controlling procedures to enable an economic and profitable service business. Besides these more process-oriented transition areas, there are more, however equally important factors to consider. For instance the culture creation across all manufacturer's functions in the sense of a certain urgency to move forward, the generation of awareness that the value of "intangible" services represents far more than the delivery of repair and maintenance services and maintaining the motivation to pursue a long-term insecure profitability horizon. Also, the literature characterizes several different transition modes that are described along a services continuum as being either gradual at one end or stepped or staged at the other end, while all other thinkable transition variations are interspersed in between. The common denominator for the preparation and implementation of a transition results from the fundamental difference of products and services as well as the orientation of how a traditional product manufacturer has approached its customer-oriented culture in order initiate the change of his product-oriented legacy. In fact, a successful transition to servitization seems to reveal a tendency to take rather a long time.

(F1F) *"With hindsight over the past two decades I have to admit, that I initially thought that we would progress much faster than we actually did over quite long periods. In particular, progress was restrained by the time it took to establish a customer orientation to the detriment of our previously product orientation focus. The battle for customers' product reliability and product and process availability was no natural orientation for the service engineers of my service delivery function; it took rather a lot of education and motivation in order to re-align. Another factor was the time it took to build up a pool of resources able to establish durable customer relationships, be engaged in qualified dialogues and provide consulting services on equal terms. Furthermore, I come to think about the time it took to muster our courage in order to be prepared to face risk and uncertainty and negotiate and accept penalties for missed process and production results. Today, after all these years, we have learnt how to span the boundary between us and the customer and we have acquired the practices of our industry. Meanwhile, we also know how to exploit our technology and process knowledge to expand our service delivery into adjacent business areas of similar industries. Most important of all, together with other company functions, we have overcome the mutual rivalries and jealousies and co-operate as a team. This has helped us to act image-wise as an equal business partner and our positive and significant contribution towards the company result is very well recognized."*

(F1C) Often, the service philosophy of a re-direction towards customer orientation and solution-based services is easily expressed. However, the process from conceptualization to final implementation bears some similarity with steeplechases or the running of an obstacle race. Certainly, it is not enough to focus on the servitization philosophy; instead, a manufacturer's product-oriented service delivery function must consider the feasibility and operational implementation as well as the potential degree for customer demand for such services. This manufacturer's service delivery function had a very strong and successful product focus in the past where the product was the centre of all activities. Their service personnel had to go through an arduous experience phase in order to find the courage to take responsibility as seen from the customers' perspective and act accordingly. And they were also able to establish and maintain their customer-oriented position within their company and co-operate on equal terms with them. Also it took a long time, but now the solution-based service delivery function has become the major company profit contributor.

(F2F) *"In answering your question of how I would proceed with the transition under the impression of what I know today I have to tell you that I would probably set out the very same way as I did over the past ten years. I was lucky that the executive team of my company was united in the decision to re-orientate the company with a customer focus. This assisted the establishment of the appropriate service culture throughout my function in a relatively short time. However, I took time and today I know that it would again take a considerable time to establish all the necessary procedures to align service delivery with customer-oriented requirements. These requirements are related to the demand for reliability and availability, the build-up of skills and competencies that are not technology-oriented and investments in the development and the implementation of real-time collection and monitoring tools. Furthermore, the selection and build-up of a suitable service business, its organizational, procedural and mental integration into my service function demanded some ongoing functional guidance and control. Last but not least, the greater commercial awareness and emphasis in the development of services, their sales and systematic alignment with the existent service delivery offerings as well as the re-engineering of applicable administrative processes provided a series of challenges. I started beginning to feel that we were well positioned when we could assume process and production tasks and responsibilities on behalf of customers outside our historic and traditional market and thus react professionally in our response to the market demand, managing our service delivery along a strategic continuum."*

(F2C) Pending the decision to transition to servitization, a traditional product manufacturer has to be utterly clear about the activities and processes that result from a customer-oriented re-direction. The scope of services that have to be delivered for solution-based services as well as the related activities differ substantially from those for product-oriented services. Solution-based services are an entirely new services field for a previous traditional service delivery function. This “terra incognita” must be explored systematically while all processes for the identification of service opportunities, the build-up of relations and required competencies and skills as well as the co-operation inside the company have to be established. The efforts to create a new service culture and reaffirm the self-esteem of the service employees in the new direction will also represent an unknown challenge for the service leadership team. Additionally, it poses the issue of justification for investments in tools and test equipment, software and administrative systems. The risk has to be painfully stretched over a period of time, longer than desired. After all, the sale of services also differs considerably by nature in comparison with the sale of products and maintenance contracts. The conclusion derived leads to a considerable period of time before servitization becomes operational in its full spectrum of a solution-based service delivery.

(F3F) *“We would very much have liked to extend the organic evolution of our product-oriented service engineers as we have done in the past. Their orientation towards a product reliability attitude worked on the whole. I have to admit, however, that their further development to take responsibility for product and process availability was, in terms of time, a difficult and complicated endeavour. The advent of the ubiquitous interconnection of workstations and facilities generated an ever-rising demand for resources that they had basically to be able to implement, operate, and inter-connect software, applications and products. Furthermore, they were required to understand the complex business processes of customers in order to provide professional advice and consulting for continuous process availability. The re-alignment and motivation of the current and newly recruited resources and the subsequent re-arrangement of relationships required me to proceed cautiously. While implementing the necessary monitoring tools, analysis procedures as well as debugging and communication tools, one has to be prepared to experience a tedious and time-consuming process.”*

(F3C) A product-oriented service delivery professional task has only a rudimentary resemblance to those of solution-based service. One of the major differences is based on taking responsibility for the results of customers’ processes. Of course, there are

differences concerning the degree of impact on customers' processes that are caused by the type and professional service delivery. However, reliability services as the initial point of entry to a solution-based service compared with outsourcing, for example, bear a smaller business impact but are nevertheless also oriented in their delivery according to the demands of customers. This requires a "revolution in the heads" of all those involved in the prior product-oriented service delivery of a traditional product manufacturer.

*(F4F) Services business partners who acted on our behalf carried out the major part of our reactive product-oriented service offerings. With our re-direction towards the generation of value for customers, we also had to revise the product-oriented service delivery offerings as well as the mode of operation that was applied by the service business partners. At first, the way of disseminating this re-orientation we chose the classical path "learning while doing" under the guidance of instructions akin to "white papers". This mode of business culture deployment did not lead to consistent and reliable practices throughout our customer base. We had to depart from this approach. From then on, we certified and recertified business partners within a certain period of time or with the advent of new or unique service offerings in order to assure sustainable customer orientation. At least as important is the part of our service delivery that concerns the different production processes and their requirements on availability and production output. Our agricultural industry is, in this regard, not fully aware of these requirements in all branches and sectors. This results in a time-consuming and laborious task to develop the required resources ourselves rather than recruiting them from the market."*

(F4C) For product-oriented service delivery functions of a product traditional manufacturer there exists a range of deliberately chosen and well-justified models of how to partner with service companies that deliver product-oriented services on a manufacturer's behalf and in accordance with the standards of the manufacturer's service delivery function. The procedures and instructions in delivering these product-oriented services were uniformly established and also applied uniformly to all who were involved in the product-oriented service delivery. This facilitated the interaction and the allied process work could be driven to near-perfection, supported by documented process descriptions. The situation changes with the focus on customer-orientation and the emerging individual customer requirements for solution-based services. A much closer interaction, communication and co-operation between manufacturer and service business partner is crucial. This close interaction should assist in the establishment of a customer-oriented culture and assure a streamlined approach of all functions of a manufacturer towards functional guidance for the provision

of individual customer solutions in accordance with the relevant service and business systems.

(F5F) *“Although the company re-orientation towards value creation took place and that was underpinned by the emphasis on solution-based services, still, in the past, we found ourselves in a somewhat “exotic” position. Even though our respectable business results increased strongly and in a very sustainable manner, the relative profit share rendered us the position and resultant image of a small brother in relation to the various product divisions of our corporation. In consequence, the unlocking of the required investments and recruitments proved always to be a cumbersome, lengthy process until the matter was brought to a head. However, the recruitment of the skills necessary for an entire sphere of production processes of customers resulted in a supreme effort. Retrospectively, I am bound to admit, that the progress and speed of the entire transition was tied to the availability of adequate resources as they became available along the time line. Of course, I redeployed experts from other functions but the need to establish real-time data collection and monitoring and production health systems as well as development of the principles and operations modes of data analytics, forced me to establish co-operation with universities and institutions that carried out research on these subjects. Generally speaking, I had to revise the entire value-added chain from the provision of spare parts to the assumption of operational responsibility for customer’s production processes. I partially had to focus on the service delivery for the availability of products; I had to build up resources for process, real-time monitoring and prevention analytics and form a further group that took care of operational tasks and requirements. It seemed the entire journey to reach today’s status took rather a long time. Looking back I would fight for investments and resources earlier and with more intensity. Nevertheless, the impact would be evident from a more significant business result rather than a shorter transition process.”*

(F5C) As I have learnt during this research, the ability and readiness to create and deliver solution-based services as well as the ability to release enthusiasm and persuasive power is often overestimated. Also in addition it is surprising that considerable resistance to the implementation of change is frequently not perceived by an attitude of euphoria among those who are responsible for the implementation. Thus, scarce resources and capacities are not available for services and innovations that promise good prospects and the result is a further blocking to the development of servitization. It is absolutely necessary, to prepare for accurate service business results backed by the appropriate volume of funds and investments in resources and suitable processes, software and systems.

#### 4.7.7. (G) Partnering

The nature of solutions in the capital goods industry is generally characterized as value adding networks that necessitate a high degree of security, reliability and ability to control the production processes of the customer. These networks encompass an array of individual and particular services or special skills that by their nature cannot solely be delivered by the service function of a traditional product manufacturer. Thus, various partners have to be involved in order to design, create and operate the intended value-adding network. These can be the service delivery function of a traditional manufacturer, the manufacturer's service business partners, the customer's operational personnel and its long-time service partners as well as one-time partners who are engaged for a specific task. In order to ensure the predictability and expectability of the solution, the operation of such networks requires a seamless interaction and a high level of co-operation and co-ordination of all involved functions. For this, a traditional product manufacturer has to create the foundations that enable customers and their partners as well as the manufacturer's own service delivery function and its service business partners to participate and engage actively in the development and innovation processes. At the same time, customers and co-operating partners have to display the willingness and ability to feed their own knowledge into these processes as an essential, central condition in order to enable this inter-organizational and intercompany co-operation.

*(G1F) "In order to generate the willingness to co-operate and facilitate the preparedness of our service business partners to share their industry-specific knowledge as well as practical customer knowledge, I invested careful and considerable attention in establishing mutual trust and loyalty. Rather than choosing the most economical service partner case by case for each project and every solution, I always planned to work together with a strategic reliable service business partner acting on behalf of my service delivery function and in accordance with our company's mission statement. Regular meetings with those service engineers who had direct contact and business relationships with customers were carried out. My service administration was sensitized to the service requirements of our service business partners by periodic two-day education sessions, in which the business partners and my administration function participated. Also on a regular basis, I personally visited the executive management of our service business partners and brought their business expectations into agreement with our company's service mission. In parallel, furthermore, I made substantial personal investments in order to establish rapport with my most important and influential customers. This approach bears two advantages. I learnt*

*the industry's business direction directly and the challenges and also I was able to demonstrate trust and the professional ability to assist and collaborate in the creation and operation of solutions as their service partner of choice."*

(G1C) This elucidatory example displays an attitude that is not prevalent at service delivery functions of traditional product manufacturers operating in a reactive mode. The aim of a long-lasting partnership is to establish a situation in which customers, service delivery functions of manufacturers and partners interact and co-operate actively in the creation and operation of development, operation and innovation processes. This must take place on the basis of strategic co-operation in order that all parties are able to jointly plan innovations. Depending on the type of partners and the mode of co-operation new fields of technology application can be explored and market entry barriers overcome. This is a very good example of how to approach this goal by establishing trust and professional insight with all parties involved.

(G2F) *"We had to overcome a very long-established and focussed legacy in order to align our service business partners with the company service mission and goals that resulted from our transition to servitization. Previously, the service strategy was based on a reactive mode in order to ensure a product focus in our service delivery approach. The entire product-oriented service knowledge was based at the company headquarters that autonomously designed all relevant service delivery processes. Subsequently, these were disseminated to the service business channel, and the service business partners received functional guidance in the delivery of the various service delivery processes. The service control was solely oriented on technical product repair and maintenance parameters – customer related measurements such as reliability and production availability did not exist. There was a disturbing and paralysing atmosphere that prevented a quick start towards servitization. That atmosphere was caused by a governance attitude that honoured service business partners who achieved these product-oriented targets and "left them to operate in peace". It took an incredible amount of time and conviction to address the orientation towards servitization and to re-align the service business partners accordingly."*

(G2C) This constitutes a further transition that exemplifies the necessity to switch from a guidance mode to a process that integrates all potential partners involved in the delivery of solution-based services. This is even more important with manufacturers who built their past success on their technological superiority and when all subsequent service processes



and service terms and conditions were aligned to procedures that solely supported the sale of their products. The solution of customers' business problems necessitates the understanding of the industry and sector in which customers operate as well as continuous interaction of all functions involved in the creation and operation of the solution. A traditional product manufacturer must take the lead in order to establish the conditions and prerequisites that enable an active co-operation of customer, manufacturer and service business partners in the creation and operation of solutions.

(G3F) *“In the past, we commenced quite early to re-orientate our service delivery processes in the direction of customer orientation. Although we understood the increasing indicators that advised of the necessity to change, initially we received hints from customers in our sector to adjust our service delivery approach, rather than being influenced by the entire re-direction of our company. Nevertheless, we were one of the very few pioneers in our industry and our success was more impeded by the lack of corporation funds released for my service delivery function than by our ability to progress. One solution contract closure for operational services and the next outsourcing contract followed suit. Privatization as a game changer arrived in our industry. Deriving from this, a substantial number of contracts were reversed. As a company we had no influence on this development. Fortunately, in parallel we engaged in areas of high technological complexity. This technology was also utilized in customer accounts in which our company products were installed. The properties of these complex products posed a certain difficulty in maintaining the continuous reliability and availability of the customers' production processes. Due to our focus on availability procedures and their related tasks as well as on occasional customer requests we involved ourselves in the operational aspects of this technology. In a relatively foreseeable period of time we became the service organization of choice for a considerable number of customer installations. Finally, we also became the certified service business partner of these complex technology manufacturers. In the end, this partially compensated for our regulation-induced losses and opened an entirely new service market as a service business partner for OEM products.”*

(G3C) A stimulating case, where the service delivery function of a traditional product manufacturer on the one hand had re-directed its service delivery processes according to the customers' business requirements and on the other hand exploited its service technology in order to conquer a position as a service business partner for other original equipment manufacturers. Besides the willingness to immerse itself into unfamiliar

technologies, is the openness to collaborate, to interact, to communicate with other original equipment manufacturers - indispensable prerequisites in order to establish rapport and build trust with all functions involved.

(G4F) *“According to our service delivery re-orientation, the revision of our product-oriented service delivery processes was carried out in accordance with the requirements and needs of our customer base. At that time, our service business partners delivered the major part of the product-oriented services. Therefore, we also had to include them in the process of re-orientation. In our typical product and technology-influenced thinking we provided our service business partners with the theoretical foundations by means of “white papers” and built our faith on their progress by “learning while doing”. However, we had to abandon this approach when we had to learn painfully that this operational mode did not yield the required service culture change within our dealership. Only when we realized that we had to involve every single service business partner in the establishment of the individual and particular processes, did we achieve the required mind-set as well as the level of co-operation and trust that is necessary to provide benefits for all functions involved within a value-added network.”*

(G4C) Generally, business solutions represent a form of value-added network that, in order to generate the intended value for the customer necessitates a regular, customer-oriented interaction and communication for every function and partner who is involved in the customers' value generating process. This also holds true for the service business partners, especially those who bore the major part of the previously product-oriented services. In particular, while re-orienting towards servitization, traditional product manufacturers must establish the prerequisites for overall conforming communication and lay the mental and practical foundation for effective interaction and co-operation.

#### 4.8. Discussion of Findings

The purpose, aim and the objective of this study are presented in chapter one. The outcome of this research should furnish a revised understanding about the transformation prerequisites and requirements, the necessary activities and the resulting service culture re-direction. In addition, the outcome should also provide a conceptualization that can be deployed by practitioners of a product-oriented service delivery function of a traditional product manufacturer when considering a transition to servitization. The findings validated the consequences of this study's literature review. The extant literature generally portrays grand theories for the manufacturing industry and isolated transition cases that are

complemented by numerous service conferences and studies that focus on the actual subject of servitization or on specific service tasks. However, research that guides and direct traditional product manufacturers on how to individually approach re-orientation towards a customer orientation seems to be missing. The impetus for my established research came from my knowledge of the actual earnings that product-oriented service delivery functions contribute towards the economic success of their own parent firm today. In addition, I was motivated by my observation that today's companies are exceptionally dependent on an orderly operation of their production and business processes. The underlying infrastructure and the related operational processes are required particularly to maintain the demand for reliability, availability and continuous operation in order that the service and supply chains satisfy their customers' requests. In addition, new production environments that are based on the global interconnection of customers' sites as well as the potential production and process technologies that result from IoT implementation will urge traditional product manufacturers to reconsider their approach towards the provision of services for their customers. Therefore, I started my research right with product provision that represents today the main business relationship with customers. In order to avoid industry specifics and similarities my interview samples consisted of companies from entirely different industry sectors and ownership structures, from privately owned to stock corporations. In addition, all interview partners were top executives in their company and responsible for the re-orientation towards servitization. All but two of them had long-standing service experience as well as a product-related background either in product development, engineering, production or product services.

Before I start to discuss the findings and related influences and impacts I feel that it is important to explain a number of limitations and factors that generally apply to most diametrically opposed business changes. Therefore, my research does not refer to, for example, the principles of change management and motivation or process of individual competency building. Neither does it mention the study details regarding incentive systems or about industry-specific tools and test equipment, or process descriptions of the development of service delivery offerings. Also, IT investments to support the service platforms and service business controlling software and alternatives for organizational structures are not among the contents of this research. All information has been obtained from manufacturers who in the past already operated a traditionally successful product-oriented service delivery function as an essential part of their product sales philosophy – either as a generator of customer satisfaction or as a factor in the exchange of goods.

The study does not reflect the perspectives of traditional product manufacturers who did not commence their transition towards servitization by initially providing outsourcing or services in an entirely unfamiliar industry or customer set. It is therefore appropriate to apply prudence in the inferences drawn, should a similar approach to the examples mentioned be envisaged.

Furthermore, a number of interview answers are provided verbatim. This form represents a transcription in a literal sense of the input rather than a reproduction in every sense of the word.

If these limitations are borne in mind, then this study will provide a deep insight into the requirements of a re-direction as well as the related major transition areas towards customer orientation. In addition, the particular focus on key issues and benefits provides a set of rich information that could enable a product-oriented service delivery function of a traditional manufacturer to start the appropriate planning activities towards servitization.

Through the interviews the study pursued the exploration of an “invisible red thread” as a consistent element and theme that supports embarking on servitization. The outcome of the interviews through thematic analysis merges into four major themes that represent the customer’s service demand that is generated at various customers’ enterprise stages. Each of these major themes brings to light an array of key issues that are directly related to the underlying theme of each major theme. It is interesting to note that all major themes that surfaced in the interviews of each product manufacturer show that the key issues are addressed to a varying degree from manufacturer to manufacturer. I have outlined these four major themes as Operational Readiness as can be seen in Table 5, Asset Availability as in Table 6, Business Continuity shown in Table 7 and Business and Market Strategy, as in Table 8. The following part will discuss the context and related implications in the meaning of the purpose of my study.

<b>Major theme</b>	<b>Perceived benefit</b>	<b>Key issues</b>
Operational Readiness	The concentration on operational readiness offers manufacturers the opportunity to extend their basic reactive service delivery approach in the direction of after sales services that focus on technical product performance, preventive activities and continuous customer support. Thus the operational product reliability for customers is increased and the brand of the manufacturer protected.	<ul style="list-style-type: none"> <li>- Culture</li> <li>- Brand</li> <li>- Installed base</li> <li>- Readiness</li> <li>- Materials management</li> <li>- Problem resolution</li> <li>- Internal alignment</li> <li>- Quality management</li> </ul>

**Table 5 - Source: Duschek (2015) Operational Readiness**

<b>Major theme</b>	<b>Perceived benefit</b>	<b>Key issues</b>
Asset Availability	The focus on asset availability leads to a very close interaction with customers, as all service activities are now directed by customer demands with the ultimate goal to attain the product reliability according to the operational requirements. All influencing factors that impact availability must be considered and the relevant preventive activities accordingly aligned on the customer's behalf. Regular interaction with customer personnel and OEM manufacturers will provide a position as preferred service provider.	<ul style="list-style-type: none"> <li>- Operational product availability</li> <li>- Service level</li> <li>- Contract management</li> <li>- Customer priorities and requirements</li> <li>- Competence and skill</li> <li>- Service infrastructure</li> <li>- Service sales</li> <li>- Modernization</li> </ul>

**Table 6 - Source: Duschek (2015) Asset Availability**

<b>Major theme</b>	<b>Perceived benefit</b>	<b>Key issues</b>
Business Continuity	By approaching activities that support the process business continuity of customer production and business operations, manufacturers will assume operational and business responsibilities that go far beyond their previous product responsibility. Through this, they establish a trusting interaction and co-operation with customers and provide solutions, thus creating value for customers.	<ul style="list-style-type: none"> <li>- Internal competition</li> <li>- Process availability</li> <li>- Life cycle costing / Total cost of ownership</li> <li>- Refurbishment and recycling</li> <li>- Investment</li> </ul>

**Table 7 - Source: Duschek (2015) Business Continuity**

<b>Major theme</b>	<b>Perceived benefit</b>	<b>Key issues</b>
Business and Market Strategy	Manufacturers may approach this along two avenues. Ultimately, they may take over customer operations partly or entirely by delivering production outcomes and business results. They may also exploit their technological advanced knowledge and provide reliability and availability services on behalf of OEM manufacturers. This may lead to the achievement of a superior competitive edge.	<ul style="list-style-type: none"> <li>- Solution orientation</li> <li>- Business process</li> <li>- Industry specific expertise</li> <li>- Innovation</li> <li>- Anticipation</li> <li>- Transition time</li> <li>- Partnering</li> </ul>

**Table 8 - Source: Duschek (2015) Business and Market Strategy**

#### 4.9. Operational Readiness

Operational Readiness emerged as one of the major requirements that a user of a product or equipment builds upon the expectations of its effective use. These expectations are governed by the manufacturer's stipulation about the range of product functionalities and features. In addition, these parameters are supposed to be available for the customers' operation within a predefined spread of standards and operational parameters. This results in the general perception of customers that a product that fulfils these requirements can be judged as a very reliable product based on a perfect design and produced under high quality standards.

However, in the real world, this ideal product performance is hampered by a number of reliability influencing factors. Those can be design glitches, development flaws, manufacturing problems caused by unsuitable material, out-of-spec production machinery and handling errors. Equally impacting the product reliability is the manner in which a manufacturer's product-oriented service delivery function professionally approaches remedial activities in order to counteract those influences and responds to customers' service requests. The main product-focused reliability parameters in which the product and service delivery performance is perceived are MTBF (mean time between failures), MTTR (mean time to repair) and MDT (mean down time). A manufacturer's product-oriented service delivery function aims to support the operability of the equipment by providing the sale of spare parts, equipment inspection, repair and scheduled maintenance in a reactive mode.

The delivery management of these services has to take place via communication about the service activity progress status according to the situation, in order to meet the customers' demands for product reliability. If service activities are not delivered in an orderly fashion, they might in the worst case exert a negative influence on the customers' production and business flow. A traditional product service delivery function aims therefore mainly at two targets: to support the product company's image and brand and also to protect the service delivery reputation by achieving a high level of customer satisfaction. The analysis of the findings has brought to light eight key issues within the major theme of reliability that pose challenges in particular in the pursuit of excellence in a product-oriented service delivery.

These are the key issues that are the subjects of the discussion in the following sections:

- (A) Manufacturer's culture in respect to its service delivery positioning
- (B) The protection of the company's brand
- (C) The dependencies in relation to the installed base
- (D) The readiness in fulfilling the service delivery
- (E) Materials management as the activities in a spare parts context
- (F) Problem resolution as the capability to resolve incidents effectively
- (G) Internal alignment with the other company's functions
- (H) Quality management as the approach to assure quality in the product-oriented service delivery.

**(A) Culture.** In order to achieve a re-direction from a product-oriented focus towards a customer redirection a traditional product manufacturer has to re-form its product competence towards a service culture. This redirection leads to a distinctive mentality change and ideally expresses service as the manufacturer's core competence. The transition is positively supported by the integration of the entire manufacturer's functions into a streamlined service approach that includes also the previous product-oriented service delivery function as the manufacturer's best-positioned function. The company's executive team will live the values of this fresh cultural approach fulfilling binding values and clear targets. The clear benefit from this re-direction results in an aggressive customer-orientation that brings together all its competencies and pools the resultant company strength towards the delivery of solutions for the business problems of customers. However, some implementing issues remain. One of the major issues regards the degree of appreciation of the product-oriented service delivery function as a business contributor within the manufacturer's organization. This appreciation is influenced by the level of maturity of the service delivery function and depends also on the business attitude of its leadership (A1F). The executive of a service delivery function has to pay utmost attention to become integrated into the transition as a business function. This will assist him in forming the required service culture based on the actual status of his service delivery function (F5F). This holds true in particular if the service personnel is spread across a wide geographical area or even across several regions and countries (A2F). A further issue appears in the context of the forces of the transition induction. A manufacturer must be clear about the driving motivation as the extent of the resulting cultural change activities might vary considerably if the transition sets out from a problematic business situation or from a position of strength (A2F). The thoroughness of a cultural change might be questionable if driven by exogenic forces, e.g. by customers (A1F).



**(B) Brand** generally represents a manufacturer's promise to customers of what they can expect from the product and similarly from the manufacturer's services. Since product-oriented services are linked very closely to product properties and functionalities they play a decisive role in the customers' perceptions of the manufacturer's brand. Those manufacturers that consider the delivery of their product-oriented services as an important business contributor already today ensure that a professional product-oriented service-delivery management supports a high level of branding being maintained and conveyed into the market place. In the course of recent years the customers' attention on costing parameters such as TCO and LCC grew considerably. These considerations generally include the cost of product-oriented service delivery as well and therefore they increasingly assume a position as a determining factor in the purchase of products. Therefore a professional product-oriented service delivery that focuses on the achievement of high reliability of a manufacturer's products will form a solid foundation for embarking on customer-orientation.

The approach of an effective brand support is in particular a key issue when the manufacturer's reactive service delivery function assumes responsibility across regions or countries and where service business partners claim responsibility for the delivery of product-oriented services. This situation is considerably worsened if service delivery functions of merged manufacturers of different languages have to be integrated into the general product offerings stream (B2F) and resultant from this all products and the related product-oriented service deliveries will be implemented at the same customer's site (B1F). A further serious hindrance takes place when operating, utilities or environmental influences impair the product reliability. A reactive service mode in the form of an effective spare parts sale is not sufficient. Required is the understanding about a service approach for product reliability, a common end-to-end service platform from product development to the delivery of services as well as a service infrastructure to deliver product-oriented services with common standards, tools and processes based on a common service language. An example of this kind demonstrates quite clearly the demand for investments in modern ICT capabilities such as remote monitoring, diagnosis, problem reporting or software updating in order to demonstrate and deliver a service approach according to the product reliability demands of customers' operations (B1C). Additional issues in relation to the manufacturer's branding can be suppressed if the standards for a product-oriented service delivery such as MTTR and MTBF are "religiously" pursued and concurrently embedded into a constant cycle of service process improvements. This

approach is ideally poised if the re-direction towards customer orientation is accompanied by an agreement with the product sales function to sell a maintenance contract with every product sale (B2F). A detailed explanation of the new service values has to be ensured in particular as new resources join, for example through mergers and in order that the present service engineers and management of the manufacturer's service delivery function will find their place in the transition.

Potential brand issues that may be evoked at the area of contact between product sales and the product-oriented service delivery can be avoided if the manufacturer's CEO represents and acts as the figurehead of the transition. A sound task allocation in the approach towards customer orientation can lead to a successful co-operation between the sales and service function (B3F). The sales function assures that every product sale is furnished with a service contract and the service delivery function assists products sales in the making of a product and service offering. A direct reporting line to the manufacturer's executive boards is a further pillar in confirming the self-awareness of the product-oriented service delivery function as an important business contributor (B3C). Products that by their motionless nature appear to cause no wear and tear create a particular brand issue. A service delivery function will have to convince customers and their own sales function about inherent incidents that arise from the "bath tub" product principle. A major task will be the anticipation of potential reliability impacts by malfunctions and the initiation of actions to prevent operational impacts at customers' sites (B4F). By ensuring short spare parts procurement times, an effective service management process for customer advice, service activity dispatch and efficient escalation processes to resolve problematic incidents, embarking on servitization is satisfactory, assisted by the company image.

**(C) Installed Base** of a manufacturer's products represents a unique knowledge source of the installation site, the configuration and features of their products. In addition, the operational environments and product performance measurements such as defects, number and type of incidents and their remedial activities as well as the number and type of engineering changes for product improvements assist in a profound understanding of the operational demands of customers. If managed in an orderly way, this knowledge leads to two business benefits. One may extend their reliability offerings to a new, not yet approached customers operations by means of the product-oriented service delivery function, and the other may prepare an extension of their service delivery offerings towards servitization.

An installed base that has been established right from the beginning on the premise of allowing a shipment and installation tracking of all products across various sales channels and project responsibilities will avoid deep structural problems. An array of important service elements is formed by this base: the core knowledge for the service help line, the spare parts scheduling, service pricing and resource planning as well as the planning for the training of service resources (C2F). This is of particular importance for a manufacturer's product-oriented service delivery function in order to abandon its reactive mode in favour of preventive activities (C1F). It is a prerequisite in extending the reach of customers for individual proactive reliability service offerings, which may encompass the analysis of technical product performances, preventive measures, spare parts replenishment and engineering changes. Delivered satisfactorily, this will increase the business volume of maintenance and service contracts (C1C) and (C2C). And finally, communication with the manufacturer's development and production can be achieved about early field malfunctions and product performance (C2F).

**(D) Readiness** represents the ability of a product-oriented service delivery function to operate a service infrastructure to deliver services with appropriate facilities and tactics within the guidelines of the manufacturer's strategic direction. Core competencies are the installation, commissioning and after-sales activities. Frequently, the product-oriented service function is further involved in the product design and development due to specific knowledge about customers' operational parameters. The typical tasks in these phases ensure the requirements input for the reliability and serviceability of products according to customer requirements. These tasks aim to achieve a positive customer image perception and should also lead to a lower service cost level of the new product compared with the previous manufacturer's product or the comparable competitor product that is already installed in the market place. A sign-off by the service delivery function to acknowledge the launch of a new product is "ready to be announced" state confirms its business influence in obtaining a positive perception of product and service. These responsibilities are complemented by a systematic and consistent feedback to product production and development about product "infant mortality" cases and technical product performances. This feedback process serves also as a long-time information channel about important applications and product, and assists in maintaining a manufacturer's product liability position.

A proactive customer-oriented service business stance requires that the basic as well as the vital service functions such as tour and route scheduling, spare parts provisioning, job

roles, training and motivation programs have to be precisely implemented and made operational throughout the entire service organization across regions and countries. Further embedded is the service business orientation, taking an active role in the planning of new product and service offerings rather than acting as a sales factor in the exchange of goods (D2C). The implementation of the complementary service systems as well as the implementation of system interfaces for enterprise resource planning and CRM front-end need to be harmonized with each other while assuming a customer's point of view (D1F). The service focus has to centre on the achievement of high product reliability, the acquisition of product performance data and their analysis in order to draw conclusions for reliability improvements (D1C). To run the product-oriented service delivery function in a business-like mode, the re-orientation should solely abandon the reactive mode of service, yet exploit the previous profitable spare parts business element as a solid base in the proactive service delivery approach (D2F). Company and organizational restructuring and mergers and acquisitions require special attention in the dissemination of the enhanced service delivery re-direction that focuses on operation, production and asset management of customers' processes. An integrative approach assures the uniform service execution of all related service delivery processes from headquarters to service business partners and across heterogeneous installations and site topographies (D3F). The new perspective, from product to customer orientation, the quest for reliability and the revision of the related service delivery processes and job roles for the service personnel will occupy rather a long time in reaching a perfect execution (D3C).

**(E) Materials Management** represents the provision of service parts and spare parts. It is an inherent part of service management and as the traditional major profit-contributing element, a critical success factor for a profitable service business. Within the different phases of the product-oriented service delivery process, the required service and spare parts are provided within the required time frame and at the required place, whereby a required parts provision level is instated for customers and the manufacturer's own service force. An economic parts replenishment process balances the related capital lock-up versus the number of parts referrals. A material return process for defective, no defect found or erroneously replaced parts enables their reuse, refurbishment or scrapping. Particular attention has to be placed upon parts provision for third party products to ensure parts provision for captive parts that cannot be obtained through independent outlets.

Failing machine elements and parts may have a significant impact on customers' business and production processes. This aspect is especially important in those environments that

are characterized by customized and designed-to-order configurations and where parts procurement times cause operational impact. A service offering that advises and plans in optimal customer stock locations and for customers' self-service activities will target product reliability effectively (E1F). Due to the heterogeneous product installations of diverse product manufacturers the planning must include the availability of the related original equipment supplier parts (E1C). The quest for product total quality management and the growth in product sales influence the volume of ordered parts. The proper parts turn-rate management also influences the profitability of today's product-oriented service business. The turn-rate has to be closely monitored in relation to the continuous product improvements in order to avoid excess stocking or parts obsolescence (E2F). In the interest of high product reliability service approaches and remedial activities like "first time fix" play an increasing role. In order to shorten the related problem resolution time, the customers' operating personnel of is increasingly involved in problem resolution by means of a guided troubleshooting process. Service kits composed according to the operational environment of customers fulfil a clear-cut service component in achieving this target (E3F). However, only effectively working together with a manufacturer's product-oriented service delivery function with product development and engineering will enable this reliability support approach (E3C).

**(F) Problem Resolution** aims to restore a failing product to an orderly operational condition according to customers' requirements. For this, the manufacturer's service delivery function will apply relevant service processes, procedures, tools and test equipment and assure that relevant problem determination and identification facilities are operational and usable. The service delivery function will gather all relevant data of the failing process and offer a personal or digital touch point for the initiation of further activities by using the information obtained. Problem resolution is further enabled by product development work for the design and implementation of components and systems for failure recognition, failure diagnosis and analysis according to customers' operational requirements.

The present-day tightly controlled and automated production processes require revolutionary re-architecture of product-oriented service delivery response to customers' product problems compared with the traditional process. A countrywide, regional or global customer advisory centre acts as the first customer touch point rather than a traditional call dispatch that answers calls and dispatches service personnel. There, a relevant dedicated problem expert diagnoses the cause, decides on the resolution activities and directs the

appropriate service engineer supplied with the right information and the appropriate service part synchronized to the customer location so that all elements arrive at the same, previously agreed time. In this way, the restoration of customer processes is accelerated and the number of severe incidents decreases with the early detection of non-product related causes. The complementing of a “follow the sun” principle with the customer touch point enables the global support of customer problems on a 24/7 basis (F1F). This concept further enables the internal productivity of the service delivery function by avoiding travel time and parts cost and reduces potential production interventions to an absolute minimum level. This principle could also serve as a future model in achieving the desired availability level of customer operations (F1C). The designation of responsible service personnel assigned to “machine parks” or widely dispersed customer production processes enables an accurate understanding of the operational conditions and the particular dependencies on product reliability (F2C). Based on the industry and production process knowledge, guided problem resolution processes can be initiated more effectively and the manufacturer’s problem support team may intervene with a sound knowledge base. If the intervention fails, the entire support line has to be re-examined and re-trained in the interests of product reliability (F3F). The integration of service business partners, the manufacturer’s last level support and the customer in a guided problem resolution process constitutes significant progress towards servitization (F3C). The application of suitable service systems facilitates the process accountability to customers for the tracking of incidents, their status progress and potential escalations (F4F). Besides the change in the interface approach of customer and product service delivery function in relation to reliability supporting services, the contractual relationship also requires revision. Individual service level agreements rather than standard maintenance contracts will lead to a more profound understanding of the customers’ production and operating environment and facilitates communication and interaction (F6F). Early involvement of the product service delivery function in the project design and development phase facilitates the infusion of customer service requirements and the preparation of a holistic product and service offering (F7F). Traditional product manufacturers will equally benefit if customer service requirements are systematically gathered and evaluated and as serviceability criteria are sustainably integrated into the product development process. (F7C)

**(G) Internal Alignment** refers to the nature of the challenges encountered of a manufacturer’s transition to servitization. The individual fear of uncertainty, job loss or failure and the individual tolerance maturity in taking risks might create an underlying

peril and hamper the progress of the transition. Besides these personal and individual fears an array of business and functional influences are affected by the re-orientation. A decline in new product sales, the disturbance of proven customer relationships, unwanted costs due to investments and resource hiring, or the difficulty in re-aligning the personal professional mind-set from product-orientation to customer-orientation are a small selection. The manufacturer's leadership and executive team will have to find appropriate arguments for re-orientation and the required resultant culture, align the functional strategies with the overall company strategy and pursue co-operation across all functions and divisions of the company by living the values of this fresh cultural approach, fulfilling binding values and clear targets. Eventually, services, intangible by nature, have to be explained to the other company functions that are aligned to a world that centres on products. The responsibility to enforce the process that delivers what has been promised to customers cannot be delegated.

The volume of duties for the internal alignment might be considerable for a product-oriented service delivery function, in particular if their internal business image literally resembles one of a "fifth wheel". Among primary tasks is the winning of the morale and conviction of the service delivery function as well as establishing visibility inside the company and winning vis-à-vis the board of directors in order to build up credibility and win reputation (G4F). The removal of fears, obtaining consent and team building accompanied by a strong commitment to succeed will assist in enabling the self-confidence of service engineers in their business contribution (G3F). These tasks are accompanied by the revision of essential service delivery processes, the resolution of potential service business partners channel conflicts and a restructuring of the service leadership in accordance with servitization principles and customer orientation (G1F). In addition to the revision of all reactive service processes is the investment required in service technologies, services systems, the necessary re-deployment and re-training as well as hiring of new resources and the acquisition of industry knowledge, which will have to be balanced in accordance with expected business results (G3C). The transition to servitization is guided by principles of trust and authenticity: What has been promised has to be delivered (G4C) and everything must turn out to have a practical use for customers and for the manufacturers' own service force. Therefore it is imperative that the business climate change and plans and activities are profoundly reasoned with the works council, with explanation of the resulting benefits of more demanding job roles (G4F). Eventually, other manufacturer functions such as product sales or development will need to understand the

intangible value of services and that customer-oriented services encompass considerably more than mere repair and spare parts services (G5F).

**(H) Quality Management** in service management is based on the same philosophy as the production quality approach and constitutes a major role in the total quality management approach of a traditional product manufacturer. The related product-oriented service delivery tasks are divided into four areas: product quality, maintenance quality, internal as well as external service quality. Product quality focuses on the analysis of product malfunction and the discussion of the results with development and production in order to increase product reliability and decrease the number of unscheduled service interventions. Maintenance quality concentrates on customer complaints and on repair and maintenance targets such as MTTR, MTBF and first-time fix. The goal is the constant improvement of product-oriented service delivery processes. Internal service quality challenges the internal processes, e.g. contract management, training, spare parts provision, remote monitoring and call dispatch. External service quality measures encompass all customer-oriented activities, e.g. accessibility of service delivery touch points, duration of service intervention, as well as empathy and friendliness. The scope and extent as well as the quality of execution of the service intervention determine the service maturity level as perceived by the customer.

Several factors jeopardize product reliability and thus the company image. Real-time condition monitoring, fast incident reporting and the identification of pervasive problems and the subsequent feedback to product development and production will ensure a systematic product improvement approach (H1C). Critical and non-standard product malfunctions as well as deficiencies in the product-oriented service delivery are steered through periodic management committees in which the service delivery function participates. In addition the active co-operation of the service delivery function towards the product development right from the initial stage to the product announcement in order to implement service knowledge and customer service requirements (H1F) is essential. Also outside a product's warranty period defective parts have to be analysed and measures taken that improve the product reliability. Early in the improvement stage, information is issued to the service delivery function and service business partners in order to release a work-around or guide future service interventions (H2F). Defective captive parts of third party original equipment manufacturers should be analysed in order to identify their potential for refurbishment and re-use (H2C). The steadily growing interest of customers in life cycle costing demands effective co-operation between the manufacturer's service delivery



function and its development and production functions. Field-derived product quality information is incorporated into the development and production process while the service process is adjusted accordingly. Product reliability is thus progressively supported and the service delivery productivity substantially assisted (H3F).

#### 4.10. Asset Availability

The reactive service interventions of a product-oriented service delivery function follow a stringently developed service process that is firmly connected with each individual product type. Unplanned machine down times should be minimized by a professional service intervention and known malfunctions should be proactively prevented by the scheduled implementation of product improvements in order to support the product reliability. The customer assumes responsibility for procedure and processes that assure an orderly product operation. However, the constantly increasing demand for a failure-free availability in product operation forces the manufacturers product-oriented service delivery function to reconsider its current intervention approach. Instances in the customer's operational practice indicate that impacts on product availability are caused by product malfunction and furthermore by an array of influences that bear no relation to the product itself. These impacts can be caused by, for instance, energy supply, materials flow, co-ordinating glitches or by inappropriate operating and process handling. In order to meet this growing demand for continuous product availability, a product-oriented service delivery function has to commence to understand the customer's operation and the resultant dependencies. This understanding of the production requirements of individual customers must be accompanied by the acquisition of methods and procedures that enable the support for continuous product availability. However, these procedures and methods can only be brought to an operational state by close co-operation with the customer's personnel. Therefore, a new service culture is required, a service mentality and mind-set that sees the meaningfulness of the service intervention in the benefit of customers rather than satisfying the sole product-oriented performance parameters. Additionally, a change in service leadership practice will assist in achieving this re-orientation. Rather than controlling, ruling and activity directing, new framework conditions in personnel management will have to be considered. Coaching in attaining business attitudes and self-reliance and the granting of empowerment are some of the preconditions for product availability services. In their analysis, the findings have led to these five key issues that have to be considered when a customer re-orientation is envisaged:

- (A) Operational product availability
- (B) Customer priorities and requirements
- (C) Competency and skill
- (D) Service infrastructure
- (E) Service sales

**(A) Operational Product Availability** represents one of the capital requirements of the current production environment. As a recurring subject it appears as a common thread in all discussions with customers (A5F). In this context it is important to note that far more factors influence product availability than mere product malfunctions. The non-product related factors that impact product availability are outside the manufacturer's responsibility. However, the systematic acquisition of knowledge of the operation of processes, sector and industry knowledge will provide the opportunity to offer advice and service activities that assist in achieving product availability according to the customers' requirements. Synchronized technology amendments and scheduled failure prevention programs will further assist in the achievement of high product availability. This approach represents a logical sequence in the development of customer orientation: starting from a position as a professional product-oriented service delivery function, subsequently commencing with the build-up of remote sensing capabilities for real-time data to assist in product reliability followed by competency development for the co-ordination of customers' and manufacturer's resources in assisting high product availability.

The current demand for high product availability measures the service delivery for the achievement of product availability targets rather than repair time or reaction time after a customer calls for help. Cases of non-compliance with previously agreed targets lead to direct compensation and penalty payments (A1F). This underlines the importance of engaging in solution-based services to assist in the effective implementation of high availability service measures (A1C). These measures are based on collaboration with production planners and the regular monitoring of operational parameters, careful planning and scheduling of product production capability and the diagnosis of particular circumstances (A2F). Effective co-operation can be achieved by the assignment of a dedicated individual customer service co-ordinator who guides all relevant availability-assisting activities as perceived by the customer (A3F) with the ultimate goal that his/her competencies grow and are finally developed to reach responsibility as an operations consultant (A4F).

In the interests of high product availability a trusting personal relationship with the customers' personnel involved can be established through this (A4C). Besides the implementation of his/her own technological knowledge under the consideration of the customers' operation it is also important to scan the market for new developments especially in the area of interconnection and interoperation of machines, processes and geographically dispersed production sites (A7F).

This opens the potential towards market developments such as "Industry 4.0" and enables production health checks of remotely operated equipment (A7C). In order to cause the least impact on the product availability the service method of condition monitoring in combination with the capability to predict the product performance, the periods of equipment use can be extended from the point of view of asset management (A7F).

**(B) Customer Priorities and Requirements.** During the past decades, a traditional product manufacturer has had to re-direct its legacy product-oriented service delivery towards servitization in order to meet customer demand for high availability production operations. Ultimately, this re-direction turns the product strategy into a customer orientation that leads to the interaction of customer and manufacturer. This approach results in intensive investments for service delivery capabilities and service competencies as well as in processes that allow the capturing of customer requirements. The simultaneous building of personal relationships and internal as well as external communication paths will solidify the acquisition of customer priorities and demands. Thus, the re-definition of the individual customer's perception is achieved and a powerful competitive edge in combination with new service technologies can be realized.

The separation of duty principle in assuming responsibility for tasks that assure high availability and an undisturbed product operation is not a reality anymore. Experiences derived from past severe production failures suggest that the service delivery function of a product manufacturer ought to offer assistance for all activities that assure the availability of machinery and equipment (B1F). The offerings of product availability services have to be governed by a service strategy that aims at a long-term partnership based on the strategy of entering solution-based services. (B2F). Availability promoting services could be delivered if a dedicated customer contact is established in parallel with methods that assure a precise identification of customer demands (B2C). Once, after high availability targets are set, regular meetings and periodic workshops will track the availability improvement process and secure further progress supporting procedures (B3F). Open communication

and willingness to discuss will cushion periods of declining sentiment and ultimately lead to a resilient customer relationship (B3C). In addition to a good relationship on a working and operational level it is important that service executives build a network that incorporates their counterparts among leading customers. The aim is to get acquainted with their business expectations and in parallel demonstrate the service executive's orientation towards the customer service requirements (B4F). The collection of the "customer's voice" can furthermore be obtained by systematic and periodic customer visits at management level, scheduled as non-incident related discussions (B5F). Special attention is needed when the product distribution is carried out by a multi-tier concept that encompasses, for instance, certified service business partners, special expert dealers or specialist resellers. In parallel to the top executive relationships particular service consultants provide effective and dedicated business and market strategy services (B5F).

There is no uniformly shaped customer. Thus, their operational processes are often very dissimilar and the customer's service requirements are equally dissimilar. However, there is one requirement in common: the requirement for product reliability and availability. It will be no surprise when a product-oriented service delivery function that aims at availability services will experience a certain amount of trial and error and unpleasant business encounters. Customer orientation will often not bring about the desired result but instead will need some degree of stamina and staying power (B7F).

**(C) Competence and Skill** will be one of the critical success factors and principal tasks a manufacturer has to focus on when transitioning to servitization. Resources that are able to detach their communication and interaction from a product orientation and refocus on the business of customers are very scarce. New competencies and skill are required to offer a comprehensive array of business oriented services and solutions. A broad range of non-technical, however professional skills will be reflected in new job roles and competence profiles. Processes that identify and promote talents are complemented by training investments that develop current suitable service personnel. An integrative part of the competency re-orientation comprises, for example, interpersonal skills, planning, management practices and business administration and elements such as negotiating, selling, counselling and effective communication. Servitization leading companies understand the time requirement for this skill migration and that the nature of business solutions will require life-long learning. Thus, they sustainably pursue the development and promotion of skills and competencies.

The re-direction towards customer orientation will sooner or later require resources that possess knowledge about customer business process and industry knowledge as well as interpersonal and negotiating skills (C1F). These resources are required to evaluate the customers' demands that may sometimes be vaguely formulated (C2F). This knowledge can be obtained by external hiring and by partial retraining of current product-oriented resources. This sourcing process should aim at obtaining a good equilibrium of technology as well as inter-personal and consulting skill (C2F). The further development of this skill mix should be oriented towards the business development of customers (C1F) and its activities should therefore be oriented along a manufacturer's strategy cycle (C2F). Human resources would do well to recognize and promote the resulting and demanding new job roles accordingly (C3F). Appearing as job advancement by nature, these seem to be a very logical step from the traditional product-oriented maintenance and repair role to reliability and availability services with numerous elements of planning and consulting (C4F). Furthermore, the offering of services and selling of service contracts present new challenges that are not answered by the traditional product sales representative. Solution-based services will require service consultants that offer requirements, process and business oriented solutions rather than product specifications and properties (C3F).

**(D) Service Infrastructure** is one of the main decision factors in procurement of service contracts. The service delivery functions of a manufacturer have to grow in the value chain of a customer in order to identify the business value of a solution and participate actively in the improvement of the decision-making process. Neither particular solutions nor specific products mark the customers' interests in the early solution conceptualizing stages. A manufacturer's account service representative constitutes a trusted contact point and value-creating partner in the wide-ranging value chain. Generally, value chains are composed of an array of different and specific solution elements and components that require special skills and competencies. Since a number of those are by their nature not in the reach of a manufacturer's service function, customers will evaluate the manufacture's capability to co-operate with service business partners, and assess its remote service support systems as well as the seamless integration of the partner network into manufacturer's service delivery process.

Currently, determined by customer demand and competition, the boundaries of industries and sectors are redrawn. This change places an intensive demand on customer-oriented service delivery function to anticipate the development direction of tools, service software, algorithms and infrastructure systems in order to respond to future communication,

prediction and control capabilities (D1F). Several elements of adaptation and change have to be envisaged in particular while bearing the arriving technologies of “Industry 4.0” in mind (D1C). The development and investment in resources that are able to understand and evaluate the demand for solutions that is induced by the customers’ operational and business processes is significant (D1F). The original service processes will have to be re-positioned by regarding the entire service process of the customers operation. In consequence, the current reactive complaints approach will be replaced by the service process for reliability and availability that will focus on avoidance of operational down time, predictive activities and corrective interventions (D2F). This methodological approach is based on the implementation of continuous condition monitoring that by analysis delivers the information to drive reliability and availability according to customer requirements (D4F). In addition, the corrective intervention process will change from a local to a central, single point of contact approach. This central approach ensures the best specialist know-how for every intervention and ensures equally the arrival of a service engineer, the appropriate spare part and suitable service information at the pre-agreed time (D5F). The service delivery function will take responsibility for central spare parts managing systems that will assist in delivery and replenishment while balancing the customers’ demands with the appropriate level of referrals (D3F). A network of customer-oriented service business partners will act on behalf of a manufacturer’s service delivery function. They will be certified as a manufacturer’s service business partner, integrated in the entire service delivery process and deliver all assigned services accordingly. This is the integration of the entire service delivery chain by knowledge systems that contain all remedial and proactive data, product and procedural related data as well as project and contractual information that can be retrieved by the appropriate person in order to fulfil a specific service task (D5F).

The journey towards servitization commences by re-considering the entire service process as perceived by the customer. Previously unseen levels of availability demands for production operation in connection with pervasive interconnection of machines and business systems result in a certain degree of urgency to act, as the requirements for service topographies will change considerably and faster than previously assumed.

**(E) Service Sales**, as a key element of a profitable service business and comprises product-oriented remedial services in warranty as well as out-of-warranty phases and professional, solution-based services. Traditionally, the sale of product-oriented services is owned by the product sales function that uses services as a bargaining factor in the exchange of goods

during the closing stages of a product delivery contract. The advent of solution-based services made it clear that the traditional product sales tactics and methods in the service sales approach do not suffice any longer. Business administration considerations such as TCO and LCC as well as the pervasive implementation of ERP systems paired with conceptualizing and installation of interlinking networking platforms require precise knowledge of the customers' business processes. A trusted manufacturer's contact in service who is aware of the operational needs, the related insight, knowledge and level of know-how about the array of potential problem solving choices will offer solution-based services as a way of consultative selling.

Over time and on the journey towards servitization, the product sales function has assumed quite a different role compared to the past. Today, rather than merely focussing on the sale of products and related reactive remedial services, the aim is to lead customers strategically as solution sales in order to develop their industry specific business (E1F). Key account managers assume the overall co-ordination role for this and the service delivery function account assumes account responsibility through customer service managers. The role of a customer service manager was established by a systematic further evolution of the previous reactive product-oriented services (E1F). The delivery of reliability and availability oriented services leads inevitably to contacts with customers and to their operational and business problems and with these contacts the chance to assist and advise in solving those problems by solution-based services grows. Quite naturally, solution sales will act in the beginning as gatekeeper (E1F) while the service delivery function assumes sales responsibility over time in order to offer all services along their operational utilization of the products, their interconnection (E2C) and all services that bear no direct connection with the manufacturer's core product business (E3F). Dedicated service sales resources can either be assigned to solution sales and act as a team on behalf of the service delivery function or the service function guides directly these resources (E3F) (E4C) in order to prevent possible contract closing variations (E4F). Dedicated service sales resources should possess remarkably strong project and process skills combined with experience in product-related services (E4F). Service volumes are a particular part of the sales quota of each sales representative. Service offerings are principally closed as service contracts - they are billed and accrued as service revenue while their success is tracked monthly (E3C). In order to respond to particular service requirements in different markets and different countries with varying expectations the elaboration of a common service structure comprising particular and specific service disciplines is strongly advised (E5F). Eventually

permanent discussion and trusting contact of the services leadership with the top executives of leading industry customers about possible solution approaches for business problems will constitute an important pillar for the success of servitization (E2C).

#### 4.11. Business Continuity

Value Proposition constitutes the central element of servitization of a traditional manufacturer and its promise to deliver the promised solution with the expectation of winning a competitive edge by means of unique differentiation. However, several challenges seem to force the realization of this strategy. Well-established legacy service delivery processes, decades of successful contributions towards the company earnings as well as the image of a perfect reactive product-oriented service delivery function seem to provide counter-evidence. Therefore, a number of personal properties such as mind-set, culture and the readiness for a life-long learning have to be addressed in order to progress on the one hand. On the other hand service delivery functions must demonstrate how to solve a customer's business problem and deliver the promised benefits by re-considering their service approach as perceived by customers in order to support customers' business continuity through operational and business proactive and preventive service interventions. An entire new level of service offerings emerges: a value proposition by assisting customers in achieving their operational targets. My study focuses thereby on:

- (A) Internal competition
- (B) Process availability
- (C) Life cycle costing and total cost of ownership
- (D) Refurbishment and recycling
- (E) Investment

The following paragraphs focus and discuss these topics.

**(A) Internal Competition.** The extant literature reveals visible evidence if a manufacturer's go-to-market model does not align with its business targets. So an improved asset management might prolong a product's effective utilization and thus new product sales are jeopardized by services. A service solution may recommend an OEM product rather than that of the company itself, or product sales might endanger the sale of maintenance contracts since the sale of new products results in new warranty periods that render maintenance contracts obsolete. Resulting from this the value proposition for various customers needs a co-ordinated and harmonized approach between sales and services. Failing this the journey towards servitization is severely compromised.



The service discipline of asset management answers a growing customer demand. In an environment where products of various product divisions of one manufacturer are installed at the same customer account it is very important that a common service strategy is established. The offering of services is carried out on the basis of this common service strategy by a uniform sales approach across all divisions. Specialized service sales resources within all divisional sales forces will assure a common service sales approach (A1F). The potential rivalry in the sale of products and the sale of services are thus conceptually avoided (A1C). In addition, intensive discussions and frequent information should be exchanged between the sales functions for products and services. The aim must be to abolish misunderstandings of the servitization concept that might result in obscuring customer relationships and impeding the sale of products and services (A2F). Therefore, right at the beginning of any re-direction towards customer orientation an absolutely clear understanding of how particular customers and industry and sector groups should be approached by the corresponding sales channels and relating go-to-market model is essential (A3F).

**(B) Process Availability.** The introduction of enhanced business administration considerations that are guided by a strong will of “doing more for less”, leads to close and detailed examinations of operational cost for business processes and investments. An emerging climate strongly suggests an increase in the productive use of equipment and hence in the increased demand of customer service requirements. The previous main focus on reactive product remedial parameters such as MTTR and MDT migrates to production-oriented parameters such as product reliability and product and process availability. Thus, a traditional manufacturer’s entire reactive product-oriented service delivery processes have to be revised and the responsibility for reliability and availability services assumed. For this, new capabilities in collecting and analysing operational data systematically, in predicting potential production interruptions and in the provision of preventive measures have to be developed. The combination of the manufacturer’s proprietary technological knowledge and the understanding of the customer’s operation and industry applications will herald a closer customer relationship than ever before and facilitate a value proposition by assisting in the achievement of the operational targets of customers.

The main driving force for customers service requirements are the reliability and availability of its production processes. A detailed impact analysis of operational production disruptions reveals that product failures constitute a minor part of all production disturbances among a wide range of influences such as energy supply, materials flow or

operating. The joint work of a dedicated customer service manager, customer personnel and service business partners establish planning guidelines, operating instructions and task and responsibilities for the delivery of logical interventions. Periodic status meetings track the achieved status of previously agreed parameters and initiate targets and responsibilities for measures in order to improve the reliability and availability of products and processes (A1F). The crucial aspect in this approach is the willingness to also take into account all non-product related areas to assure a minimal operational disruption (B2F). Geographically dispersed service delivery resources – either a manufacturer’s own or a service business partner, may create a remarkable array of differences in the realization of a complex product commissioning. Thus, the assignment of dedicated build-up teams may assure a standardized implementation according to the perception of customers (B5F). The implementation of computer-based remote online monitoring and analysing facilities will control the actual products part and integrated alerting functions will even predict a possible depletion of operating material (B3F). Before availability disruption occurs, preventive interventions, recovery or emergency interventions can thus be initiated (B2F). By exploiting the computer-based monitoring facilities, preventive services in form of operational health checks and preventive intervention within pre-agreed time limits can be offered for complex operations. Looking forward, manufacturers should focus their service offerings on the development of operational support, assume operational responsibility and offer service contracts that are supplemented by targets for reliability, availability and percentage of operational production achievement (B6F).

**(C) Life Cycle Costing / Total Cost of Ownership** become important influencing considerations in a customer purchase decision. The initial capital investments in the product purchase, however, generally amount to a fraction of the entire life span, whereby its life cycle cost can be considerably impacted by the various operating solutions. Normally, these encompass purchase, design and development of solutions, downtime and production loss. But they also contain the cost of repair and remedial activities, spare parts and preventive and predictive maintenance that are provided by a manufacturer’s product-oriented service delivery function and customers expect from this that the service cost are adjusted according to their LCC considerations. To achieve this, generally two directions are pursued: cutting costs that do not generate new service business and improving service productivity as well as responding to customers’ demands for increasing productivity and availability of production equipment and processes.

In order to maintain a competitive edge, product-oriented service delivery functions will continually have to improve their profitable product-oriented service delivery processes, expand and exploit their installed base, retrain relevant resources towards availability consulting according to customer availability requirements and engage in services that aim at decreasing customer's business operation cost (C1F). In accordance with the manufacturer's umbrella strategy of re-orientation towards customers, its service delivery function will permanently strive cost reduction and exploit the benefits of reliability services. The preventive measure of reliability and availability services will lead to less product interruptions, which in turn lead to fewer service interventions which eventually causes less cost in time and material (C2F). Increasingly, conversations with customers centre on business problems rather than on technology and products. Now it is very common to be involved in service contractual negotiations with purchase and buying centres (C4F). There, the value and benefits of the offered solution will have to be demonstrated quite clearly and pricing elements such as customer premiums that incentivize achievement levels of production process availability and amount of avoided cost will have to be accepted (C2F).

**(D) Refurbishment / Recycling.** A traditional manufacturer's service delivery function bases its service on an orderly provision of spare and service parts. With more than 50 percent, spare and service parts constitute the main service business contributor. In the interests of high availability and to respond to customers' demands, an increase in stock locations close to customer sites may be considered by a product-oriented service delivery function. The resulting high capital commitment in combination with a low parts usage rate caused by quality improvements will lead to stock levels of unprecedented high values. Therefore, service delivery functions are advised to implement capabilities for remote monitoring and diagnosis in order to prevent unscheduled repair actions, prolonging at the same time the usage of equipment and ultimately decreasing the amount of replaced spare parts. In order to improve the parts cost mix, processes have to be identified that return used parts into a state as "equivalent to new" and rework, refurbish and recycle them according to production quality rules. These measures support environment protection goals and provide the flexibility to adjust service contract conditions accordingly.

The customary scrapping of maintenance and service parts ought to be replaced by a systematic reconditioning and refurbishment also for valuable machine assemblies and operating equipment. This can be achieved locally or in recycling centres that are purposely established. In the interests of production availability mobile centres will be

moved to customer sites in order to cut time in transportation and packing. New job roles as reconditioning specialists will be created (D1F). Depending on the specific state of each part – standard or captive, the related administrative processes have to be entirely redesigned in order to facilitate the re-use option (D4F).

**(E) Investment.** The business environment in which the products of the capital goods industry are placed is driven by the demand of modern technology and the quest for production processes that provide availability and output. The service delivery function of a traditional manufacturer assumes responsibilities in assisting to ensure this demand. In parallel to the product-oriented services, it provides a framework of proactive, non-remedial activities additional services that support the full use of technical and performance features of the operated equipment. Resulting from this are investments in tools, monitoring and diagnosis systems and databases, hiring of new resources and the streamlining of administrative processes for service proposals and contract management.

In order to monitor remotely and online the performance of products to predict potential malfunction and release preventive interventions, a manufacturer's product development should provide these capabilities within their products. Thus, a holistic service approach for different and various products is enabled. In addition, the legacy service contract processes have to be replaced by modern enterprise resource software that allows for a fast and precise tracking and controlling of the various states of service proposals and contracts (E1F). Re-allocated and hired scarce resources for customer-oriented and solution-based services should be placed close to the customers' operations to interact and advise customers (E2F). According to the available time that allows a response to customer requests the acquisition of a company that possesses the required competencies and skills may be advisable (E4F).

#### 4.12. Business and Market Strategy

Today, a traditional product manufacturer faces strong competition and experiences intricacies in order to maintain a competitive edge. New technology platforms, IP technologies and manufacturing strategies such as "Industry 4.0" open new roads to success. However they also invite new competition. Blanchet, Rinn, von Thadden and de Thieulloy (2014, p.12) caution manufacturing executives that "High quality digital (outsourced) services and a fail-safe digital infrastructure are becoming the fundamental prerequisites for successful Industry 4.0. And there will be even closer dovetailing between IT/telecommunications firms and traditional manufacturing companies. The former might

become the new industry leaders.” Adding services to products, often cited as a kind of panacea, is thought to evade the ever-present struggle. This approach, however, bears the inherent disadvantage of attempting to gain a greater share of the customers’ wallet rather than responding to competition and providing solutions to customer business problems. My study highlights the fact that re-orientation towards solution-based services appears to represent an evolution that a reactive product-oriented service delivery function has to undergo in order to create value: starting from the sale of spare parts to the provision of reliability and availability services and subsequently taking care of entire production processes of customers. The orientation towards solutions bears an array of key issues that I identified in my research:

- (A) Solution orientation
- (B) Business process
- (C) Industry specific expertise
- (D) Innovation
- (E) Anticipation
- (F) Transition time
- (G) Partnering

These will be discussed in the next paragraphs.

**(A) Solution Orientation.** The re-direction of the entire product manufacturer towards customer orientation should lead to an intensive integration into the customers’ development and value creation process rather than announcing the implementation transition as a new strategy to increase revenue growth. The development of an effective position as a value creator for customers is not a trivial task. The explicit commitment of the board of directors and the unconditional co-operation of the executives as well as the investment in adequate resources constitute critical preconditions.

A re-direction towards customer orientation and solution-based services will require intensive inter-functional co-operation. Due to potential misunderstandings and misinterpretations any comprehensive process change as the transition to servitization progresses must be accompanied by a clear and strong board endorsement (A1F). Previous and positive experiences with solution-based services could encourage the understanding of the non-service functions (A2F). This experience fosters its own service personnel as they have gained confidence and might now enter non-product or operations-related solution-based services (A3F). Clearly defined bonus systems that incentivise the sale of

service solutions will prevent discussion about the strategic re-orientation intent (A4F). To guide a successful transition, the service communication platform should be enhanced to encompass the external direction to understand customer processes and internally to foster inter-divisional co-operation. In order to ensure customer production goals, external specialist competencies as well as data analysing tools have to be provided and eventually all manufacturer's divisional product and service functions should be combined (A5F).

**(B) Business Process.** The provision of solution services that provide customers with the greatest benefit and generate the greatest value requires a deep interest in the customers' business, a comprehensive understanding of its situation and the unconditional willingness to enter into a partnership. Based on the possession of a deep process comprehension and excellent industry knowledge combined with the capability to integrate products into production and business processes will enable the implementation of solution-based services.

Any services that address customer business processes should be commenced under the clear understanding of mental preparation of a service function's involvement in driving forward the solution complexity, interlinking the customer into the service operation and creating process dependencies on the solution (B1F). The precondition to respond to the customer requirement of process availability is based on a close interaction with customer personnel in all activities throughout the process life cycle. This will assist in the goal of a continuous operational cost improvement, in the simplification of processes and the gaining of a customer's competitive advantage (B2F). In order to balance service resources for product-oriented and solution-based services the deployment of an intentionally tailored service spectrum by service business partners may be recommended (B4F). However, a major focus will have to be upon the achievement of a common understanding of the meaning and contents of customer requirements for service due to a greater variety of personal and informal customer contacts (B5F).

**(C) Industry-specific Expertise.** In order to provide solution-based services, a manufacturer's responsibility does not end with the supply of monitoring and data analysing facilities to predict or prevent production interruptions. In addition to the provision of availability related tools and systems, the service delivery function must "speak the language" of the relevant industry or sector and understand their relevant business processes as well as being able to issue functional and operational guidance to customer personnel (C1F). This industry-specific knowledge will also facilitate addressing

challenges resulting from third party equipment (C2F). The required resources could be re-trained product service resources, outside hiring or service partners (C4F). Continuous and systematic certification programs will identify talents to be assigned for counselling and consulting tasks (C3F) in order to interact on equal terms with customer personnel and industry experts (C4F). Close co-operation with all divisional functions will facilitate the creation of solutions for complex business problems (C5F).

**(D) Innovation.** Customers' demands for process availability, production process outcome and business continuity require an innovative re-orientation in a manufacturer's service delivery approach. Eventually, this comprises the assumption of responsibility and co-ordination of the entire customer business processes, from the definition of requirements to the end-of-life phase. The targeted, rapid build-up of industry-specific knowledge, related resources and capabilities is of vital importance. A further contribution to the solution creation is added by the identification of the company's inter-divisional synergy potential.

A close inter-divisional co-operation with all the company's functions assists in a rapid industry-specific knowledge acquisition (D1F). The highlighting of exemplary solution-based lighthouse cases and the rewarding of their replication will support widespread dissemination throughout the service delivery function (D2F). The formation of reference to other industries will further provoke novel solution approaches (D2F). The hiring of outside resources will further exploit this approach (D3F). The gained solution experience of a specific industry could be beneficially disseminated into neighbouring industries (D4F). The intra-company synergy exploitation with other functions and the 'learning-while-doing' with their assistance will induce novel solution approaches and will be further driven by the implementation of R&D for services (D5F).

**(E) Anticipation.** Based on previous experience, service delivery functions must consider an array of transition influences that focus on two directions: the ability to identify complex customer requirements and the strategic delivery anticipation of the resulting services. Therefore, manufacturers should devise a long-term strategic road map and a blueprint for the positioning of solution-based services.

The pursuit of a customer long-term partnership could result in a deep insight of business processes, leading to close relationships and assisting in gaining information about the proliferation of novel production capabilities (E1F). The continuous development of service resource analytical competencies aligned with the progress of megatrends could identify future solution services (E2F). Manufacturers must place a strong focus on

software, network-based applications and IP technologies to enable future process exploitations (E3F). The remote monitoring and diagnosis paired with the delivery of control tasks for facilities and production sites fosters the anticipation of a growing market demand for automated processes (E4F).

**(F) Transition Time.** The provision of solution-based services represents far more than adding services to products. Suitable solution strategies, the definition of relevant business processes, the build-up of required resources with industry-specific knowledge and investments in competencies and service systems, the appropriate customer-oriented culture and maintaining the motivation to endure relatively long phases of business insecurity are preconditions for a manufacturer to embark on the path to servitization. The fundamental difference of solution-based services compared with product service delivery is constituted in the approach to customers rather than to products. The preparation of professional and cultural directions and the creation of interpersonal relationships, interaction and the acquisition of industry knowledge suggest a tendency, which may take rather a long time.

The alleviation of intra-company rivalries and jealousies accompanied by fostering teamwork may assist in accelerating the required mind-set, culture and unified customer approach (F1F). Trusting and united co-operation of the executive will support the appropriate service culture within a relatively short time while the implementation of commercial and professional processes may stretch over a considerable period (F2F). The retraining and hiring of scarce resources may be tedious and time consuming (F3F) but outside co-operation with, for example, universities might help (F5F). The method of certification of involved service business partners should shorten the dissemination and assignment of contracted responsibilities (F4F). Reluctance and coercive attitudes in investment decisions may be overcome by tougher negotiation with service executives (F5F).

**(G) Partnering.** Due to the nature of solution-based services, all solution elements can hardly be provided by the service delivery function. Therefore, service business partners will be engaged in the delivery of solution services.

Rather than employing partners case-by-case, manufacturers should concentrate on strategic, long-time service business partners that pursue the manufacturers' business (G1F). In order to enable these partners to pursue the service strategy, customer-oriented service targets should be agreed (G2F). Special competencies and capabilities of a



servitized manufacturer may offer the opportunity to act as service business partner for OEM producers (G3F). The required mind-set, trust and level of co-operation could be established by the involvement of each partner in the creation of related service processes (G4F).

#### 4.13. Summary

After more than two decades, the transformation from the role of a traditional product manufacturer into the position of customer-oriented solution-based services provider seems to have won the status of one of the most prominent research themes in the services arena (Kunz and Hogreve, 2011). “The academic literature and the relevancy for practitioners suggest that theoretical foundations and extensive empirical evidence exists. However up to now, general theoretical underpinnings and complete, empirically sound correlations do not exist” (Gebauer and Saul, 2014, p. 228). Unlike conferences and workshop papers that seem to offer by and large either grand theories or snapshots of mastered isolated problem cases, In my study I approach a conceptualization that focuses on the potential practical transition of present product-oriented service practitioners.

In this chapter I examine the information that I obtained from the fieldwork. While I analysed the data gathered, four distinctive major themes emerged: operational readiness, asset availability, business continuity and business and market strategy. While analysing the key issues, these four major themes gradually became apparent as they shed more and more light on the present operational dependencies of customer business processes.

The theme ‘operational readiness’ reveals the state of a present reactively operating product-oriented service delivery function. The necessity for transition towards customer orientation is accentuated and the resulting additional customer-oriented tasks are inferred. This service approach relinquishes a reactive mode and leads to a proactive mode that supports customer demand for product reliability as an initial mental starting point towards customer-orientation. The theme ‘asset availability’ points even more to a strong customer relationship. The direction of professional competencies and capabilities as well as interpersonal, communication and communication qualities that have to be developed in order to identify customer demand for operational availability and act accordingly constitute the core of this theme. ‘Business continuity’, which emerges subsequently, centres on the availability and continuous operation requirements as well as the economic and financial demands resulting from customer business and production processes. Already within this theme the task and responsibilities emerge that direct towards assuming partial

responsibility on the customer's behalf. And finally, the theme 'business and market strategy' addresses a number of typical issues that a previous product-oriented service delivery function would face while embarking on the path to solution-based services. A strong focus evolves regarding the achievement and implementation of capabilities, competencies and interdependencies that enable a service delivery function to engage in solution-based services.

During the course of my work in the field I was offered the opportunity to attend university congregations, meetings and workshops of service associations. There I noted that some of the key issues isolated were dealt with. I was very touched when I noted that the four themes emerged in all interviews in their entirety to offer a potential "red thread" towards a servitization conceptualization, commencing from a position as traditional product-oriented service delivery function.

All of my interview partners were convinced enough that they contributed favourably to their companies' earnings by their achievements towards servitization although they believed that the final state has not been reached and will be probably never reached. Nevertheless, they were very interested to learn what has been experienced in other companies, also in possible ways to exchange and share their own approaches to customer-oriented and solution-based services.

The following chapter will aim on the conceptualization of a transformation model towards servitization that could be applied by practitioners for instance in the capital goods industry.

## Chapter 5

### Development of Conceptual Framework

#### 5.1. Introduction

The purpose of the previous chapter was to obtain an impression of how reactive service delivery functions and how traditional product manufacturers commenced their journey towards servitization and the path they have chosen in order to accomplish their desired state of customer-orientation. In chapter 5.2, I tried in particular to identify for the reader the specific determination and development of services that were aligned to the various functions throughout a customer's entire enterprise structure. The recognition of customer requests for operational and production impacts was of special interest for me, and the emergence of matching answers in order to solve the customers' business problems. The second, concluding part explains how the different manufacturers positioned themselves vis-à-vis these customer demands and how they derived their strategy towards solution-based services.

This chapter is dedicated to the creation of a transition conceptualization that could be applied by service delivery functions of traditional product manufacturers that consider re-directing their business orientation from product-oriented services to solution-based services. For that purpose I will focus on the customer service requirements in their operational and production process phases and how a manufacturer could position itself accordingly. The aim is to answer research questions RQ1 and RQ2 as presented in chapter one.

#### 5.2. Customer and Manufacturer – present situation

The prime objective of any company is to meet targets such as market position and cost reduction, as specified in the particular operating plan, in order to secure future economic success for the company. This is equally applicable to business and production processes. Fierce national as well as international competition in the manufacturing industry results in a continuous increase in production requirements. High product quality at short lead times and strict adherence to deadlines are essential requirements today. Furthermore, the production operations in effect today are changing and becoming more customer-oriented and knowledge-driven. In my study I could clearly recognize that a manufacturer with all its functions has to re-direct towards customer-orientation rather than focusing merely on total quality and zero defects in products and production processes. This is of prime

importance, either to quickly fulfil a new customer demand or implement a unique range of offers in goods and services. An additional challenge derives from the situation that customers look more and more globally and place increasingly stringent requirements, with more severe penalties, on the meeting of production targets. If, in this scenario, the manufacturers in the German capital goods industry want to stay ahead of competition they need to increase their investments in, for instance, automation, flexibilization of production processes, collaboration of different technologies, networks and remote controlling, data analysis and software knowledge as well as their ability to form partnerships. This development has commenced within the scope of “Industry 4.0”, the Internet of Things and 3D printing. Manufacturers that traditionally centred their attention mainly on production parameters are going to need assistance and support. At the same time, traditional manufacturers that embark on a journey towards servitization will have to realize the span of servitization that can be applied towards their supported customers. They will have to grasp where to engage in customer operations, how to start and how to proceed. However, before entering into a general servitization discussion and recommendations, in my study I found various instances advising the scrutiny of a general work and organization flow of production customers and their potential service and solution demand for each of the principal functional arrays. The result should lead to a discussion of the manufacturer’s best-placed function as the embarkation point towards servitization.

### 5.3. The Principle of Functional Arrays

“The customer” as a notion is generally applied indiscriminately as a generic, representative expression for a customer’s company, enterprise, or function, for example, by the extant literature in the same way as the notions “servitization”, “services” and “solutions” are deemed applicable for all functions of a customer’s manufacturing enterprise. The study has made clear that the term “the customer” has to be analysed in greater detail in order to identify individual customer requirements. There are quite distinct and specific servitization tasks and responsibilities according to the production or business function of a customer’s entire company structure. A very effective method in identifying and collecting these servitization tasks is to overlay the customer’s structure with individual functional arrays. These individual functional arrays are the place of origin of the specific tasks and responsibilities. Resulting from my research these are the individual arrays that I analysed: “product”, “production”, “business process”, “facilities”, “organization” and “strategy, vision”. On the x-co-ordinate in Figure 5 these functional

arrays are put side-by-side. Customer functional arrays of service demand generation, the title of the abscissa, describes the various areas of customer-generated demands in a production and business environment, while the y-co-ordinate expresses the degree of customer interaction a traditional manufacturer may develop and undergo when transitioning towards servitization. Each of them is highlighted by an individual colour in order to indicate a recognizable pattern. Horizontal bars in Figure 5 designate the service requirements that are generated by the functional array. These bars are labelled as “basic”, “operational readiness”, “asset availability”, “business continuity” and “business & market strategy”. They may span one or more functional arrays and represent customers’ individual service requirement(s) generated by each individual functional array. A traditional manufacturer will only have reached a full servitized state if he is able to respond to the customer demands along the entire x-co-ordinate.

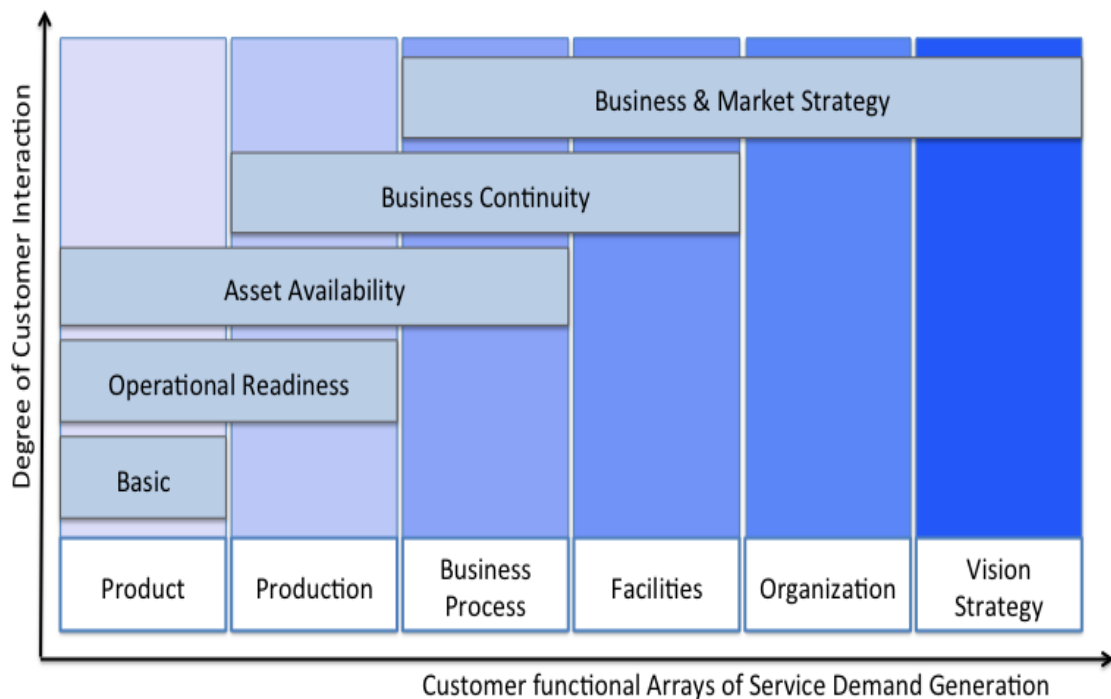


Figure 5 - Source: Duschek (2014) Arrays of Service Demand Generation

In this context the term “solution” is not solely occupied by a grand business move or by specific ERP applications or programs. The term “solution” rather stands for solving any problems that might arise, related to the customers’ production or business operations along the entire sequence of functional arrays.

The study has further provided the concept that the ultimate goal of a servitized manufacturer results in the strategic guidance of a customer. However, it is highly probable

that not all manufacturers will be able to develop and deliver all solution-based services and solutions along the total chain of customer demands through resources of their service delivery function. Therefore, it is of paramount importance that manufacturers consider and identify the provision of service sourcing alternatives in order to offer the required solutions.

The present section of this chapter explains the principle and aim of functional arrays. The following paragraph scrutinizes the data corpus that resulted from the interviews and presents the facts that lead to the formation of customer service requirements based on functional arrays.

#### 5.4. Customer Service Requirements

**1. Product.** The first functional array “product” in Figure 5 represents any product that is either delivered by the traditional manufacturer to the customers’ account and any other OEM or third party product, regardless of its provenance or origins as long as customers regard it as operations-relevant or production-relevant. The first interest of the customer is based on basic service, meaning contractual fulfilment within the product warranty framework (4.5.1 / B2F, B3F, B4F, C1F, D1F, E1F, E3F). After the warranty, manufacturers provide after-warranty service delivery, generally on a reactive basis, either paid by single-event bills or periodic payments based on maintenance contracts according to individual needs and budget requirements (4.4.1. / A2F, 4.4.2. / B1F, B3F, 4.4.7 / G5F). Although often regarded in the industry as an excellent service provision, a manufacturer’s service delivery function that reacts only on customer incident calls is not regarded as acting sufficiently in the present production process environment (4.4.1. / A1F, A2F, 4.4.2. / B1F, B4F, 4.4.3. / C1F, 4.4.4. / D1F, D2F, 4.4.4. / F1F, F6F, 4.4.7. / G1F, G2F, 4.5.1. / A1F, A6F, 4.5.2. / B1F, 4.4.2. / B1F). Customers expect a manufacturer to assure them of the operational readiness through the reliability of the product delivered (4.4.1. / B1F, B2F, B3F, B4F, 4.4.3. / C2F, 4.4.4. / D3F, 4.4.5. / E1F, E2F, E3F, 4.4.8. / H3F, 4.7.1. / A2F) where reliability is defined by The Association For Manufacturing Technology (2011, p. 32) as “The probability that machinery and equipment can perform continuously for a specified interval of time without failure, when operating under load conditions.” The relevant service processes, therefore, should comply with the demand for reliability and must be carried out in a replicable manner (4.4.1. / B1F, 4.4.4. / D2F, D3F, 4.4.5. / E3F, 4.4.6. / F1F, F2F, F3F F4F, F6F, F7F, 4.4.7. / G1F, 4.6.2. / B5F, 4.7.1. / A3F). Instead of just responding in a reactive mode and delivering or replacing a defective machine part,

manufacturers should understand the reason for failure and improve that element accordingly so it will not continue to fail (4.4.3. / C2F, 4.4.5. / E1F, 4.4.6. / F3F, 4.4.8. / H1F, H2F, H3F). By maintaining an appropriate record of the installed equipment, manufacturers should implement solutions to resolve problems (4.4.1. / A1F, 4.4.3. / B3F, 4.4.3. / C1F, 4.4.8. / H1F, H2F, H3F, 4.6.2. /D5F). Of equal importance is the fast reaction to the first customer incident call. Customers expect an expert contact that either resolves the problem immediately by his expertise and industry knowledge or schedules information, a product service engineer and the needed part in such a way that everything arrives at the same pre-agreed time at the failing product, in order to cause minimal disruption (4.4.3. / C2F, 4.4.5. / E3F, 4.4.6. / F1F, F4F, F5F, 4.6.2. / D5F). Integral part of this is the precise and timely standardized status information along the entire incident resolution process (4.4.3. / C2F, 4.4.4. / D1F, 4.4.5. / E3F, 4.4.6. / F4F, F5F, 4.4.8. / H1F, H2F, H3F). Finally, customers also demand from manufacturers that their service delivery function should understand the impact of the service activities on customer production and business processes and should continuously analyse their maintenance and repair activities in order to improve and adapt them according to the customer's business settings (4.4.2. / B1F, B2F, 4.4.4. / D3F, 4.4.5. / E1F, E3F, 4.4.6. / F1F, F3F, F6F, 4.4.8. / H3F).

**2. Production.** Sequentially, the functional array “production” in Figure 5 encompasses all machines, products and elements that are integral parts of a controllable production process, where production results can mean physical pieces or intangible goods such as energy or data. A particular key production success factor for this process constitutes the asset availability of all equipment such as machines, components and elements that are planned for production (4.4.6. / F7F, 4.5.1. / A1F, A2F, A4F, A5F, A6F, 4.5.2. / B3F, 4.6.2. / B1F, B2F, B3F). Equipment availability is “a percentage measure of the degree to which machinery and equipment is in an operable and committable state at the point in time when it is needed” as defined by The Association For Manufacturing Technology (2011, p. 32), contrary to machine reliability where parameters such as mean time between failure and mean time to repair are the controlling parameters. High availability should support the achievement of specified production quantities within the planned production period and the defined product quality (4.5.1. / A1F, A2F, A5F, A7F, A8F, 4.6.2. / B2F, B3F, B4F, B6F, 4.6.3. / C3F).

However, a variety of exogenous and endogenous factors could prevent compliance with the specified production volumes. These could be, for example, solid or intermittent product malfunctions, operation, implausible information, control and embedded software,

utilities or manufacturing supplies (4.5.1. / A2F, A5F, A6F, A8F, 4.6.2. / B1F, B2F). Therefore, for customer production, planning the availability of all machines that are involved in the production is of utmost importance (4.5.1. / A2F, A4F, A5F, A7F, A8F, 4.6.2. / B2F). Their service requirements centre on a proactive mode rather than a reactive service mode (4.5.1. / A2F, A3F, A4F, A5F, A6F, 4.6.5. / E5F) and they expect customer-oriented service delivery functions act as a self-learning organization. The forecasting of potential impacts and problems and the proactive initiation of preventive measures should be established in accordance with customer production requirements and based on the specific customer business and industry setting (4.5.1. / A2F, A3F, A5F, A6F, A7F, A8F, 4.6.1. / A3F, 4.6.2. / B1F, B2F, B3F, 4.6.5. / E1F). Customers require a dedicated point of contact acquainted with the production requirement of the manufacturer's products as well as those of original equipment manufacturers (4.5.1 / A3F, A4F, A7F, 4.6.1. / A2F, 4.6.2. / B2F, 4.6.5. / E1F). This dedicated contact should assist in defining the appropriate level of production element availability and assist also in developing the appropriate procedures to collect and analyse the relevant production availability achievement rates (4.5.1. / A2F, A4F, 4.6.2. / B3F, B6F). He should furthermore work closely and actively with all involved parties in order to co-ordinate measures that envisage and predict potential problems and result in effective counter-measures that support the achievement of the planned production targets (4.5.1. / A2F, A3F, A4F, A5F, A6F, 4.6.2. / B3F). In addition, manufacturers should constantly compare the customers' products with the entire installed base in order to detect early out-of-range situations or pervasive defects (4.4.3. / C2F, 4.5.1. / A6F, A7F). Manufacturers should also enable their service delivery function to cooperate permanently with the product development and production functions in order to inform the acquired customer service requirements as well as the requirements of the service delivery function to implement product construction principles that assure a product service to be delivered at the utmost minimal impact to customers' production (4.4.3. / C2F, 4.4.1. / D1F, 4.5.1. / A7F, A8F, 4.6.2. / B2F, 4.8.3. / C4F). In addition, manufacturers should advise customers of these improvements or work-around procedures and apply them to their products without any production impact. Manufacturers should also assume service responsibility for original equipment manufacturers equipment, establish an effective working relation or partnership to ensure an operational spare parts supply and last-level assistance in critical product down situations (4.4.5. / E1F, 4.5.1. / A2F, A3F, A7F, A8F). In order to ensure the optimal product availability support, manufacturers must manage the portfolio of their offered service and maintenance



contracts to apply the best customer-adapted services processes according to budget and their customers' operational requirements (4.4.1. / A7F, 4.5.1. / A2F, A3F, A4F, A5F, A7F, A8F, 4.5.2. / B2F, B3F).

**3. Business Process.** The next functional array in sequence is named “business process” in Figure 5. A business process encompasses a number of logically linked individual tasks and activities. They are executed in order to obtain either a business or operational objective. A business process can be repeatedly executed, and is generally associated with the generation of value and utilizes the resources and information of one or more organizational units. Therefore, business processes constitute the backbone of the business of companies. In the context of my study, mainly the processes of product origination, sales and distribution, order processing as well as internationally-structured supply chain networks have been more closely discussed, as they were all characterized by a high demand on process output, complex degree of collaboration and a constantly decreasing tolerance for business process disruptions (4.4.6. / F6F, 4.5.1. / A1F, A2F, A5F, A6F, A7F, A8F, 4.5.2. / B1F, B2F, B3F, B4F, B5F, B7F, 4.5.4. / D5F, 4.6.2. / B6F, 4.6.3. / C1F, C3F, C5F, 4.6.4. / D1F, 4.6.5. / E2F, 4.7.2. / B2F, B3F, 4.7.3. / C6F) . A great deal of discussion featured the process responsibility of customer executives who were related to the areas of business process disruption, impacts caused by defects and errors within the process flow itself, process and workflow migration (4.4.2. / B4F, 4.4.4. / D3F, 4.4.5. / E1F, 4.4.6. / F1F 4.5.1. / A3F, A4F, A6F, A8F, 4.5.2. / B1F), changes of elements in the process, disaster strikes such as fires, floods and earthquakes and the challenges in constant process cost improvements (4.6.3. / C1F, C2F, C4F, C5F, 4.6.4. / D1F, D2F, D3F, 4.6.5. / E1F, 4.7.2. / B2F, B5F) The discussions in this study would suggest that company executives are aware of the consequences resulting from process disruptions (4.5.2. / B1F, B3F, B4F, B6F). These disruptions have their origins in many areas and their consequences can be devastating: financial and reputational loss, loss of good will, products not delivered on time, increase in expenses, loss of customers, loss of data or buildings that cannot be accessed. It is therefore no surprise that customers ask manufacturers to accompany and assist them in all process steps in order to ensure measures for the mitigation or prevention of process disruptions (4.5.1. / A2F, A6F, A7F, 4.5.2. / B1F, B5F, B7F, 4.5.3. / C4F, 4.4.4. / D1F, 4.6.2. / B2F). Customers demand predominantly that they assume counselling, planning and managing responsibility for the total production process availability (4.4.2. / B3F, 4.4.6. / F5F, F7F, 4.5.2. / B7F, 4.5.3. / C1F, 4.5.5. / E4F, 4.6.2. / B1F, B2F, B3F, B4F, B5F, B6F, 4.6.3. / C3F, C5F 4.6.4. / D4F, 4.6.5. / E1F, E2F, E3F, E4F, 4.7.1. / A3/

A5F, 4.7.2. / A1F, A2F, A4F, 4.7.3. / C1F, C2F, C4F, 4.7.4. / D1F, 4.7.5. / E3F, 4.7.6. / F2F, 4.7.7. / G3F). This responsibility includes the manufacturer's currently installed equipment and process elements as well as those of original equipment manufacturers, and ongoing improvement measures (4.5.2. / B1F, B5F, B7F, 4.5.3. / C4F, 4.4.4. / D1F). The planning and implementation of changes or future process migrations and the co-ordination with all internal and external functions are integral parts of this request in order to achieve an optimal production infrastructure and support the customers' goals of investment protection (4.5.4. / D4F). A customer quest for prevention or mitigation of process disruption is extended by the demand for recovery time objectives in cases of disaster or other long-standing impacts. This leads to a further customer request for a manufacturer's constant and periodic reporting about product performance and service activities that enables the continuing adjustment of total cost of ownership and life cycle management and thus should result in a permanent improvement of the process cost (4.6.2 / B2F, B3F, B7F, 4.5.4. / D2F, 4.7.4. / D1F, 4.7.5. / E2F).

**4. Facilities.** The functional array "facilities" in Figure 5 encompasses all elements of a customer's strategic approach for governance and administration, the organization of material, personal and finance resources within a company or between enterprises. These include, among others, buildings, information and communication facilities, infrastructure and security. Typically, all these areas are under different organizational guidance and management responsibilities. In contrast to companies that were established in a green-field fashion, companies that have grown step-by-step in an organic manner frequently possess structures that do not comply any more with the developed production program and the attained economic size of the company. This begins with the organization of production processes and ends with an unsatisfactory operational site layout in particular, when changes have to be planned for plant expansions, relocation of equipment, workflow changes, modernization and business restructuring, process alterations and migrations of production methods and techniques. It is no surprise to observe therefore long-standing impacts on production processes and business processes as well as problems that appear in the course of the migration of equipment, changes in the production processes or even in the daily operation of company processes. Furthermore, even the co-ordination of air conditioning, supplies and utilities, the lack of an error-free provision of infrastructure, the various responsibilities for security and building access will pose perils to the orderly state of business continuity. Failed availability targets, missed cut-over dates and missed production targets will endanger the business results, but sadly also will frequently and

utterly destroy the personal career of those who are responsible for the correct functioning of those business processes. The study has drawn attention to quite a variety of various influences that may impact customer processes (4.5.2. / B3F, B6F, 4.6.2. / B1F, B5F). Just as wide as this array is, composed of factors and elements that bear no direct relation to the products of a manufacturer, so diverse and multi-faceted are the service opportunities that are related to potential prevention of these disturbances (4.4.3. / C2F, 4.4.5. / E3F, 4.4.6. / F1F, F4F, F6F, 4.4.8. / H1F, 4.5.1. / A2F, A5F, A8F, 4.5.2. / B3F, 4.5.5. / D4F, 4.6.1. / A3F). Thus, manufacturers are in a unique position. Founded on their own technological advantage and manufacturing experience, and experiences obtained with other customer accounts within their industry and sectors, as well as other industries, they ought to have the potential to respond appropriately and offer customers relevant services along their business continuum, from products to strategy (4.4.6. / F4F, 4.5.1. / A2F, A7F, 4.6.2. / B1F, B2F, B6F, 4.6.5. / E1F, E2F, E5F, 4.7.5. / E1F, 4.7.7. / G3F).

Here is a wide-ranging selection of examples mentioned during the study: customers asked to carry out a critical analysis about the impact on their business processes that is caused by the influences of their facilities and production infrastructure. This resulted in a re-configuration of the entire business process, including new and back-up equipment as well as recovery procedures to mitigate possible production impacts. Manufacturers were required to participate in the total migration planning of a new production line where the production line cut-over should have taken place without interruption seamlessly. A further request was to plan an entire new plant at an entirely new site, assume production and manage the follow-on production and all facilities. One of the major problems of a cloth producer was the management of various subcontractors that were involved in the production process. A manufacturer offered the co-ordination of the present subcontractors and also those to come. He furthermore assumed the role of a strategic partner for the customer who managed all partners according to efficiency criteria. A maker of agricultural high technology vehicles extended his business internationally. A manufacturer's service delivery function built up a single point of contact for all customer incidents, established in co-operation with the manufacturer's product development function databases that contained all relevant product performance data as well as all improvements and operational hints for customers. This way, they assumed total responsibility for the entire equipment problem identification and resolution process. Power strikes and supply failures were long-standing disturbances that plagued a producer of electrical connectors and fasteners. A manufacturer responded to this business problem

by hardening the customer's power supply, implemented an uninterrupted power supply and mirrored the production control system on a small transporter. In case of emergency this small transporter was moved to the customer premises to be switched into the customer's operation. Incidentally, this solution could also be offered successfully to other customers. A further customer built a new head office. The service delivery function of a manufacturer assumed the planning and total rollout and integration of the manufacturer's new equipment as well as the relocation of the entire present facilities.

**5. Organization.** The following section concerns the functional array "organization" as depicted in Figure 5. Generally, the term "organization" is related to the making and functioning of an organization with the intent to "do the right things" and "do the things right". The making or revision of an organization could come into play for example, with any strategy change or restructuring work. The functioning of an organization is tested every day by the business outcome, where major impact results from the performance of the individual company functions, the reporting line of each individual function within the organization and the degree of power a function may exercise within its reporting line. This general principle holds true for customer organizations as well as for manufacturing organizations.

In this context and within the scope of this study, I have tried to probe deeply into the fundamental question of how enterprises could benefit from value creation by the provision of customer-oriented and solution-based services. Rather than posing questions in the context of the organizational and operational performances of customers and manufacturers, I searched the various customer service requests that stem from diverse customer domains (functional arrays). There, I investigated the approaches of a manufacturer in establishing a resilient working relationship and the manner in which a manufacturer's service delivery functions responds to customer service requests with appropriate service capabilities.

To be able to advance further it was helpful to look closer into the expression of "a solution", which is usually applied ubiquitously to a myriad of more or less appropriately defined problem situations. In business or information technology environments the term "solution" usually applies as a synonym for important projects or grand undertakings. When I tried to obtain a deeper understanding of various customer functions and their related responsibilities and tasks, it occurred to me that the term "solution" means basically the solving of any problems. However the meaning and value of a problem varied greatly

and the type and manner of problem solutions will depend on the eye of the service requester and the perception of how his request is responded to. This is an attempt to explain this with the following example: the literature depicts a widespread belief that the sale of service contracts represents a service offering and thus constitutes a solution to customer problems. However, rather than the sale of service contracts, the contents and mixture of service contracts to the customer contributes a problem solution. It seems to be apparent that a manufacturer's service delivery function will have to respond differently with their services to the problems of a shopfloor team leader who is more interested in product reliability and operational availability than to the problems of a business process or a production manager who requires continuous and resilient business processes in order to achieve planned production targets, or an executive for supply chain management who is held accountable for relocating a product line to a different site. Therefore, a manufacturer's service delivery function has to recognize that each task of each customer's function should be regarded as a business problem that should be responded to and supported and resolved according to each specific situation

As this research has revealed, the attainment of a good working relationship as a pre-requisite to be considered in delivering solution-based services is dominated by two overriding factors. First, it is the level and degree of mutual trust between two persons. And it is also the emotional trust between two people in believing that the right things are done, things are done right, and that mutual interest is established and shared and the willingness to work together and deliver value is realized (4.4.6. / F6F, F7F, 4.4.7. / G3F, G4F, 4.5.1. / A6F, 4.5.2. / B1F, B2F, B3F, B4F, B5F, 4.6.1. / A2F, 4.6.5. / E1F, 4.7.2. / B1F, B2F, 4.7.7. / G1F, G4F, G4H, 4.8.1. / A1F). This principle is no constraint upon a certain level in the hierarchy of customer or manufacturer. The principle of mutual trust applies rather to all people who have a mutual relationship. This could be the appliance operator on the shopfloor interacting with the service engineer as well as the chief executive officer of the customer who communicates with the manufacturer's service executive.

In particular, this research has also shed light on the fragile customer-supplier relationships within manufacturing organizations. Traditionally, service delivery functions of manufacturers have been regarded as a cost factor, as a factor in the exchange of goods and in terms of image as "the fifth wheel" of the company. Customer re-orientation towards servitization requires that the former product repair cost-function adopts a distinct business attitude, assumes responsibility for profit contribution and establishes new relationships along the entire customer hierarchy (4.4.4. / A2F, 4.4.3. / C1F, 4.4.4. / D1F, 4.4.7. / G1F,

G2F, G3F, G4F, G5F, 4.4.8. / H3F, 4.5.1. / A3F, 4.6.2. / B4F, 4.6.3. / C2F, C3F, 4.6.5. / E2F, 4.7.1. / A3F, A5F, 4.7.6. / F5F, 4.7.7. / G2F). The interviews revealed that these customer relationships have to be very precisely explained, defined and tuned, in relation to the active relationships of all further functions of a manufacturer already in contact with customers (4.5.3. / C3F, 4.5.5. / E1F, E2F, E4F). Otherwise, the present sales function might believe that their well-proven customer relationships are dangerously disturbed and thus fear the loss of new product sales. Additionally, the responsibility for service sales should be defined as well as the method of how the achieved services quotas are distributed across the functions and the resulting services profits are shown on the company earnings sheets. If no agreement can be reached, then the potential for long-lasting jealousy and distrust between the manufacturer functions will result (4.6.1. / A1F, A2F, A3F, 4.6.3. / C2F, 4.7.1. / A4F, 4.7.6. / F1F). The teardown of the previous as well as the newly emerging trust barriers that could be caused by failure to agree will be very challenging situation.

The second dominating factor is characterized by the customer's belief in the manufacturer's ability to understand specific customer business problems, to respond appropriately and deliver the promised solution reliably whatever its nature and condition may be. As the examples in this research have revealed, the ability to comprehend potential customer problems is generally determined by the stipulation of the manufacturer's business purpose (4.4.5. / E2F, 4.4.6. / D1F, 4.6.5. / E4F, 4.7.4. / D1F). Of special significance, thereby, is understanding how a traditional product manufacturer perceives the difference of services that are product-related and induced by product functionalities and properties, compared with those services that are oriented on the customer business needs and demands (4.5.3. / C1F, C3F, 4.5.4. / D1F, D2F, 4.5.5. / E1, E4, E5, 4.6.2. / B2F, B3F, B5F, 4.6.3. / C1F, C3F). Then, it is of equal importance how the consequences of this consideration will be turned into a customer-oriented strategy and how changes will then be extracted and shaped into logical and sustainable service delivery approaches. An additional critical factor in the area of recognition of customer requirements is the way these requirements are determined, because the study has shown that customers are frequently not aware of the nature and goals of their potential long-term requirements (4.5.2. / B4F, 4.5.4. / D1F, D2F, D3F, 4.5.5. / E1F, E2F, 4.6.1. / A1F, 4.7.1. / A3F, A5F). Mere interviews or surveys do seem not to be sufficient in order to establish a solid status over these customer needs.

The study further made clear that the degree and scope of service delivery performance will vary according to the previous service maturity level and service experience of a traditional manufacturer's service delivery function (4.5.4. / D4F, 4.6.2. / B1F, B2F, B3F, B5F, 4.6.3. / C3F, C4F). The scope of the identified potential customer requirements will probably reveal gaps in preparedness to offer the full degree of services accordingly, in particular to those manufacturers that commence on their embarkation to servitization. Consequently, the build-up of an additional degree of readiness will have to be planned for. In doing so, it is necessary to realize, as the study has shown, that not all service elements can be delivered by the solution-offering manufacturer and thus alternative ways to close these gaps have to be set in place in order to be able to offer an appropriate and competitive solution for customer business problems (4.4.2. / B3F, 4.4.3. / C2F, 4.4.7. / G1F, 4.5.3. / D3F, D4F, 4.5.4. / D4F, 4.5.5. / E1F, E3F, E4F, 4.6.1. / A2F, 4.6.2. / B4F, B5F, 4.6.5. / E1F, 4.7.1. / A5F, 4.7.2. / B4F, 4.7.6. / F7F, 4.7.7. / G4F).

**6. Vision, Strategy.** The last functional array in the sequence of building arrays in Figure 5 represents two terms: Vision and Mission. Generally, vision expresses the main purpose of a company strategy to represent in an aspirational statement the company values, the basic beliefs and the culture of a company. In consideration of all relevant interests and on the basis of a long-term company scenario it is supposed to outline and guide the course of future activities and enable all parties involved to pursue the same company direction. In principle, a company's vision is directed to the inside of the firm as well as to customers, suppliers and the general public and thus prominently promotes the corporate image.

To identify an answer for the term strategy is not so easy. The strategy expert Mintzberg (1987, p.11) put it so aptly: "The field of strategic management cannot afford to rely on a single definition, indeed the word has long been used implicitly in different ways even if it has traditionally been defined in only one". Indeed, there is a multitude of definitions of the term "strategy". Based on my past management experience and observations during the course of interviews, my participation in service strategy workshops and for the purpose of this study I suggest that the "strategy" of a company is a long-term plan. The strategy implies a definition of how the company vision can be turned into reality. Therefore, a strategy represents an orientation that guides future company activities. The subsequent implementation of the strategy is carried out by crafting targets, measures and policies accordingly.

This principle wins special importance for the service delivery function of a traditional product manufacturer as well as for the customers in times of technological or radical game changes. Normally, services executives need to ascertain that their service function collects the appropriate customer requirements. This could be achieved by regular customer surveys and by service report evaluation of past incidents on an operational level. However, as the study indicates, customers expect their service suppliers to understand their strategy, to think and act as a self-learning organization in line with the customer strategy. And vice versa: as customers frequently are not aware of their future strategic service needs, they need to understand the opportunities that can be achieved through the solution capabilities of a manufacturer's technology and service knowledge. As a result, customers and a manufacturer's service functions have to exchange opinions and experiences regularly (4.5.2. / B4F, 4.5.4. / D2F, 4.5.5. / E1F, E2F, 4.7.5. / E4F, 4.7.1. / A3F, 4.7.5. / E4F, 4.7.7. / G1F). In general, customer executives try to stay in line and keep pace with any changes within their industry and technological developments. For this, they are members of industry associations, participate in conferences and symposia and maintain a good relationship with suppliers, business partners and further information sources such as universities, literature and even trusting contacts with competing companies. However, sudden technological advances such as "Industry 4.0", IoT, 3D printing and the rapid broad dissemination of network technologies and ICT functionalities seem to represent one of the most significant driving forces in changing the industry. This change, in combination with the rapidly increasing and hitherto unknown possibilities and capabilities to gather vast amounts of operational and business data could bear all the ingredients of a game change. Combined with the opportunities of deriving fast and reliably meaningful results and information that are leveraged by investments in analysis capabilities, it is envisaged to lead into a digital revolution of the entire industry. This could be true for customer companies as well as for supplier industries.

Therefore, customers' executives are going to tap into their customary information and knowledge resources. They will also address their present manufacturer or service supplier in order to obtain suitable information or knowledge that they have gained through practical experience or by lighthouse cases. Customers may assume that their present and trusted suppliers have already gained sufficient knowledge through their service capabilities as manufacturers and thus are able to support their business and issue advice and input for a customer's strategic redirection as well as for their operational re-positioning. With a certain degree of probability, customers are also going to address



further knowledge resources and will also be addressed by other knowledge sources such as competing consultant companies in order to satisfy their quest for a holistic information status.

### 5.5. Service Delivery Platforms

The previous sections of this chapter outlined the present business position of customers and manufacturers in the German capital goods industry. Based on the principle of functional arrays as depicted in Figure 5, customer service demand has been extracted and denoted as “basic”, “operational readiness”, “asset availability”, “business continuity” and “business and market strategy”.

In this study I paid special attention to the service delivery functions of traditional manufacturers who intend to embark on the transition to servitization. The approach of analysing customer functional arrays offers a particular opportunity for those manufacturers who commence servitization from a purely reactive product-oriented service delivery. By doing so, they ought to be able to recognize the required service delivery activities, according to the requirements of each functional array, and plan their necessary capability build up and arrange related investments.

Those manufacturers that have already embarked on the path to servitization ought to be able to locate their present position and continue towards the desired goal of servitization. Wherever a manufacturer defines its current position along the x-axis in Figure 6, the content of service offerings will always have to be oriented towards solving customers’ business problems with the aim of creating value for customers. The x-co-ordinate in Figure 6 expresses the manufacturer’s service potential related to customer demand as it emerges along the various functional arrays and its y-axis represents the development of servitization a manufacturer might consider while transitioning towards servitization. Customer service demand and requirements principally determine the capabilities in which a traditional manufacturer’s service delivery function should invest. This will be the base to create the range of service delivery offerings that correspond to the specific functional arrays along the customer enterprise structure. Figure 6 depicts this relation. Besides the signalling repetition of the colour scheme, the presentation of the functional arrays and the concomitant customer service demand of Figure 5, Figure 6 adds a new element: the service delivery platform.

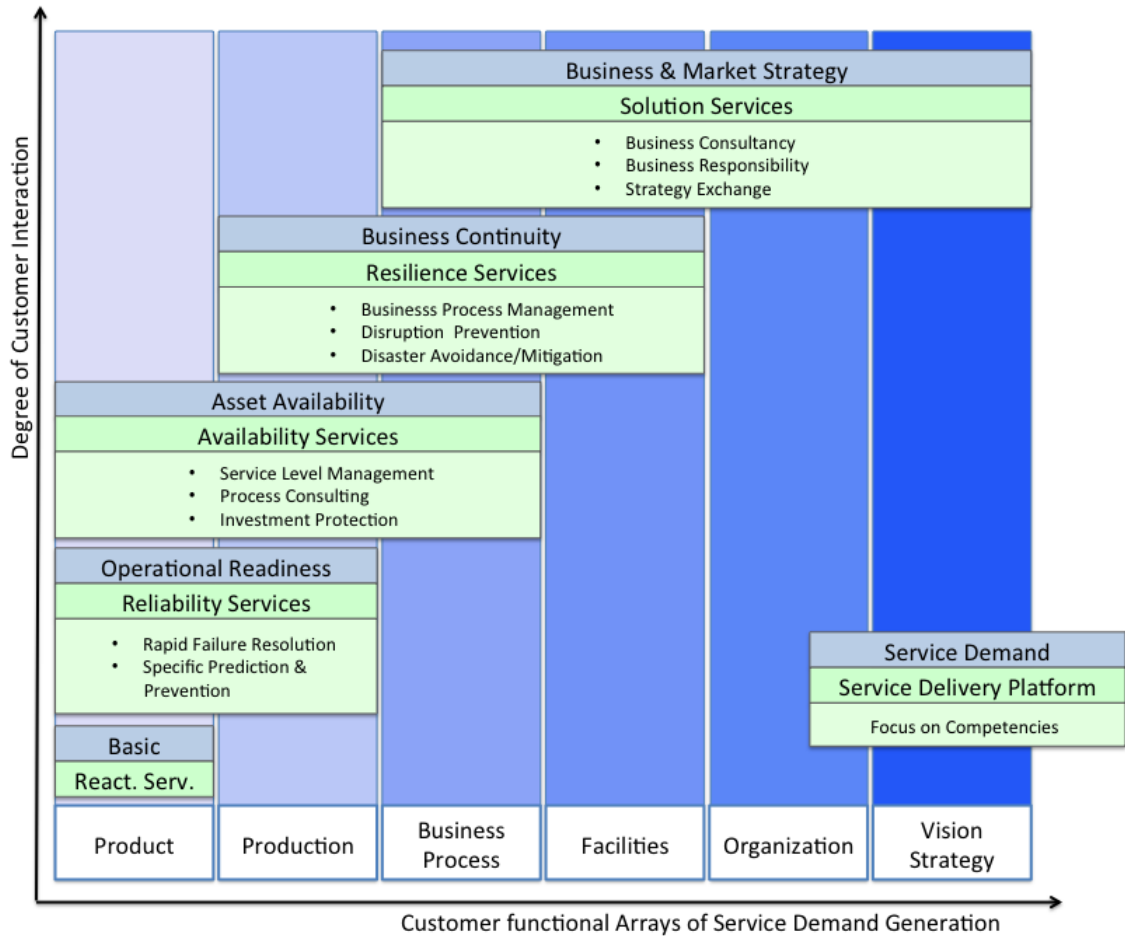


Figure 6 - Source: Duschek (2014) Service Delivery Platforms

The service delivery platforms have been established as a service answer to respond to customers' service demands that are generated in each individual functional array. These service delivery platforms are depicted in dark green and presented as superimposed boxes above the x-co-ordinate. The shaded green represents the required principal competencies that manufacturers need to establish. These principal competencies direct the core capabilities of each individual service delivery platform. These service delivery platforms are largely congruent with specific customer requirements. Thus, they coincide with the span of specific customer service requirements and may also stretch across several functional arrays.

### 5.6. Required Capabilities

The answer to RQ1 is derived from the customer requirements that were extracted from the individual interviews. The corresponding service delivery platforms have been derived as answers for the specific production or business functions of a customer company.

These platforms correspond with either one or more functional arrays, indicating the nature of the offered services and are designated from left to right as the service delivery platforms of A) “basic service”, B) “reliability services”, C) “availability services”, D) “business continuity services” and E) “solution services”. The following sections address each of the service delivery platforms in detail, considering the customer requests that were established in chapter 5.4 “customer service requirements”. Concurrently, the detailed explanation of each service delivery platform is also complemented by the relevant service capabilities.

**A) Service Delivery Platform: Basic Service (reactive).**

The service delivery platform “basic” represents a reactive service delivery mode and is mainly delivered in the customer functional array “product”. Service delivery function will only respond in a reactive manner to customer service requests. This service delivery mode constitutes the contractual fulfilment of warranty obligations by replacing either failing machine components or forwarding those for customers’ self-service activities. After-warranty services are also reactively delivered either on single case payment basis or through periodic maintenance contracts according to individual needs and budget conditions. A basic service delivery is often mistakenly regarded as excellent due to fast parts procurement times and quick on-site responses after customer requests. However, as the study confirms, manufacturers are advised to regard a basic service delivery as insufficient to enable customer production targets. Thus, they should respond to customer service requests by assisting in attaining the desired product state.

**B) Service Delivery Platform: Reliability Services.**

The subsequent service delivery platform “reliability” aligns predominantly with the customer functional arrays “product” and “production” and relates to their resulting service requirements. These two functional arrays are characterized by a strong customer demand for product reliability. Customers pay paramount attention to a high equipment and product operational probability to function under a certain load. They track the achieved reliability by operational parameters such as mean time between failures, mean time to repair, mean down time, number of unscheduled interruptions and the number of failure reappearances. Therefore, manufacturers should respond with a service delivery with the prime goal of improving the rate of product reliability according to the customer operational requirements.

Manufacturer service delivery functions should thus build up and provide capabilities that focus primarily on failure prevention and secondly, if malfunctions occur, remove them as rapidly as possible. In order to be effective at every service action, the development of service processes should also focus on service process standardization and the replicability of the related service deliveries. So, manufacturers will, while maintaining a proactive stance, first need to provide proactive capabilities that lead to a decrease in the number and length of product failures appearing at customer sites. This could be achieved by two approaches: the approach for a rapid failure resolution and an approach for the prevention of malfunction reappearances.

The approach to rapid failure resolution could be addressed by a game change in the manner of how the first customer contact with the service delivery function is established. If, on first customer contact, a highly skilled expert treats all failure information so that action plans can be established at once and problem resolution activities can be initiated immediately. Thus, service engineers and necessary machine elements will arrive at the customer at a co-ordinated time, an expert action plan is executed and thus a significant product down time reduction can be achieved and unscheduled service interventions minimized. To reduce the number of product malfunctions, manufacturers should provide for preventive capabilities. This implies that a root cause failure analysis (RCFA) is applied for every service: remedial as well as preventive service activity.

The outcome of the analysis as well as the related failure information is reported to the manufacturer's product development and product production function and also stored in a service database. Information about product improvements, work-arounds of problems and enhanced service procedures are equally relevant for insertion into the same database. By regular and scheduled collating of the contents of this service database with the customer-installed base, possible weak spots in customer installed products as well as product improvements can be identified and preventive actions initiated.

Thus, a manufacturer should also invest in capabilities for database management and the analysis and related retrieval of customer specific information. A systematic exploitation of the installed base will provide more opportunities to obtain prevention information and at the same time provide a welcome extension in offering additional service contracts. Customers rate a manufacturer's service delivery functions strictly by BOC standards. A proactive product reliability support and superior preventive service performance are

regarded as merely an “entry ticket” to be further considered as a potential solution-based services provider.

### **C) Service Delivery Platform: Availability Services.**

The “availability” service delivery platform follows in sequence and spans the service requirements that are derived from the functional arrays product, production and business process. This platform embraces all machines, elements and products as integral parts of a controllable production process as well as a number of logically linked individual tasks and activities whose result can be either physical products or intangible results or objectives. Therefore, business processes constitute the backbone of a company’s business. Availability as the core characteristic of business and production processes is supposed to assist in the achievement of specified production quantities with a clearly outlined production quality and within a precisely defined production period. Operational availability constitutes one of the utmost important critical success factors for customers. However, availability could be susceptible to various internal as well as external impacts. Besides, product malfunctions could be factors such as operation, information, infrastructure, energy supply or original equipment manufacturer products have a negative impact on the operation availability. Derived from this, customers request proactive assistance in predicting potential negative impacts and in planning and initiating preventive measures in order to augment the required level in operation availability. These measures should comply with the customer production requirements and be based on the specific customer and industry setting.

Service delivery functions of manufacturers could respond to these requests by providing capabilities in various characteristics. They could provide professional personal counselling that possesses technological as well as industry and business expertise accompanied by virtue of the knowledge of their own and OEM products. By this means, the required level overall as well as the specific component availability levels can be defined and the procedures to collect and analyse the relevant data in order to determine the achieved levels can be established. Furthermore, a critical analysis of the entire process configuration can be carried out and appropriate measures that envisage, predict and prevent potential process impacts can be co-ordinated with all involved functions. In addition, a manufacturer can establish data management and analysis capabilities that continuously monitor and track the performance of all process elements, and collect and analyse the obtained data in order to detect early problem high-flyers or pervasive defects.

Manufacturers can also invest in product planning and support capabilities that meld customer service requirements into the product planning process and exercise their sign-off right in future product announcements. Complementary capabilities could be investments in interpersonal relationships in order to enable an effective interaction, communication and co-operation with all parties that are involved in the successful running of business processes. Finally, manufacturers can provide control capabilities that first enable an effective service contract management to allow the economic evaluation and assessment of individual service contracts and secondly provide the portfolio management of maintenance and service contracts with the aim of applying the best customer-specific service delivery offerings according to the budget and operational requirements of customers. And thirdly, these controlling capabilities should facilitate the performance tracking of the entire business process configuration under TCO and LCC considerations in order to assist in attaining a holistic protection of customer investments.

#### **D) Service Delivery Platform: Resilience Services.**

The fourth service delivery platform from left to right in Figure 6 represents “resilience services”. The service platform business continuity spans the diverse service requirements that arise from customer functional arrays production, business processes and facilities. Resilience services aim at two areas whose negative performance could have a devastating impact on a customer’s entire business success. First, resilience services addresses areas in relation to long-standing business process disruption caused by process workflow design, process migrations or disruptions that are generated by catastrophes, natural disasters or fire. In this area the mitigation of disruption effects in combination with prevention measures represent the centre of interest. Secondly, resilience services encompass services that assist a customer’s strategic approach in order to achieve an orderly organization of material, personal and financial resources within a company or between enterprises. These services are offered to mitigate or avoid impacts that could be ascribed to legacy responsibilities, organizational incongruences or matrix management structures. Resulting problems, such as failed availability targets or missed production results could endanger the company earnings and also, sadly, utterly destroy the personal careers of those who are held accountable for the business results.

In this respect, this study identifies a wide range of challenges that bear no product relation and that could also be addressed by a service delivery function of a manufacturer. For example, manufacturers could provide capabilities for counselling and planning with the

aim of planning for disaster reduction and mitigation of related business impacts. In addition, they could provide capabilities for the planning, co-ordination and implementation of future process migrations. Counselling capabilities could be applied to critically analyse business impacts resulting from facilities and production infrastructure. Alternatively, partner management capabilities could be applied in order to act for customers as their strategic partner in co-ordinating further business partners. Again, manufacturers could offer tangible services like mobile platform capabilities that are moved to customer premises or offer back-up resources such as office and production space in cases of disaster. Even rollout capabilities could be established in order to move departments or plant locations to new sites.

#### **E) Service Delivery Platform: Solution Services.**

The service delivery platform “Solution Services”, as the last of the service delivery platforms in Figure 6, spans the service requirements that result from the functional arrays: business process, facilities and organization. The understanding of the term “solution” within the scope of this study means solving problems in connection with customer business and production processes. The nature and importance of problems can vary according to the diverse tasks and responsibilities within a customer operation. So, manufacturers’ service delivery functions will have to respond specifically and accordingly to any customer service request or demand along the customer’s entire line of functions. The ability to respond will depend on the manufacturer’s ability to comprehend potential business-related solutions, on the trusting interaction between manufacturer and customer, the manufacturer’s internal relationship of product sales and service delivery, the service level of maturity and previous experience. Since solutions could contain service elements that cannot be delivered by the manufacturer, alternatives service sourcing should be planned for.

In order to attain a position as solution provider, manufacturers should establish research capabilities to identify customer solution demand systematically and periodically. They should build up service business capabilities for solution-based services depending on the previously achieved level of maturity. The provision of consultative selling capabilities could bridge a potential gap between pure service sales and business process consulting. Manufacturers could assume responsibility for the outcome and results of business and production tasks and processes complemented by running entire sites and plant on behalf of customers as BPO business process outsourcing services. Manufacturers could even

assume reliability and availability on behalf of OEM suppliers. Furthermore, manufacturers could enter adjacent sectors and industries or even entirely new markets and apply their exploited, previously developed, built-up service capabilities.

The identification of customer solution demand is particularly important for a manufacturer's service executives. The delivery of product-related services that form primarily the main part of customer-oriented services could lead to a certain service-myopia if the service demand identification is mainly tied to product properties and functionalities. Manufacturers will lose contact with opportunities that result from customer business and process problems if they focus mainly on solutions in relation to their sold products. Therefore, services executives ought to get together with their customer counterparts regularly in order to become acquainted with their company strategy and thus influence the development of their service capabilities. This approach also offers the opportunity to make customer executives acquainted with the manufacturer servitization strategy, as they are often not aware of the manufacturer's solution potential to solve their business problems.

The first part of this chapter centred on answering research question RQ1 in focussing on customer requirements. These requirements as depicted in Figure 5 were extracted from the twelve interviews and brought into the context of six principal customer functional arrays. The outcome of these functional arrays was aligned with the superimposed service delivery platforms of Figure 6 resulting in the exemplary service capabilities for each specific service delivery platform. This outcome could serve as a long-term concept to plan for sourcing and investments in the required competencies along a service continuum, especially for those manufacturers who are in their initial re-orientation phase.

### 5.7. Transition Approach

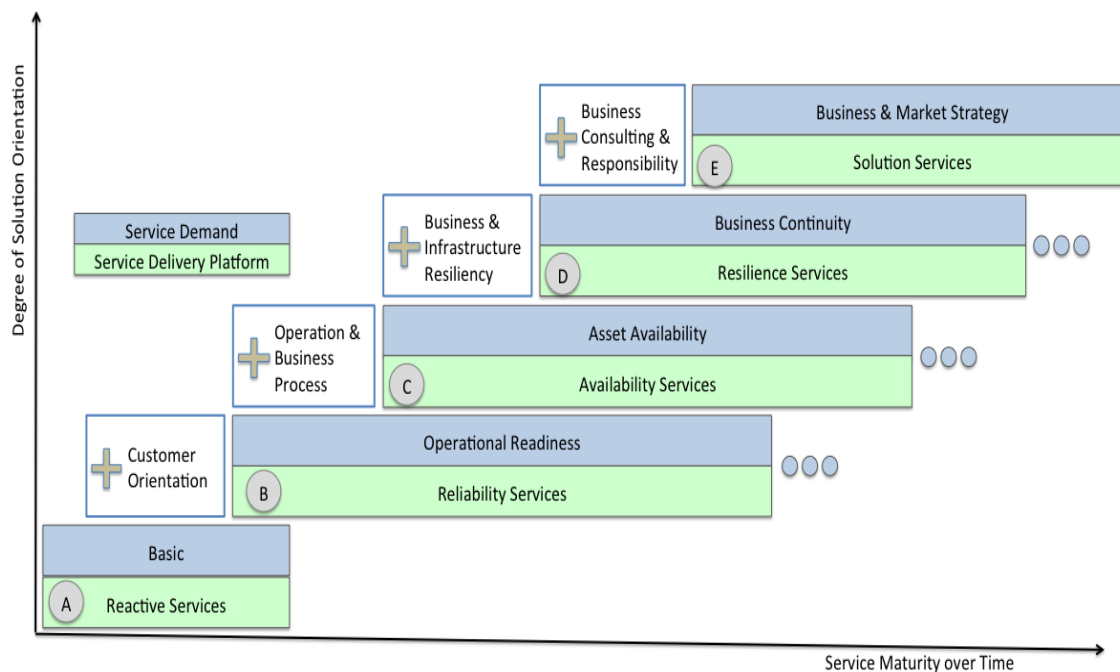
The second part of this chapter deals with the area of research question RQ2. The outcome of RQ1 focuses on identifying the required servitization capabilities. The outcome of RQ2 provides a transition approach as depicted in Figure 7 that could be applied by a traditional manufacturer to embark on the path towards servitization.

A manufacturer's re-orientation towards servitization is guided by a transition conceptualization that is based on customer service requirements across the entire manufacturer' enterprise structure. As I have ascertained in the study, these customer requirements are linked to the production and business functions of a company and result in quite distinct service tasks and responsibilities that are contained in specific service



delivery platforms. The linking of the customer service requirements with the company functional arrays in Figure 5 leads to the development of specific service delivery platforms that are depicted in Figure 6. The platforms and their transition formation are depicted in Figure 7 and labelled as A) “basic service”, B) “reliability services”, C) “availability services”, D) “resilience services” and E) “solution services”.

This arrangement of service delivery platforms represents a conceptualization general approach towards a servitization continuum. The x-co-ordinate of Figure 7 is labelled “Servitization Maturity over Time” and represents the service maturity progress that a traditional product manufacturer achieves on its transition after the start from a “Basic” service position. The sequential build-up and inter-relation of each specific service delivery platform and their well-timed representation convey a servitization development of evolutionary nature. The achieved maturity of each service delivery platform represents a platform of departure to form the next one in sequence.



**Figure 7 - Source: Duschek (2014) Transition Approach**

The related y-axis is labelled “Degree of Solution Orientation”, providing an attainment impression in the degree of customer orientation of a manufacturer on its way towards servitization. While each of these service delivery platforms could be regarded as self-sufficient in their respective tasks and responsibilities it can quite evidently be assumed that a traditional product manufacturer that is at the starting point towards servitization will neither possess the required capabilities nor the necessary resources to start at the right end

of the x-abcissa. The “+” - insets indicate the progress of the servitization journey, as well as the specific competency orientation and the increased shift in customer interaction during this journey. The bullets indicate the service continuum of a service delivery platform. Therefore, I set out with my work from a manufacturer’s point of reactive, basic product-oriented service in order to obtain a servitization conceptualization.

#### **A) Service Platform: Basic Service.**

Customers regard this reactive product-oriented service delivery as insufficient to support production and business process requirements. Spent labour is allocated to product cost; replaced spare parts are allocated to product sales. Manufacturers are advised to re-orientate their product-oriented business towards customer-oriented services that solve customer problems, create value for customers and generate new revenue for manufacturers.

#### **B) Reliability Services.**

This is the most dramatic and profound change a manufacturer’s service delivery function will have to undergo. The manufacturer must abandon its reactive response to customer service requests and fulfil all services proactively in a systematic and planned manner that is aligned and dependent on customer requirements. Customers will value this proactive approach and regard it as an “entry ticket” into the future provision of solution-based services – without this it, customers will not engage further with the manufacturer.

This product-based service delivery platforms is customer-oriented and constitutes the transition starting point. The reliability services respond to a strong customer demand for high reliability and product operational probability to function under a specified load. Product performance parameters such as MTBF, MDT or number of unscheduled interruptions are prime customer measurements. Therefore, manufacturers must respond according to mutually agreed operational requirements.

The service function will also have to assume a business posture and act as a profit centre rather than acting as a cost factor as previously in reactive basic services. Therefore, manufacturers have to assure a sound service delivery structure that encompasses principally:

1. The service fulfilment receives a separate business identity guided by a service strategy. Service business results are measured in gross profit terms

2. A database for the installed base of each customer as well as about the entire manufacturer's product fleet is created to obtain a service business base
3. Service and product performance measurements are implemented to guide the service delivery and fulfilment process
4. Processes for failure prevention and rapid problem resolution that are delivered in a standardized and consistent manner have to be set up
5. The service touch points are redesigned to allow a proactive activity
6. Database management is implemented for the reporting, storing and analysis of every product failure and service activity for each installed product and each customer in order to identify single product or entire product fleet failure highflyers and obtain opportunities for service process improvements
7. The service function receives the sign-off right for new product announcements as antecedent to infuse customer service requirements into the product development process
8. A systematic, periodic identification of customer service requirements and demand is introduced
9. Service business control and database management for service contract administration and billing is implemented
10. Customer specific service contracts honour proactive reliability improvement measures that are implemented by customers or manufacturers
11. The responsibility for the offering of services, services sales and related sales processes is defined and agreed
12. A business plan that covers investments for required resources is approved.

These foregoing points constitute a structured services backbone. They are rather big steps for manufacturers' service product-oriented service delivery functions that previously acted as a cost centre and responded reactively to customer service requests. All manufacturers that participated in this study had to take these steps in order to win confidence, act as a business function and also win a position as a trusted partner vis-à-vis customers. They understood that only a superior service performance allows the future offering of solution-based services. Rather than months they needed years to learn and acquire the necessary customer, industry and sector knowledge and find their accepted position within their companies.

### **C) Service Delivery Platform: Availability Services.**

Business processes constitute the backbone of each company. Availability as a major core characteristic of business and production processes should assist in achieving specified production outcomes and production quality within a preset production period. Services that assure availability embrace all machines, elements and products within a controllable production process including logically linked activities that result in tangible or intangible results. Thus, customers rate operational availability as one of the utmost critical success factors in order to assure an orderly business compliance achievement. However, there are a number of customer internal and external availability impacting variables, which cannot be attributed to technical product performances. This could be e.g. energy supply, operating materials, inadequate co-ordination, infrastructural weakness, operation or imprecise instructions or incomplete change management procedures. Even a single failing element could have a company-wide impact. Derived from this, manufacturers will provide assistance and guidance to establish and control methods and procedures that ensure operational availability for customers production and business processes.

While all reliability services measures are applied in order to improve product reliability, manufacturers build on this and advance to offer availability services that:

1. Introduce customer-specific availability managers who possess technological, industry and process knowledge
2. Define a customer specific availability roadmap and enable performance targets
3. Define and establish individual process service level agreements
4. Co-ordinate change management for process and configuration changes
5. Co-ordinate the interaction, communication and co-operation of all involved customer functions as well as external functions such as OEM and infrastructure suppliers
6. Leverage partners for those services that cannot be provided by the manufacturer
7. Manage all preventive and predictive activities
8. Enable remote condition monitoring and remote problem resolution by connecting all process equipment to online failure detection and diagnosis systems, whenever and whenever this could be feasible.
9. Offer individual customer service contracts to honour proactive availability augmentation measures that are either customer or manufacturer implemented.

10. Introduce appropriate controlling that demonstrates the economic and business value.

Again, availability services represent a major step towards servitization, as it requires substantial adaptation in business orientation. The delivery of reliability services, although carried out according to customer reliability service requests, is mainly tied to product-related activities. Availability services direct entirely all activities in such a way that business and production process availability is achieved according to customer business requirements. The manufacturer service delivery function assists in the design and implementation of required activities, co-ordinates the related process work of all internal and external functions involved. Responsibility is assumed for the tracking, analysis and implementation of remedial and preventive measures with the objective of maintaining high process availability.

#### **D) Resilience Services.**

Reliability services address the operational readiness of a customer-installed product base and availability services aim to maintain a high business and production process availability according to customer requirements. Resilience services address those customer enterprise-wide aspects whose negative performance could have a devastating impact on the customer's bottom line. They could also damage the company reputation, e.g. by worldwide media reporting as personal careers could be utterly destroyed as well. Where availability services focus on achieving a high process availability aiming at resilience services on continuous availability and the necessary methods and techniques that assist in achieving this objective of business continuity. These methods and techniques are applied in order to mitigate or avoid impacts. These could be ascribed to, for example, failing infrastructure, energy or air conditioning, organizational incongruences, human errors, natural disasters, product malfunctions or security and compliance problems. Furthermore, the continuous increase of the international division of tasks and processes leads to a complexity that challenges the objectives of continuous availability permanently. The principle of the division of labour, leveraging third party companies, outsourcing on a growing scale and accompanied by the almost universal networking technologies aggravate the challenges that are already inherent in the customers' proprietary business processes.

A scenario like this gives the appearance of being everything that customers could need assistance in implementing measures that could harden continuous availability step-by-step in order to enable their business to continue operating under the most pressing

circumstances. Manufacturers respond by offering resilient services for processes and the infrastructure and back up services to restore business in cases of potentially long outages caused by natural disasters or fire.

They could offer for instance:

1. Strategic resilience consulting resulting in a customer specific resilience strategy.  
This specific resilience strategy should be applicable for the entire business process topography
2. Evaluation of a critical mission operation that comprises the mitigation of potential impacts and recovery measures for the entire production and business process life cycle
3. Assure the co-ordination of the implementation of all business continuity improvements regardless of their origins
4. Assess that implemented measures are based on facts rather perceptions,
5. Introduce procedures that maximize business continuity
6. Provision of mobile or local platforms that provide production and workspace capabilities as back up as well as recovery measures for long standing outages
7. Co-ordination of communication and interaction of all involved customer functions and third party suppliers

All these resiliency services that aim for continuous business continuity are far from being related to the endogenous manufacturers product business. Consultancy, evaluation, planning, controlling, communicating, interacting, service marketing and the build-up of customer and service business partner relationships are competencies that are merely product-oriented. In the past, manufacturers had not developed and invested in these features and thus these required competencies and services have to be developed over time.

#### **E) Solution Services.**

This service delivery platform will bring a manufacturer into very intensive contact with customers and could also lead to the most focused participation and co-operation of customers by addressing and solving their operational, business and strategic problems. Based on their technological and industry-specific knowledge, manufacturers must form an understanding about the type, value and meaning of customer problems and be appropriately positioned in order to envisage a solution and create value for them. Generally, the nature of these problems will certainly be widespread across the customer's entire company structure. All the problems that originate from products, product-related,

operational and functional implications should be addressed by reliability services, availability services and resilience services of a manufacturer. These services at the same time should also form the foundation and ability to successfully address problems that originate from customer business and strategic challenges. As they are very remote from bearing a direct relation to products, manufacturers will therefore have to identify the areas in which they could leverage their technological strength and utilize their industry-specific skills. These areas could address a wide scope of service opportunities that originate from a customer business operation as well as from the customer's re-direction or strategic considerations. This could be, for example, a re-organization of a production flow, a re-design or new design of products, the management of assembly partners, business process re-engineering, the operation of facilities and plants or the customer's horizontal and vertical business expansion or the addressing of new markets. All the time, manufacturers ought to be assuming an open mental posture towards the avoidance of problems and equally for solution alternatives.

As a result, inefficient fragmentation of service skills will be avoided, technology and industry-specific synergies will be built up and further developed and a dissemination of best practices systematically promoted. Thus, manufacturers will pursue the build-up and the further development of competence platforms, as they ought to do when offering reliability, availability and resilience services. These will be a business consultancy platform, e.g. for business process engineering, business expansion or the identification of new business opportunities or a business partner management platform for the management of supply chains. In order to exploit the manufacturers development and production capabilities a development and engineering platform could be offered for the re-design or new design of products or the re-engineering of manufacturing and production processes. And furthermore, an outsourcing platform comes naturally as a manufacturer can exploit its capabilities to run a production facility or production site and assume responsibility for the planned results.

Besides the more business-like nature of these service competence platforms, manufacturers ought to establish a strategic relationship platform across the entire functions of the customer. As this study has revealed, customers are often not aware of their future business and service needs. However, future needs seldom arrive suddenly. They should be understood as an ongoing journey and the process of their understanding should be considered as a constant task. Through the exchange of opinions and experiences, customers and manufacturers can stay in line with industry and technology

advancements. Thus, customer executives could attain a nuanced insight into strategic changes, e.g. the Internet of Things, Industry 4.0 and business advantages by the implementation of Big Data as well as influences that are related to regulatory, social and stakeholder implications.

An effective strategic relationship platform is of particular importance for manufacturers' services executives. By being involved in the customer's strategic consideration, manufacturers could be able to understand the customers' business needs and the resulting service requirements and adjust their service delivery accordingly. At the same time they could convey their services strategy, and explain and demonstrate the advantages for customers by delivering services that are based on specific platform capabilities. The resulting trust should lead to a close long-standing relationship and ought offer the potential to keep the manufacturers competition at bay.

#### 5.8. Summary

The previous chapter should provide an insight into the approach of traditional product manufacturer's reactive service delivery functions towards servitization and the journey they could choose in order to attain their desired state of customer-orientation.

This chapter centres on the creation of a transition conceptualization for servitization for reactive service delivery functions of traditional product manufacturers. The first part of this chapter should provide an answer to research question RQ1 by focusing on customer requirements that were established in chapter four and that were brought in alignment with the customer functional arrays. The outcome of this alignment was superimposed by service delivery platforms that resulted in exemplary service delivery capabilities for each service delivery platform. The second part concerns the research question RQ2. By applying the answer of research question RQ1 and assuming the posture of a reactive services delivery function, I could establish a servitization conceptualization that could guide such a reactive service delivery function from the initial start of a servitization journey to the delivery of solution-based services. This conceptualization could also serve as long-term guidance for related sourcing and investments.



## Chapter 6

### Conclusion and Recommendation

#### 6.1. Introduction

The purpose of this last chapter is to bring together the relevant findings and particular evaluations that could be derived during the course of this research and place them in relation to the literature gap that is described in section 1.2. In addition, the implications of this research will be taken into account as well as suggestions for further possible field research are parts of this study. Briefly, and for ease of reference, these are the research questions:

1. How could product-oriented service delivery functions of traditional product manufacturers enable their transformation into solution-based services?
2. How could product-oriented service delivery functions of traditional product manufacturers accomplish a transition from product-oriented services to solution-based services?

The first chapter began with a situation depiction of the German capital goods manufacturers during the past two decades. Due to a dramatic change in the business climate that led to the erosion of prices and margins, manufacturers have tried to re-orientate their going-to-market strategies from a product focus to customer-orientation. Under the header of servitization this re-orientation aims to assist customers in solving their business problems rather than merely providing products. The term servitization has been reflected in the literature by numerous articles, in particular during the past ten years. However, in spite of the manifold advantages that were suggested by the extant literature, hardly any successful practical transition process could be achieved during this time frame and the actual transition achievement rate is far too low. This therefore sparked the motivation to research a transition approach that could be applied by practitioners.

The literature review as the core of chapter two introduced the manifold servitization studies that characterize servitization as grand strategies and described various antecedents and approaches towards servitization. Generally, they focus on service strategies, organizational structures and culture, market-oriented service development, the development of service offerings and communication. However, a practitioner approach of how reactive service delivery functions of traditional product manufacturers ought to advance towards servitization is generally lacking. Work on guidance related to assessment

and implementation principles, priorities, transition management in connection with the definition and collection of customer requirements is completely absent. This is more than astonishing as the re-orientation of servitization particularly requests practitioner executives to attain the status as a preferred service delivery function for solution-based services. This triggered my research to aim at two areas: to focus strictly on the customer requirements and demands that are generated individually in each specific customer functional arrays across the entire company structure and to concentrate on service platforms and their related competencies that are required to respond appropriately to customer service requirements and demand. The next parts of this chapter will draw the conclusion, the contribution to professional practice and suggestions for further research.

## 6.2. Conclusion

The servitization approach requests practitioner services executives to re-orientate their service delivery function towards solution-based services that assist customers in solving their business problems. In addition to the goods-dominant logic and service-dominant-logic of Vargo and Lusch (2004) Windahl and Lakemond (2010) place a solution logic as a further exchange element with certain boundaries and implied orientation focus. These approaches mainly endorse either products that are complemented by services or services that support products or stand-alone services. Oliva and Kallenberg (2003) suggest in contrast a service continuum in which manufacturers transform from a product provider to a solution provider over time, as shown in Figure 3. Moreover, the extant literature, adapting the work of Oliva and Kallenberg, marks the value of product-oriented services as “low-end” services and the customer-oriented services as “high-end” service. This might generate a conceptive illusion that customer value may only be generated by pushing the service delivery orientation towards solution-based services.

The outcome of my study suggests that these distinctions might not apply if a traditional product manufacturer commences initially on the path to servitization from a position as a reactive product-oriented services provider. I am convinced through my research that the key to this distinction is based on the understanding of the term “problem solving” in the context of solving customer business problems as well as the understanding of where problems appear across the entire customer functional arrays. This could regard specific product malfunctions on the customer’s shop floor as well as strategic considerations in the executive office.

Therefore, for my research I adopted a stance that led to the understanding that customer problems **will** surface across the whole customer business structure and it is the manufacturer's opportunity to address these and provide an adequate solution rather than limit the action radius and focus on particular functions within the customers' structure. Furthermore, this consideration leads to the conclusion that servitization, as frequently mentioned, does not mean that the focus on products and technology is abandoned in the favour of services. Quite the contrary, all interviewed manufacturers exercised a strong bond between services and products or technologies, either their own or those of original equipment manufacturers (OEM) whereby the product emphasis varied with the related business problems.

Hence, manufacturers must adopt a servitization conceptualization, build up capabilities and design service delivery approaches in order to assist adequately in providing solutions. A transition approach, according to chapter 5.7 and as illustrated in Figure 7 could guide practitioners in establishing a specific transition towards servitization. Based on my study I am aware that most of the reactive service delivery functions will at their initial point of embarkation on the path to servitization neither possess the required competencies nor a customer relationship that allows a further trusting interaction nor a recognition as business contributor within their company. In consequence they should start by abandoning their reactive mode and concentrate their development for service delivery capabilities on customer requirements. By doing this they could acquire specific customer and industry knowledge, complement it by proactive service delivery methods and procedures, and arrange these capabilities in service platforms. These service platforms offer the potential to create dedicated job roles and subject matter experts and thus offer the opportunity to scale the service delivery according to the customer base and deliver services repeatedly in a consistent manner.

As a last, yet important, observation: the process of a manufacturer's transition to servitization like this will result in rather a long time frame. The conceptualization as featured in Figure 7 allows the insight that the transition is neither a linear process as could be assumed by the work of Davies (2004) or by the service continuum model of Oliva and Kallenberg (2003) nor an agile incrementalism that is merely guided by weak orientation as Kowalkowski *et al.* (2012) characterize it. In the reality of industrial services in the capital goods industry the systematic development of service competence platforms and their sustainable further progression could be rather challenged by a number of various internal as well as external influences that might have their roots in, for example,

emotional, professional, economic or environmental causes or any combination of these. The evolving process could prove to be a constant and endless struggle whereby the first step in abandoning the reactive product-oriented service delivery in favour of a proactive orientation could be the most challenging stage.

### 6.3. Contribution to Theory

Servitization as a re-direction from a product-orientation to a customer-oriented business focus addresses traditional product manufacturers and requires them to establish a transition towards a solution-based business.

If one considers the wide range and variety of published researched servitization themes, in combination with their resulting conclusions, servitization seems to be growing in popularity among scholars and practitioners. This transition has received a high level of attention and interest within the past two decades, and in particular during the past ten years, as testified by all the current servitization literature. There, various avenues to servitization are elaborated, e.g. goods-dominant logic, service-dominant-logic or solution-logic and an array of related “derivative” approaches. In addition, a growing multitude of singular themes and aspects are studied in academic papers addressing the introduction, launching and deployment of servitization. In particular, they concern topics such as bundles as new products, distinguishing services in presales and post-sales activities, detailing inherent transition challenges, benefits and barriers, partnership models and designing in the context of total care products, training, compensation, contract models and sales processes.

Even now, in spite of the high level of special attention and the identified manifold motivations about a powerful competitive advantages and convincing commercial, the actual rate in the achievement of a successful servitization status is still very low. This status is caused and affected *inter alia* by prior success, lack of information about customer preferences, and misunderstood or underestimated basic requirements and expectations (Oliva and Kallenberg, 2003; Baines *et al.*, 2007; Neely, Benedettini and Visnjic, 2009; Thomas, Bayard and Evans, (2012).

Heiskanen and Jalas (2003) point directly to the manufacturer itself as the causal link by its inability to achieve control over customers' behaviours, and MacDonald, Wilson, Martinez and Tossi (2011) claim that manufacturers failed to detect or even find a route to respond to customer demand by the inability to innovate.

A review of the extant studies on servitization indicates that the major part concerns varying issues rather than providing guidance about actual and operative implementation approaches to servitization. Neely (2008) firmly claims that there is little evidence of practical implementation within the industry and Gebauer and Saul (2014) point out the current non-existence of general theoretical underpinnings and empirically sound correlations. The literature review reveals that the servitization implementation constitutes a major challenging undertaking affected by the lack of information about customer requirements or underestimated basic requirements and expectations (Thomas, Bayard and Evans, 2012). And Viitamo (2013) emphasizes and strongly underlines the practical importance by arguing that “a strategic re-orientation with real changes in the firm’s offering and business involves more than service-oriented marketing tactics” where “the aim is mainly to enhance brand loyalty through a servitized image.” To conclude, the literature remained all but silent about conceptualizing a practical transition approach and its related processes and disseminated almost no deeper elaboration or appropriate guidance. In this context it is also interesting to note that Baines *et al.*, (2007) and Neely (2008) claimed that there is an actual demand to comprehend the changes and developments that manufacturers have to carry out to attain a servitized status.

During my research I could acknowledge the conclusion of Marks *et al.*, (2011) that a re-orientation of a traditional product manufacturer towards servitization is more easily suggested than realized. None of the twelve manufacturers that I studied commenced their re-orientation embedded in an overall servitization strategy of their company. They either experienced resistance to change of a greater or lesser degree or were exposed to extremely unrealistic revenue targets to be generated by “new services”. Regarding their reactive and product-oriented service delivery they maintained an outstanding business position by a reliable, sustainable and constantly growing revenue stream, and exceedingly high gross profit margins that surpass those of the product sales function. Also, to a larger or smaller degree, they all conformed to their role in the exchange of goods. Their services were either often bundled with products without a service charge with the aim of achieving a favourable product deal or were discounted in order to ease a certain phase in the sales cycle. However, after a period of five to ten years, all of the former manufacturer’s product-oriented service delivery functions achieved access to their customers also on a non-product basis, acquired the necessary industry specific knowledge, built up and positioned the required competences and finally achieved a successful servitization status. From this, I aimed on drawing information from their past and present journey to derive a

conceptualization that could provide direction and guide practitioners on their journey towards servitization.

In order to establish a clarification about potential approaches to a conceptualization towards servitization and thus ultimately contribute to theory, my study aimed to attain knowledge in several areas. My first objective was to widen the prevailing understanding of the transformation process of a traditional product manufacturer when setting out towards servitization. Secondly, I intended to capture their process of identifying and collecting customers' service demand and requirements and thirdly, to find out how manufacturers position their resources and respond to these service demands and align them across the entire company's functions. Lastly, I intended to ascertain how manufacturers accomplish the build up and further development of the required competencies and skills.

By establishing a servitization conceptualization as a result of my research, the findings of this study contribute in several ways to theory. They provide a novel understanding about the crucial first step in a traditional product manufacturer's customer re-orientation. Likewise, traditional manufacturers also need to build awareness about the terms solution and problem solving and ultimately realize the potential of according solution-based service opportunities across the customer's entire production and business processes. Correspondingly, manufacturers have to be absolutely clear about whom they address and what is meant by the ubiquitously used term "customer". For this, my study further contributes to theory in a two-fold manner:

Firstly, it facilitates the understanding of the term "customer". The study results in the finding that for the purpose of achieving a synopsis about the generation of typical service demands, it is principally important to disaggregate companies in operational, business and strategical tasks and responsibilities. Subsequently, this disaggregation results in typical specific functional arrays such as "product", "production", business process, "facilities", "organization" and "vision and strategy". Consequently, each individual functional array can now be analysed and their individual and distinct service request can be defined and collected. As a result, manufacturers are now able to correlate the functional arrays with generated demand for solution-based services and group them into the demands for "operational readiness", "asset availability", "business continuity" and "business and market strategy" as depicted in Figure 5.

Secondly, a further study outcome directs clearly to a customer-oriented attitude that traditional manufacturers have to maintain while approaching the journey towards solution-based services. My research indicates clearly that the terms “solution” and “problem solving” constricts the service business view neither to grand business moves nor to complex ERP applications and systems. Rather, the terms stand for solving any problems that might arrive, related to the customers’ production, business operations or strategic considerations along the entire sequence of functional arrays.

Progressing from this foundation, traditional manufacturers are now able to define, develop and build service delivery platforms that proactively address customer service demand and requirements that correlate to each individual customer’s functional array in accordance with the entire company structure of customers. These are the service delivery platforms “reliability services”, “availability services”, “resilience services” and “business and market strategy services” as shown in Figure 6. Resulting from this, traditional product manufacturers can thus analyse their present reactive product-oriented position and take stock of their available resources and skills. Now, they are able to define their future resources and develop and progress the required skills along all service delivery platforms and offer proactively and in a coordinated manner solution-based services to customers in accordance with the service demand of functional arrays. This prevents an inefficient fragmentation of valuable skills due to ad hoc responses to singular uncoordinated service requests.

And finally, a further contribution to theory could be achieved by establishing the missing transition approach as part of my conceptualization towards servitization. This transition approach bases on the consideration that there is a pronounced interest from a manufacturer to grow into the customer’s value chain, enabled by a forward-looking service continuum assuring the future development and progression of a manufacturer’s transition. While maintaining an unbroken alignment with the business progress of customers, a manufacturer will have to develop, build up and progress further in such a sequence that prevents discontinuities, gaps, failures or even a servitization discontinuation. The derived transition approach is drafted in Figure 7 and bases on the assumption that a reactive service delivery function starting its servitization journey from a basic service delivery position will hardly possess the required processes, skills and competences. By embarking on the platform of reliability service, the service function will experience a fundamental change towards a proactive customer orientation. The successful acquisition of new industry knowledge, competencies and customer relations will promote

the advance to the next service delivery platform of availability services. While maintaining and further advancing the reached servitization maturity status, this iteration cycle is repeated until the platform of solution services has been attained and a reliable servitization status achieved. The experience that I gained in my research reinforces my conviction that any approach that endeavours to shortcut or skip development stages is questionable and provides at best a temporary low probability for success.

#### 6.4. Managerial and Practice Implications

My study addresses practitioners of traditional product manufacturers that operate under a reactive product service delivery model and consider commencing a transition from product-orientation towards servitization in order to assist in solving customers' business problems. A traditional product manufacturer will only succeed in the transition by abandoning entirely its reactive product service delivery, re-orientating and developing its resources and capabilities to respond to customers' service demand and service requirements. The overall aim is to become a service organization of choice that ultimately guides customers strategically in their business direction.

In the course of the past two decades, servitization has been suggested by the extant literature as a transition from products to solutions by traditional product manufacturers to respond to customers' solution demands, to regain competitive advantage and to generate considerable new revenue opportunities. This consideration was triggered and stimulated by fierce global competition, product similarities in functional attributes and technology, saturated markets and new market entrants that endanger former advantages such as quality and technology to become economically uncompetitive. This is becoming particularly important for the capital goods industry as one of the largest sectors in Germany with its business volume of more than 200 billion Euros.

After all, and in spite of, the identified manifold motivations and advantages, the actual level in the achievement of a successful servitization status is still very low – apart from a number of hidden champions. The factual approach to conceptualising a transition process and its subsequent practical diffusion and dissemination received almost no deeper elaboration in the extant literature.

Furthermore, a re-orientation of traditional product manufacturers to a customer-oriented business focus wins a certain urgency for its future survival. The emerging technologies, in conjunction with Industry 4.0, paired with the Internet of Things and new market entrants, will result in a game change. Without too much doubt, established present-day players are



going to adapt their competencies, processes and related organizations. In spite of that, new players that transform the new functionalities into radically new industrial business models will lead to an unparalleled rivalry and competition. In the light of fail-safe digital infrastructures these new players will challenge the established present-day relations and business models – also those of service organizations as new coalitions and alliances are at this time already being explored.

Therefore, my research focuses on a conceptualisation towards servitization that provides orientation for its application by practitioners of traditional product manufacturers and to its dissemination in the service market. The ultimate goal of the practical application of servitization is to become a customer-oriented service organization of choice and resulting in the strategic guidance of customers.

The cornerstones of a servitization conceptualization are firstly based on the recognition that the ubiquitously and indiscriminately used expressions “customer” and “solution” have to be defined and evaluated in order to determine their relevance and importance. Figure 5 of this study furnishes a first guidance to subdivide the term “customer” into single steps of functional arrays that represent a typical structure of a customer’s enterprise and identify furthermore the necessary service demands as generated by each individual customer’s functional array. In addition, Figures 5 and 6 offer the opportunity to position present skills and capabilities and respond purposefully with future services and resources according to service demand and service requirements, in relation to each individual customer’s functional arrays. These responses are best accomplished through the establishment of service delivery platforms that are aligned with specific customer arrays. Figure 6 depicts these platforms. Secondly, service executives will have to be aware that the term “solution” does not solely apply to the solving of complex and extreme intricate business problems. Rather, manufacturers should address all problems related to operational and business processes. Each individual functional array generates distinct generic servitization tasks and distinct responsibilities according to the production or business functions of a company’s enterprise. These tasks and responsibilities range from operating problems of the production floor to strategic consideration of the board of directors.

Resulting from this, service executives will have to position their service delivery function in order to respond differently and individually with their services to specific problems. For example, a shopfloor team leader who is more interested in product reliability and

operational availability than in generic problems of a business process, or a production manager who requires continuous production and resilient business processes, or an executive for supply chain management who is held accountable for relocating a product line to a different site. Therefore, a manufacturer's service delivery function has to recognize that providing solutions means assisting in solving business problems that result from each customer's functional array. Each problem should be regarded as a generic business problem that should be responded to, supported and resolved according to each specific situation.

The second conclusion of this study covers the area of the transition approach from a current position as a traditional product manufacturer's reactive product service function. The initial start for this transition is depicted in Figure 7 close to the intersection of the x/y axis, as it can quite evidently be assumed that a traditional product manufacturer who is at the starting point towards servitization will neither possess the required capabilities nor the necessary resources to provide solution-based services in its entirety. The foremost important step will be to relinquish a reactive service delivery and focus on customer requirements to assure product reliability and availability according to customer requirements. Through this, competences, communication and customer-specific knowledge is built up leading to mutual trust and cooperation. Customers regard this first step by its nature as an "entry-ticket". They will not proceed further with manufacturers service-wise if this first stage is not achieved. During this first stage, all acquired and further developed skills and competences have to be organized purposefully in order to form a service delivery platform for reliability services. These have to be in accordance with customer service requirements that originate from the customer functional arrays "product" and "production". This represents a platform of departure in order to then embark on availability services, which also, after the acquisition and build-up of new competences, will lead to a further service delivery platform. By systematically continuing, a manufacturer will have formed all service delivery platforms accordingly and reached a status in providing services responding to customers service demand in business and market strategy.

The journey towards servitization neither represents the announcement of another a new manufacturer's product, nor does it introduce a new strategy for a recurring revenue stream. Based on a strong board commitment for a company-wide transformation, executives will have to evaluate their present business position in order to define and set the appropriate starting and progression points.

In preparing the customer-orientation and commencing the transformation towards servitization, manufactures will, as my study reveals, have to brace for a number of crucial, all-determining milestones. A number of those milestones was directly hinted at by my interview partners, while others were identified during the analysis of the evidence. In particular, the following represent a number of the most prominent “must“ milestones:

*Company Culture.* The basic belief of traditional product manufacturers is founded on the by the conviction that customer requirements are best met by product functionalities and features and paired with production quality. Customers are more interested in the solving of their business problems than in the provision of products. These solutions require an intensive and trustful communication, cooperation and co-creation and long-term relationships with customers on many department and company levels. Furthermore, the speed in managing the business of solution-based services and taking risks differs considerably according to the nature of developing and manufacturing products. Manufacturers will have to ensure, therefore, that they create a business environment that promotes an exogenic focus of their entire company. They will also have to establish organizational structures, metrics and employees’ attitudes that reflect this change towards customer orientation.

*“Entry-Ticket”.* The first and most important implementation stage towards servitization is characterized by the abandoning of a reactive service delivery philosophy in favour of a proactive service approach. Instead of delivering a mere “basic” reaction to customer service requests that constitutes solely a contractual fulfilment of warranty obligations, the manufacturer must focus on failure prevention and prediction, rapid malfunction resolution with the aim to support a high product and production reliability according to customers’ operational requirements. In order to be further considered as a potential solution based service provider, it is important to understand that the demonstration of a proactive product reliability support and superior preventive service performance are regarded by customers merely as an “entry ticket”. Without this “ticket” it is impossible to be accepted as a solution provider by customers.

*Industry-specific Expertise.* The driving force behind any re-direction towards customer-orientation and solution services has to be the focus on solving customers’ business and operational problems. In order to assist in the co-creation of solutions for customer’s business problems, support their core business processes as well as to be able to issue functional and operational guidance to customer personnel, a manufacturer’s service

delivery function “must speak the language” of the relevant industry and specific sector. This industry-specific knowledge will also facilitate addressing challenges resulting from OEM equipment. In general, the nature of the customers’ business problems, including re-directions and strategic considerations, originates across the entire company structure. The required resources could be re-trained product-oriented resources, outside hiring or service partners. A close inter-divisional co-operation across all functions of a manufacturer will enable and facilitate the creation of solutions for complex business problems. It will further avoid an inefficient fragmentation of service skills and the systematic promotion and dissemination of best practices. Continuous and systematic certification programs will identify talents to be assigned for counselling and consulting tasks in order to interact on equal terms with customer personnel and industry experts. The implementation of platforms for reliability, availability, resilience and solution services is strongly recommended as they reinforce and amalgamate the industry-specific knowledge with the manufacturer’s technological, product development and business expertise.

*Customer Requirements.* The foundations of all servitization activities must be determined by the recognition of customer service demand and requirements. On the one hand, this regards the identification and collection of those requirements spanning from those for product reliability up to service demand for business and strategy solutions. As a first step and on the other hand, a manufacturer’s service organization will have to negotiate and co-operate with its product development and manufacturing departments about the implementation of customers’ service requirements. The negotiations must yield predictive and preventive service procedures that result for the customer in higher operational product reliability and availability for current and future products. Ultimately, a service organization must have announcement rights for new products. The more a manufacturers’ service function advances towards solution based services, the more will it take responsibility for the development and delivery of non-product, solution-based services. The necessary skills and capabilities have to be developed on the progression of further service delivery platforms.

*Service Technology Infrastructure.* A manufacturer expanding into solution-based services will experience a gap in the present application portfolio. Clearly, a product-oriented service delivery will lack the entire range of customer-oriented programs and databases. The burgeoning Industry 4.0 technologies aggravate this situation further by posing fundamentally new challenges in the areas of prediction and business analysis capabilities. Although a number of programs and application functionalities could be

similar for products and services, their particular business requirements frequently are dissimilar. For example, a supply chain software will not suffice for the management of availability services or resilient services approaches or the management of remedial product interventions. Traditional product manufacturers will have to reconsider fundamentally their application portfolio in order to be able to expand towards solution-based services.

*Design of Organization.* Manufacturers will find themselves in a situation where they grapple with strategic questions they should have clearly resolved before they entered the market. By nature, the development of a business under a different focus than the traditional product emphasis will require some degree of freedom and autonomy. An autonomous growth of a service business vis-à-vis the present larger product business has to be carefully considered in order to counteract potential demands by product sales for service discounts and bundling services with products. Manufacturers must carefully decide whether service business should act as an independent business unit with its own independent management structure and own profit and loss statement to allow and foster the growth of a nascent transformation.

*Go-to-Market.* When offering products and solution-based services manufacturers will find it challenging to appear as one coherent enterprise. In order to prevent inconsistencies in the offerings approach for products and solution-based services, manufacturers will have to decide on and define the appropriate customer interfaces according to the specific service delivery platforms and individual customer functional arrays. The nature of the solution-based service will require new contracts, new contract administration processes, new pricing models as well as new approaches in negotiation and risk management.

*Cooperation.* The key to solution-based offerings is based on the understanding of customer specific operational and business problems. A manufacturer's service delivery function, starting from a reactive mode will have to grasp speedily the specific knowledge of their industries and sectors. In order to quickly speak the language of their customers, build up rapport and the ability to respond with appropriate service offerings, the service delivery function will have to seek a close cross-functional contact and cooperation within the entire enterprise. In addition, a service function could assess at the initial stages of servitization or in future projects that they do not possess and master the entire scope of

capabilities and service skills. In order to avoid a premature limitation of their offered service scope they should revise alternatives for service sourcing and service co-operation.

Lastly, the entire journey constitutes a seemingly endless process where the successful implementation of each stage might exceed by far the planned timeframes and established objectives. In spite of all the ambition in delivering on target, executives should be prepared to envisage the need for a fair amount of patience.

#### 6.5. Suggestion for Future Research

While focussing on my research several other question areas that were related to servitization naturally surfaced. Most of these have been more or less intensively researched and some work has already been done, such as in organizational service structures, value based pricing, service offering development, skill transfer, outsourcing or degree of customer involvement.

The first and foremost need for future research is the area of service technology. Burgeoning approaches to manufacturing, such as “Industry 4.0”, Big Data and Analytics, also termed as “the fourth industrial revolution” are moving irreversibly into plants and offices of the industry. They confront manufacturers and their service delivery function with fundamentally new service challenges and set new customer standards for product reliability, process availability and business continuity. Therefore, service delivery functions will have to respond accordingly and seize resulting opportunities. The ensuing requirements will lead to unprecedented demand for production and business continuity that will render the traditional service technology and related processes obsolete. During my research I found that some service delivery functions have been investing and researching for a number of years already, and some I found were still in a probing state. My impression is that this field is largely underexplored, and should be studied.

The core concept and gist of servitization is based on the premise of establishing added value for customers. That value could be in areas such as cost cutting, improvement of revenues, good will or a combination of those. A traditional product manufacturer that re-orientates towards solution-based services will have to furnish this approach by investments and expenses in fields such as systems, processes, service technology, skills and competencies. I learnt in a number of cases that, due to the impossibility to transfer the costs incurred to the service price without generating a significant advantage for the customer, the transition to servitization was severely hampered. Other cases that I had seen were able to unlock their cost advantages by exploiting the reliability and availability

measures that were implemented for customers, also for themselves. The balance and relation of service cost, investments for customer and service delivery function to approach the achievement of customer value in order to exploit mutually the benefits is not all clearly implemented in practice. This is an apparent field for future research.

A further field I noticed in particular during the literature research phase was the multitude of words and expressions that were used in the various servitization approaches and explanations. Often, this demanded a high degree of interpretation in order to compare situations and come to conclusions. A common servitization “vocabulary” that enables the sharing of meanings could be a further field to explore.

On the basis of qualitative research I created theory from a sample of twelve manufacturers who transitioned successfully towards servitization and thus assumed that these approaches are “field-tested”. Although the established theory matches generally the approaches in each specific industry I could identify distinct differences that led to the same result. Therefore, I could imagine that a future vertical quantitative evaluation of specific sectors and industries could provide a more refined and adaptable approach to servitization.

## 6.6. Summary

The preceding chapter centred on the creation of a transition conceptualization towards servitization based on the research question answers. The conceptualization could serve two purposes: to guide reactive product-oriented service delivery functions from their initial commencement towards servitization and to aid as long-term guidance for the necessary sourcing and investments.

In this last chapter, all relevant findings and particular evaluations that were derived during the course of my study are brought together and placed in relation to the literature gap. Furthermore, it takes into account the implications of this research that stem from a new over-arching and comprehensive understanding of the terms “problem” and “solution”. It further contributes to theory that could have the potential for application to service practitioners in the capital goods industry and finally provides suggestions for further research that are spread across the entire servitization approach.

In concluding this chapter I would like to mention that I have experienced on my research journey a number of personal accounts, fates and careers. I was involved in listening and explaining, in counselling and coaching. I found that quite an amount of courage paired with fortune and patience is needed in order to drive servitization forward, in particular

from a reactive service delivery position. I also found however, that the recognition that a service delivery function could achieve as a substantial business contributor by means of a successful servitization transition is much more than just a reward.



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## Appendix A

### Interview Invitation Letter (translated from German into English)

Walter Duschek

Gärtringen, . . . . . 2014

Dear Mr. ....,

As a research student of the University of Gloucestershire, I would like to invite you to take part in my study to identify influencing factors that could lead to a transition of product-related services towards customer-oriented and solution-based services as we already discussed on the telephone.

The objective my study is to conceptualize a transition model to servitization and contribute new knowledge to theory.

Your participation is entirely voluntary and the information received will only be used for my thesis with your permission, whereby I will prepare the information in such a way that no inferences can be drawn from it about you or your company. I will handle all information absolutely confidentially, for the purpose of evaluation only making a single digital copy and deleting the original version immediately afterwards. When my thesis is finalized I will either give you this copy or delete it immediately, according to your decision. I ensure through technical procedures that nobody other than me has access to this information.

I intend to gather this information during the course of an interview, during which it would be very helpful for me to make a voice recording in order to be able to concentrate fully on our conversation. For this I plan a time frame of . . . . . hours – of course, this can be prolonged or shortened according to your wish.

I am very much looking forward to our meeting.

Yours sincerely

Walter Duschek

## Appendix B

### Participants Informed Consent Form

	yes	no
I understand that Walter Duschek asked me to participate in his study		
I have received and read the attached invitation letter		
I do understand that my data will be kept confidential and who will have access		
I understand that I participate voluntarily; I am free to withdraw any time		
I agree to take part in the above study		
I give permission to be voice recorded during my interview		

---

Name of Participant

Signature

Date:



## Appendix C

### Questions of Semi-structured Interview (modified and evolved partial synopsis)

1. I would like to learn more about your company and the related business climate. Please let me share your opinion.
2. I would like to know more about you, your managerial responsibilities and the career you have made within the industry. Please let me share you opinion.
3. What is the present business position and of your service function within your company?
4. How would you rate the present level of customer satisfaction induced by your service function?
5. How does your services function communicate with customers across all professional and managerial levels?
6. How would you rate the present contribution and dynamics of your service function to the company earnings?
7. How do you describe the present earnings share and dynamics of product-oriented services vice versa customer-oriented services?
8. Why did do re-orientate towards customer-oriented services?
9. How was the busines climate at this time?
10. What was the company business position at that time?
11. How would you describe the image of your service function within the company at this time?
12. Did you seek consent and cooperation within the company?
13. How did you prepare your service organization in order to commence?
14. What services external measures and drivers of change facilitated the re-direction?
15. I would like to learn more about your embarkment towards customer-oriented services, the intended service delivery direction, your experiences, encounters and challenges, mistakes and successes. Please let me share your knowledge.
16. How did you overcome the most severe problems – internal and external?
17. How did you establish the interaction with customers to gather their service requirements and demands?

18. How do you position and prepare your service function to comply economically with these demands?
19. How did you integrate business partners and service business partners into the service delivery processes of your service function?
20. Did you establish a close cooperation with the development and manufacturing function of your company and how?
21. How did you define the major milestones?
22. How did you and how do you presently prepare business, technological and social changes?
23. How does your service personnel receive the present service business orientation?
24. When you look back on the journey commencement, how many years did it take to reach the present state?

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## List of Abbreviations and Acronyms

AMR	Gartner Analyst Company
AFSMI	Association for Services Management international
BOC	Best of Class
BPO	Business Process Outsourcing
B2B	Business – to – Business
BS	British Standards
CEO	Chief Executive Officer
COO	Chief Operating Officer
CRM	Customer Relationship Management
DBA	Doctor of Business Administration
DIN	Deutsche Industrie Norm
EBIT	Earnings before Income and Tax
e.g.	for example
e.V.	Eingetragener Verein
ERP	Enterprise Resource Planning
ExOS	Experts of Service
FTF	First Time Fix
GDP	Gross Domestic Product
IBM	International Business Machines
ICT	Information and Communication Technologies
i.e.	that is (to say)
IoT	Internet of Things
IP	Internet Protocol
ISO	International Standards Organization
IT	Information Technology
IP	Internet Protocol

KVD	Kundendienstverband Deutschland
LCC	Life Cycle Costing
MDT	Mean Down Time
MTBF	Mean Time Between Failures
MTTR	Mean Time To Repair
OECD	Organization for Economic Co-operation and Development
OEM	Original Equipment Manufacturer
PLC	Public Limited Company
PSO	Product-Service-Organization
p.	Page
pp.	Pages
RCFA	Root Cause Failure Analysis
RWTH	Rheinisch-Westfälische Technische Hochschule Aachen
R&D	Research and Development
RQ	Research Question
SLA	Service Level Agreement
SME	Small and Medium-sized Enterprises
SPOC	Single Point of Contact
TCO	Total Cost of Ownership
TPM	Third Party Maintenance
TQM	Total Quality Management
TSIA	Technology Services Industry Association
USA	United States of America
USD	USA Dollar
USP	Unique Selling Proposition
VDI	Verein Deutscher Ingenieure
VDMA	Verband Deutscher Maschinen- und Anlagenbau