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„Servitization:
Challenges with Transition and the Impact of
Information and Communication Technologies“

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Abstract (English)

The concept of servitization originates from the manufacturing industry that currently struggles with decreasing profit margins and therefore strives for a competitive strategy to handle this. Due to the higher operating margins on services the concept of servitization appears therefore to be a considerable approach. Consequently, the main challenge about dealing with this topic arises from the fact that one has to consider several diverging research disciplines, comprising of service science, manufacturing and operations management equally.

Accordingly a comprehensive literature review was conducted, which finally derives a generic framework to identify challenges within ones company as well as a three-level approach to conduct the transition from a pure manufacturer to a service provider. Since emergent ICT affect customer behavior as well as existing business models, a comprehensive review on the implications regarding servitization concludes this thesis.

Abstract (Deutsch)

Das Konzept namens „Servitization“ hat seine Wurzeln in der Fertigungs- und Produktionsindustrie, welche nach einer konkurrenzfähigen Strategie trachtet die gegen die stetig sinkenden Gewinnspannen ankämpfen soll. Folglich hat sich „Servitization“ als brauchbarer Ansatz herauskristallisiert, da es sich die weitaus höheren Gewinnspannen in der Dienstleistungsindustrie zu nutzen macht. Daraus ergibt sich jedoch die Herausforderung, dass man sich demnach mit unterschiedlichen Fachdisziplinen aus der Dienstleistungs-, Fertigungs- und Produktionsindustrie sowie Arbeitsprozessoptimierung auseinandersetzen muss.

Um dies zu bewerkstelligen wurde eine umfassende Literaturrecherche zu diesem Thema durchgeführt, welche letztendlich einerseits ein Grundgerüst für die Betrachtung und Auseinandersetzung mit den verschiedensten Schwierigkeiten hinsichtlich „Servitization“ ermöglicht. Andererseits konnte ein umfassender 3-stufiger Leitfaden für das Handling des Überganges von einem reinen Fertigungs- und Produktionsunternehmen zu einem Dienstleistungsunternehmen erarbeitet werden. Da sich das Thema bezüglich der Auswirkungen neuer und leistungsstarker Informations- und Kommunikationstechnologien durch viele Bereiche wie Konsumentenverhalten und Geschäftsmodelle zieht, wurde dieser Aspekt mit Hinblick auf „Servitization“ ebenfalls untersucht.

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1 Introduction

The concept of servitization originates from the manufacturing industry that currently struggles with decreasing profit margins and therefore strives for a competitive strategy to handle this (Neely, 2008). Due to the higher operating margins on services the concept of servitization, which comprises the enrichment of products by corresponding services, appears therefore to be a considerable approach. In order to raise the value for supplier as well as customer even further, servitization aims towards a continuous movement into a service economy (Baines, Lightfoot, Benedettini, & Kay, 2009 a; Mathieu, 2001b; Neely, 2007).

Consequently, the main challenge about dealing with this topic arises from the fact that one has to consider several diverging research disciplines, comprising of service science, manufacturing and operations management equally. In fact, this comprehensive combination of diverging approaches, beliefs and intentions finally constitutes a tremendous challenge for management as well (Bascavusoglu-Moreau & Tether, 2011; Davies, Brady, & Hobday, 2006). Nevertheless the concept of servitization also bears a lot of benefits both for the applying company and the profiting customer, which consequently tempts companies toward this direction (Neely, 2007; Spohrer, Demirkan, & Krishna, 2011). Thus, not aware about the inherent challenges it's by all means necessary to consider and deal with this matter.

Accordingly, the purpose of this thesis constitutes on raising awareness for the inherent challenges of applying a servitization strategy. Furthermore a generic framework will be derived, which eases the identification of challenges and issues concerning one's own business. The main goal comprises of the development of a step-wise guideline regarding the transition process from a pure manufacturer to a service provider within servitization.

In order to enhance understanding of this comprehensive topic this thesis is structured into four main chapters, whereas each comprises a brief introduction and a concluding summary to establish independent blocks. Consequently the first chapter

examines the topic of services and the inherent vast amount of diverging definitions and beliefs. Additionally it also elaborates the topics regarding goods and business models, since they likewise represent everlasting parts within servitization. The first chapter concludes with the discussion on related research fields with regard to products and value adding services. After the initial theoretical background the second chapter illustrates the intrinsic topic of this thesis manifested by servitization. Consequently it comprises its definition, drivers and options of application. The third block elaborates the diverging sources of challenges and drawbacks that may occur during transition of servitization. In fact, the third chapter concludes with considerations regarding the transition from a pure manufacturer to a service provider. In the end the topic of emergent information and communication technologies draws attention to the reader, since it likewise offers several benefits originating from novel technologies.

2 It is all about Services

Service economy, service science, service-dominant logic and servitization are apparently related terms, but hard to distinguish on the first sight. All of them emerged and are located in different economic disciplines, which don't ease things at all. Accordingly this chapter will provide on the one handside a fundamental theoretical background on these topics in order to draw the line about the context of this thesis and on the other handside to facilitate subsequent research by providing some reference points.

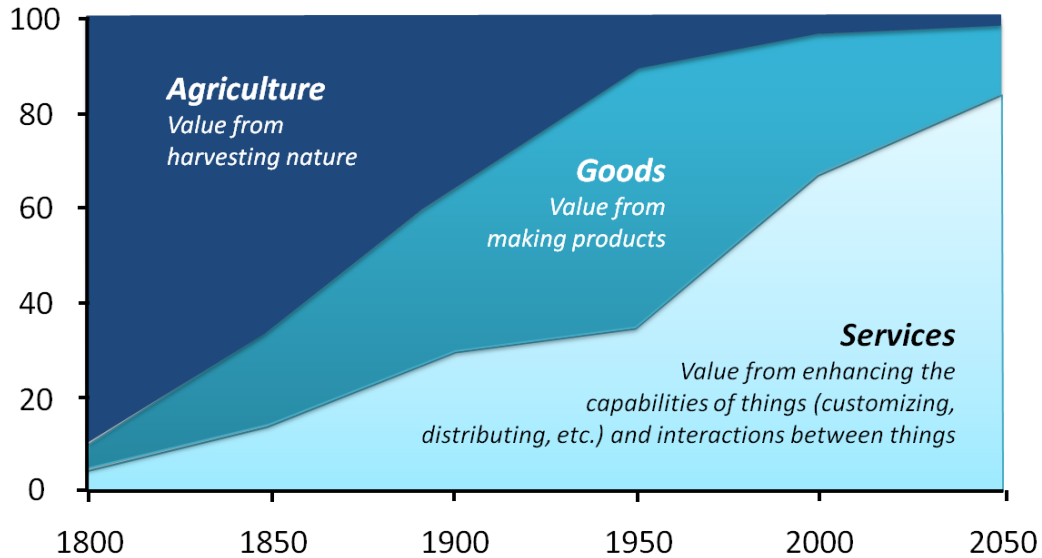
In the very beginning the topic of service economy and its increasing share on total employment will be elaborated to show its current importance. Consequently the notion and definition of the term service is conducted which is followed by the discussion about goods, their differences to service and the drivers for the transition to a dominant service economy. Furthermore the concept of business models and its varying characteristics will be reviewed, since they play a major role in the service economy. The last section will finally lead over to the intrinsic topic of this thesis manifested by servitization. Therefore a brief introduction of all service-related research fields will be conducted to define the actual topic.

2.1 Emergent Service Economy

Managers as well as researcher observed a distinct growth of services as the major trend within economic sectors in recent years (Johnstone, Dainty, & Wilkinson, 2009; Memedovic & Lapadre, 2009; Spohrer & Maglio, 2008). This secular increase among service-related jobs affected both Europe and the US which therefore causes a reduction in industry- and agriculture-related jobs (D'Agostino, Serafini, & Ward-Warmedinger, 2006). The OECD computed a share of 70 % accounting for the service sector of total employments, which still continues to grow (Wölfl, 2005). Spohrer & Maglio (2005) derived a chart that illustrates this transition in economic sectors from agriculture-dominant to service-dominant during the last 200 years in the US. This evolution is shown in Figure 1 whereat the Y-axis describes the relative amount of

employments in the US separated between the agriculture-, the industry- and the service-sector (Spohrer & Maglio, 2005).

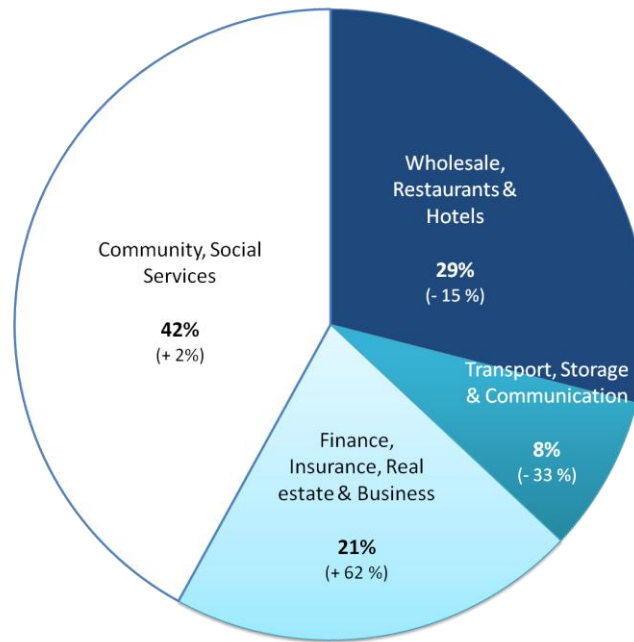
Figure 1 - US Employment History & Trends



Source: own illustration according to Spohrer & Maglio (2005)

D'Agostino, Serafini, & Ward-Warmedinger (2006) proposed an additional differentiation among four sub-sectors within the service sector to enhance the understanding of this development. Consequently they consists of (1) wholesale and retail trade, restaurants and hotels (2) transport, storage and communication (3) finance, insurance, real estate and business and finally (4) community, social and personal services, which consolidate 12 branches. Figure 2 describes the current weighted shares among Europe and the US in 2001 and the alteration since 1970. Thus, the community and social services sector remains very stable over the last decades, whereupon wholesale and transportation lost a bit. Obviously the finance and insurance sector gained the highest growth during the last 30 years (D'Agostino, Serafini, & Ward-Warmedinger, 2006).

Figure 2 - Service Sub-Sector Share and Alteration since 1970 to 2001



Source: own illustration according to D'Agostino, Serafini, & Ward-Warmedinger (2006)

Accordingly scientists and managers engaged on the discussion about preliminary drivers and reasons to explain this progression. Regarding this you can summarize in general to three main blocks (Wölfl, 2005). By all means scientists found (1) *imbalances in productivity growth between services and manufacturing* aiming at the slower productivity growth of services relative to manufacturing as one of these blocks (Baumol, 1967). Furthermore there are some (2) *factors related to final demand* like the increase of per-capita income levels, demographic shifts and the continuous trend of urbanisation influencing structural change (D'Agostino, Serafini, & Ward-Warmedinger, 2006; Wölfl, 2005). Finally also (3) *the role of intermediate demand* aiming at transport and communications services counts responsible for this development (Wölfl, 2005).

Nevertheless this doesn't implicate that you don't need manufacturing or agriculture at all. In the case of the UK the manufacturing sector contributes a turnover of £150 billion each year, therefore responsible for the half of UK exports, which finally employs three million people (Benedettini, Clegg, Kafouros, & Neely, 2011). But once have to be aware that still the value didn't lie solely in the manufactured product itself (Parry, Newnes, & Huang, 2011). Nowadays the complexity of some high-technological products impedes the installation or maintenance on its own

(Godlevskaja, van Iwaarden, & van der Wiele, 2011; Neely, 2007) or requires complementary services supporting its lifecycle, configuration and its disposal (Benedettini, Clegg, Kafouros, & Neely, 2011). Therefore the service sector will retain as “lion share” in economy but always constituting a symbiotic interdependency with the manufacturing and agriculture sector (Andreoni & Gomez, 2012).

2.2 Notion of Service

The subsequent section provides the fundamental definitions and notions on the topic of service by discussing its origins as well as diverging viewpoints. This theoretical background constitutes the basis for the evolution introduced above and enhances understanding of further reading of this thesis. Initially the challenges among the definition of services will be examined and consequently followed on the one hand by the IHIP characteristics approach and on the other hand by service actors and relationship concepts.

2.2.1 Approaches and Challenges on the Definition of Services

In literature the definition of service and the inherent distinction from goods and products arises from a long discussion among researchers from several disciplines like marketing, operations, general management, computer science, systems engineering, design & psychology and service science (Araujo & Spring, 2006; Spohrer, Demirkan, & Krishna, 2011). Nevertheless there is no common notion about its definition, classification and terminology (Araujo & Spring, 2006; Parry, Newnes, & Huang, 2011; Spohrer, Demirkan, & Krishna, 2011; Spring & Mason, 2007; Wood, 2010). According to the Oxford English Dictionary there are more than 38 definitions of the word “service” using it as well as noun, transitive verb or adjective (Jordan, 2007). Opinions among the Advocators are diverging considerably, due to different views resulting from variable disciplines dealing with this topic. Actually Spring & Mason (2007) summarized that nevertheless two relevant, pervasive themes emerged out of this discussion, dealing on the one hand with (1) treating this term as aberration, which means defining what services are not (e.g. intangible, non-storable, non-transportable and so on). The second approach deals with the (2) involvement of services which originates from its so called IHIP characteristics (intan-

gibility, heterogeneity, inseparability and perishability). Consequently as things are now one has to choose and align the appropriate definition matching to its economic discipline and topic (Araujo & Spring, 2006; Parry, Newnes, & Huang, 2011; Vargo & Lusch, 2004).

2.2.2 Four IHIP Characteristics

The definition according to the four IHIP characteristics (intangibility, heterogeneity, inseparability and perishability) is actually the most popular one dealing with services (Araujo & Spring, 2006; Parry, Newnes, & Huang, 2011; Wood, 2010) though it not always provides a sufficient description in any case (Parry, Newnes, & Huang, 2011; Spring & Mason, 2007). In order to highlight this occurrence the widely spread IHIP approach will be discussed in detail and some diverging cases which fail in applying this concept are presented as well in the following section.

The first of the total four characteristics is described by *the (1) intangibility* of services, which seems quite obvious, because a service is finally not a physical object (Wood, 2010). Therefore Harker (1995) stated a very humorously and vivid illustration describing services as “*something you cannot drop on your foot*” (see in Parry, Newnes, & Huang, 2011, pp. 21). This description applies very well considering typical services like transportation, delivery, repair or customer helpdesk to name but a few (Baines, Lightfoot, Benedettini, & Kay, 2009 a; Lovelock, 1983; Tether & Bascavusoglu-Moreau, 2011). Nevertheless once may be confused trying to classify products like DVD, books or CDs which indeed on the one hand appear as tangible objects, but don’t provide any value to the customer by solely owning them. Accordingly on the other hand customer’s value lies in the intangible service of consuming the content (film, music or thrilling story) which is provided¹ by the tangible good (Parry, Newnes, & Huang, 2011).

Furthermore a service appears to be (2) *heterogeneous*, due to the relative inability of standardizing its output in contrast to goods (Wood, 2010). According to Parry,

¹ This approach also refers to the concept of SD logic by Vargo & Lusch (2004), which is described in the subsequent section 2.5.2

Newnes & Huang (2011) once can vary a service according to four factors consisting of (a) *customer perceptions* like the context, nature or its individual requirements and (b) *costs* which therefore count responsible for the delivered quality standards. In addition you also may vary a service according to (c) *geographical characteristics* like different regions or cultural backgrounds or finally among different (d) *service providers*. This classification likewise attracts a vast number of typical services like a coiffeur, doctors or project management (Spohrer, Demirkan, & Krishna, 2011). Actually there are also some exceptions that don't support this approach perfectly. Exemplarily the case of the Mercedes E-Class describes a tangible product, which however provides heterogeneity by offering 10²⁴ variations of this car, claiming that there have never been two the same. This as well underpins the lack of the apparently ubiquitous characteristic of heterogeneity (Parry, Newnes, & Huang, 2011).

Another characteristic is represented by the (3) *inseparability* of services considering the production and consumption of a service. This obviously arises from the nature of services and its cardinal simultaneous production and consumption of value (Wood, 2010). Accordingly a service provider couldn't provide his offering without participation of the customer. In the case of physical products activities happen in a sequential order independently of the end customer (Spohrer, Demirkan, & Krishna, 2011). In the end literature also provides an exemplarily exception manifested by the automated service of an ATM, which operates due to predefined services without pre-knowledge or assistance of banking personnel (Parry, Newnes, & Huang, 2011).

Finally a service is typically characterized by its (4) *perishable appearance*, due to the fact that you can't store services in an inventory like a good (Wood, 2010). Smith (1776) stated therefore very evidently that "*a service will perish in the very instant of its performance, and seldom leave any trace or value behind them for which an equal quantity of services could afterwards be procured*" (see in Parry, Newnes, & Huang, 2011, pp. 22). This approach is supported by evidence like the case of the airline industry, where any empty seat in a current flight couldn't be stored to be sold in a subsequent flight and therefore perishes (Wood, 2010). Consequently literature provides as expected also a particular case, where this definition doesn't holds. Con-

sidering a servants performance whose service consist of cleaning and tiding several rooms, doesn't expires after finishing his work (Parry, Newnes, & Huang, 2011).

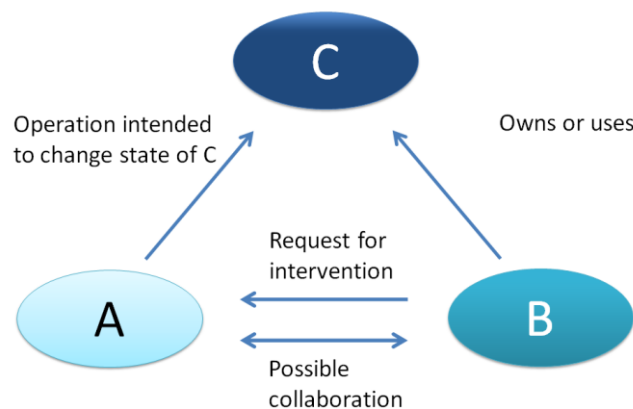
2.2.3 Definition and Rationales by Actors and Relationships

Actually the viewpoint concerning the notion of service varies a little bit among other scientist. Accordingly Hill (1977) states that:

"[A service] may be defined as a change in the condition of a unit or a person, or of a good belonging to some economic unit, which is brought about as a result of the activity of some other economic unit, with the prior agreement of the former person or economic unit" (see in Araujo & Spring, 2006, pp. 799; Spring & Mason, 2007, pp. 3).

Consequently this declaration implies a relationship among several actors, which therefore reflects on the importance of institutional structure of production. Building on this insight Delaunay and Gadrey (1987) and Gadrey (2000) derived a triangular relationship among the *change in status of reality C*, which therefore is *owned by consumer B* and finally effected by the *service provider A*. Certainly there has to be a prior request of *consumer B* to *service provider A*, which sometimes even demands for a collaboration with *consumer B* and usually results in a temporary transfer of property rights (Araujo & Spring, 2006; Spring & Mason, 2007). This relationship is finally illustrated in the following Figure 3.

Figure 3 - The Service Triangle



Source: own illustration according to Araujo & Spring (2006); Spring & Mason (2007)

Dealing with the goal to express the service definition with regard to its actors or recipients and its nature, once has also to consider the concept of the nature of the service introduced by Lovelock (1983). Basing on these two dimensions he derived a matrix build by four quadrants, which finally contains services aimed at (1) *people's bodies* like health care or restaurants (2) *physical items* like transportation or repair (3) *people's mind* like entertainment and finally (4) *information* like banking or insurance. This matrix as shown in Figure 4 provides a framework for defining once service item as well as a classification for them (Lovelock, 1983).

Figure 4 - Nature of the Service Act and its Recipients

		Recipients of the Service	
		People Processing	Possessions Processing
Nature of the service	Tangible Actions	Service aimed at people's bodies Health care Beauty Salons Restaurants ...	Service aimed at physical items Transportation Repair Laundry ...
	Intangible Actions	Service aimed at people's mind Education Theaters Museums ...	Service aimed at information Banking Accounting Insurance ...

Source: own illustration according to Lovelock (1983)

Although this section doesn't provided a comprehensive review of literature concerning the development of service definition and notion, it nevertheless offered a fundamental theoretical background on this topic to enhance further reading of this thesis. Intending for deeper knowledge on the former development of the research field of service please refer to Johnston (1998), Roth and Menor (2003). Due to the fact that the definition and notion of service corresponds to the anti-definition of goods, the subsequent section will deal with its definition, differences and drivers.

2.3 From Goods to Services

Since a lot of approaches to define services are conducted by stating them as antipode of goods, this section aspires to provide an appropriate theoretical background about the notion of goods. Consequently this part initially describes the definition of goods and proceeds by elaborating key differences to services and finally discussing drivers and reasons for the shift from goods to services.

2.3.1 Definition of Goods

In contrast to the challenging procedure of determining a common definition for services², opinions and notions regarding the terminology of goods are mainly congruent. Adam Smith (1776) accounts for the first definition of goods and since then hardly anything changes about it. The subsequent Table 1 summarizes all the characteristics incorporated by the definition of goods and therefore reflects the academic debate of the last 200 years (Parry, Newnes, & Huang, 2011).

Table 1 - Set of Attributes for defining Goods

Attributes
Goods are Physical Objects for which a Demand exists
Physical Attributes of Goods are preserved over Time
Ownership Rights can be established
Goods exist independently of their Owner
Goods are exchangeable
Unit ownership Rights can be exchanged between Institutions
Goods can be traded on Markets
Goods embody specialised Knowledge in a Way that is highly advantageous for Promoting the Division of Labour

Source: cf. Parry, Newnes, & Huang (2011)

Accordingly the most distinct attributes in comparison to services are the characteristic of physical objects and their persistency over time. Furthermore the establish-

² Please refer to section 2.2.1 concerning the definition of service

ing of ownership and the inherent independence of their owner designate the characteristics of goods (Spohrer, Demirkan, & Krishna, 2011). This basic separation already induces the differences examined in the following section.

2.3.2 Differences

With regard to the declaration “*service is a non-tangible opposite of a tangible product*” (Wood, 2010, pp. 6) it indicates that the definition of services is mainly hooked on the comparison to goods, which is also reflected in some IHIP characteristics described above. Accordingly Spohrer, Demirkan, & Krishna (2011) approached the topic of service definition by mainly comparing it to goods. Therefore they discussed its differences by exploring three factors consisting inter alia of a comparison between (1) *tangible versus intangible*, which appears in the style of IHIP and derives similar findings (cf. Parry, Newnes, & Huang, 2011). Additionally Spohrer, Demirkan, & Krishna (2011) examined the disparities considering (2) *ownership versus access*, which somehow relies to the concept of perishability already mentioned above. This disparity could be illustrated vividly by the case of music, thus not owning it, once is still provided with access to it. Therefore one can say that “*a service-producing entity is one that by definition provides access to resources it owns, but does not transfer ownership*” (Spohrer, Demirkan, & Krishna, 2011, pp. 331). Finally there is a difference between goods and service due to the (3) *production versus coproduction/transformation* separation. In comparison to producing goods, consuming a service demands cooperation of the customer and even some little effort. Exemplarily one has to consider the case of listening to music which requires at least some attention or cognitive resources (Spohrer, Demirkan, & Krishna, 2011).

Consequently there are not only differences in terms of definition and notion among goods and service but also regarding their management approaches. Thus, the Harvard Business School introduced very early in 1972 a separate course dealing with this considerations called “Management of Service Operations” (Spring & Mason, 2007). This is affirmed by the diverging ideas goods manufacturer and service provider are finally after. Hence manufacturer try to benefit from economies of scale,

which therefore demands for standardisation of production. Service provider in contrast have to customize their products to meet customer needs entirely to maximize their satisfaction (Mellet, 2008). Accordingly manufacturer and service provider are striving for different goals, which therefore refer to diverging drivers as discussed in the following section.

2.3.3 Reasons and Drivers

Regarding section 2.1 a really vast increase of the service sector took place in recent years, which obviously arises from some powerful reasons and drivers. Spohrer, Demirkan, & Krishna (2011) conducted a comprehensive literature review and derived finally ten interrelated drivers for the growth of the service phenomena. In fact they identified (1) *global economic change* as one driver enhancing the penetration of the service sector. This is based on the one hand on the enlarging scientific research body among several disciplines which originates from economics, marketing and operations and proceeds nowadays with engineering, computing, design and law (Araujo & Spring, 2006; Spohrer, Demirkan, & Krishna, 2011). Consequently also the (2) *ICT-enablement or technology change* accounts for a distinct push, which relies on the enhanced communication capabilities. These enable new types of service offerings and therefore increase the share of the service sector (Belvedere, Grando, & Bielli, 2012; Prahalad & Ramaswamy, 2004). Another driver, which is also very closely related to the enablement by ICT is manifested by (3) *outsourcing*. Accordingly the rising amount of outsourcing within firms accounts for the the inherent growth of B2B services (Spohrer, Demirkan, & Krishna, 2011). Due to the fact, that customer demand more products with a corresponding service plan, which therefore relies on the increasing complexity of products, builds an additional driver consisting of a (4) *business model change*. As a consequence several customer prefer nowadays solely access (leasing) instead of ownership (Godlevskaja, van Iwaarden, & van der Wiele, 2011; Spohrer, Demirkan, & Krishna, 2011). The fifth driver is represented by (5) *where people live*, which refers to the shift towards urban areas. Thus, the convenience among services attracts more and more of the worlds population. This in fact corresponds to another demographic change represented by (6) *how long people live*. Evolution in society and the emerging

importance of women in workforce causes a driver with regard to (7) *the nature of family life*. As a consequence personal services like child care, hospitality or entertainment gained rising importance. Finally there also arises impetus by rising (8) *education level*, the corresponding (9) *dependence on universities* and (10) *dependence on non-profit organizations* (Spohrer, Demirkan, & Krishna, 2011).

2.4 Business Models

Concerning the business of a service company one is inherently concerned with different business models to transfer generated value into revenues. Accordingly the subsequent section provides the necessary theoretical background to deal with this topic by providing the definition and notion of business models as well as the underlying research streams and the resulting characteristics and patterns.

2.4.1 Definition and Notion

The concept on business models is a relatively new one which was mentioned the first time by Bellman & Clark (1957) in an academic article (Hirvonen, 2011; Lindemann, 2009; Niemi & Buren, 2012; Spring & Mason, 2007). Afterwards interest declined and recently gained back higher attention which relies on the current emergence of internet-based businesses (Hirvonen, 2011; Niemi & Buren, 2012). Zott, Amit & Massa (2011) stated therefore that “*the concept has virtually exploded in the 15-year period between 1995 and 2010*” (see in Lindemann, 2009, pp. 7). Nevertheless scientists have not found yet a common definition or language to deal with this topic, which therefore avoids drawing on each other’s work. Combining the both extensive literature reviews conducted by Hirvonen (2011) and Palo (2009) they finally provide a very comprehensive compilation on the current research status. This condition is accordingly illustrated in the subsequent Table 2 (Hirvonen, 2011; Palo, 2009).

Table 2 - Business Model Definitions

Author(s)	Year	Definition
Yunus, Moingeon & Lehmann-Ortega	2010	The method of doing business by which a company can sustain itself i.e. to generate revenue
Chesbrough	2010	Companies commercialise new ideas and technologies through their business models
Teece	2010	The essence of a business model is in defining the manner in which the enterprise delivers value to customers, entices customers to pay for value, and converts those payments to profit
Yunus, Moingeon & Lehmann-Ortega	2010	In the simplest form, business models can be defined as the method of doing business by which a company can sustain itself i.e. to generate revenue
Gambardella & McGahan; Chesbrough	2010, 2006	Every company has a business model
Chen	2009	A business model is the method of doing business by which a company can sustain itself – that is, generate revenue
Kamuriwo	2009	The business model has a link to value capture
Zott & Amit; Bornemann	2007, 2009	Business model design affects firm performance
Komulainen et al.	2006	There can be identified three core elements of a network business model; the product/service, the business actors and their roles, and value-creating exchanges among the actors
Helander & Rissanen	2005	Business models of the companies must be linked to the business models of the other companies involved in the network
Osterwalder, Pigneur, & Tucci	2005	A business model describes the rationale of how an organization creates, delivers and captures value
Shafer, Smith & Linder	2005	Business model is defined “as a representation of a firm’s underlying core logic and strategic choices for creating and capturing value within a value network”
Afuah	2004	Business models are about making money and most firms are in business to make money
Hedman & Kalling	2003	The concept of business model generally describes the key components of a given business: 1) customers, 2) competitors, 3) offering, 4) activities and organisation, 5) resources, 6) supply of factor and production inputs and 7) a longitudinal process component to cover the dynamics of the business model as well as the cognitive and cultural constraints that management has to take into account.
Chesbrough & Rosenbloom,	2002	Companies must find the right business model in order to create value from new technology. Business model provides a framework which considers the technological

		characteristics and potentials as inputs and converts them through customers and markets into economic outputs.
Amit & Zott	2001	A firm's business model is an important locus of innovation and a crucial source of value creation for the firm and its suppliers, partners and customers
Weill & Vitale,	2001	Business model represents the roles and relations among the firm's customers, allies and suppliers identifying the major flows of product, information and money and the major benefits for the actors.
Timmers	1998	An architecture for the product, service and information flows, including a description of the various business actors and their roles; a description of the potential benefits for the various business actors; and a description of the sources of revenues

Source: cf. Hirvonen (2011), Palo (2009)

Going through the table above, one will immediately realize the two trends already discussed in advance. First, all the definitions and elaborations start with the year 1998 and later on which confirms the correlation to the emergence of internet-based businesses in recent years (Hirvonen, 2011; Niemi & Buren, 2012). The second trend is probably not that obvious, which finally is represented by the huge amount of different definitions on this topic and therefore approves the broad research field. Actually both authors reviewed a lot of literature but only complied in one single definition provided by Amit & Zott (2001). No other definition was found and displayed by both authors (cf. Hirvonen, 2011; Palo, 2009). (Osterwalder, Pigneur, & Tucci, 2005)

Elaborating the definitions shown in Table 2 there also appear certain patterns, which can be expressed by diverging notions among this topic. Hirvonen (2011) consolidated these patterns to finally three different notions implying revenue logic, technological inputs and finally the separation from strategy. Accordingly the (1) *revenue logic* embraces all definitions with regard to the main ambition of generating revenue out of the business (Hirvonen, 2011). Therefore the enterprise as to initially deliver value to customer, attract customers to pay for value and finally transform this value into revenues (Lindemann, 2009). Actually it's all about value which consequently cannot be defined by the company but has to be both defined and co-created by the customer (Vargo & Lusch, 2004). The second notion is based on (2) *technological inputs* representing a useful framework by Chesborough (2003)

to tie technical decision to economic outcomes (Hirvonen, 2011). Finally once have to be aware of the (3) *separation of business model and strategy*, because per definition the business model represents the architectural implementation of a strategy (Hirvonen, 2011). In fact the business model describes how the specific parts within a business fit and interact together, while strategy puts more emphasis on competition and market behaviour (Spring & Mason, 2007).

2.4.2 Research Streams

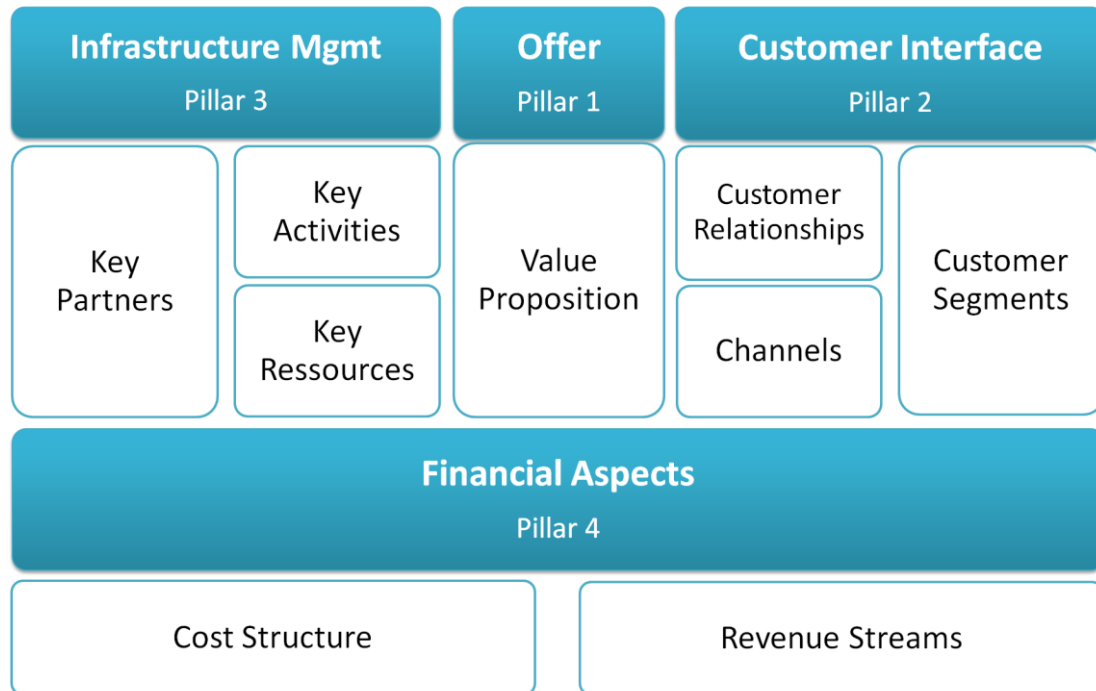
Due to the different approaches regarding the notion of business model mentioned above, there also developed several diverging research streams dealing with this topic. Literature provides therefore on the one hand the separation among the three disciplines e-business, technology & innovation management and strategy (Zott, Amit, & Massa, 2011) and on the other hand the separation between components and dynamics of business models (Hirvonen, 2011), which finally forms five research streams. According to Zott, Amit & Massa (2011) business models are linked very intense with (1) *e-business* due to the emergence of improved communication and information technologies. Consequently operating costs decreased considerably and therefore enhanced new possibilities of doing business (Spring & Mason, 2007). Emerging businesses were usually based on unconventional information exchange methods (e.g. eBay's auction, Groupon's voucher) which all were prospecting to explain this value and its monetization. In turn business model evolved as the best way in doing this (Amit & Zott, 2001). Furthermore another application of business models evolved within the (2) *technology and innovation management*, where they were meant to commercialize pioneering ideas and technologies or to be itself the new subject of innovation (Zott, Amit, & Massa, 2011). Therefore one can say that "*business models ... can translate technical success into commercial success*" (see in Teece, 2010, pp. 184), which perfectly corresponds with the fact that "*technology is seen as an enabler of the business model rather than as a part of the concept per se*" (see in Zott, Amit, & Massa, 2011, pp. 22). The third research stream considers the topic of (3) *strategy*. Although a business model not equals a business strategy (as discussed in section 2.4.1.) there are still interplays and relationships among them (Lindemann, 2009). The nature of firm's network of value creation anyhow affects

firm's performance (Amit & Zott, 2001). Considering the separation suggested by Hirvonen (2011), there is also the research stream based on (4) *components* of an e-business model. Accordingly a business model consists of customer value, scope, price, revenue sources, connected activities, implementation, capabilities and sustainability (cf. Afuah/Tucci, 2001 in Hirvonen, 2011). These components can be summarized to an architecture for product, service and information flows (Amit & Zott, 2001; Niemi & Buren, 2012). Finally there is a research stream concerning (5) *dynamics* of business models, which deals with the way of interactions and the inherent value creation. For further insights on this area please refer to publications of Applegate (2001) and Weill & Vitale (2001) (see in Hirvonen, 2011).

2.4.3 Characteristics and Business Model Patterns

Basing on the former section and the introduced research stream of components of a business model, the subsequent section will discuss these components more in detail and offer an encircling architecture of it. Furthermore dominant business model types will be elaborated and broke down into certain patterns. According to the large number of diverging definitions among business models, there also circulate several items, mentioned as components throughout literature (Amit & Zott, 2001; Hirvonen, 2011; Spring & Mason, 2007). The extended research of Morris et al. (2005) found finally 24 components, whereat only a view of them gained recurring mentions. Hence the most frequented are value proposition, economic model, customer interface, partner network & roles, internal infrastructure and target segments (Lindemann, 2009). This finding perfectly matches the elaboration of Osterwalder, Pigneur & Tucci (2005) introducing a business model architecture that is based on exactly these components. The particular components were consolidated to finally four pillars as they are shown in Figure 5 below.

Figure 5 - Business Model Architecture



Source: own illustration according to Osterwalder, Pigneur & Tucci (2005)

Obviously the most elementary matter of each business is its (1) *offer*, which manifests the first pillar. Accordingly this part describes the products and services offered by the business and consolidate it to the *value proposition* (Morris, Schindehutte, & Allen, 2005; Osterwalder, Pigneur, & Tucci, 2005). The next step is to clarify the (2) *customer interface*, which describes all elements visible by the customer. This pillar actually consists of *customer segments* that are attracted, the *channels* used to reach them and after all the *customer relationships* (Lindemann, 2009). In fact the business offer and the corresponding customer interface have to be established upon an underlying (3) *infrastructure management* enabling all these things. Consequently once have to be aware of the necessary *key activities*, which are carried out with the corresponding *key resources* that in the end require appropriate *key partners* (Osterwalder, Pigneur, & Tucci, 2005). Finally each business model consists of several (4) *financial aspects* dealing with the precedent *cost structure* to enable the business and the corresponding *revenue streams* to keep going the business (Lindemann, 2009; Morris, Schindehutte, & Allen, 2005; Osterwalder, Pigneur, & Tucci, 2005).

In fact the execution and succeeding of a business model doesn't relies to the solely consolidation of its components. The power of a business model actually stems from the interrelation of its components (Puhakainen/Malinen, 2009 see in Lindemann, 2009). Finally a business model describes how to create, deliver and capture value, which arises from a dominant design theme (Osterwalder, Pigneur, & Tucci, 2005). The work of Lindemann (2009) exactly focuses on this topic by elaborating a framework of these dominant design themes, which in the end introduced a separation among four types, displayed in Table 3.

Table 3 - Dominant Business Model Design Themes

Theme	Approach
Cheap and Quick	Relies on the transaction costs theory
Intangible Barter	Includes network effects
Customer Lock-In	Based on switching costs
Team-Up	Usage of power of complements

Source: cf. Lindemann (2009)

Companies aiming to operate via (1) *cheap and quick* business models focus on efficiency and strive for being cheap or quick or both. Basic elements of this approach are described by no frills, agora, aggregation or integration to achieve competitive advantage. Typical examples are Wal-Mart, eBay, Amazon or DELL. Another possibility is to establish a (2) *intangible barter* business model, which caters to achieve a maximum market acceptance by providing products or services for free. Consequently customers pay with intangible assets like traffic, publicity or his consumer behaviour, which finally is sold to third parties. Once can find such business models in companies like Google, Facebook or Skype. Companies also may operate via (3) *customer lock-in* business models by establishing psychological or transactional switching costs. Typical applications are premium bait & hook, servitization of products and competitor lock-out. Finally (4) *team-up* business models describe the case of bundling activities among product levels, development, production or delivery. In general this approach results in strategic alliances, joint ventures or merger and acquisitions (Lindemann, 2009).

2.5 Related Research Fields

The last section of this chapter will finally lead over to the intrinsic topic of this thesis manifested by servitization. Therefore a brief introduction of all service-related research fields will be conducted to define the actual topic. It starts with the general topic of service science and proceeds with outcome-focused concepts like service-dominant logic and concludes with the value-adding concepts like servitization.

2.5.1 Service Science

The research conducted within the field of service science comprises fairly the same topics as discussed and elaborated in the whole section above. Consequently it is still a big deal in service science to find a common definition³ on the term “service” which lasts for a long time now (Araujo & Spring, 2006; Spohrer & Maglio, 2005; Spring & Mason, 2007). Another research sector deals with the phenomena of continual increase of the service sector⁴ in all economies (D’Agostino, Serafini, & Ward-Warmedinger, 2006; Johnstone, Dainty, & Wilkinson, 2008; Memedovic & Lapadre, 2009; Spohrer & Maglio, 2005) and likewise concerning with the reasons and drivers⁵ for this evolution (Araujo & Spring, 2006; Belvedere, Grando, & Bielli, 2012; Spohrer, Demirkan, & Krishna, 2011). Besides this also some new service-oriented sub-discipline areas developed that cover topics regarding service-oriented architectures in computer science, service system engineering in industrial engineering and knowledge-intensive business services in economics (Spohrer, Demirkan, & Krishna, 2011). Finally also the very contemporary topic of innovation finds its way into service science. In this connection the terms innovation in service and service innovation appear, while the former deals with both product and process innovation in service firms and the latter with the creation of new services (Miles, 2012).

2.5.2 Service-Dominant Logic and other outcome-focused Concepts

Actually the research field of service-dominant logic (SD logic) evolves out of general service science and provides a certain framework that allows refining existing theo-

³ Please refer to section 2.2 concerning the challenges in defining service

⁴ Please refer to section 2.1 concerning the increase of the service sector

⁵ Please refer to section 2.3.3 concerning the reasons and drivers of service dominance

retical foundation. First introduced by Vargo & Lusch (2004) the SD logic approach assumes that all firms are delivering services regardless of their product offering. This arises from the aspect of collaborative co-creation among the involved parties, which is based on the idea using goods as mechanism for service provision (Vargo & Lusch, 2008). According to this focal point customers are not after the property of a good but more after the generated value by using or operating it, which is manifested in a service (Castaldi, Addeo, Massaro, & Mazzoni, 2007). Accordingly there occur some implications on marketing activities which have to be adjusted to the merchandising of services instead of goods (Vargo & Lusch, 2004). The basis of SD logic is build by ten foundational premises (FP), which are displayed in Table 4.

Table 4 - Foundational Premises of SD Logic

#	Premise
FP 1	Service is the fundamental basis of exchange
FP 2	Indirect exchange masks the fundamental basis of exchange
FP 3	Goods are a distribution mechanism for service provision
FP 4	Operant resources are the fundamental source of competitive advantage
FP 5	All economies are service economies
FP 6	The customer is always a co-creator of value
FP 7	The enterprise cannot deliver value, but only offer value propositions
FP 8	A service-centred view is inherently customer oriented and relational
FP 9	All social and economic actors are resource integrators
FP 10	Value is always uniquely and phenomenologically determined by the beneficiary

Source: cf. Vargo & Lusch (2008)

Consequently one has to consider these premises when applying the SD logic framework and trying to understand its origin. As discussed before the SD logic perspective derives from general service science and can be separated into three episodes starting with the (1) *emergence of services marketing* in the late 70s – early 90s. Subsequently the (2) *attention to services and its new subtopics* increased drastically starting in the early 90s - 2003. Obviously the final episode is the most recent

one which started by 2004 and was affected by the (3) *domination of the SD logic perspective* (Dohmen, 2012).

Another research field pointing in a related direction like SD logic is depicted by *outcome-based contracting*, where companies are asked to deliver outcomes instead of activities (Ng & Ding, 2010a; Zhang, Ma, & Dong, 2009). This relies somehow on the focal point of SD logic where also the outcome, manifested as service during usage of a good constitutes the main thinking style. A traditional application is the operation of maintenance, repair and overhaul (MRO) activities and supply chain management, why also the term *performance-based logistics* is common in this relation (Kim, Cohen, & Netessine, 2006). The most prominent case therefore is the business model introduced by Rolls Royce in the aeroplane industry called “Power-by-the-hour[®]”, where the customer doesn’t buys an engine but guaranteed flying hours (Ng, Nudurupati, & Tasker, 2010b). In this case value is finally delivered through transformation of material, information and customer behaviour in terms of co-production (Ng & Ding, 2010a).

2.5.3 Servitization and other value-adding Concepts

Actually servitization is a related research field of service science, but initially originates from manufacturing and operations management science (Baines, Lightfoot, Benedettini, & Kay, 2009 a). The term servitization was primarily coined by Vandermerwe & Rada (1988) and is seen as manufacturing strategy that creates value by adding services to products. This idea stems from providing competitive advantage for manufacturing firms to handle decreasing margins and other sources of competition (Baines, Lightfoot, Benedettini, & Kay, 2009 a; Gebauer, Fleisch, & Friedli, 2005; Neely, 2008). Servitization describes the transition from a pure product manufacturer to a finally service offering company striving for increasing revenues out of higher margins. This is conducted through offering product-service bundles via varying integration⁶ possibilities (Bascavusoglu-Moreau & Tether, 2011; Godlevskaja, van Iwaarden, & van der Wiele, 2011; Kinnunen, 2011; Mellet, 2008; Neely, 2007; Vandermerwe & Rada, 1988).

⁶ Please refer to chapter 3.3 concerning detailed integration possibilities of servitization

Table 5 – Value-adding Products-Service Concepts

Concept/Authors	Central Elements & Characteristics
After-sales Service Borchardt (2010) Cohen (2006)	generating revenues with services at long life cycle products; complex technological products which require specialized services
Complex Product Systems Hansen/Rush (1998)	High cost, engineering and information technology intensive, customized products; consisting of large number of tailored subsystems and components
Functional Products Alonso-Rasgado et al. (2004)	Total care products; comprise “hard” and “soft” elements
Integrated Solution Brax (2009) Davies (2004) Oliva/Kallenberg (2003)	competitive advantage for manufacturing firms; solution is complex and customized offering beyond mere bundles of services and products; create value by improving operating efficiency; increasing asset effectiveness
New Service Model/ New Manufacturing Antonacopoulou (2008) Marceau et al. (2002)	propounds the integration of products and services; approach to build relationships to customers & long-term partnerships; customer focus
Product-Service-System Baines (2007) Davies (2006)	market proposition that extends the traditional functionality of a product by incorporating additional services; “sale of use” rather than “sale of product”; restructuring risks, responsibilities and costs associated with ownership; sustainability
Servitization Baines (2009a)(2009b) Neely (2007) Vandermerwe & Rada (1998) Servicisation Jordan (2007) Lee/Alger (2010) Dematerialization Dobers/Wolff (1999) Hybridisation Mellet (2008) Tertiarization Leo/Phillippe (2001)	creating value by adding services to products; increasing revenue streams; competitive manufacturing strategy; extending product-life-cycle
Solution Business Marceau (2002) Pekkarinen (2011)	linking manufacturing and services, product/service integration, product/service packaging, product/service bundling at POS
Symbiotic Interdependencies Andreoni (2012)	set of corresponding production and service actions have to be performed across a number of functional areas to produce given commodities
Winning in the After-market Morris (2006)	deliver the value which customers get out of using those products

Source: own illustration

Consequently there occur some considerable challenges and drawbacks⁷ whilst applying and transferring from a pure manufacturer to a service company (Baines, Lightfoot, Benedettini, & Kay, 2009 a; Morgan, Levitt, & Malek, 2008; Weeks & Plessis, 2011). Although the terminology “servitization” by Vandermerwe & Rada (1988) already exists for a long time, nevertheless several other terms like “servicisation” (Jordan, 2007; Lee, 2010), “hybridisation” or “tertiarisation” (Mellet, 2008) occurred. Additionally also some differently named concepts emerged in literature but still dealing with the same task (Baines, Lightfoot, Benedettini, & Kay, 2009 a; Johnstone, Dainty, & Wilkinson, 2009). Finally the subsequent Table 5 provides an extensive overview about current research fields dealing with value-adding product-service concepts.

2.6 Summary

Actually the service sector contributes for approximately 70% of employments and still remains growing, which relies to certain trends like the imbalances in productivity growth between services and manufacturing or increasing complexity of manufactured goods demanding for complementary services. The definition of service persists a challenging task, but one can look about by considering the IHIP characteristics consisting of intangibility, heterogeneity, inseparability and perishability.

Dealing with services one also has to bear in mind the concepts of business models, which are still a lot due to the development out of several economic disciplines. Table 2 above displays a vast amount of definitions, that all together emerged mainly during the late 90’s basing on the appearance of the internet. Nevertheless dealing with the topic of servitization the definition that *“a business model describes the rationale of how an organization creates, delivers and captures value”* (Osterwalder, Pigneur, & Tucci, 2005) fits most appropriate, since it meets the concept of adding value to a product most suitable.

⁷ Please refer to chapter 4 concerning detailed challenges during transition to servitization

Finally there are several related research fields all concerned with service, but still emerging from different motivations and disciplines. Accordingly service science focuses on definitions and innovation of service, whereas service-dominant logic strives to provide a framework for a new focal point on merchandising products. In the end servitization emerged from manufacturing industry to supply competitive advantage in selling goods by adding value through services.

3 Servitization

The concept of servitization initially originates from the manufacturing industry which currently struggles with decreasing profit margins and therefore strives for a strategy to handle this. Consequently the enrichment of products by corresponding services appears to be a considerable approach, which in fact implicates a continuous movement towards a service economy. According to this the subsequent section strives to explain the concept of servitization in detail in order to declare its capabilities in being a powerful strategy to provide competitive advantage in manufacturing industries.

This will be conducted by initially elaborating its notion and origins in literature as well as the characteristics and processes regarding value creation, which is consolidated as fundamentals of servitization. Subsequently the driving characteristics separated by general environmental trends, financial-, strategic- and marketing-drivers are discussed in detail. The final section refers to the classifications of servitization and the actual options of implementation.

3.1 Fundamentals of Servitization

Although this thesis referred mainly to service science issues so far, the concept of servitization initially originates from the manufacturing industry. Consequently this section deals on the notion and origin of servitization and therefore also elaborates the fundamental idea of value creation as competitive advantage.

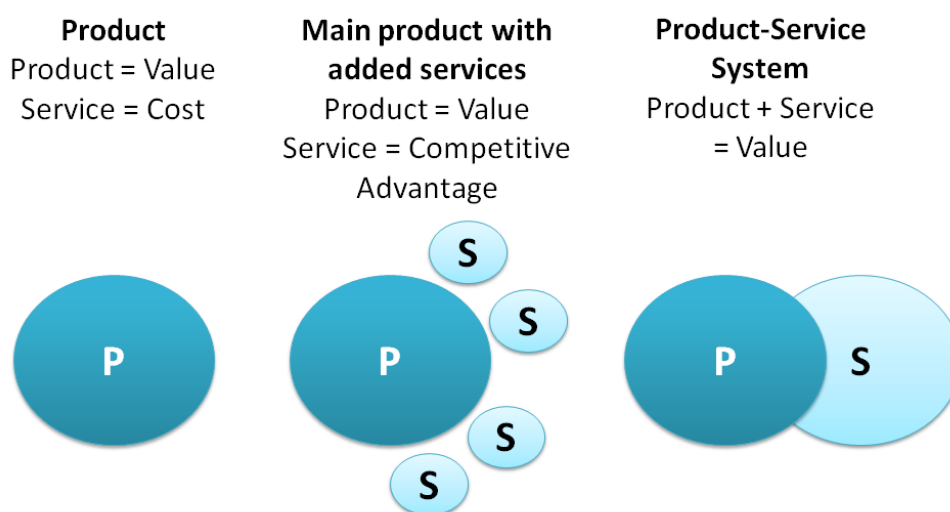
3.1.1 Notion of Servitization

The concept of servitization is a term one can find in the manufacturing industry and consequently deals with goods and products. Though considering its denotation there has to be a relation to services as well. According to Vandermerwe & Rada (1988) who described the concept as the process of creating additional value by adding services to products, finally were persuaded that:

“Modern corporations are increasingly offering fuller market packages or “bundles” of customer-focused combinations of goods, services, support, self-service and knowledge. But services are beginning to dominate. This movement is termed the servitization of business” (see in Vandermerwe & Rada, 1988, pp. 318).

Recent literature adopted this concept to a competitive manufacturing strategy in order to⁸ establish entry barriers to lock-out competitors and to lock-in customer (Baines, Lightfoot, Benedettini, & Kay, 2009 a; Neely, 2007; Neely, Benedettini, & Visnjic, 2011; Oliva & Kallenberg, 2003). Besides the work of Vandermerwe & Rada (1988) also some other researcher attempted this topic deriving nominations like hybridisation, tertiarisation, service infusion or servicisation which still unaffected the dominance of servitization remaining as most cited and referred one in literature. Furthermore also the concept of a product-service-system (PSS)⁹ occurred which handles exactly the same topic. In fact, both concepts strive for the same goals and are based on the same drivers and motivations as well (Baines, Lightfoot, Benedettini, & Kay, 2009 a). Consequently the difference between both concepts lies in the perception of its ultimate result, which can be described by the following Figure 6.

Figure 6 - Transition from a Product to a Product-Service-System



Source: own illustration according to Pawar, Beltagui, & Riedel (2009)

⁸ Please refer to section 3.2 concerning drivers and motivations for servitization

⁹ Please refer to section 2.5.3 concerning the definition and concept of a PSS

According to the definition of a PSS, the value for a common manufacturer is provided by the product itself, whereas every occurring service equates with additional costs. In order to achieve competitive advantage and distinguish from competitors some product related services are offered to enrich the total offering. Finally the product and service merge to a product-service-system that provides its value solely in their combination (Baines, et al., 2007; Goedkoop, Halen, te Riele, & Rommens, 1999). The transition within the concept of servitization goes a step further with the final transformation from a manufacturing company to a service provider (Vandermerwe & Rada, 1988), which actually corresponds with the concept of SD¹⁰ logic (Vargo & Lusch, 2004). Baines, Lightfoot, Benedettini, & Kay (2009 a) confirmed this conclusion by conducting an extensive research among 58 articles concerning PSS and servitization. Consequently they suggested refining the definition of servitization to encompass the PSS theme, by stating that: *“servitization is the innovation of an organization’s capabilities and processes to better creates mutual value through a shift from selling products to selling PSS”* (see in Baines, Lightfoot, Benedettini, & Kay, 2009 a, pp. 555). Consequently all the subsequent sections in this thesis embrace the findings of literature concerning PSS as well as servitization in order to maximize credibility.

3.1.2 Value Creation

Actually a lot of industries identified the proposal of superior customer value as one of the most enduring and successful strategies to gain competitive advantage. Consequently a lot of academic researchers are already debating on the concept of value for a long time (Amit & Zott, 2001; Ng, Nudurupati, & Tasker, 2010b). The approach underlying this concept refers to the notion of value, which is conducted via the exchange of value among the involved parties. Accordingly, companies strive for establishing and maintaining a strategic buyer-seller relationship (Bastl, Johnson, Lightfoot, & Evans, 2012; Pawar, Beltagui, & Riedel, 2009; Prahalad & Ramaswamy, 2004). Concerning the topic of delivering and proposing services to add value, which are generally characterized¹¹ by the fact that they have to be consumed in the same moment they are conducted (Parry, Newnes, & Huang, 2011; Spohrer, Demirkan, & Krishna, 2011; Wood,

¹⁰ Please refer to section 2.5.2 concerning the definition and concept of SD logic

¹¹ Please refer to section 2.2 concerning the definition and notion of services

2010), the corresponding research of Vargo & Lush (2004) referring to the concept of *value-in-use* has to be considered. Accordingly *value-in-use* is solely realized during the process of consumption (Vargo & Lusch, 2004). Therefore Woodruff (1997) stated that:

“Customer value is a customer's perceived preference for and evaluation of those product attributes, attribute performances, and consequences arising from use that facilitate (or block) achieving the customer's goals and purposes in use situations” (see in Woodruff, 1997, pp. 142) .

Finally recent academic research proposed that companies actually don't offer or provide value, but the proposition of value. Thus there is a need of contribution from the involved customer, who finally determines the value and consequently co-creates it (Vargo & Lusch, 2004). Accordingly, companies store unrealized potential value in their products, which is finally executed through customers' co-creation in order to gain the benefit (Ng, Nudurupati, & Tasker, 2010b). In the end one has to be aware about the distinct difference to the topic of co-production, which asks the customer to provide input to product design or self service and therefore appears in contrast to the notion of value co-creation (Fang, 2008; Ordanini & Paolo, 2008). In terms of servitization the desired value can vary across industries and the specific needs of customers, which may last from cost effectiveness, sustainable use of resources and operational improvement to less environmental burdens (Durugbo, et al., 2010). Consequently the subsequent section deals with the drivers and motivations for the concept of servitization.

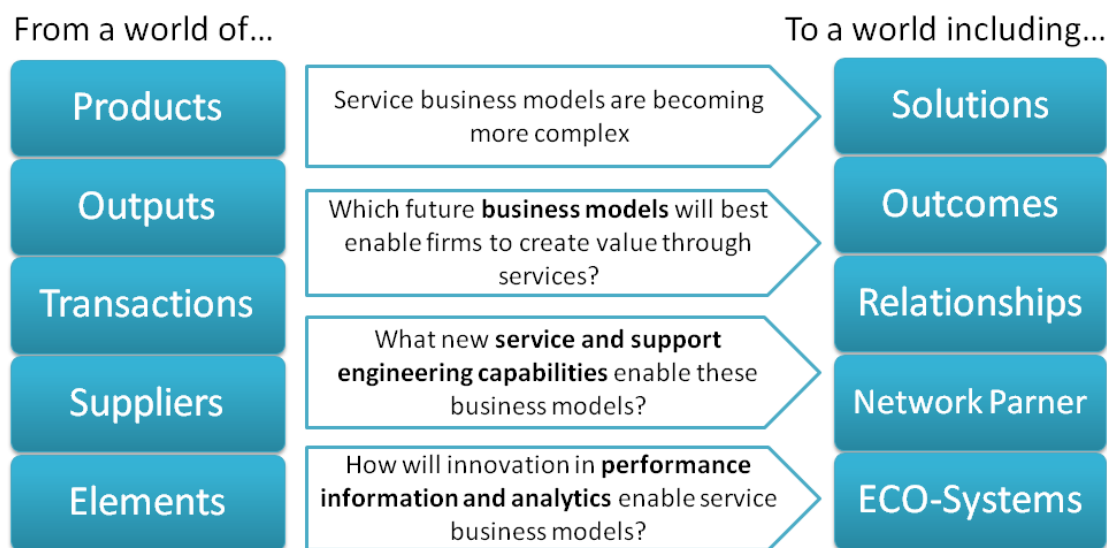
3.2 Drivers of Servitization

Actually every emerging approach or strategy evolves out of several intentions and drivers. Consequently the subsequent section discusses those driving servitization by splitting them to general environmental trends on the one hand side and to internal drivers regarding finance, strategy and marketing on the other hand side.

3.2.1 General Trends

Today's global manufacturing firms are faced with serious hassle regarding their market position and competitive advantages, which is mainly related to intense and aggressive market behaviour resulting in even decreasing margins and revenues (Baines, Lightfoot, Benedettini, & Kay, 2009 a; Gebauer, Fleisch, & Friedli, 2005). According to the emergence of economies in the Middle and Far East who provide cheap workforces, it's becoming harder and even not feasible to compete solely on the basis of costs. Since US manufacturers would have to cut their costs by 30 % to meet the level of Asian companies, which actually is scarcely marketable in developed economies (Baines, et al., 2009 b; Neely, 2007; Neely, Benedetinni, & Visnjic, 2011). Accordingly academic researchers suggest moving along the supply chain in order to innovate and create more sophisticated products and services to distinguish through additional value (cf. Porter/Ketels (2003) see in Neely, 2007). In fact the OECD computed a share of about 70 % accounting for the total employments of the service sector (Wölfl, 2005), whilst approximately 30 % of all manufacturing companies were conducting servitization (Neely, Benedetinni, & Visnjic, 2011). Furthermore Neely, Benedetinni & Visnjic (2011) elaborated five underlying general trends to explain this development, which are shown in the subsequent Figure 7.

Figure 7 - General Trends for the Shift to Services



Source: own illustration according to Neely, Benedetinni & Visnjic (2011)

Finally they consist of the shift from (1) *products to a world including solutions*, which rather means that solutions are supplementing products than replacing them (Sun, Mo, & Chang, 2009). Consequently also (2) *outputs become outcomes* which especially refer to outcome-based contracts¹² that guarantee e.g. the availability of a product (Hypko, Tilebein, & Gleich, 2010). After all there are also shifts from (3) *transactions to relationships*, (4) *suppliers to network partners* and (5) *elements alter to eco-systems* (Neely, Benedettini, & Visnjic, 2011).

3.2.2 Financial Drivers

The precedent section already briefly hints on some financial benefits that may occur conducting a servitization strategy. Actually it's a big issue for manufacturing companies to gain profitable revenues out of solely selling products, which relies to the really thin profit margins. Consequently manufacturers are tempted adding services to their products in order to exploit much higher margins (Baines, Lightfoot, Benedettini, & Kay, 2009 a; Falk & Peng, 2012; Mathieu, 2001b; Tether & Bascavusoglu-Moreau, 2011). In fact, some companies actually do well in applying this strategy and experiencing explosive growth. Exemplarily, GE Capital Services are exploiting higher margins and revenues out of services, which therefore account for 60 % of their final profits (Mathieu, 2001b). The latterly prevalent case of complex engineered products accounts for another possible revenue stream in the manufacturing industry. The resulting longer product life cycles raise the ratio of installed-base to new units, especially in the automotive, civil aircrafts and locomotive industry. Accordingly the ratio for automobiles is 13 to 1, those of civil aircrafts 15 to 1 and concerning locomotives even 22 to 1, which means that for every new build car already 13 operating ones already exist (Neely, 2008; Kumar & Markeset, 2007). In terms of financial benefits this means that companies can establish stable income streams by charging for maintaining , repair and other product-related services (Baines, Lightfoot, Benedettini, & Kay, 2009 a; Mathieu, 2001b; Tether & Bascavusoglu-Moreau, 2011; Velamuri, Neyer, & Möslin, 2011). This push of considerable revenues downstream towards service support actually diminishes potential volatility originating of drops in sales and the inherent effects of mature markets

¹² Please refer to section 2.5.2 concerning the definition and concept of outcome-based contracts

and unfavorable economic cycles (Tether & Bascavusoglu-Moreau, 2011). In order to finally utilize this feasible revenue streams one has to consider an appropriate pricing strategy and cost structure¹³, concerning fixed/variable and direct/indirect costs as well as the choice between bundling or unbundling prices. Providing very specific and intense service offerings would equally raise the chance and possibility to gain higher financial benefits (Mathieu, 2001b).

3.2.3 Strategic Drivers

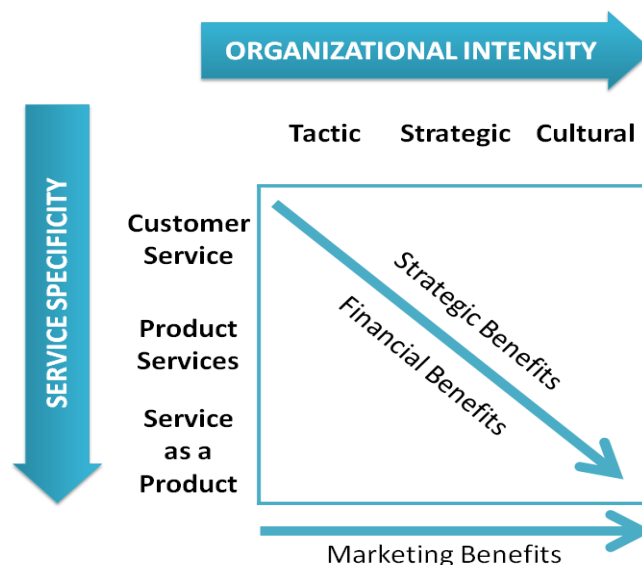
Besides the financial benefits as they are described above, the application of servitization in a manufacturing company also may create strategic benefits. These are generally manifested by competitive advantage, which is carried out by the differentiation of manufacturing offerings (Baines, Lightfoot, Benedettini, & Kay, 2009 a; Bascavusoglu-Moreau & Tether, 2011; Tether & Bascavusoglu-Moreau, 2011). Consequently academic researchers identified services as one of the most essential competitive factors in manufacturing, even enhancing the constitution of industry entry barriers (Mathieu, 2001b; Schmenner, 2009; Vandermerwe & Rada, 1988). In fact, it's difficult to imitate a well intended service, since they are less visible and mostly dependent on labor skills, which therefore creates a sustainable source of competitive advantage (Baines, Lightfoot, Benedettini, & Kay, 2009 a; Oliva & Kallenberg, 2003; Tether & Bascavusoglu-Moreau, 2011). In order to establish this competitive weapon one has to consider that it's substantial to offer outstanding services to the customer, to enable valuable co-creation. Consequently these services should directly enhance the value of the related product rather than being of simply general nature. This relies to the fact, that in a competitive market consumer expect certain services as given basics, which therefore don't provide any competitive advantage (Mathieu, 2001b). Finally the highest strategic benefit could be gathered, by providing the more specific and intense service offering (Baines, Lightfoot, Benedettini, & Kay, 2009 a; Oliva & Kallenberg, 2003; Tether & Bascavusoglu-Moreau, 2011).

¹³ Please refer to section 4.3.2 concerning the challenges of an appropriate pricing strategy and cost structure

3.2.4 Marketing Drivers

Finally engaging in marketing opportunities literature shows that services likewise may account for several benefits. According to the fact that services enrich the solely goods offering and consequently appeal the customer (Mathieu, 2001b) therefore pushing the selling of products by influencing purchasing decisions (Baines, Lightfood, Benedettini, & Kay, 2009 a; Tether & Bascavusoglu-Moreau, 2011). Concerning the B2B context Mathieu (2001b) derived three implications encouraging this pretention. Consequently a servitization strategy (1) *influences overall clients satisfaction*, whereat (2) *improving the adoption of the new product* and finally (3) *strengthening clients confidence* whilst improving supplier's credibility (Mathieu, 2001b). In fact this increasing demand for services actually creates customer loyalty and lastly tends to induce both first-time and repeat sales (Baines, Lightfood, Benedettini, & Kay, 2009 a; Tether & Bascavusoglu-Moreau, 2011; Vandermerwe & Rada, 1988). The declaration for the increasing demand of services arises from the work of Vandermerwe & Rada (1988) who actually derived five main reasons for this evolution, consisting of the (1) connection of value to the use and performance of the system, (2) the desire for solutions instead of products, (3) gaining advantage of suppliers know how, (4) the need for integrated and global offerings and the inherent (5) customized relationships. All these above consolidate the challenge in gathering the knowledge about the services customers actually desire, since most of them don't even know it yet (Mathieu, 2001b).

Figure 8 – Evolution of Servitization Benefits



Source: own illustration according to Mathieu (2001b)

Considering the findings of Mathieu (2001b) already mentioned above, who actually elaborates on the degree of organizational intensity and service specification, he derived the evolution of servitization benefits which is shown in Figure 8. Accordingly the financial, strategic as well as the marketing benefit expand in relation to the extent of service provision growing even more whilst moving towards a solely service oriented company (Mathieu, 2001b).

Actually the discussion above was structured according to financial, strategic and marketing benefits which was initially suggested by Baines, Lightfoot, Benedettini, & Kay (2009 a), Mathieu (2001b) and Oliva & Kallenberg (2003). Another research conducted by Tether & Bascavusoglu-Moreau (2011) recommended the separation according to the intention of the competitive strategy, which tends to be offensive, defensive or neutral. In order to provide a valuable typology of servitization benefits these two approaches were merged together and finally illustrated in the subsequent Table 6.

Table 6 - Typology of Servitization Benefits

	Offensive	Defensive	Neutral
Financial Benefits	Increase Total Turnover	Stability of Turnover	Extending Lifecycle of Products
Strategic Benefits	Differentiation of Offering	Services are difficult to imitate	Sustainable Environmental Benefits
Marketing Benefits	Aids understanding Customer Needs	Increase Customer Loyalty	

Source: own illustration

Finally the emergence of powerful information and communication technologies (ICT) likewise enhanced the evolution and penetration of servitization strategies in manufacturing (Belvedere, Grando, & Bielli, 2011; Belvedere, Grando, & Bielli, 2012; Godlevskaja, van Iwaarden, & van der Wiele, 2011). However, one has to be aware that these benefits exclusively depend on the mode of implementation of the servitization approach. Therefore these technological advantages are incorporated in the subsequent section, which elaborates the options of servitization.

3.3 Conducting Servitization

The final section illustrates the approaches and possibilities concerning the implementation and execution of servitization. Accordingly the variety of services as well as their classification will be elaborated. Finally the fundamental options of implementing servitization are depicted.

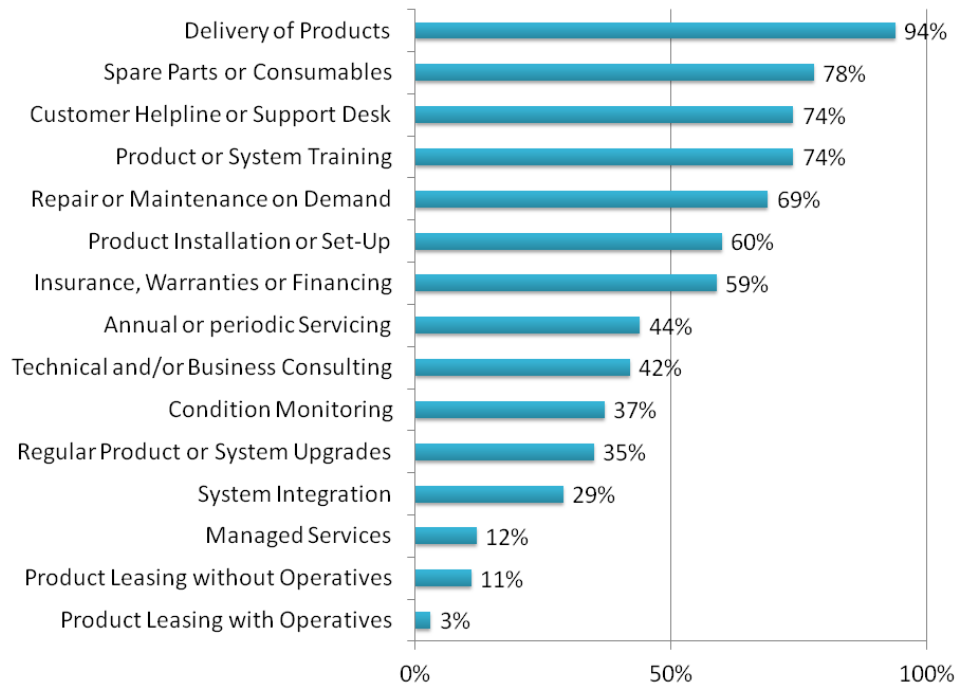
3.3.1 Services and Value Offerings

According to the discussion above a company makes a value proposition to the customer who therefore gains the benefits by co-creation, which finally is manifested in some kind of service (Vargo & Lusch, 2004). Several researchers dealing with servitization among manufacturing firms, finally found out that despite of diverging manufacturing industries, a recurring patterns concerning the mode of services provided appears. Consequently Baines, Lightfoot, Benedettini, & Kay (2009 a) identified five fundamental services consisting of training, delivery, spare parts, repair and customer helpdesks, that occur most frequently. Besides this Tether & Bascavusoglu-Moreau (2011) conducted a survey amongst UK manufacturers that finally elaborated 15 different services, which were ranked according to their extent. Comparing these two findings revealed that the Top 5 services discovered by Tether & Bascavusoglu-Moreau (2011) perfectly matched the five ones discovered by Baines, Lightfoot, Benedettini, & Kay (2009 a). The ranking of the 15 common services associated with servitization and introduced by Tether & Bascavusoglu-Moreau (2011) are illustrated in the subsequent Figure 9.

Concerning the choice of nature of the offered service provision as discussed above, one has finally to be aware of two fundamental considerations regarding the (1) *requirements of infrastructure and skills* and the desired (2) *competitive advantage*. Consequently the first service offerings illustrated in Figure 9 generally implicate a huge and widespread infrastructure network to enable their execution among the market, which actually accompanies considerable initial investments. These preliminary fixed costs emerge¹⁴ regardless whether the service of delivery, customer help-line or maintenance is executed or not (Benedettini & Neely, 2010).

¹⁴ Please refer to section 4 concerning detailed challenges regarding the execution of servitization

Figure 9 - Extent of Service Provision amongst UK Manufacturers



Source: own illustration according to Mathieu (2001b)

Additionally the service modes like delivery, repair, maintenance or warranty may appear in several industries as common ground among competition. Consequently these services still would still cause costs, however don't provide additional excitement for the customer and therefore equally don't provide any competitive advantage yet (Baines, Lightfoot, Benedettini, & Kay, 2009 a; Mathieu, 2001b; Oliva & Kallenberg, 2003; Tether & Bascavusoglu-Moreau, 2011).

Another research stream concerning service and value offerings is performed by Ng & Ding (2010a) who focused on outcome based contract performance in B2B maintenance and repair services, examining value co-creation and its delivery. In order to provide the fundamental basis for the final act of value co-creation a certain transformation of value has to take place. Consequently these three generic transformations are composed on the one hand by the (1) *transformation of materials and equipment* conducted by e.g. manufacturing, repair or installation throughout the supply chain or on the other hand by the (2) *transformation of information* like design or analysis through knowledge management. Finally also a (3) *transformation of people* may take place which therefore is characterized by training and the establishing of relationships (Ng & Ding, 2010a). The subsequent Table 7 provides a com-

pendium on the extensive mapping regarding contextual offerings into value transformation. Actually the study found that the “lion share” of its processes is designed according to the transformation of materials and equipment. Nevertheless the three transformations interact among each other, whilst executed jointly by the firm and the customer (Ng & Ding, 2010a).

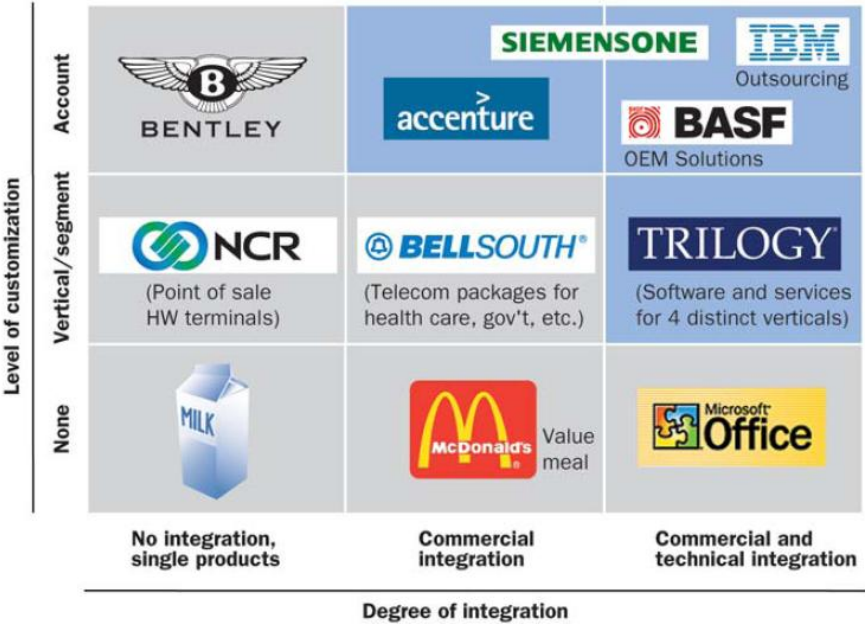
3.3.2 Classifications of Servitization

After the preliminary discussion concerning modes and extent provided of services associated with servitization, the subsequent section elaborates several classifications regarding their implementation. Consequently one can differentiate amongst three approaches comprising of the relation between (1) *customization and integration* (McKinsey, 2003; Visintin, 2012) being in contrast with the differentiation concerning (2) *services supporting the product or the client* (Mathieu, 2001a). Finally one can also examine the difference concerning the (3) *time frame* of the service execution (Almeida & Miguel, 2009; Marceau & Martinez, 2002).

Consequently one of the most critically differentiations refers to the degree of customization a company is capable to provide which has to be evaluated in relation to the extent of integration across its services applied (Visintin, 2012). Both variables consist of actually three characteristics, whereat no customization and no integration also represent a possible degree of implementation. Accordingly one level of customization is represented by *industry verticals or customer segments*, which finally come by with some differences in technical specifications, pricing and service levels. In contrast some *large accounts* probably gain highly customized and specific solutions (McKinsey, 2003). Furthermore the degree of integration is also very crucial, since it reflects whether products and services within an offer deliver additional value ahead of the sum of their parts. In doing so there is on the one hand the possibility of *commercial integration* standing for bundling of products and services into one transaction and on the other hand the *technical integration* basing on physical interoperability (Visintin, 2012). The arrangement of all these characteristics finally yields a 3x3 matrix (McKinsey, 2003) which is shown in Figure 10 below. For a better

comprehension some exemplarily companies and their corresponding business models are illustrated as well.

Figure 10 - Classification due to Customization and Integration



Source: McKinsey (2003)

Another approach is pursued by Mathieu (2001a) who considers the differentiation whether a service supports the supplier’s product or the client’s action. Typical executions regarding the *support of supplier’s product* are manifested for example by after-sales services like delivery and installation. Training services on the operation of the product are considered oppositional as ones *supporting the client’s action*. Accordingly both approaches are heading for diverging goals, whereas the former one strives to ensure appropriate operation of the product and the latter one the extraction of knowledge about customer perceptions to work on subsequent product and service offerings (Mathieu, 2001a).

Finally literature likewise provides a classification regarding the time frames of consolidating products with services. The “lynchpin” for this approach is manifested by the point-of-sale (POS) that yields the pre-purchase, at-purchase and after-sales purchase time frame (Almeida & Miguel, 2009; Marceau & Martinez, 2002). Consequently during pre-sale within the manufacturing process it’s classified as *product-service integration*, where services are linked to products while they are created. In

fact these inputs throughout the production process, concerning characteristics as well as physical composition of the product itself, are finally client-driven and therefore summarized as customization (Marceau & Martinez, 2002). Considering the moment at-purchase or after point of sale the appropriate terminology for this linking is *product-service packaging*. This packaging can be either conducted internally or by collaborating with external firms (Almeida & Miguel, 2009). Referring to the automotive industry a typical paradigm occurs while purchasing a car and complementing it by financial and maintenance services (Marceau & Martinez, 2002). The final process is characterized by a dominance of the service among the product and named as *product-service-bundling* (Almeida & Miguel, 2009). The telecommunications industry provides therefore a well established example by selling manufactured mobile telephones in conjunction with their mainly service offering concerning the access to telecommunication (Marceau & Martinez, 2002).

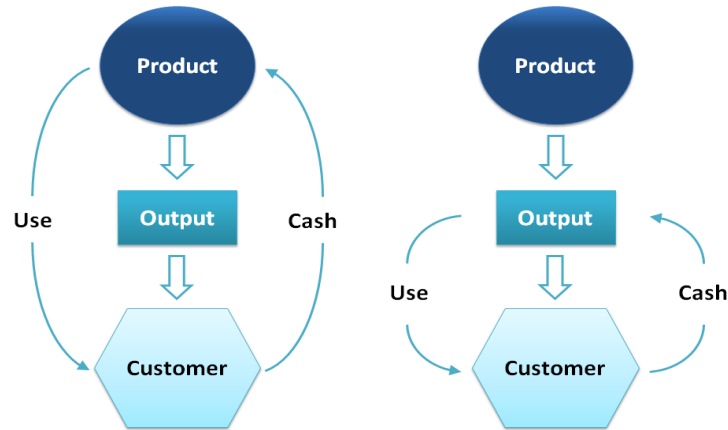
The final perception concerning these classification schemes of product-services is the fact that providing excellence in services requires decisive knowledge on clients operations and activities. Consequently these classifications enhance the identification of potential benefits carried by appropriate value propositions which therefore actually provide competitive advantages (Baines, Lightfoot, Benedettini, & Kay, 2009 a; Oliva & Kallenberg, 2003; Tether & Bascavusoglu-Moreau, 2011).

3.3.3 Options of Servitization

Conducting a servitization strategy there actually occur several options for its implementation and the resulting business models. In fact this classification differs considerably from the antecedent one, since it declares the constitution and nature of the business accounting for projected revenues (Neely, 2007). The first one dealing with this topic was Tukker (2004) considering product-service systems (PSS) who finally established three fundamental classifications manifested by product oriented PSS, use oriented PSS and result oriented. Since the topic of servitization is broader than PSS Neely (2008) enlarged this approach in recent time to finally five items adding the integration oriented and service oriented approach. The subsequent section will elaborate these five options in detail.

The concept of providing services by reason of vertical integration is very common in the manufacturing industry and finally described as (1) *integration oriented PSS*, which was added by Neely (2008) to the initial approach of Tukker (2004). Typical applications of integration oriented PSS are retail and distribution services according to the case of the oil industry. These companies on the one hand extract, refine and produce gasoline and on the other one provide a huge infrastructure for distribution and retail (Baines, et al., 2009 b; Tether & Bascavusoglu-Moreau, 2011). Finally this option is characterized by the transfer of ownership regarding the tangible product (Neely, 2008). In contrast to the first option the (2) *product oriented PSS* offers a service directly related to the considered product, which finally also results in a transfer of ownership amongst the involved parties (Tether & Bascavusoglu-Moreau, 2011). Consequently some basic services like disposal or warranty (Cohen, Agrawal, & Agrawal, 2006) as well as advanced ones like development and implementation services are conducted (Neely, 2008). The corresponding evolution of the second option by shifting the focus even more towards the augmented service, finally results in a (3) *service oriented PSS*, which was added by Neely (2008) as well. The incorporation of the service into the product actually implicates that there is no choice for the customer whether he deploys the additional service or not. Accordingly the offer finally transforms into an inseparable bundle of product and service (Brax & Jonsson, 2009). The (4) *use oriented PSS* actually constitutes a considerable change regarding the notion of the originally manufacturing business, since the ownership of the tangible product retains by the service provider (Neely, 2008). Consequently a completely new business model has to be established to meet the need of solely charging for access instead of ownership among the product (Baines, et al., 2007; Pawar, Beltagui, & Riedel, 2009). This evolving relation and the requiring new business model scheme are illustrated in Figure 11 below. The final characteristic concerning the options of servitization is manifested by the (5) *result oriented PSS*, which actually represents the most devilish occurrence in terms of applying a servitization strategy for a manufacturing company. In fact the product is now irrevocable replaced by a substituting service. The most popular example is the introduction of voicemail services to replace individual answering machines (Neely, 2008).

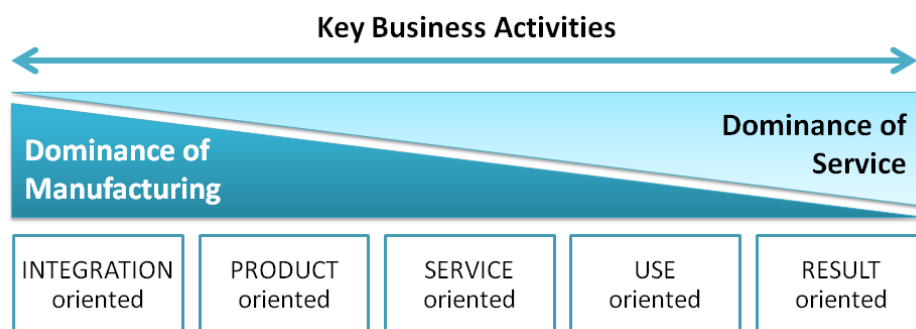
Figure 11 - Shift to Access instead of Ownership of Products



Source: own illustration according to Baines et al. (2007)

Concluding it's important to highlight the differences between the solely classification of servitization and the currently discussed options of it. Accordingly the classifications enhance the understanding about the nature of the service offered and the inherent requirements of the customer heading for potential benefits carried by appropriate value propositions to gain competitive advantage (Baines, Lightfoot, Benedettini, & Kay, 2009 a; Oliva & Kallenberg, 2003; Tether & Bascavusoglu-Moreau, 2011). The options of servitization in contrast reflect on the fundamental idea about it referring to the extent of its application. Considering a manufacturing company applying an integration oriented servitization approach to gain competitive advantage, nevertheless remains mostly a manufacturing company. However executing one of the other options of servitization pushes company's key business activities towards more service dominated ones. Finally applying a result oriented servitization approach transforms the company ultimately to a service providing one. This fundamental idea and the corresponding transition of servitization are illustrated in the subsequent Figure 12.

Figure 12 - Transition of Servitization



Source: own illustration

3.4 Summary

Actually one has to be aware that although servitization exclusively deals with services, its origin and motivation arises from the manufacturing industry, since these services are augmented elements of the tangible product offer. The aim is to co-create value with the customer in order to gain benefits by enriching its product offers with services.

The concept of servitization is driven on the one handside by general environmental aspects like decreasing profit margins and revenues in manufacturing and equally internal drivers concerning financial, strategic and marketing aspects emerged on the other handside. Consequently higher margins on services tempt financial consideration whilst the competitive advantage due to differentiation drives strategic aspects. Finally also marketing issues are served since servitization pushes sales and tightens relationships resulting in a customer lock-in.

Since the desired value co-creation is carried out by the underlying services, it's crucial to know about their characteristics and modes. Companies usually apply services like training, delivery, spare parts, repair and customer helpdesks, which in any case establish benefits for customers. Unfortunately these are considered in some industries as common ground, why they cannot provide any competitive advantage yet. In order to enhance the knowledge and understanding of customer's value perceptions one can classify services regarding the degree of customization in relation to its integration. Actually servitization strategies can be consolidated to five options consisting of integration oriented, product oriented, service oriented, use oriented and finally result oriented product-service systems (PSS). Finally the options of servitization describe the transition from a pure manufacturing company to a service provider.

4 Challenges and Transition of Servitization

The concept of servitization bears a lot of benefits both for the applying company and the profiting customer, which was examined in detail in the precedent chapter. Consequently several companies are heading this direction tempted by these expectations, possibly even not aware about the inherent challenges. Since there are some issues even threatening existence of companies, and some other pretty easy to overcome, it's by all means necessary to consider and deal with this matter. Additionally this chapter will also provide a certain guideline concerning the appropriate transition, in order to ease the approach of servitization.

Hence, this chapter will open up with some general considerations regarding failure in servitization named "service paradox" and also discuss corresponding managerial issues. The second and third section will elaborate the inherent challenges of servitization in detail, which are separated to back-end internal challenges and customer facing front-end issues. The fourth section finally deals with the transition in servitization from a pure manufacturer to a pure service provider.

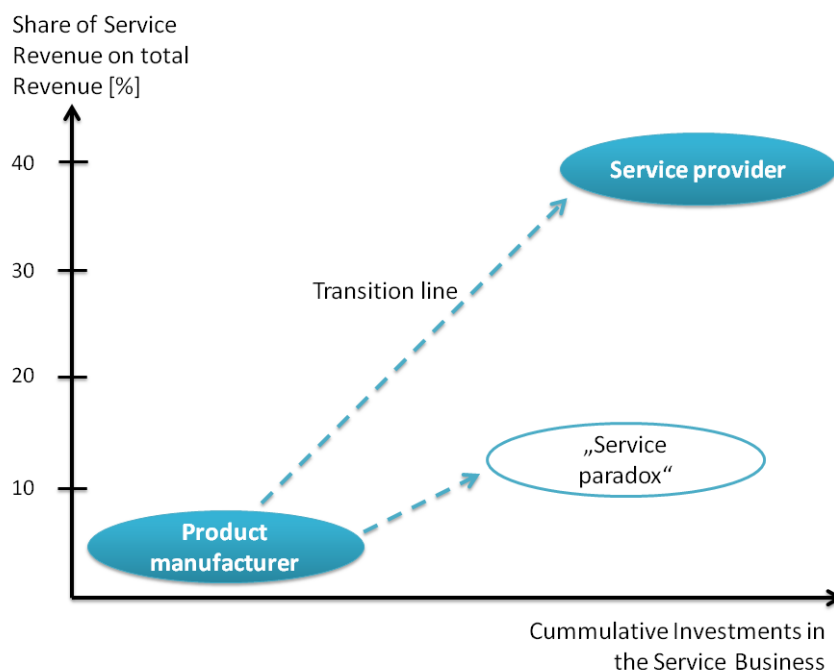
4.1 General Considerations

Since there are some challenges that may affect a certain business, the first section strives to give a brief introduction about the consequences of failing in servitization and its precedent triggers regarding management issues. Consequently the first part describes the service paradox, which embodies the implications of failure, while the second one deals with managerial issues stemming from diverging beliefs and perceptions. The final section will elaborate a certain framework in order to examine the challenges and drawbacks more in detail, which will be discussed in section 4.2 and 4.3 afterwards.

4.1.1 The Service Paradox

Rolling back the options of servitization as discussed in the former chapter, the concept of servitization actually aims for a transition from a manufacturing company to a service provider (Baines, Lightfoot, Benedettini, & Kay, 2009 a; Neely, 2007; Oliva & Kallenberg, 2003; Vandermerwe & Rada, 1988). This transition is driven by several intentions concerning financial aspects as higher profit margins, strategic matters like differentiation or marketing benefits from customer lock-in (Baines, et al., 2007; Bascavusoglu-Moreau & Tether, 2011; Falk & Peng, 2012; Mathieu, 2001b; Tether & Bascavusoglu-Moreau, 2011; Vandermerwe & Rada, 1988; Velamuri, Neyer, & Möslin, 2011). Despite this vast amount of advantages several firms fail in applying the servitization strategy and exploiting its benefits, which consequently is called the *service paradox* (Gebauer, Fleisch, & Friedli, 2005; Neely, 2008; Visnjic & van Looy, 2011). Accordingly there are several reasons for this occurrence, which can be explained best by drawing the transition line of servitization shown in Figure 13.

Figure 13 - The Service Paradox



Source: own illustration according to Gebauer et al. (2005)

Consequently the process of servitization is a step-wise transition between two extremes of the continuum manifested on the one hand side by the pure product manufacturer and on the other hand side by the service provider (Baines, Lightfoot,

Benedettini, & Kay, 2009 a; Neely, 2007; Vandermerwe & Rada, 1988). In order to explore the service paradox, one has to align this transition of business activities with the corresponding share of revenues they account for (Gebauer, Fleisch, & Friedli, 2005; Visnjic & van Looy, 2011). Considering the pure manufacturer the core product is the main source of revenues, whereas the corresponding add-on services enhance the differentiation of the product in terms of marketing strategy. The service provider in contrast operates the other way round extracting the lion share of his revenues out of the offered service, whilst the matching products only serve as add-ons (Baines, Lightfoot, Benedettini, & Kay, 2009 a; Neely, 2007; Vandermerwe & Rada, 1988). In fact companies who successfully execute servitization deem somewhere along the transition line, depending on their business focus and the applied options. Consequently services contribute a considerable share on total revenues and therefore enhance business. Actually executing the wrong service or executing the right one wrong¹⁵ finally causes high operating costs, which therefore cannot contribute an appropriate share to total revenues (Gebauer, Fleisch, & Friedli, 2005; Neely, 2008; Visnjic & van Looy, 2011).

4.1.2 Management Issues

Essentially the task of servitization is a task of implementing a new business model and strategy, which actually is a complex and comprehensive process (Bascavusoglu-Moreau & Tether, 2010; Claes & Martinez, 2010; Davies, Brady, & Hobday, 2006; Oliva & Kallenberg, 2003; Weeks & Plessis, 2011). Accordingly Morgan, Levitt & Malek (2008) found that a vast number of expensive, well-intended strategies, finally failed in the execution phase, which actually represents a significant waste of resources that could have been used more profitably elsewhere. The omnipresent rapid change of business environments which definitely represents a tremendous challenge, characterizes by all means the strategic management process whilst implementing the derived strategies (Brax, 2005; Morgan, Levitt, & Malek, 2008). Consequently about 90 % of companies fail to execute their scheduled strategies (Weeks & Plessis, 2011). In fact two decided issues occur pretty frequently manifested on the one hand side by the lack of executive's knowledge concerning a systematic ap-

¹⁵ Please refer to section 4.4.3 concerning service success factors

proach in order to identify and implement the right arrays of actions. On the other hand side an unmeant overestimation of own capabilities to deal with the inherent changes and challenges of servitization finally results in a lack of implementing the strategy (Morgan, Levitt, & Malek, 2008).

Another management issue arises from the diverging ideas goods manufacturer and service provider are finally after. Hence manufacturer try to benefit from economies of scale, which therefore demands for standardization of production. Service provider in contrast have to customize their products to meet customer needs entirely to maximize their satisfaction (Mellet, 2008). Accordingly manufacturer and service provider are striving for different goals, which consequently also affect the design of service that is characterized by its diverging nature considering the straight product and fuzzy service (Brax, 2005; Weeks & Plessis, 2011). In fact the decision on a service-oriented strategy implicates necessary adaptations concerning organizational structures and processes (Baines, Lightfoot, Benedettini, & Kay, 2009 a; Davies, Brady, & Hobday, 2006; Oliva & Kallenberg, 2003; Vandermerwe & Rada, 1988).

4.1.3 Classification of Challenges

Actually barriers and issues hindering the appropriate implementation and execution of servitization are characterized by versatile origins. Several academic authors elaborated this topic, ultimately revealing related results. Accordingly the extensive literature review of Niemi & Buren (2012) finally identified five characteristics consisting of organizational culture, pricing, risk absorption, complicated customer demand and close cooperation. Additionally several other researchers retrieved characteristics of servitization challenges by conducting case studies or interviews. Consequently there are also classifications of challenges regarding servitization manifested by marketing-, production-, delivery-, product-design-, communication- and relationship challenges (Brax, 2005) as well as embedded product-service culture, delivery of integrated offering, internal processes and capabilities, strategic alignment and supplier relationships (Martinez, Bastl, Kingston, & Evans, 2010).

In fact, regarding certain points there is accordance, however still diverging in total. In order to provide a common framework for the subsequent section dealing with challenges, a new classification will be suggested to consolidate the related findings. Consequently the barriers and challenges will be separated according to their appearance manifested by front-end and back-end activities. This arrangement stems from the research of Davies, Brady & Hobday (2006) who derived a basic organizational structure for servitizing companies consisting of front-end customer-facing units and back-end units separated into product- and service-units. The overarching strategic center finally coordinates all these collaborating units. The subsequent Table 7 illustrates the corresponding allocation of barriers among front-end and back-end activities.

Table 7 - Challenges separated among Front-End and Back-End Activities

	Front-End Activities	Back-End Activities
Niemi & Buren (2012)	<ul style="list-style-type: none"> – Pricing – Risk Absorption – Complicated Customer Demand 	<ul style="list-style-type: none"> – Organizational Culture – Close Cooperation
Brax (2005)	<ul style="list-style-type: none"> – Marketing Challenge – Product-Design Challenge – Communication Challenge – Relationship Challenge 	<ul style="list-style-type: none"> – Production Challenge – Delivery Challenge
Martinez, Bastl, Kingston & Evans (2010)	<ul style="list-style-type: none"> – Delivery of integrated offering – Strategic Alignment 	<ul style="list-style-type: none"> – Embedded P-S Culture – Internal Processes and Capabilities – Supplier Relationships

Source: own illustration

A brief review of the table above instantly highlights two confusions originating from the primary classification regarding the topic of relationships and delivery, since these terms are classified in diverging categories. According to Brax (2005), the relationship challenge draws on a lack of credibility between the customer and the service provider, whilst Martinez et al. (2010) identified challenges regarding the relationship between the company and its supplier. Finally Brax (2005) engaged on the delivery challenge concerning internal organizational and structural issues, whilst Martinez et al. (2010) considered challenges regarding diverging service/value offer-

ing perceptions. Consequently these comparisons affirm the suggested classification, which finally serves as framework in the subsequent discussion.

4.2 Back-End Challenges

According to the separation suggested in the section above, the subsequent one will examine back-end challenges occurring internally within the company. In order to give one an understanding of this matter the primary section will discuss several issues concerning organizational structure. Consequently the subject of occurring costs, that refers to the given infrastructure are elaborated afterwards. Since the adoption of organizational structure inherently affects internal processes, the final section discusses challenging supplier relationships as well.

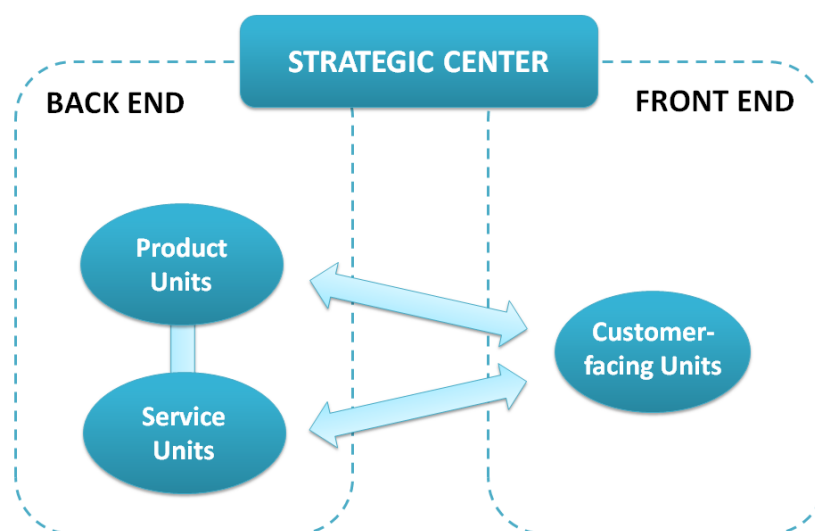
4.2.1 Organizational Structure

In fact, the adaptation of a servitization strategy implicates the transition from manufacturing to servicing issues within the company, which finally requires considerations amongst at least three tasks. These are manifested by establishing a (1) *separate service organisation* that consequently needs a (2) *common culture and mindset* in order to provide a basis for appropriate (3) *information exchange*, which will be discussed in the following (Baines, Lightfoot, Benedettini, & Kay, 2009 a; Brax, 2005; Davies, Brady, & Hobday, 2006; Gebauer, Fleisch, & Friedli, 2005; Martinez, Bastl, Kingston, & Evans, 2010).

Organisations applying servitization are obviously faced with the need of acquiring new capabilities in order to compete in these new service spaces. Consequently processes supporting design and transition from product to service have to be aligned to enable adequate service provision (Martinez, Bastl, Kingston, & Evans, 2010). Since the customers with their current and future needs are the lynchpin of value co-creation, one has to build their organization around them in order to achieve success in servitization (Davies, Brady, & Hobday, 2006). The corresponding necessity for an appropriate service infrastructure consequently demands the establishment of a separate service organization to meet the goals set for the service

strategy (Davies, Brady, & Hobday, 2006; Weeks & Plessis, 2011). The execution of this task can be enhanced or eased by operating this unit according to an independent service organization, which therefore relies on performance measures regarding customer- and employee-satisfaction and general business success (Gebauer, Fleisch, & Friedli, 2005). Accordingly Davies, Brady & Hobday (2006) suggested a specific reconfigurable framework for company's organizational restructuring, consisting of front-end customer-facing units, which are supplied by corresponding back-end capabilities, comprising of product units and service units. In fact, this three-part organizational structure is completed by a supervising strategic center to provide essential leadership. The allocation of this organizational structure is illustrated in the following Figure 14.

Figure 14 - Three-Part Organizational Structure



Source: own illustration according to Davies, Brady & Hobday (2006)

Within an established organization the behavior of its members is guided through a system of shared actions, values and beliefs which is actually defined as corporate culture (Weeks & Plessis, 2011). In fact, there also evolves a certain culture within the separate established service organization, which has to be aligned and guided by management in order to meet the desired service strategy. Since the underlying values of manufacturing and service are conflictive management is faced with a challenging task to align manufacturing's efficiency and economies of scale with service-oriented innovation and customization values (Baines, Lightfoot, Benedettini, & Kay, 2009 a; Gebauer, Fleisch, & Friedli, 2005). Furthermore one has to expect internal

resistance among employees due to misunderstanding or apprehension regarding infrastructural changes (Mathieu, 2001b) since company's long-standing practices and attitudes are altered (Oliva & Kallenberg, 2003; Vandermerwe & Rada, 1988). Accordingly the most important issue in terms of organizational culture management is to find the appropriate people, which acclaim to company's strategic beliefs (Mathieu, 2001b), and develop a certain passion for service, in order to meet and exceed customer expectations in providing excellence service (Martinez, Bastl, Kingston, & Evans, 2010).

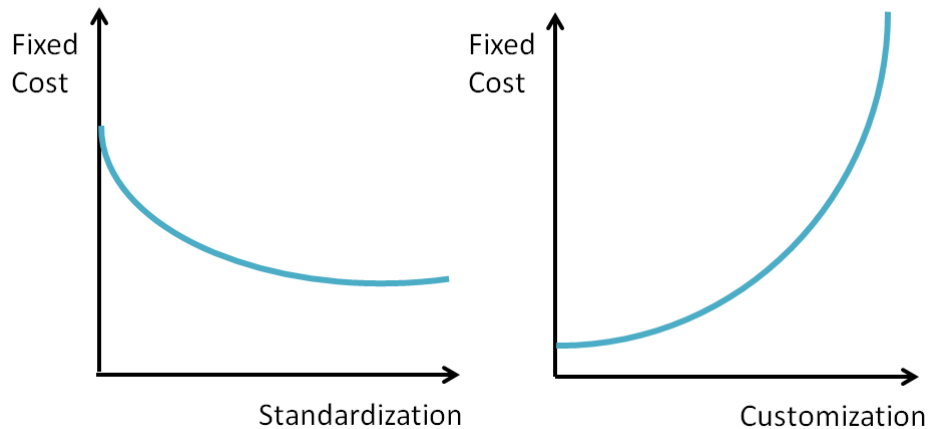
Finally one has to be aware of the inherent drastically rising demand of additional information executing servitization strategies (Brax & Jonsson, 2009). Accordingly servicing a large installed base of products requires information concerning applied configuration modes, current conditions and other relevant data for maintenance (Cuthbert, McFarlane, & Neely, 2012). Difficulties in terms of accessing this information arise from very basic reasons like the lack of appropriate delivering of supplier documentation for their items, or short-term changes during installation without proper updating in documents (Brax, 2005). Consequently an accurate operation of delivery and information infrastructure accounts significantly for succeeding in servitization businesses, which therefore will be discussed in the following.

4.2.2 Costs and Infrastructure Issues

Considering the costs of executing and performing a servitization strategy, one has inherently to deal with both, customer satisfaction and productivity tasks. However there is no firm stand in literature yet whether these two goals are compatible or comprising trade-offs (Anderson, Fornell, & Rust, 1997; Visnjic, Neely, & Wiengarten, 2012). In fact, the literature review conducted by Anderson, Fornell & Rust (1997) revealed two diverging viewpoints considering this matter. Consequently one research body advocates that improved customer satisfaction enhances productivity through reduction of effort concerning the handling of returns, rework, warranties and complaint management. Another party negates the compatibility of customer satisfaction and productivity due to the increased costs regarding the improvement of product attributes and product design (Anderson, Fornell, & Rust, 1997). The

trade-off between customer satisfaction and productivity is furthermore manifested by the diverging approaches of customization and standardization, whereas customization in general maximizes customer satisfaction and vice versa (Visnjic, Neely, & Wiengarten, 2012). Customization and standardization are two mutually dependent, but in general often conflicting, characteristics of quality, which therefore account for different cost structures. According to common operations management literature, overall costs of standardization decline with its increasing implementation, whereas a growing degree of customization equally will cause growing costs in contrast (Anderson, Fornell, & Rust, 1997). This correlation is illustrated in the subsequent Figure 15.

Figure 15 - Cost Structure of Customization and Standardization

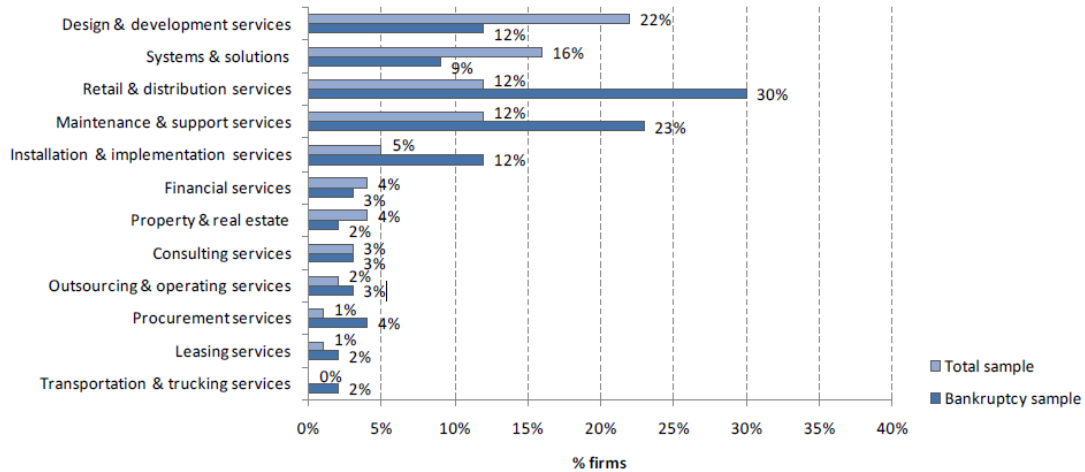


Source: own illustration according to Anderson, Fornell, & Rust (1997)

In fact, the degree of customization or standardization is likewise limited by the nature of the conducted service offering, which therefore may comprise substantial financial drawbacks. Considering distribution services one has to be aware of the high fixed costs to enable a broad distribution, which decreases profit margins considerably in lower demand periods. Similar non-elastic behaviour occurs for maintenance services which require a large installed base in order to repay the costs for delivering the service (Benedettini & Neely, 2010). Accordingly potential drawbacks of certain service types rely on the nature of its corresponding product. Considering product design and development services, that are consequently still combined with complex and technologically intensive products, which therefore don't generate high fixed costs like running a broad distribution network (Brax, 2005; Neely, 2008).

These findings refer to the research of Benedettini & Neely (2010) who conducted an extensive survey amongst servitizing manufacturing companies in order to identify challenges and reasons for bankruptcy, which are consolidated in Figure 16 below.

Figure 16 - Service Types with higher Potential for Bankruptcy



Source: own illustration according to Benedettini & Neely (2010)

Reviewing Figure 16 above confirms the discussion above, whereas services that require a large base of investments in infrastructure and therefore high fixed costs for operation (e.g. retail, maintenance or installation) tending rather falling victim of bankruptcy. Offering design & development services or systems & solutions remains in the end fairly beneficial for companies in comparison to providing retail & distribution services, maintenance & support services and installation & implementation services, accounting for the lion share of bankruptcy cases (Benedettini & Neely, 2010).

Actually there are rather more servitizing companies declaring bankruptcy in comparison to pure manufacturers, which relies to the lack of exploiting their financial benefits (Benedettini & Neely, 2010). Corresponding to the service paradox discussed in the former section Gebauer et al. (2005) pointed out that only 11.1 percent of manufacturing companies earn more than 40 percent of their revenue through services, while more than 35 percent of the companies only generate 10 percent of their revenue through services and are therefore struggling with the service paradox. According to Benedettini & Neely (2010) this is due to the fact, that

servitization indeed reduces some of the traditional risks affecting manufacturing firms, but also introduces some new ones considering service business.

4.2.3 Supplier Relations

Finally considering back-end activities related to precedent suppliers one has to be aware of the inherent and necessary greater degree of cooperation. This is based on the occurring need for more comprehensive insights on problems and applications of customers (Niemi & Buren, 2012). Nevertheless thinking styles and attitudes regarding supplier issues still tend to be the same as they were whilst performing mainly product centred. Consequently this hindered external frameworks from successfully supporting complex service offering, since the changes in relationships between the product-service provider and its customers are not reflected in the relationships with the provider's suppliers (Martinez, Bastl, Kingston, & Evans, 2010). Actually one of the most important issues is the alignment of internal as well as external mindsets and understandings between collaborating parties. Consequently a solid base for know-how intensive information exchange has to be established, in order to provide outstanding service provision (Brax, 2005).

4.3 Front-End Challenges

Consequently this chapter handles the opposite part of the basic organizational structure regarding the customer-facing front-end challenges. In fact, one has to be aware that the source of front-end challenges stems from the underlying desired benefits of customers, which therefore is discussed in the initial section. Other challenges are constituted by the appropriate pricing and the shift of risks due to the emerging business models, which are elaborated in the second and third section.

4.3.1 Derivation and Assessment

Referring to the text above, it's intelligible that the concept of servitization implies several benefits and motivations for manufacturing companies¹⁶, concerning financial, strategic and marketing issues (Baines, Lightfoot, Benedettini, & Kay, 2009 a; Mathieu, 2001b; Neely, 2007; Vandermerwe & Rada, 1988). Since the customer represents an important and essential element regarding value co-creation, which therefore constitutes the premise of servitization, it's very crucial to focus on its perception concerning his own benefits and goals (Hypko, Tilebein, & Gleich, 2010; Vargo & Lusch, 2008). Consequently front-end issues for manufacturing companies are manifested by the challenge to meet the benefits that customer desire and percept. According to the literature review of Hypko, Tilebein & Gleich (2010) one can separate most customer expectations into two categories consisting on the one hand side of increased performance due to productivity and quality and on the other hand side a resulting decrease of costs. Considering maintenance of increased productivity and quality, the shift of risks from customer to the service provider, states a common approach, which in general is inherently applied with cost optimization (Martinez, Bastl, Kingston, & Evans, 2010; Niemi & Buren, 2012). Consequently both considerations are discussed more in detail in the subsequent sections, after primarily elaborating approaches of assessing these customer benefits.

¹⁶ Please refer to section 3.2 concerning benefits and drivers of servitization

According to the text above most challenges arise from the need to meet the expectations of customers, which therefore implicates that one has to understand the creation of value through the eyes of the customer and their corresponding evaluation. This stems from the increasing number of customers focusing on their core competences which therefore demands for more integrated offerings and solutions (Borchardt, Sellitto, Pereira, & Petry, 2010). In fact, literature dealing with customer solutions indentified diverging perceptions of quality between customers and suppliers, which confirms the need for evaluation. Beyond that, literature provides very limited considerations on this topic (Raja, Martinez, & Claes, 2010; Tuli, Kohli, & Bharadwaj, 2007).

Table 8 - Assessing Front-End Activities

Activity	Items
Installation	1. Capability to define requirements, methods and schedule for installation (pre-installation) 2. Capability to perform installation in compliance with pre-installation 3. Capability to meet deadlines and schedules 4. Capability to perform installation that will not require later fixes
Training	5. Training's capability to meet previously set technical targets 6. Capability to provide/make available adequately configured equipment (hardware), software and access during training sessions 7. Instructors' capability to pass on the technical knowledge outlined in the course syllabus, communicate efficiently, and establish rapport
Customization	8. Capability to identify clients' needs and demands as regards product customization 9. Capability to propose adequate alternatives to clients and companies (in terms of technological effort, deadline and cost) 10. Capability of implemented customizations to fulfil clients' needs and demands 11. Capability to implement customizations and/or and provide clients with subsequent training 12. Capability to meet deadlines set for customization
Support for use	13. Capability to fulfil clients' demands as regards product use 14. Capability to meet deadlines set with clients
Consultancy	15. Capability to implement clients' IT management activities 16. Capability to fulfil clients' demands for support for use
Trouble-shooting and product upgrade	17. Capability to understand clients' problems 18. Capability to solve clients' problems 19. Capability to deliver solutions within the set deadline 20. Capability to consolidate improvements resulting from 'product troubleshooting' activities 21. Capability to inform clients of upgrade 22. Capability to meet deadlines and make upgrade available

Source: cf. Borchardt, Sellitto, Pereira & Petry (2010)

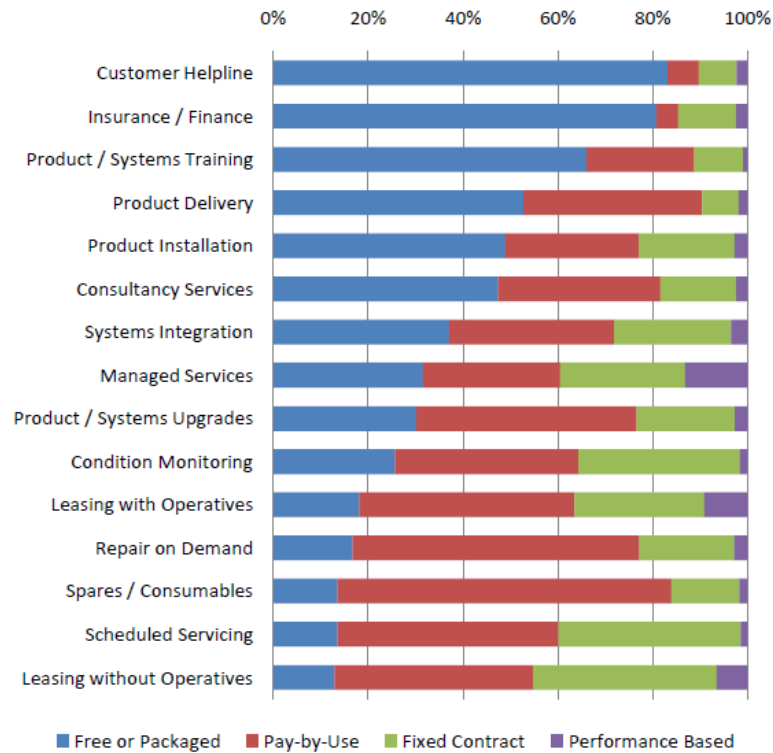
Actually the common perspective regarding this, focused on the embedded dimension which finally declares a presence of product/service attributes, for which the customer is prepared to pay regarding to their supposed potential (Vargo & Lusch, 2004). Although there is no firm stand in literature regarding appropriate characteristics for evaluating service operations, it ultimately agrees that it cannot be measured by traditional product based measures (Gebauer, Fleisch, & Friedli, 2005; Raja, Martinez, & Claes, 2010). Finally Borchardt, Sellitto, Pereira & Petry (2010) derived a very basic but comprehensive approach to evaluate after-sales services. Their approach is based on six subcategories regarding front-end activities consisting of installation, training, customization, support for use, consultancy and troubleshooting, which therefore account for total 22 assessment items. This comprehensive checklist for the evaluation front-end activities is displayed in Table 8 above.

4.3.2 Pricing

Since customers expect beside of increased productivity and quality a reduction of operating costs as well, it's very crucial for the supplier to offer appealing prices. Nevertheless manufacturer would like to gain financial revenues from this serving activity as well, which consequently is considered as one of the most critical challenges in servitization (Baines, et al., 2007; Colen & Lambrecht, 2012; Niemi & Buren, 2012). However, according to the research of Tether & Bascavusoglu-Moreau (2011) most of services related to products are offered ultimately for free. The number of pay-by-use or performance based offerings is actually very tiny, which is illustrated in Figure 17 below.

Actually this approach isn't very smart due to two corresponding reasons, which finally concern on the one handside financial aspects as well as marketing aspects on the other handside. Consequently, companies shed considerable revenue streams (Tether & Bascavusoglu-Moreau, 2011; Neely, 2008) and inherently suggest lower value of their offering (Frei, 2008; Reinartz & Ulaga, 2008).

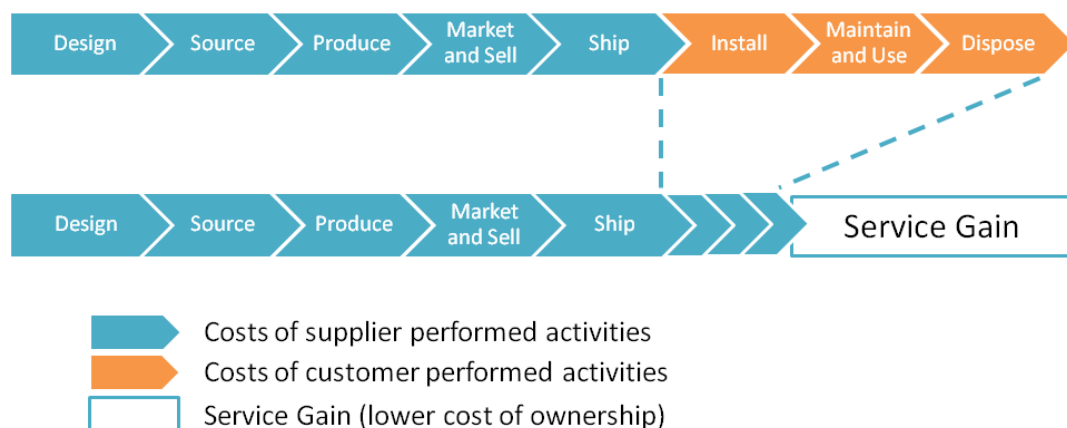
Figure 17 - Revenue Modes of Service Provision amongst UK Manufacturer



Source: cf. Tether & Bascavusoglu-Moreau (2011)

In fact, customers appreciate the value of services more if they are with costs. Since the offer of servitization is based on ownerless consumption, the effective pricing is ultimately a very delicate issue for companies. In order to deal with that, one has to consider by all means the whole product/service life cycle, to achieve reliable revenues (Colen & Lambrecht, 2012; Niemi & Buren, 2012). Actually the research of Colen & Lambrecht (2012) identified the same behaviour regarding customer perception, which is illustrated in Figure 18 below.

Figure 18 - Customer Benefit through Service Gain



Source: own illustration according to Colen & Lambrecht (2012)

Consequently, customers consider their own maintenance costs as well in order to reduce costs by saving on extensive maintenance obligations or intensive personnel training (Hypko, Tilebein, & Gleich, 2010). Regarding Figure 18 above a typical life cycle of a product consists of efforts generated before the purchase and therefore has to be carried by the supplier and costs occurring after the purchase of this product, which consequently have to be carried by the customer. In fact, customer strive to reduce their after-sales cost, referring to installation, maintenance or dispose to a minimum. Accordingly, the challenge of suppliers is to provide a service offering that comprises the after-sales services but still appears cheaper for the customer, than conducting the activity on its own. Customer will therefore profit from the *Service Gain* and likewise tied-in to the supplier (Colen & Lambrecht, 2012). As a consequence customer don't have to bear any fixed costs related to the ownership of machinery and therefore gain from reducing risks since fixed costs turned into provisional variable costs (Hypko, Tilebein, & Gleich, 2010). Referring to that the subsequent section will elaborate the shifts of risks and its implications both for customer and suppliers.

4.3.3 Shifting Risks

In fact, applying exemplarily servitization through performance based contracting results in a transfer of risks from the customer to the service provider, who has to maintain proper operation of its devices as well as the expected output (Hypko, Tilebein, & Gleich, 2010; Martinez, Bastl, Kingston, & Evans, 2010; Niemi & Buren, 2012). Actually a very prominent example of shifting risks from the customer to the manufacturer is constituted by Rolls Royce business model "Power by the hour" offering a guaranteed and predefined amount of operation hours of their jet engines instead of solely selling them (Ng & Ding, 2010a). Another benefit regarding productivity and quality is settled by ideal allocation of customer financial resources, which bears distinctive effects concerning seasonal businesses and their sporadic usage of items. Consequently servitizing manufactures serving theses businesses are likewise faced with instable income revenues (Neely, 2008). Finally customers may gain increased performance quality by embracing servitization offerings through exploiting latest technological achievements (Belvedere, Grando, & Bielli, 2011). This consti-

tutes on the fact that service provider strive to achieve customer satisfaction and simultaneously establish competitive differentiation through offering latest machinery and equipment. Thus the service provider has to deal with uncertainty concerning emergent technologies, which may decrease the market value of its offering (Hypko, Tilebein, & Gleich, 2010).

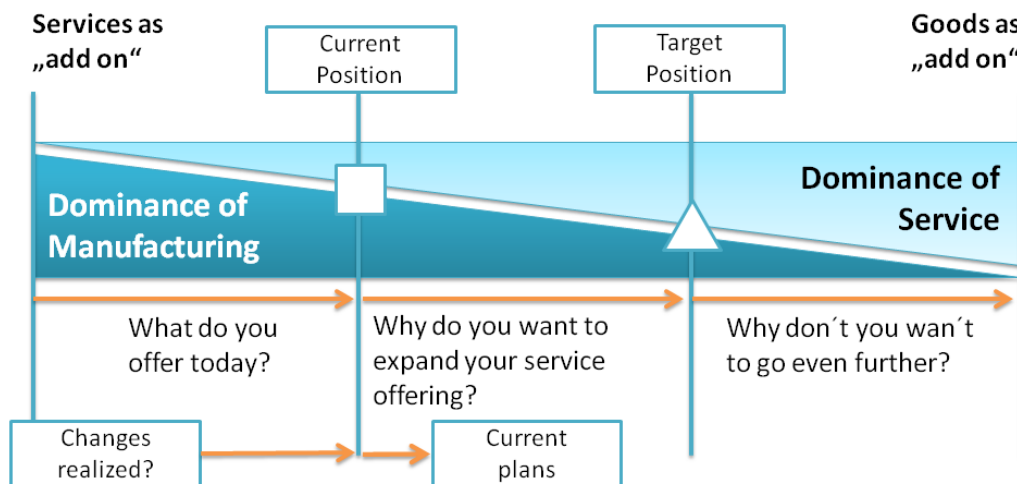
4.4 Transition to Servitization

Actually the most difficult step is the first one towards a new, uncertain development. In order to provide a guideline for conducting the transition to servitization, the subsequent chapter elaborates a three-level framework. Accordingly, the first section elaborates a certain route map to ease the access for this approach. Consequently the second section examines some strategic considerations concerning prospective businesses, with regard to companies existing capabilities. The third section depicts success factors considering a service business to complete the transition to servitization.

4.4.1 Transition Route Map

Actually servitization doesn't represent a certain mode of applying a service to a good, but more the transition from a manufacturer to a service provider. Consequently, this evolution is characterized by several benefits for both customer and supplier but also implicates considerable challenges (Baines, Lightfoot, Benedettini, & Kay, 2009 a; Neely, 2008; Oliva & Kallenberg, 2003). According to the text above one has to consider organizational restructuring, developing new capabilities and even the change of the business model from transaction- to relationship-based, which states a substantial challenge for management since most tasks are new for them. Finally the aim of a company applying servitization is constituted by gaining certain advantages concerning financial, strategic or marketing tasks, through operating somewhere on the transition line between the product service continuum. Oliva & Kallenberg (2003) illustrated this evolution according to Figure 19 below.

Figure 19 - Product/Service Transition

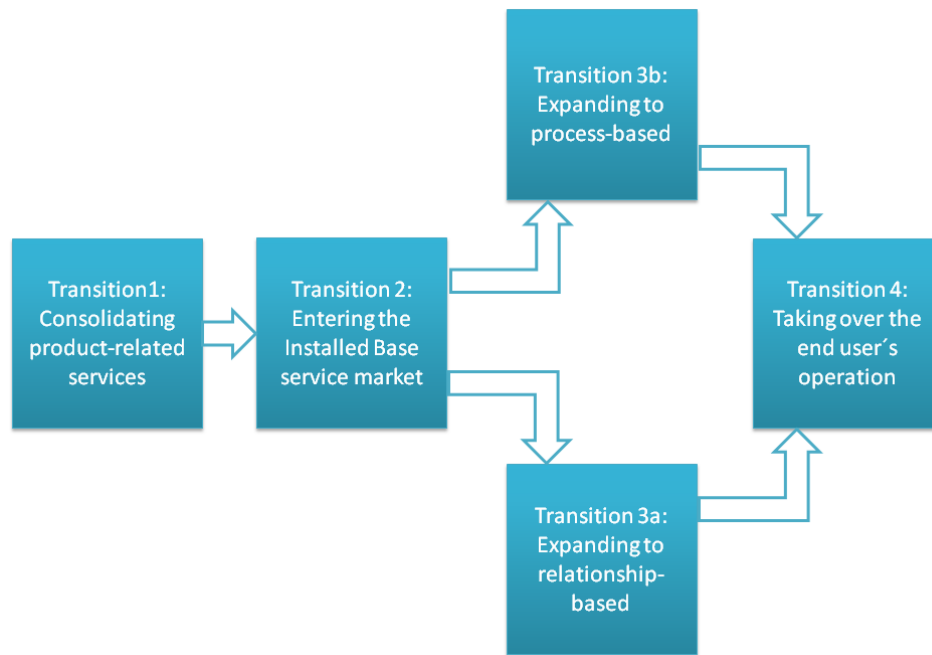


Source: own illustration according to Oliva & Kallenberg (2003)

As illustrated above, the product/service transition comprises of two extremes, manifested by the pure manufacturer on the one handside treating services merely as “add-on” and the pure service provider on the other side considering therefore goods as “add-on”. Moving along this transition line represents several diverging options of servitization, which alter with regard to the extent of service dominance (Gebauer, Fleisch, & Friedli, 2005). Consequently the procedure of servitization starts with the evaluation of one’s current position on this change line, which is followed by pondering the trade-off between desired benefits and prospective challenges on the way to the required target position (Oliva & Kallenberg, 2003). Nevertheless it seems quite difficult to get in touch with this complex approach initially, which therefore can be separated into four stages comprising a servitization route map (Mills, Neaga, Parry, & Crute, 2008). Accordingly it summarizes the incorporation of services into ones offerings, which is displayed in Figure 20 below.

The (1) first step of this route map regarding the consolidation of product-related services stems from the pretension that most manufacturing firms provide services anyway in order to sell and support their products. Since they emerged from diverging parts within the organization they barely contribute solid revenues and are therefore considered as unprofitable necessity to sell the product (Mills, Neaga, Parry, & Crute, 2008).

Figure 20 - Servitization Route Map



Source: own illustration according to Mills, Neaga, Parry, & Crute (2008); Oliva & Kallenberg (2003)

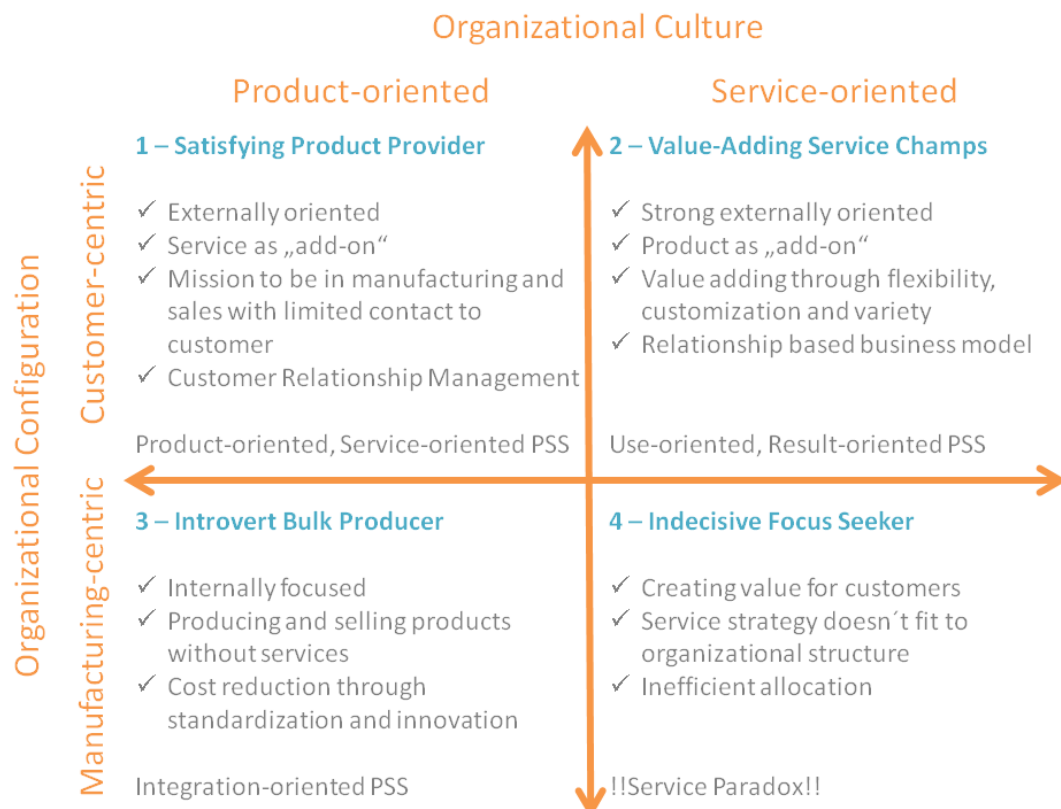
In order to improve the service efficiency, the recommended result of the first stage constitutes of a consolidation under a single organizational unit, which comes with a comprehensive monitoring system to assess its performance (Oliva & Kallenberg, 2003). Going on with the transition the (2) second step is characterized by the recognition of profit opportunities within the precedent defined service field and the corresponding structural adaptations. Although this procedure is supported by the previously implemented monitoring system, one is still faced with challenges regarding cultural change and creating capable service infrastructures (Mills, Neaga, Parry, & Crute, 2008). Finally the second stage is completed by establishing a well-functioning service organization, which can be evaluated regarding customer and employee satisfaction and general business success (Oliva & Kallenberg, 2003). The subsequent (3) third stage is manifested by a selection towards a distinctive direction. Consequently the focus of customer interactions can be changed either from transaction- to relationship-based or from product efficacy to product efficiency. The former one changes the way the service is finally priced whereas the latter one transfers the product to a part of the offering (Mills, Neaga, Parry, & Crute, 2008). The final development of necessary and considerable capabilities assigns the goal of the third stage (Oliva & Kallenberg, 2003). Actually the (4) last stage yields a pure service provider, who adopts customer's operation risks and responsibilities taking

over customer's maintenance or operating organization (Mills, Neaga, Parry, & Crute, 2008; Oliva & Kallenberg, 2003).

4.4.2 Setting the Business

Considering the transition of servitization illustrated in figure 19 above, the procedure always starts with the evaluation of one's current position regarding modes of implementation (Mills, Neaga, Parry, & Crute, 2008; Oliva & Kallenberg, 2003). Consequently this consideration aims at companies internal capabilities focusing on organizational structure and know-how. Kinnunen (2011) derived therefore a certain framework, comprising of two dimensions represented by organizational culture and organizational configuration, which examines the portfolio formed by dedicated strategic business units (SBU). The framework enables a screening regarding product- or service-oriented organizational culture which is opposed to manufacturing- or customer-centric organizational configuration, in order to evaluate how capable a certain section is in applying servitization (Kinnunen, 2011). The resulting four quarters of the framework are displayed in Figure 21 below.

Figure 21 - Framework to examine Companies Servitization Capabilities



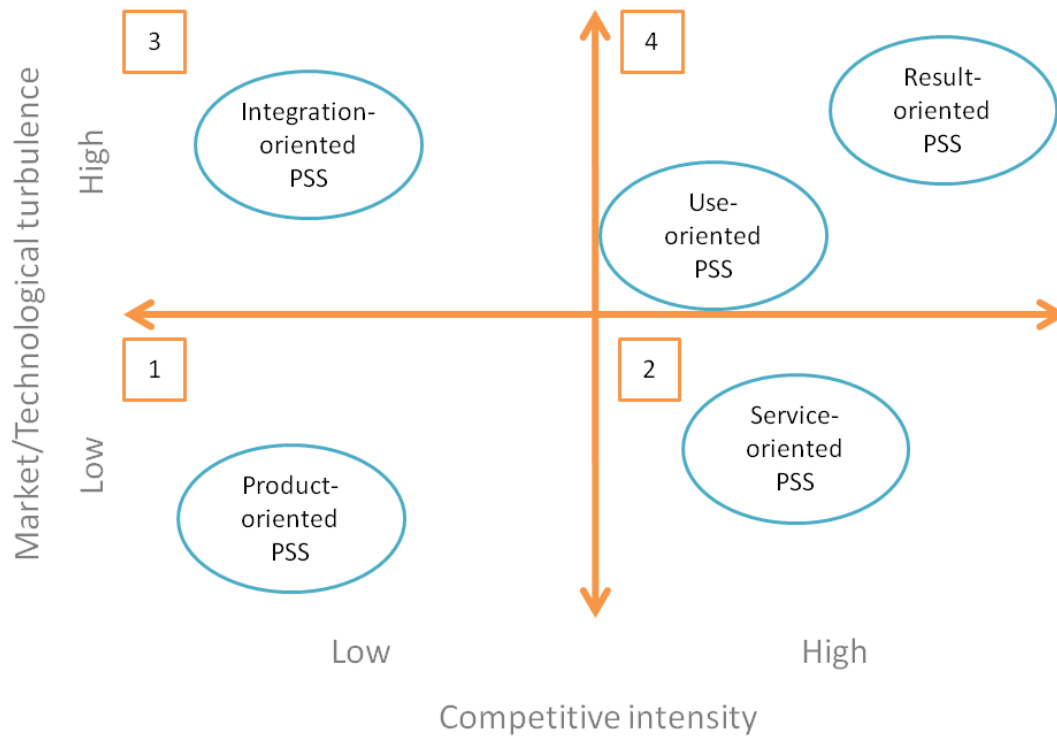
Source: own illustration according to Kinnunen (2011)

The first quarter labelled “Satisfying Product Provider” operates product-oriented with a customer-centric model, which therefore appears externally oriented, executing tasks like customer relationship management. Since the emphasis lies on manufacturing and services are for that reason treated as “add-on” (Kinnunen, 2011) companies should approach this section with a product-oriented or service-oriented product-service-system (PSS) (Baines, Lightfoot, Benedettini, & Kay, 2009 a; Neely, 2007). Regarding the second quarter “Value-adding Service Champs”, which is characterized by an actually stronger external focus (Kinnunen, 2011) one should even consider moving into use-oriented or result-oriented PSS applying therefore relationship-based business models (Neely, 2007). This refers to the fact that value creation is already conducted via flexibility, customization and variety, which consequently provides the best basis for servitization. The third quarter, which is labelled as “Introvert Bulk Producer” in contrast, appears as completely internally focused with barely no intentions to conduct services (Kinnunen, 2011). Since the main source of cost reduction is based on standardization and innovation, one still may try to approach an integration-oriented PSS by moving into distribution and merchandise (Baines, Lightfoot, Benedettini, & Kay, 2009 a; Tether & Bascavusoglu-Moreau, 2011). The last quarter is characterized by an indecisive behaviour, since it tries to create value for the customer, but still organizes like a manufacturing company. Consequently this inefficient allocation consumes most of service profit margins without contributing considerable revenues (Kinnunen, 2011), which therefore leads over to the service paradox (Gebauer, Fleisch, & Friedli, 2005). In fact, this quarter strives for a certain commitment to its strategic perception.

Since the current position regarding servitization capabilities is fixed now, one has to consider as a subsequent step its desired target position¹⁷ along the transition line of servitization (Oliva & Kallenberg, 2003). Considerable reference points are provided by the evaluation of one’s surrounding market forces (Fan & Zhang, 2010).

¹⁷ Please refer also to Figure 19 above

Figure 22 - Aligning PSS with Market Forces



Source: own illustration according to Fan & Zhang (2010)

This approach of Fan & Zhang (2010) is mapped in Figure 22 above, which comprises of two dimensions constituted by the degree of market- or technological turbulence on the one handside and the extent of competitive intensity on the other handside. Consequently this constitutes a matrix of finally four quarters depicting diverging market contexts, whereas each one appears more suitable for a particular servitization approach (Fan & Zhang, 2010). Since add-on services like maintenance, repair, re-use or recycling, labelled as product-oriented product service system (PSS), aim to extend the product life cycle of tangible products (Baines, Lightfoot, Benedettini, & Kay, 2009 a; Mathieu, 2001a; Neely, 2007; Tukker, 2004), this concept optimally fits into the first context of market forces. Consequently the market/technological turbulence as well as the competitive intensity are low, which implicates stable demand for the product that inherently is considered as long-term investment. The application of a product-oriented PSS would therefore support this occurrence. (Fan & Zhang, 2010). This would be in contrast to a service-oriented PSS that in fact establishes entry barriers for competitors by locking customer in (Baines, Lightfoot, Benedettini, & Kay, 2009 a; Mathieu, 2001a; Neely, 2007; Tukker, 2004),, which therefore appeals best for the second market context. Accordingly, this one is char-

acterized by low market/technological turbulence as well but entails high competitive intensity, which therefore strives for the application of competitive strategies (Fan & Zhang, 2010). Considering integration-oriented PSS, which aims to move downstream along the supply chain by vertical integration, conducting distribution and merchandising services (Baines, Lightfoot, Benedettini, & Kay, 2009 a; Mathieu, 2001a; Neely, 2007; Tukker, 2004), seems to be the best way to meet high market/technological turbulence in the third market context. Since incurring the role of the distributor, manufacturing companies may avoid financial losses stemming from bullwhip effects due to unstable customer preferences and expectations. Finally one should consider the application of a use-oriented or result-oriented servitization approach in a highly competitive and turbulent market context, since customers are faced with a vast number of alternatives which therefore hinders customer loyalty (Fan & Zhang, 2010). Consequently customer would gain benefits from the solely use and availability of a product resulting of the use-oriented and result-oriented servitization (Baines, Lightfoot, Benedettini, & Kay, 2009 a; Mathieu, 2001a; Neely, 2007; Tukker, 2004). In fact, proceeding with the transition of servitization ultimately yields towards a comprehensive examination of the service offering, which will be discussed below.

4.4.3 Success Factors in Service

The final step during transition of servitization is in fact to deal with the core characteristics and options of the service offering, whose extent alternates due to the degree of servitization applied (Oliva & Kallenberg, 2003). Manufacturers are striving to escape from declining product margins and therefore gaining higher operating margins from services (Gebauer, Fleisch, & Friedli, 2005). Consequently there have to take place some inherent organizational reallocations of organization's capabilities and processes to enable the shift from selling products to selling PSS (Baines, Lightfoot, Benedettini, & Kay, 2009 a; Davies, Brady, & Hobday, 2006; Neely, 2007; Weeks & Plessis, 2011), which therefore demands increased focus on the designing of compelling service offerings that attract customers (Frei, 2008). Consequently this task may appear challenging to the management of manufacturing firms, since the inherent fuzziness of services makes it much more difficult to define them properly

in comparison to straight product designing (Araujo & Spring, 2006; Baines, Lightfoot, Benedettini, & Kay, 2009 a; Davies, Brady, & Hobday, 2006; Spring & Araujo, 2009).

Current service literature fortunately provides certain step-wise frameworks to approach this issue and develop outstanding service strategies (Cohen, Agrawal, & Agrawal, 2006; Frei, 2008) in order to become services the new cash cows of the company, that finally account for up to half of total sales (Reinartz & Ulaga, 2008). Consequently the following section will discuss a six-step framework, which originates from the merging of another four-step framework (Frei, 2008; Reinartz & Ulaga, 2008) with the six steps derived by Cohen, Agrawal & Agrawal (2006) to provide a decent approach for success in service business. The subsequent Table 9 summarizes these findings.

Actually the (1) first step constitutes of identifying considerable products one can valorise with corresponding services. Consequently the decision arises whether to support all products offered or to choose only complementary ones to gain possible synergies from economies of scale in service technologies. The (2) second step depicts the allocation of service offerings into a whole portfolio in order to separate between different service levels. Hence, customers may choose between rapid execution of the service, which therefore is charged with a higher fee or lower prices due to basic services. One has to be aware that customer derive the overall quality levels with regard to the number of offered service products, which may be too few but also too many (Cohen, Agrawal, & Agrawal, 2006). Proceeding along the framework the (3) third factor to consider is constituted by the appropriate choice of business models and corresponding revenue modes. In fact, one has to apply in any case a funding mechanism, which consequently emphasizes the value of the service offering (Frei, 2008; Reinartz & Ulaga, 2008). Additionally there should be a separation between pay-per-use and pay-per-output business model which serves either sporadic service requests or long-lasting performance-based contracts (Cohen, Agrawal, & Agrawal, 2006).

Table 9 - Six Step Framework for Success in Service

1 – Identify which Products to cover

- ✓ Support all products
- ✓ Support only complementary products
- ✓ Support even competing products

2 – Create a Portfolio of Service Products

- ✓ Too few or too many service products reduce quality levels and profits
- ✓ Separate through different performance levels

3 – Select Business Models to support Service Products

- ✓ Establish funding mechanism to make aware of service value
- ✓ Apply different models for different products and life cycle stages

4 – Modify after-sales organizational Structures

- ✓ Employee management through additional recruiting and trainings
- ✓ Consider outsourcing of service units to third-parties

5 – Design and manage after-sales Services Supply Chain

- ✓ Match supply of resources with demand
- ✓ Deliver right materials, through right people, with appropriate infrastructure, at the right place, within an agreed-upon time at the lowest price

6 – Monitor Performance continuously

- ✓ Deeply understand customer problems and perceptions
- ✓ Evaluate performance against benchmarks

Source: own illustration according to Cohen, Agrawal, & Agrawal (2006); Frei (2008); Reinartz & Ulaga (2008)

Accordingly the (4) fourth step in applying excellence in service is manifested by adaptations and changes in organizational structures. These last from initial employee management regarding additional recruiting and trainings to structural optimizations like outsourcing (Frei, 2008; Reinartz & Ulaga, 2008). In fact, this new established organizational structure demands for the (5) fifth step entailing a savvy service supply chain, which streamlines back-office processes (Frei, 2008; Reinartz & Ulaga, 2008). Accordingly this issue can be described as the delivery of right materials, through right people, with appropriate infrastructure, at the right place, within an agreed-upon time at the lowest price (Cohen, Agrawal, & Agrawal, 2006). The final (6) sixth step deals with the maintenance of providing excellence in service offerings, which should be conducted through a monitoring system that evaluates

against benchmarks and customer feedback. Consequently one can extract considerable information from the monitoring system in order to deeply understand customer problems and perceptions to enable the creation of compelling service designs (Cohen, Agrawal, & Agrawal, 2006; Frei, 2008; Reinartz & Ulaga, 2008).

4.5 Summary

Besides the vast amount of advantages arising from applying a servitization strategy, certain challenges and drawbacks also occur which by all means have to be considered as well. Moving along the transition line between the both extreme continuums of a pure manufacturer and a pure service provider offers a lot of possibilities to utilize benefits from higher profit margins on services. Though, a lot of companies fail in exploiting these benefits and are therefore struggling with the so-called “service paradox”, since the added service don’t contribute a considerable share on total revenues.

One of the most distinctive challenges concerning servitization constitutes in managerial issues, since the complex and comprehensive implementation of a new strategy in any case represents a tremendous challenge. This is additionally fired by diverging beliefs and ideas goods manufacturer and service providers are finally after. Hence manufacturers try to benefit from economies of scale, which therefore demands for standardization of production. Service provider in contrast have to customize their products to meet customer needs entirely to maximize their satisfaction, which consequently leads to a certain tension.

In order to engage more on the challenges of servitization this thesis suggests a separation among internal back-end challenges and customer-facing front-end issues, which actually represents the applied framework for their examination in this thesis. Furthermore the section concerning back-end tasks comprises organizational structure issues, considerations regarding the trade-off between customer satisfaction and productivity and finally supplier relationships. The section regarding front-end challenges initially deals with their derivation, since they mainly arise from the

precedent desires of customers. Furthermore the matter of appropriate pricing and the inherent shift of risks towards supplier are discussed in detail.

Finally the aim of a company applying servitization is constituted by gaining certain advantages concerning financial, strategic or marketing tasks, through operating somewhere on the transition line between the product service continuum. In order to maintain this, a three-level approach was introduced, which has to be executed step by step. The initial level introduces the first step to go on with the transition from a strategic point of view, via a four-step framework. Consequently the second level operates on the strategic business unit (SBU) stage, examining companies existing capabilities to choose the proper implementation of servitization. Ultimately the third level elaborates a six-step framework concerning success factors in service and completes the transition.

5 Emergence of Information and Communication Technologies

Contemporary economic environments are affected and influenced by the rapid emergence of fast and powerful information and communication technologies in several different spheres. This evolution even generates new modes of business models, especially in terms of E-Business, which anyhow constitute considerable competitive advantages. Since servitizing companies are always confronted with several substantial challenges the application of novel ICT may be a promising approach, to exploit its capabilities to generate competitive advantage.

Accordingly the first section elaborates the fundamental impact of emergent ICT on several spheres like business models and customer behavior. The following will examine the dedicated impacts and implications on servitization sourced from ICT capabilities. Finally a brief overview about current executions and applications will be discussed.

5.1 Fundamentals

The recent emergence of fast and powerful information and communication technologies (ICT) like the internet with its vast reach and multimedia capabilities constitutes a bearing role in terms of improving existing business models and the enhancing the appearance of new ones (Kalakota & Robinson, 2012). In addition this development accounts likewise for considerable effects regarding the appreciation of manufactured goods and therefore enhances new forms of product service systems (PSS). Consequently the appropriate application of this technologies and the corresponding exploitation of its benefits constitutes an elementary competitive necessity (Belvedere, Grando, & Bielli, 2012; Persona, Regattieri, Pham, & Battini, 2007; Prahalad & Ramaswamy, 2004). Since the approach and the inherent information capabilities of the internet are accessible for everyone, especially customer, the initial subsequent section examines the implications on their resulting behaviour and supremacy. In fact, the novel information and communication capabilities equally affected business operations, which is examined in the second section concerning E-Business.

5.1.1 The changing Role of Customers

Customer who utilize the capabilities of novel ICT are actually faced with a confusing paradox, since they are accompanied with increasing number of choices, that finally yield less satisfaction yet. This circumstance originates from the fact that “(...) *the role of the consumer in the industrial system has changed from isolated to connected, from unaware to informed, from passive to active*” (see in Prahalad & Ramaswamy, 2004, pp. 1). This statement actually reflects the situation about the increasing power and supremacy of customers which constitutes on their escalating information knowledge and business transparency (Belvedere, Grando, & Bielli, 2011; Persona, Regattieri, Pham, & Battini, 2007; Wall, Jagdev, & Browne, 2005). Accordingly Prahalad & Ramaswamy (2004) identified five different impacts, which are consolidated in Table 10 below and finally mirror this development perfectly.

Table 10 - Five Impacts on Customer Behavior

Information Access

- ✓ Access to matchless vast amount of information and knowledge
- ✓ Compiling more informed decisions

Global View

- ✓ Access to information on firms, products, prices, performance and customer reviews from all around the world
- ✓ Therefore limiting possibilities for multinational firms in varying offerings and performances

Networking

- ✓ Thematic consumer communities sharing beliefs and experiences without geographic barriers
- ✓ Changing traditional top-down patterns of marketing communications

Experimentation

- ✓ Possibility of experimenting with and developing on digital products
- ✓ Enhances co-development

Activism

- ✓ Under the protection of anonymity people are embolden to speak out in digital communities
- ✓ Enhances unsolicited feedback

Source: own illustration according to Prahalad & Ramaswamy (2004)

Accordingly, the internet with its novel information and communication technologies provides the customer with more (1) *information access* to enormous amounts of information and knowledge to make more informed decisions. Next, the internet allows finally a (2) *global view* about firm's products, prices and performance reviews, which therefore limits the freedom to vary the price or quality level in different regions. Another impact is constituted by the possibility of (3) *networking* among consumer to share beliefs, ideas and experiences. Finally, emerging ICTs allow (4) *experimentation* with new technologies and enhances as well as (5) *activism* among customer communities to embolden others to act and speak out, which may result in unsolicited feedback (Prahalad & Ramaswamy, 2004). Since the novel opportunities, stemming from increasing performance levels in ICT, also affect other spheres, the subsequent section introduces the implications on business models.

5.1.2 E-Business

The emergence of ICT likewise affected priorities in businesses by shifting importance from products to information, which tempts several companies to transfer their business to the internet and conduct business relationships via novel digital ICT channels. Consequently the term E-Business arose, which embodies the initiation, agreement and execution of business processes via digital channels of ICT, in order to enhance mutual value creation (Stormer & Meier, 2012). In fact, this implicates that information finally replaces inventory constituting on the stepwise replacement of physical goods by digital products (Kalakota & Robinson, 2012). In order to provide a guideline towards the transition to an E-Business organization, Wall, Jagdev, & Browne (2005) suggested a certain roadmap to approach this subject. Although the detailed elaboration of this matter definitely would go beyond the scope of this thesis, nevertheless the merely fundamental finding bears considerable knowledge. Thus, the successful transformation towards E-Business is based on the deliberate alignment of the constituted business with the appropriate technology (Wall, Jagdev, & Browne, 2005). Finally, there are nine generic business models that may occur in E-Business (Rappa, 2010). In order to provide a brief overview about this sphere within this thesis, the subsequent Table 11 illustrates their main characteristics and approaches.

Table 11 - Generic Business Models on the Web

Brokerage

- ✓ Bring buyers and sellers together and facilitate transactions
- ✓ Charge fee or commission for each transaction enabled

Advertising

- ✓ Extension of the traditional media broadcast model
- ✓ Website (=broadcaster) provides content and services mixed with advertising messages in the form of banner ads
- ✓ Banner ads may be major or sole source of revenue

Infomediary

- ✓ Collecting valuable data about consumers and their consumption habits
- ✓ Selling data in order provide information to target marketing campaigns

Merchant

- ✓ Wholesaler and retailer of goods and services
- ✓ Sales based on list prices or auctions

Manufacturer

- ✓ Reach buyers directly and thereby compress the distribution channel
- ✓ based on efficiency, improved customer service and a better understanding of customer preferences

Affiliate

- ✓ Providing purchase opportunities wherever people may be surfing, by offering financial incentives to affiliated partner sites
- ✓ Pay-for-performance model

Community

- ✓ Viability based on user loyalty
- ✓ Revenue tied to contextual advertising and subscriptions for premium services
- ✓ One of the more fertile areas of development

Subscription

- ✓ charged a periodic fee to subscribe to a service
- ✓ combinations of free content and "premium" with costs

Utility

- ✓ "on-demand" model based on metering usage ("pay as you go")
- ✓ Traditionally used for essential services (e.g., internet access, ...)

Source: own illustration according to Rappa (2010)

5.2 Impact on Servitization

Since the recent emergence of fast and powerful information and communication technologies (ICT) affected existing business models significantly, this also should be examined concerning the applications in servitization. Consequently the subsequent section initially elaborates the role ICT within the servitization approach and proceeds with its novel enabled applications and capabilities. Finally a brief framework which identifies possible opportunities regarding servitization will be elaborated.

5.2.1 The Roles of ICT in Servitization

According to the section above E-Business deals with tangible products as well as digital ones and services for sure, as long as they are handled and sold via ICT channels (Stormer & Meier, 2012). Regarding this, the research on this thesis identified two diverging possibilities on how ICT can be part of servitization and therefore enhance and support it. The first case considers the digital product itself as “lynchpin” of the offering, which constitutes value to the customer through its usage. In fact, this idea refers to the concept of SD logic¹⁸, since its value proposition stems from the intangible usage of a product and not its ownership (Vargo & Lusch, 2004). Consequently this thesis suggests naming this assignment of ICT “Product Delivery”. In contrast the integral part of the servitization offering also could be the, as well intangible, service that is conducted on digital or tangible products. Accordingly this idea would reflect the one of the typical servitization options¹⁹ consisting of an integration-oriented, product-oriented, service-oriented, use-oriented or result-oriented product-service-system (Baines, Lightfoot, Benedettini, & Kay, 2009 a; Neely, 2007). Since this idea focuses on the execution of the service, this thesis suggests naming this assignment of ICT “Service Delivery”. In order to enhance the understanding of these ideas the following section will provide each with a certain application regarding the role of ICT either as “Product Deliverer” or “Service Deliverer”.

¹⁸ Please refer to section 2.5.2 concerning the concept of SD logic

¹⁹ Please refer to section 3.3.3 concerning options of servitization

Regarding ICT as “Product Deliverer” one can illustrate this by concerning current developments in the music industry. Consequently this industry is faced with the transition from a tangible product (e.g. CD) to an intangible service, thereby applying a new business model corresponding to the latest purchasing behaviors of customers, which is offered and distributed over digital portals (Parry, Bustinza, & Vendrell-Herrero, 2012). In fact, the traditional business model, which relied on physical distribution, remains useless since the advent of the internet and the exploding popularity of downloading digital music (Graham, Burnes, Lewis, & Langer, 2004). Furthermore the value proposition of digital music may be additionally enhanced by its wider availability and greater interactivity among social media. Consequently new business models established where customers either pay-as-they-go, pay for each downloaded track (such as Apple’s iTunes) or pay-monthly to gain access to an allotted music service portal (such as Spotify) (Parry, Bustinza, & Vendrell-Herrero, 2012). Hence, the digital channels of novel ICT enable the delivery of the product, which in a row embodies the value proposition through its consumption.

The second role of ICT in servitization is manifested as “Service Deliverer”, whereupon ICT enables the execution of the servitization offering. This can be illustrated by a common case considering the application in remote diagnostics, where complex manufactured products are monitored via sensors that finally provide essential information to the supplier regarding necessary maintenance intervals (Brax & Jonsson, 2009). Consequently ICT enables and enhances possibilities in providing remote support or standardized operating processes in companies operating in geographically distributed networks (Belvedere, Grando, & Bielli, 2012). In fact, companies have to establish therefore new business models like outcome-based contracting²⁰ (Ng & Ding, 2010a; Zhang, Ma, & Dong, 2009), which most prominent case is that introduced by Rolls Royce in the aeroplane industry called “Power-by-the-hour®”, where the customer doesn’t buys an engine but guaranteed flying hours (Ng, Nudurupati, & Tasker, 2010b). Hence, the digital channels of novel ICT even enable the possibility regarding the servitization offering and furthermore conduct the delivery of this service. Consequently the subsequent section examines the function of ICT as enabler concerning certain servitization offerings.

²⁰ Please refer to section 2.5.2 concerning outcome-based contracting

5.2.2 ICT as Enabler of Servitization

At the beginning of this section, the attention should be drawn on the denomination of it, since ICT is designated as “Enabler” of servitization, which may cause considerable disagreement amongst other researchers. In fact, a lot of other authors declare ICT as “Driver” of servitization (Avadikyan & Lhuillery, 2007; Belvedere, Grando, & Bielli, 2011; Belvedere, Grando, & Bielli, 2012; Peppard, 2011; Persona, Regattieri, Pham, & Battini, 2007), which induces a more intensive examination with this matter. Referring to section 3.2 regarding drivers of servitization, literature agrees that the most distinctive ambition driving servitization is reflected by the desire to handle decreasing margins of manufacturing and selling goods (Baines, Lightfoot, Benedettini, & Kay, 2009 a; Gebauer, Fleisch, & Friedli, 2005; Neely, 2007). Since the service industry embodies higher margins than selling goods, the financial driver of servitization constitutes of applying corresponding services in order to exploit these ones (Falk & Peng, 2012; Mathieu, 2001b; Tether & Bascavusoglu-Moreau, 2011). Furthermore servitization establishes strategic advantages in terms of differentiation (Baines, Lightfoot, Benedettini, & Kay, 2009 a; Bascavusoglu-Moreau & Tether, 2011; Tether & Bascavusoglu-Moreau, 2011) and even serves marketing issues through locking customer in (Baines, Lightfoot, Benedettini, & Kay, 2009 a; Mathieu, 2001b; Oliva & Kallenberg, 2003; Vandermerwe & Rada, 1988), which finally also provides monetary benefits for the company. Finally opposing this with the arising capabilities of emergent ICT perhaps provides clarification to this matter. One probably will agree that manufacturer rather apply a remote diagnostics system (Brax & Jonsson, 2009), in order to handle the installed-base argument²¹ and achieve therefore stable revenues (Neely, 2008), than being excited about the gathered information concerning necessary maintenance intervals. Consequently this thesis will consider servitization rather as “Enabler” of advanced servitization offerings than as “Driver” of them.

According to Belvedere, Grando & Bielli (2012) one can separate the impact of ICT amongst the service offering and the operating processes of a company, where ICT enables for both sound improvement possibilities. In fact, with regard to the service

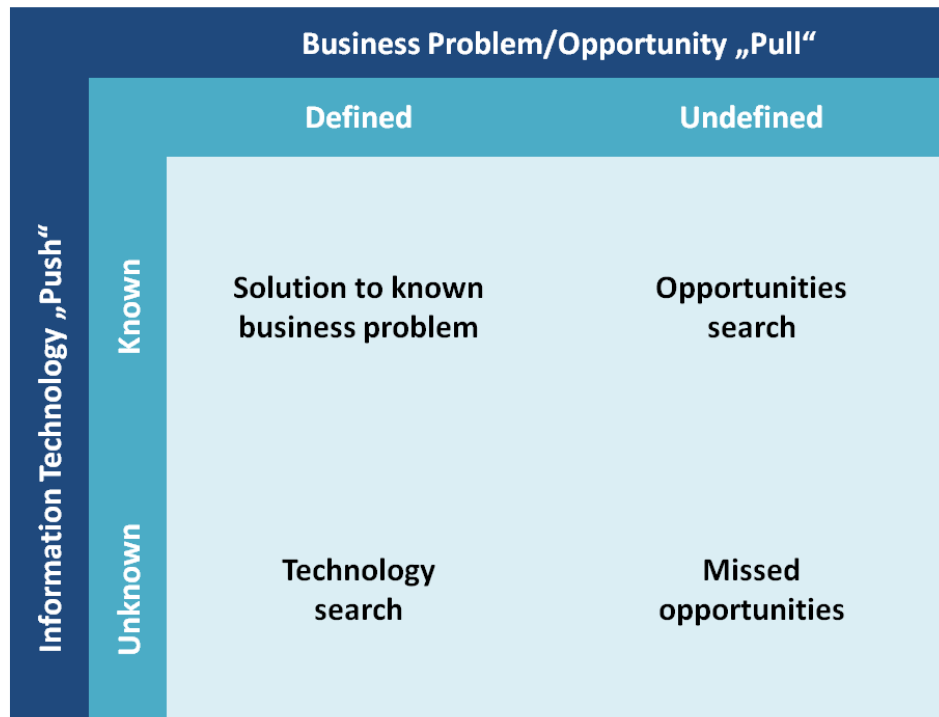
²¹ Please refer to section 3.2.2 concerning the installed-base issue

offerings, ICT can extend the scope and depth of these, which relies on the increased value added, based on higher customization levels and a broader variety of more sophisticated service offerings (Avadikyan & Lhuillery, 2007). Furthermore ICT likewise enhances the emergence of new revenue streams, since it enables opportunities to operate real-time data in remote diagnostics applications (Brax & Jonsson, 2009), which allows proficient and useful decision-making processes (Belvedere, Grando, & Bielli, 2012). Customers therefore gain considerable benefits regarding operation of products with longer life-cycles (Persona, Regattieri, Pham, & Battini, 2007). Finally ICT enables also improvements on operating processes, which becomes apparent on the standardization of processes and the resulting improvement in process responsiveness (Belvedere, Grando, & Bielli, 2012). Consequently, common issues regarding supply chain management like the negative implications of the bullwhip effect may be mitigated by smart ICT applications (Belvedere, Grando, & Bielli, 2011).

5.2.3 Identifying ICT Opportunities for Servitization

Actually the process of aligning a certain given business with an appropriate technology in order to establish an E-Business already constitutes a tremendous challenge (Wall, Jagdev, & Browne, 2005). In contrast, whilst trying to realize a smart and powerful application of ICT in terms of a novel servitization opportunity, one should either know the business application or the technological approach. Accordingly Peppard (2011) introduced the dynamics of “IT push” and “business pull”, which in combination finally account for the emergence of new ICT applications in servitization. In fact, every business implicates a certain prospective of innovation which stems from generic business issues, competitive pressures or customer demand (Wall, Jagdev, & Browne, 2005). Consequently this approach is manifested by the term “business pull”, since it roots from the desires and demands of actors within the business matter. In contrast, innovative potential also stems from emerging technologies, which therefore is called “IT push” (Peppard, 2011). These both dynamics can be consolidated into a 2 x 2 matrix, therefore constituting four different characteristics, which are illustrated in the following Figure 23.

Figure 23 - Push and Pull of ICT Innovations



Source: own illustration according to Peppard (2011)

Accordingly a new ICT application is successfully conducted when it appears to be classified in the upper-left quadrant, where both the “IT push” and the “business pull” are known and defined. In fact, the best potential for an emerging application is determined by the “technology search” or the “opportunities search”, where either the business problem is defined or the technological approach is known. Finally one cannot gain any advantages if no one of the two dynamics appears (Peppard, 2011).

5.3 Applications in Servitization

The concluding section of this chapter finally examines each with a certain case study correspondingly matching option of servitization, in order to visualize the countless possibilities of emergent ICT and therefore enhance its understanding. Consequently all of these applications are characterized by the utilization and exploitation of emergent information and communication technologies.

5.3.1 Integration-oriented PSS

Actually the case of integration-oriented product-service systems is pretty strongly prevalent in E-Business, since it's manifested by simple online shops owned by manufacturing companies. In fact, the operation of an online shop constitutes a vertical integration, which is based on the moving into retail and therefore appears as integration-oriented approach (Baines, Lightfoot, Benedettini, & Kay, 2009 a). Finally two very popular examples can be displayed comprising of the computer manufacturer DELL and APPLE who actually operate online shops, in order to sell their products (Apple Inc., 2012; DELL Ges.m.b.H., 2012).

5.3.2 Product-oriented PSS

Considering a product-oriented product-service system one deals with the purchase and ownership of a product, which is enriched by a corresponding service (Baines, Lightfoot, Benedettini, & Kay, 2009 a). Consequently this description fits to the already discussed case of remote diagnostics of complex products (Brax & Jonsson, 2009). Regarding a more up to date example one may consider the corresponding services offered from TV manufacturer. In fact, each Philips TV comes nowadays with an on-board application called "Smart TV" which consolidates video on demand functions, internet access and even social media apps directly on the TV device (Philips Austria GmbH, 2012).

5.3.3 Service-oriented PSS

The service-oriented option of servitization actually is characterized by the incorporation of the service offering into the product itself, which therefore results in a coupled product and service offering (Neely, 2007). Hence, almost everyone is faced with such an offering in daily life, if owning a Smartphone with a corresponding telephone contract. Consequently one purchases a Smartphone in order to make phone calls, which inherently implicates the need for a related telephone contract to execute the service (Castaldi, Addeo, Massaro, & Mazzoni, 2007).

5.3.4 Use-oriented PSS

A very prominent example for a use-oriented product-service system is provided by the already mentioned business model introduced by Rolls Royce in the aeroplane industry called “Power-by-the-hour[®]”, where the customer doesn’t buy an engine but guaranteed flying hours (Ng, Nudurupati, & Tasker, 2010b). This perfectly reflects that in this case the ownership of the tangible product remains by the service provider, whilst the customer solely gains value from its usage (Baines, Lightfoot, Benedettini, & Kay, 2009 a; Coyne, 2011). Another recent example is provided by the well known urban short-term car rental service “car2go” which operates in several cities around the world. Accordingly the cars are diffused over a certain city, whilst registered users can obtain a car with their individual access cards and finally pay-by-use (car2go GmbH, 2012).

5.3.5 Result-oriented PSS

The last occurrence of servitization is characterized by the total replacement of a product with a service instead. Consequently this option is called result-oriented product-service system, since the customer only demands for the result of a service (Baines, Lightfoot, Benedettini, & Kay, 2009 a). Actually this phenomenon is represented by the case of the music industry and the replacement of purchasing tangible records to purchasing intangible music entertainment (Graham, Burnes, Lewis, & Langer, 2004; Parry, Bustinza, & Vendrell-Herrero, 2012).

5.4 Summary

The most distinctive implication originating from the emergence of ICT is reflected by the fact that *“(...) the role of the consumer in the industrial system has changed from isolated to connected, from unaware to informed, from passive to active”* (see in Prahalad & Ramaswamy, 2004, pp. 1). Accordingly the terminology E-Business arose, which embodies the initiation, agreement and execution of business processes via digital channels of ICT, in order to enhance mutual value creation. This actually implicates that information finally is replaced by inventory constituting on the stepwise replacement of physical goods by digital products. Furthermore literature identified that the successful transformation towards E-Business is based on the deliberate alignment of the constituted business with the appropriate technology.

Concerning the direct implications of ICT on servitization this thesis actually suggests considering it rather as “Enabler” than as “Driver” of servitization, which represents a conflictive approach to other researchers. Finally opposing this with the arising capabilities of emergent ICT perhaps provides clarification to this matter. Accordingly, one probably will agree that manufacturer rather apply a remote diagnostics system, in order to handle the installed-base argument and achieve therefore stable revenues, than being excited about the gathered information concerning necessary maintenance intervals, which actually affirms the suggested approach.

In order to identify new opportunities of ICT in servitization, Peppard (2011) introduced the dynamics of “IT push” and “business pull”, which in combination finally account for the emergence of new ICT applications in servitization. Consequently the term “business pull” implicates that every business constitutes a certain prospective of innovation which stems from generic business issues, competitive pressures or customer demand. The term “IT push” finally stems from innovative potential regarding emerging technologies.

6 Conclusion and Further Research

In the end the concept of servitization remains still a considerable approach for manufacturing companies to defend current economic downturns like decreasing margins from solely selling goods. This constitutes on the fact that the service economy sector remains still growing in future, which therefore will develop to an efficient and sustainable occurrence. Regarding the inherent challenges one has to be aware of the applied service options, since they bear different levels of uncertainty and risk due to more or less predictable cost occurrences and revenue streams. Actually the matter of powerful ICT application will play an even more important role in future regarding the execution and delivery of services.

During literature review on this topic there appeared one isolated journal article regarding new service procurement logic (Lindberg & Nordin, 2008). The authors introduced a movement backwards to GD logic (Goods-Dominant) basing on the objectification of services. Probably this represents an upcoming thinking style in prospective marketing agendas, which should be in any case investigated.

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