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Max Finne

The design of industrial service offerings in indirect channels

Thesis submitted in partial fulfillment of the requirements for the degree of Master of Science (Technology)

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Supervisor: Professor Jan Holmström

Instructors: M.Sc. (Eng.) Luigi Malinverno

MBA, B.Sc. (Eng.) Rubén González

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ABSTRACT OF MASTER´S THESIS

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A recent trend among manufacturing companies is to move from offering strictly product related services into more comprehensive service offerings. Another change affecting manufacturers is the intermediation of their business: bigger share of the sales go through additional channel members like OEM customers or systems integrators. Current literature is lacking research on the service provision of manufacturing companies in indirect channels. This thesis contributes to the body of knowledge by exploring ways how manufacturing companies can create, together with other channel members, service offerings aimed at optimizing the performance of the installed base of the manufacturer's products.

The thesis consists of a literature review and a single-case study. The literature review introduces main characteristics of industrial services and their most important challenges. Furthermore, reviewed are ways of segmenting the industrial market, and methods for manufacturers to create after-sales service offerings. The case study proposes how a global manufacturer can segment its OEM customers, and develop service offerings together with them and other service providers to satisfy the service needs of end users. The proposed solution was evaluated in three pilot projects, by using the TAM model (Davis 1986), and by creating scenarios of potential service revenue.

The main contributions of this thesis are (1) OEM service segmentation framework, and (2) four service platforms to match the service needs of the segments identified by the framework. These two elements describe four distinct ways to arrange the service provision of a manufacturing company together with an external service provider (e.g. OEM):

a) Manufacturer provides full maintenance of its products straight to end user.
b) OEM services end user by exchanging units of manufacturer's products, and sends the units to manufacturer for repair and preventive maintenance.
c) OEM exchanges the malfunctioning units that will be repaired by manufacturer, but preventive maintenance of the products is carried out by the OEM.
d) OEM carries out preventive maintenance and also repairs the malfunctioning units.

Keywords: service offering, indirect channels, industrial market segmentation, service coproduction	Publishing language: English

TEKNILLINEN KORKEAKOULU DIPLOMITYÖN TIIVISTELMÄ
Informaatio- ja luonnontieteiden tiedekunta
Tuotantotalouden tutkinto-ohjelma

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Työn ohjaajat: Luigi Malinverno, M.Sc. (Eng.); Rubén González, MBA, B.Sc. (Eng.)		

Viime vuosina lukuisat valmistavan teollisuuden yritykset ovat laajentaneet palvelutarjontaansa tiukasti tuotteisiinsa liittyvistä palveluista kokonaisvaltaisempiin palvelutarjoomiin. Toinen valmistajiin vaikuttava muutos on liiketoimintaketjujen pidentyminen: yhä suurempi osa niiden myynnistä kulkee OEM-asiakkaiden ja systeemi-integraattorien kautta. Kirjallisuus valmistajien palvelutuotantoa epäsuorassa jakelukanavassa tarkastelevista tutkimuksista on niukkaa. Tämä diplomityö luo uutta tietoa tarkastelemalla tapoja, joilla valmistaja voi kehittää yhdessä muiden kanavaosapuolten kanssa palvelutarjoomia, joilla optimoidaan valmistajan laitteiden asennetun laitekannan suorituskyky.

Diplomityö koostuu kirjallisuuskatsauksesta sekä yhdestä tapaustutkimuksesta. Kirjallisuus-osassa esitellään teollisten palveluiden pääpiirteitä sekä suurimpia haasteita. Lisäksi tarkastellaan keinoja teollisten markkinoiden segmentointiin, sekä menetelmiä valmistajan jälkimarkkinapalvelutarjoomien kehittämiseen. Tapaustutkimus esittää, kuinka maailmanlaajuinen valmistaja voi segmentoida OEM-asiakkaansa ja kehittää yhdessä niiden kanssa palvelutarjoomia, jotka tyydyttävät loppukäyttäjän palvelutarpeet. Ehdotettua ratkaisua arvioitiin kolmessa koeprojektissa, käyttämällä TAM-mallia (Davis 1986) sekä luomalla skenaarioita mahdollisesta palvelumyynnin liikevaihdosta.

Diplomityön päätulokset ovat (1) OEM-asiakkaiden palvelusegmentoinnin viitekehys sekä (2) neljä palvelutarjoomaa, jotka vastaavat kunkin viitekehyksen tunnistaman segmentin palvelutarpeita. Nämä kaksi elementtiä kuvaavat neljä erillistä tapaa, joilla teollinen yritys voi järjestää yhdessä ulkopuolisen palvelutarjoajan (esim. OEM) kanssa palvelutarjontansa:

a) Valmistaja tarjoaa laitteensa täyden kunnossapidon suoraan loppukäyttäjälle.
b) OEM palvelee loppukäyttäjää vaihtamalla valmistajan tuotteiden yksiköt, jotka se lähettää valmistajalle korjausta ja ennakkohuoltoa varten.
c) OEM vaihtaa vikaantuneet yksiköt ja lähettää ne valmistajalle korjattavaksi, mutta tekee itse ennakkohuollon.
d) OEM sekä tekee ennakkohuollon että korjaa vikaantuneet yksiköt.

Asiasanat: palvelutarjooma, epäsuora jakelukanava, teollisen markkinan segmentointi, palvelujen yhteistuotanto	Julkaisukieli: englanti

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Finally, biggest thanks go to my loved ones who have always been there, sharing the moments of deepest despair as well as of greatest enthusiasm. You have showed me what is really important in life, and most importantly made life worth living. Thank you.

Espoo, May 2009

Max Finne

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Terms and abbreviations

Term / abbreviation	Explanation
After-sales services	Services offered after the sales of products
Demographics	Population characteristics that shape customer needs
Design science	Research method used in industrial management
DT	Down time
ESD	Electrical static discharge
Exchange unit	Repaired or new unit for replacement of a malfunctioning one
Firmographics	Characteristics of organizations that shape customer needs
IB	Installed base
Industrial services	Services related to industrial products
Module/unit	Parts of Case Company product
OEE	Overall equipment effectiveness
OEM	Original equipment manufacturer
Operations management research	Research field concerned with the production of goods and services
PM	Preventive maintenance
PS systems	Product Service systems
Reconditioning	Malfunctioning units are repaired, preventive maintenance done, and finally units are tested
Workshop	a) A meeting b) A place for repair/recondition of malfunctioning units

1 Introduction

1.1 Background and motivation

Manufacturing companies have been moving from offering products and some additional services to more integrated service offerings serving the customers' varying needs (e.g. Wise and Baumgartner 1999, Mathieu 2001a&b, Sawhney *et al.* 2004). When trying to create new ways to provide more value-added for their customers and thus achieve competitive advantage, some companies are moving to solution provision business (Brady *et al.* 2005, Brax and Jonsson 2009).

Another theme affecting some manufacturers is the intermediation of their business. Because of the change in competitive landscape, some companies that used to be serving directly the end users have become suppliers of other companies, who now serve the end users. Because of the increase in the amount of supply channel members, manufacturers get less visibility towards the end users of their equipment, and thus find it more difficult to create new and further develop existing value offerings. In this new situation better cooperation between channel members is required, in order to develop relationships with mutual confidence. This is needed, because in the new situation the importance of sharing information has increased, and many companies are simultaneously in direct competition and cooperation, which causes concerns regarding information sharing.

There exists quite a lot of research on both manufacturing services (e.g. Oliva and Kallenberg 2003, Auramo and Ala-Risku 2005) and manufacturing companies using indirect channel (e.g. Goffin 1999, Jallat and Capek 2001). However, the literature is lacking studies concerning the delivery of industrial services through indirect channels. This study is aiming at doing its part in fulfilling this gap, through a case study of a manufacturing firm (Case Company) that has moved partly away from offering its products and services directly to end users, towards offering these through an intermediate channel member; the OEM. This new party manufactures products, of which components are Case Company's products.

1.2 Objectives and scope of the study

In indirect channels the visibility to installed base of Case Company's products is significantly reduced compared to direct channels. From after-sales service point of view this causes some problems: surprising warranty obligations, long and relatively unreliable delivery of spare parts and field engineers. Thus, there is a need to systematically develop strategies for dealing with customers in indirect channels. Particularly how to:

- Develop service offerings that can be combined in different situations with the offerings of OEMs to match the after-sales service needs of end users.

This research concentrates on Case Company products needing maintenance, and on the time period after warranty expiration. The study is focused on the front-end issues, although there remain also several serious challenges with the back-end. The geographical scope is restricted to the approximately 60 Western countries, where Case Company has developed service resources. The scope decision is based on Case Company business needs, and amount of available resources for the research. The research problems are:

- How to segment Case Company's (OEM) customers in indirect channels based on their after-sales service needs and capabilities?
  - What are the main factors shaping OEM customer needs?
  - How to develop a segmentation model based on these needs?
  - How should the segmentation be carried out?
- What kind of after-sales service offerings should be developed to these customer segments?
  - How to build service offerings that can be combined with the service provision of OEM customers to match the after-sales service needs of end users?
  - Is there a need to develop new services? What kind of services?

1.3 Structure of the study

The thesis starts with an introduction (chapter 1) to the research topics, and is divided into theoretical part (chapters 2, 3, and 4) and empirical part (chapters 5, and 6). The thesis ends with chapter 7, in which contributions and conclusions of the study are discussed, as well as suggestions for further research. Figure 1 presents the structure of the research.

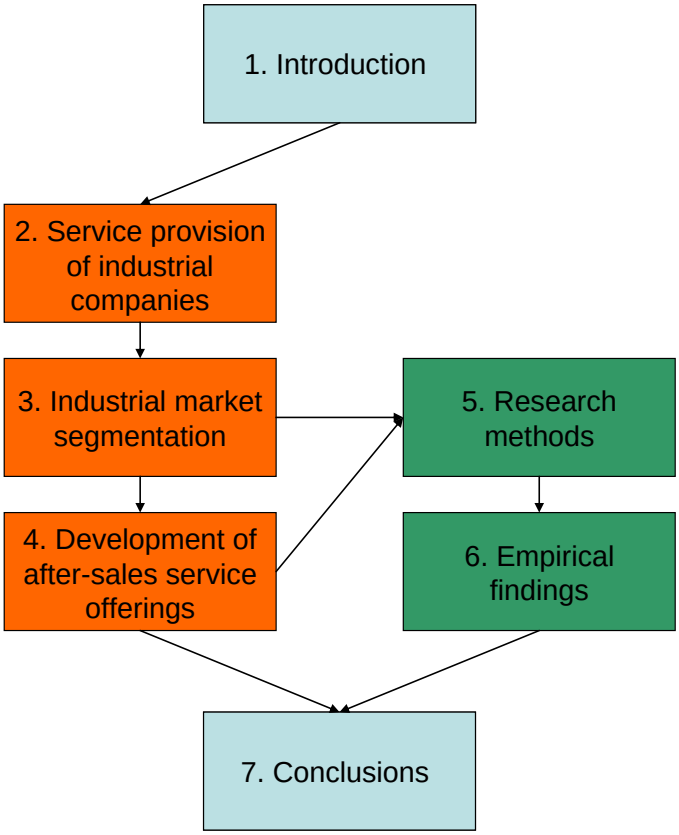

Figure 1 – Structure of the thesis

The first chapter of the literature review, chapter 2, describes current literature on service provision of manufacturing companies: why manufacturers are providing services and of what kind, the move in the scope of services many manufacturers have gone through, and the challenges related to offering services. The aim is to describe the existing knowledge of the research field in order to help positioning this research into the existing body of knowledge. The literature review presented in chapters 3 and 4 played an important role, when research methods for the empirical part of the study were chosen. In chapter 3, different methods for segmenting industrial market are discussed, and based on that, one method (needs-based segmentation) was chosen for the empirical research. Literature on development of after-sales service offerings (chapter 4) was analyzed to develop insights, for the design of service offerings carried out in the empirical part.

The empirical part of the research starts with chapter 5, in which empirical research methods are described. First the concept of design science is presented, and second how the empirical part was carried out in practice. Chapter 6 presents the empirical findings, starting with introducing the business situation of Case Company in the beginning of the

research. Next, goals of the research are described; following with the solution proposed that consists of 1) Segmentation model, and 2) Service offerings. The practical applicability of proposed solution was tested in three pilots. Finally, proposed solution is evaluated based on the results of the trials using Technology Acceptance Model by Davis (1986, modified by Davis *et al.* 1989).

Conclusions on the study are made in chapter 7, where the key findings are presented. Generalization of the research and managerial implications are discussed, and suggestions for future research topics given.

Part I - Literature review

Part I of the thesis reviews literature on three themes: services provided by manufacturers, ways to effectively segment the industrial market, and the methods of after-sales service offering development. Chapter 2 presents a literature study on industrial services, in order to develop a background for the subjects researched in this study. Chapters 3 and 4 present respectively the service concept (Edvardsson 1997) that contains a) a description of customer needs; b) service offering (how to satisfy the needs).

2 Service provision of industrial companies

Services provided by manufacturers of industrial goods have been described as: industrial services, services in manufacturing, product-related services, product-services and after-sales services (Oliva and Kallenberg 2003). This study uses the terms industrial services, and after-sales services intertwined.

In the beginning of this chapter, the reasons for industrial companies' service provision are discussed. Then the forms and main types of these services are presented. In the end of the chapter are addressed themes related to manufacturers broadening the scope of their services into more value-added offerings, and the many challenges related to this. Also discussed are the challenges in providing industrial services in general.

2.1 Reasons for service provision of industrial companies

Many manufacturers are facing the situation of stagnant product demand, increasing customer requirements, and their products becoming ever more commoditized. These companies are seeking ways to generate new business, increase profitability, and differentiate from competition. Development of services and solutions is seen as an answer to many of these challenges. Reasons, why manufacturers are offering services, are summarized in table 1.

Table 1- Reasons for offering industrial services

Reasons for offering industrial services	Authors
1. Product sales support	Cohen and Lee (1990), Cohen *et al.* (2000), Markeset and Kumar (2003), Kumar *et al.* (2004), Markeset and Kumar (2005), Kumar *et al.* (2006)
2. a. Stable, and b. Significant source of revenue	Goffin (1999), Wise and Baumgartner (1999), Oliva and Kallenberg (2003), Auramo and Ala-Risku (2005), Cohen *et al.* (2006), Glueck, *et al.* (2006), Reinartz and Ulaga (2008)
3. Customers demand more services	Yasin and Yavas (1999), Oliva and Kallenberg (2003), Glueck *et al.* (2006), Reinartz and Ulaga (2008)
4. Help in differentiation	Auguste *et al.* (2006), Glueck *et al.* (2006), Reinartz and Ulaga (2008)
5. Offer a sustainable competitive advantage	Mathieu (2001b), Cohen *et al.* (2006), Reinartz and Ulaga (2008)

The first reason for offering industrial services is obvious; services support the sales of new products. By offering services that assist customers in getting the desired benefits of their products, manufacturers can increase customer satisfaction, and thereby repeat sales (e.g. Cohen and Lee 1990, Cohen *et al.* 2000). Clever manufacturers move downstream, when trying to develop new business models, because that's where they can make additional profit (Wise and Baumgartner 1999, Auramo and Ala-Risku 2005, Reinartz and Ulaga 2008). Margins of service sales are on average higher than the margins of products (Oliva and Kallenberg 2003, Cohen *et al.* 2006, Glueck *et al.* 2006). This move is also due to a stagnant product demand, and an expanding installed base of the manufacturers' products (Wise and Baumgartner 1999).

Another benefit of services is their countercyclical nature (Wise and Baumgartner 1999). For example, during the financial crisis in South Korea in 1997-99, Hyundai's new vehicle sales dropped by 36% while the spare parts sales grew by 5,6% (Reinartz and Ulaga 2008). Some successful business models are heavily based on the steady revenues from servicing the installed base of products over a long life cycle (Goffin 1999, Cohen *et al.* 2006). Printer manufacturers like Hewlett-Packard price their products aggressively to get a large installed base in a market where the entry price is a key factor. When using printers, consumers will have to buy ink cartridges, which can then be sold with very healthy margins (Wise and Baumgartner 1999). Business models going even further – giving the product away for free, and charging only for add-on services – can be seen especially in electronic media: Google, Facebook etc.

Nowadays, customers are demanding increasingly more services (Yasin and Yavas 1999, Oliva and Kallenberg 2003), which is caused by e.g. outsourcing non-core activities (Glueck *et al.* 2006, Reinartz and Ulaga 2008). By being harder to imitate, services can also help the manufacturers to differentiate themselves in this situation, where products are becoming commodities (Auguste *et al.* 2006, Glueck *et al.* 2006, Reinartz and Ulaga 2008). To be successful in offering value-added industrial services, it is essential that manufacturer develops a deep understanding of customers' technologies, processes, and plans (Cohen *et al.* 2006). By overtaking e.g. maintenance tasks of its customers, the manufacturer will be able to develop such accumulated knowledge and skills that will offer it a competitive advantage over its competitors. The competitors will find it very hard to acquire the same kind of understanding of customer needs (Mathieu 2001b). This provides the manufacturer a great opportunity to lock in its customers (Reinartz and Ulaga 2008).

2.2 Services provided by industrial companies

2.2.1 Services in relation to time

Services offered by industrial companies can be classified into three groups based on when they are carried out in relation to the purchase (e.g. Frambach *et al.* 1997, Kumar and Kumar 2004):

1. Before sales services
2. During sales services
3. After-sales services

This thesis concentrates mainly on the after-sales services. Traditionally after-sales services were centered on product, and consisted mainly of tasks related to maintenance, service and repair (Markeset and Kumar 2003). Along with the broadening scope of product support, industrial services have come to include elements such as: installation, commissioning, training, maintenance and repair, documentation, spare parts supply, product upgrades and refurbishing, software, telephone/online support, remote monitoring, and warranty schemes (Goffin 1999, Oliva and Kallenberg 2003). These service elements can be classified based on, when they are offered, whether they are tangible, and are they related to the product (transaction) or the customer (relationship) (see table 2).

Table 2 – Synthesis of industrial service classification presented in the literature

Industrial service elements	Relation to purchase	Tangible / intangible	Product / customer related
Installation	After-sales	Intangible	Product related
Commissioning	After-sales	Intangible	Product related
Training	All phases	Intangible	Customer related
Preventive maintenance	After-sales	Both	Product related
Repair	After-sales	Both	Product related
Documentation	All phases	Intangible	Both
Spare parts	After-sales	Tangible	Product related
Product upgrade	After-sales	Tangible	Product related
Refurbishing	After-sales	Tangible	Product related
Software	All phases	Intangible	Product related
Technical support	Mainly after-sales	Intangible	Customer related
Remote monitoring	After-sales	Intangible	Product related
Warranty	After-sales	Intangible	Product related

For many industrial products the first service element after the purchase is installation, which is usually performed by the manufacturer (Goffin 1999). In addition to the installation, a commissioning might be executed by the manufacturer's personnel. Many industrial products require also user training because of their complexity (Goffin 1999, Markeset and Kumar 2003). Preventive maintenance and repairing are usually offered by the manufacturer and a service provider company that compete for this market. Documentation plays a key role in industries like medical electronics (Goffin 1999), and it is an important element of the service offering in relation to warranty and support issues (Markeset and Kumar 2003).

Spare part sales, product upgrade and refurbishing can be a substantial source of revenue for the manufacturer (Markeset and Kumar 2003, Goffin 1999). In many applications in

the machine building industry customized software is an essential part of the offering. Technical support is a necessity, when serving industrial markets, whereas remote monitoring can offer significant value-added e.g. in industries like wind energy, where the production sites are distant located and non-occupied. Most manufacturers offer warranties, and in some industries like automobiles long warranties are seen as a competitive advantage (Goffin 1999, Kumar *et al.* 2004).

2.2.2 Different approaches to maintenance strategy

Maintenance is the core component of the after-sales service offering of a manufacturer. Industrial companies have several existing strategies to carry out the maintenance tasks. Kumar, and Kumar (2004) divide these strategies into two groups, based on whether the maintenance is planned (see figure 2):

I) **Planned maintenance tasks** (proactive maintenance). Maintenance is carried out according to scheduled plans. Usually the purpose is to minimize the downtime by minimizing emergency repairs, and carefully scheduling the maintenance. Preventive maintenance includes pre-planned inspections, adjustments, lubrication, and changing of aging components; and it can be executed as based on condition, calendar, or operating hours.

II) **Unplanned maintenance tasks** (reactive maintenance). No prior planning is made, and equipment is maintained when needed. This policy suits for situations, in which the failure consequences are negligible; but planned maintenance is needed in case of complex systems, which will stop working due to a failure in some of the components.

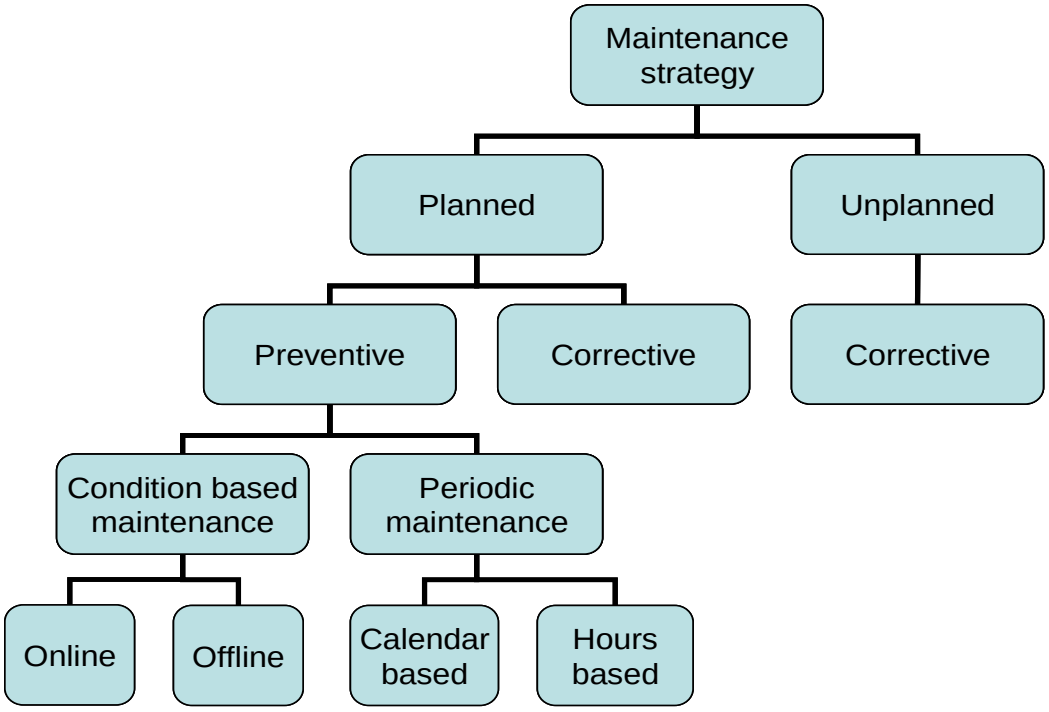

Figure 2 – Different approaches to maintenance strategy (redrawn from Kumar and Kumar 2004)

2.3 From product services to customer solutions

This chapter describes the move some manufacturers have made when trying to provide their customers more value-added. Traditionally manufacturers have provided only limited amount of product related services, but recently the scope has been broadening, and some companies have changed themselves even to become solution providers offering performance-based contracts, and taking full responsibility of e.g. customer's maintenance functions.

2.3.1 Services supporting the product vs. services supporting the client

In the literature, there are many descriptions of manufacturers' move from strictly product related services into more value-added ones with lesser relation to the manufacturers' own products, and more to customer activities and outcomes (e.g. Wise and Baumgartner 1999, Auramo and Ala-Risku 2005). Frambach *et al.* (1997) divide after-sales services into two groups: transaction- and relationship-related services. Transaction-related services are aimed to enhance product performance, and help the supplier to differentiate from competition (Frambach *et al.* 1997, Markeset and Kumar 2003). Relationship-related services relate to different life cycle phases of the customer relationship, and

enable the manufacturer to deepen the relationship, and thereby to enhance its service offering (Lovelock 1983, Frambach *et al.* 1997).

Mathieu (2001a) describes the industrial services as services supporting the supplier's product (SSP), and services supporting the client's actions (SSC) in relation to the supplier's product. The former represent a traditional view of after-sales services, whereas regarding the latter supplier has to discover, what kind of services are needed to fulfill the mission of customer organization (Mathieu 2001a). Cova *et al.* (2000) have further developed Mathieu's categorization. They divide industrial services into services supporting the client's product (SSP); services that support the client's actions in relation to the supplier's product (SSC1); services with no direct link to the supplier's product, but supporting customer activity and market position (SSC2); and services that support customer network (SSN), not only the customer company (see table 3).

Table 3 - Services supporting the product, client, and the network (Cova *et al.* 2000, Mathieu 2001a)

Acronym	Description	Additional information
SSP	Services supporting the supplier's product.	Mathieu (2001a): SSP
SSC1	Services supporting the client's actions related to the supplier's product.	Mathieu (2001a): SSC
SSC2	Services supporting the client's actions with no direct link to the supplier's product.	Help customer activity, and market position.
SSN	Services supporting the customer's network.	Offered mainly by systems integrators.

2.3.2 Solutions and Product service systems

As mentioned, many industrial companies are broadening their offerings (Wise and Baumgartner 1999), and moving along the line SSP → SSC1 → SSC2 → SSN (Cova *et al.* 2000). This move has been seen as an effort to dematerialize the offering (Cova *et al.* 2000). In order to describe these new offerings, there have emerged terms like Product Service systems, systems integration, and solutions. The common feature among them is that the emphasis is moving away from supplier's product, customer ownership, and

auxiliary services, to offering coproduced customer value, sharing risks, and solving customer's operational challenges.

Solution offerings of manufacturers

By integrating forward into services previously undertaken by their customers, some manufacturers are concentrating on solving a customer problem with a customized solution, consisting of integrated products, services, and information (Cornet *et al.* 2000, Davies *et al.* 2007, Brax and Jonsson 2009). These manufacturers are called solution providers, and their customized, integrated offerings are called solutions. These packages offer customers more value than the sum of their parts (Cornet *et al.* 2000, Galbraith 2002, Miller *et al.* 2002), and provide suppliers higher margins than selling only products would (Cornet *et al.* 2000, Stremersch *et al.* 2001, Johansson *et al.* 2003). The downside is that offering solutions also involves bigger risks, because some of the risks are transferred from customer to supplier (Davies 2003, Brax and Jonsson 2009). Product-centric companies offer stand-alone products that customers can combine as they like, thus little integration capabilities are needed from the supplier (Galbraith 2002). Solutions on the contrary are integrated and customized by their nature. The capabilities of doing the integration and customization in a cost efficient way are most important success factors of a solution provider (Cornet *et al.* 2000, Johansson *et al.* 2003, Davies *et al.* 2007).

A main challenge for manufacturers entering solution business is the need of becoming really customer-centric (Galbraith 2002, Davies 2003, Brady *et al.* 2005), because the value is created together with the customer (Cornet *et al.* 2000, Brax and Jonsson 2009). The focus of customer interactions in solution business becomes relationship-based (Cornet *et al.* 2000, Oliva and Kallenberg 2003), and the business orientation needs to be long-term: developing solutions involves longer sales cycles (Johansson *et al.* 2003, Brady *et al.* 2005, Brax and Jonsson 2009). Customers are interested in the results of solving their problems, whilst organizing the means is the supplier's responsibility (Brax and Jonsson 2009).

When products are in most cases priced based on the production costs with probably some competitive considerations taken into account, pricing of solutions should be based

on the value delivered to customers (Stremersch *et al.* 2001, Johansson *et al.* 2003, Oliva and Kallenberg 2003). This is because solutions create additional value compared to bundles of products and services, and the competitors usually can not offer any substitutes: solutions are customized (Johansson *et al.* 2003). The benefit is that competition moves away from being based on prices, to being based on the customer value of different offerings (Stremersch *et al.* 2001). At the same time performance measures need to be changed. While in product sales product profitability is a key performance indicator, in solution business it needs to be replaced by a more customer centric metric – customer profitability (Cornet *et al.* 2000).

Product Service systems in industrial markets

According to Baines *et al.* (2007, p. 1545) Product Service systems (PS systems) are commonly defined as "product(s) and services(s) combined in a system to deliver required user functionality in a way that reduces the impact on the environment". Two trends have been facilitating the emergence of PS systems: the servitization of products and the productization of services (see figure 3). This thesis covers partially the previous, when discussing the broadening of the scope of the industrial offerings; the evolution of servitization of industrial products.

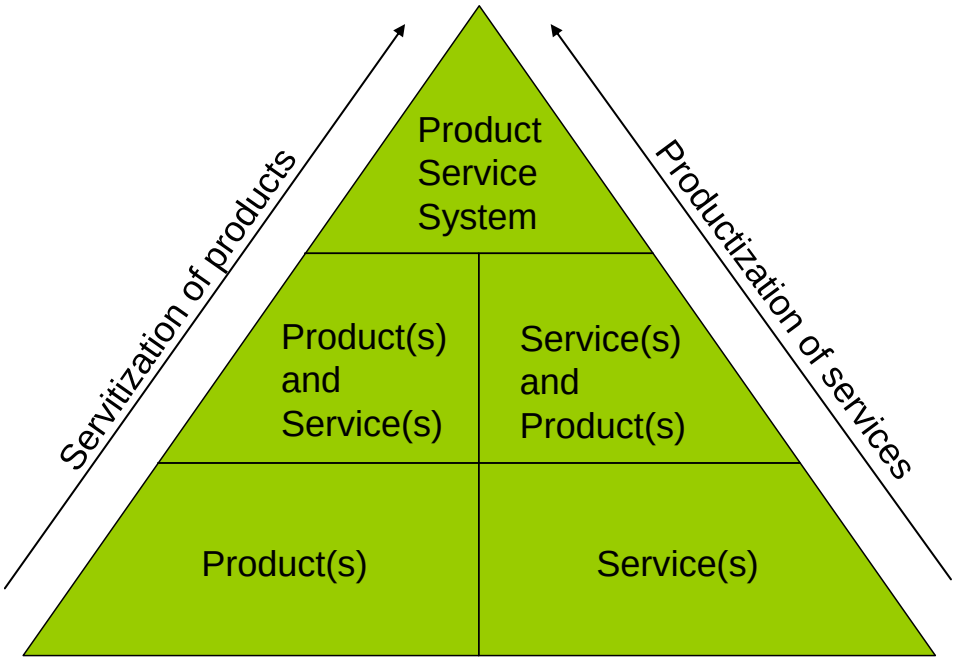

Figure 3 – Evolution of Product-Service System concept (redrawn from Baines *et al.* 2007)

PS systems in industrial market can be seen as one form of solution provision of manufacturers, thus the benefits for the customer and the manufacturer are quite similar as those in providing solutions. There are though two facts that characterize PS systems: ownerless consumption, and decoupling economic potential from environmental burden (Goedkoop *et al.* 1999, Baines *et al.* 2007). In most Product Service systems the idea is to sell functionalities instead of products (Baines *et al.* 2007). Lately there have emerged e.g. car sharing companies that offer customers the right to use a car on a time decided by the customer, on a fee based on the length of the use. Instead of owning a car, customers can pay for the use of one whenever they like to.

Ownerless consumption has been seen as enabling more efficient use of existing resources (Goedkoop *et al.* 1999, Mont 2002): the same number of people is able to drive a car with fewer cars in the resource pool. Because of more efficient use of resources, the environmental impacts (as well as costs) are lower although the benefits remain the same (Mont 2002). Thus PS systems might enable the decoupling of economic growth and environmental pressures (Goedkoop *et al.* 1999, Baines *et al.* 2007).

Some machine manufacturers are offering their customers the performance of their products without having to purchase them. The manufacturer carries the responsibility of owning, maintaining and possibly even operating the machines, while the customer can benefit from the performance e.g. as output of production (Baines *et al.* 2007). In this case, the customers are charged according to the realized performance of the manufacturer's machines.

Moving the ownership of industrial goods from customers to manufacturers changes the incentive pattern. Traditionally manufacturers have been responsible for the production of investment goods, while the burden of operations, reliability, and maintenance issues has been shifted to customer (Baines *et al.* 2007). After-sales services have provided the manufacturer additional revenue; the bigger the maintenance needs the higher the additional revenues. Because the manufacturer will carry the costs of maintenance in solution business, it will have incentives to drive down these costs by using all its expertise related to the design, production, and operation of its product. While this is

being done, asset utilization will be improved, and total costs as well as environmental burden reduced (Baines *et al.* 2007).

A major factor hindering the success of PS systems is related to financing them: few manufacturers are willing to own the goods they produce also after their installation. However, financing can be sought from companies like GE Capital, who lease expensive products such as containers, cars, and airplanes (Goedkoop *et al.* 1999). Another solution to the financing problem, in case of sharing luxury goods like yachts, is presented by Goedkoop *et al.* (1999): the luxury goods are owned by a foundation created by the investors.

2.3.3 Broadening the manufacturer's offering

As discussed, there has been a trend of manufacturers moving from offering only products with warranties into services supporting the products, services supporting the client and its network, and even into offering solutions and product service systems. This broadening of the offering towards downstream activities increases the possibilities (value-added) as well as the challenges (capabilities required) for the manufacturer, which is presented in figure 4. As the possibilities to create new business grow, and thereby increase margins by e.g. differentiation and changing the earning logic, so do the challenges. Manufacturers need to understand the new business they are entering and to develop capabilities required being successful in the new business environment. However lucrative this move might seem, industrial suppliers need to understand that they must invest a lot of resources and time to carry out this change successfully.

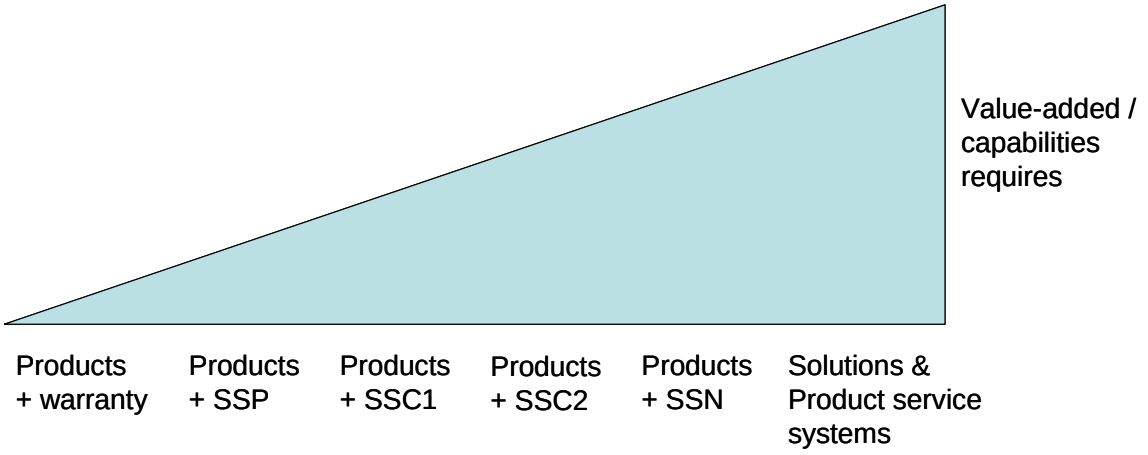

Figure 4 – Value-added and capabilities required of different offerings of manufacturer

2.4 The challenges related to offering industrial services

2.4.1 Characteristics of after-sales services compared to those of products

According to Cohen *et al.* (2006) many manufacturers see after-sales services as a necessary evil, mainly because of the several challenges related to them, which are not present in product sales (see table 4). Because of the nature of demand, services need to be delivered in more locations than products, and the forecasting of demand is always quite imprecise, which causes difficulties for manufacturers used to operating in stable and predictable environments (Auramo and Ala-Risku 2005, Glueck *et al.* 2006, Reinartz and Ulaga 2008). The vast amount and wide variety of stock keeping units in after-sales services makes the logistics very challenging; especially when the single service network should be able to deliver different kinds of service products in several locations, and handle also the reverse logistics caused by returns and disposals (Cohen *et al.* 2006). To be able to have the services available, the manufacturer needs to have in the right place at the right time the right parts, people, and equipment (Cohen *et al.* 2006, Glueck *et al.* 2006). Service demand is hard to smooth, therefore service capacity has to be adjusted to balance demand and supply (Auramo and Ala-Risku 2005).

Table 4 - Manufacturing vs. after-sales service supply chain (modified from Cohen *et al.* 2006)

Parameter	Manufacturing supply chain	After-sales service supply chain
Nature of demand	Predictable, can be forecasted	Always unpredictable, sporadic
Required response time	Standard, can be scheduled	As soon as possible
Number of SKUs	Limited	15-20 times more
Product portfolio	Largely homogenous	Always heterogeneous
Delivery network	Depends on the nature of network; multiple networks necessary	Single network, capable of delivering different service products
Reverse logistics	Doesn't handle	Handles return, repair, and disposal of failed components
Aim of inventory management	Maximize velocity of resources	Pre-position resources
Performance metrics	Fill rate	Product availability
Inventory turns / year	6-50	1-4

2.4.2 The challenges and ways to handle them

Manufacturers moving from offering products and limited amount of strictly product related services into wider scope of industrial services face many kinds of challenges. This is due to the complete change in the competitive landscape, and the skills required for excelling; which forces management to change the way of thinking of e.g. success and how it should be measured. These challenges are related to the strategy and business design; operations planning, management and monitoring; service production and delivery; and service sales (see table 5).

Table 5 - Challenges related to offering industrial services, and strategies to handle them

Main category	Challenge	How to handle, examples
1. Flawed strategy and business design	Executives do not understand the potential	Change executive mindset
	Service profitability not known	Change measures of profitability, list services, and monitor costs (Reinartz and Ulaga 2008)
	Poor supply chain visibility	Information systems, and supply chain collaboration
2. Inadequate operations planning, management, and monitoring	Low forecast accuracy for spare parts	Visibility to IB, and understanding of the probabilistic demand
	Service operations run under capacity	Develop demand forecasting, and management of demand and capacity
	Poor supplier performance, and long lead times	Information systems, and supply chain collaboration
3. Poor service production and delivery	Low perfect delivery proportion	Develop service logistics
	Inability to fulfill service level agreements (SLAs)	Get access to critical customer data → evaluate contractual risks
	Inability to satisfy customer needs at an affordable costs	Control mechanisms, service platforms, standardized service processes, and pricing
4. Inability to sell services	Lack of sales people expertise in selling services	Train, fire, and hire
	Inability to prove the value of the service offering	Systems for documenting the value (Anderson *et al.* 2007, pp. 73-79)
	Customer contacts too low in the hierarchy	Grow relationships, train, fire, and hire

Executives in manufacturing companies are used to viewing services as supporting product sales, not as a profitable business on its own right (Oliva and Kallenberg 2003, Glueck *et al.* 2006). In addition, most of the managers do not understand the key success factors of the market; nor organizational structures, and processes needed (Auramo and Ala-Risku 2005, Auguste *et al.* 2006). This challenge needs to be tackled by changing the management mindset, because it will affect all the other factors of service business.

Industrial companies have limited knowledge of the profitability of their service business (Glueck *et al.* 2006, Reinartz and Ulaga 2008), because the measures for profitability in service business are quite different than those in product sales (Auguste *et al.* 2006). To tackle this, Reinartz and Ulaga (2008) recommend that a list of currently offered services should be developed as well as a system for monitoring the costs related to providing services. Poor visibility to supply chain causes some challenges for service excellence. The lessons of "service champions" show the importance of information systems, and increased collaboration of supply chain partners in solving the poor visibility (Glueck *et al.* 2006).

There are many challenges related to operations planning, management, and monitoring; such as low forecast accuracy of spare parts demand due to unexpected break downs. According to Cohen *et al.* (2006), many manufacturers find this causing difficulties, because they use a deterministic approach for predicting the demand. Due to poor forecasting, and demand and resource management some companies run service under capacity, which causes extra expenses (Glueck *et al.* 2006). Auramo and Ala-Risku (2005) stress the importance of visibility into the installed base in developing the forecast accuracy. Information systems, and supply chain collaboration assist firms suffering from low supplier performance and long lead times (Glueck *et al.* 2006).

Service production and delivery cause some challenges for manufacturers. Only 75% of services are delivered to the customer at the right time, in right place, and containing all the right elements; according to a benchmarking study of Glueck *et al.* (2006). Inability to evaluate contractual risks causes some manufacturers make service level agreements (SLA) that they later find very difficult and costly to meet. This could be prevented by

getting access to customer data needed to evaluate the risks related to a contract (Glueck *et al.* 2006).

The balance between service level and costs has been proven quite hard to achieve for many suppliers (Cohen *et al.* 2006, Glueck *et al.* 2006, Reinartz and Ulaga 2008). Reinartz and Ulaga (2008) suggest developing flexible service platforms for cost efficient service delivery, and standardized service processes with control mechanisms. Pricing should reflect the key success factors, and guide customers to choose more cost efficient ways of service production and delivery (Auramo and Ala-Risku 2005, Auguste *et al.* 2006).

Selling services can be a hard task for manufacturers. The sales people are used to selling products and some additional services, and thus find it hard to convince customers of the benefits of value-added services (Reinartz and Ulaga 2008). Because of this, the service sales people need to change the mindset into talking about value, not costs (Anderson *et al.* 2007). The existing customer contacts are often low in hierarchy, and therefore lack the power to decide on expensive and long sales cycles involving solutions, thus the companies should prepare for building new relationships, which takes time (Glueck *et al.* 2006). Sales people need also training; and some have to be replaced with people more suited for this kind of sales. The manufacturers should have available a system for documenting the value of their service offering to help convincing the customer of the benefits (Reinartz and Ulaga 2008, Anderson *et al.* 2007).

Ensuring that service offerings create value for customers requires that customer needs are identified, and that customers are divided into groups based on these needs. In industrial markets, this is tackled by industrial market segmentation; discussed in chapter 3.

3 Industrial market segmentation

Segmentation is tightly bound to a company's market strategy. It is "at the very crux of developing a thorough, well-reasoned, competitive advantage achieving strategic plan for a product and a business unit (Sudharshan and Winter 1998, p. 8)". This should be bore in mind when segmenting the market, because for each segment company chooses to approach, a market strategy has to be designed. This imposes some requirements for the characteristics of the segments.

Some principles of consumer market segmentation can be used also when segmenting industrial markets. However, there are notable differences. Industrial buying behavior is more complex, the process involves several people, and some organizational criteria are used in making the purchase decision (Choffray and Lilien 1978). Because of the increased complexity, business marketers usually segment the markets using a sequential process (Kotler and Keller 2008).

This chapter starts with a discussion of the reasons for the existence of customer segments – customer needs and sought benefits. The requirements of effective segments are presented, and a comparison is done on two basic models for doing the segmentation: descriptive-factors-based and causal-factors-based segmentation. "Nested approach" and "Macro-micro" segmentation – two renowned industrial market segmentation techniques – are presented, as well as "Need-based segmentation" that combines the benefits of using descriptive and causal variables as segmentation basis. The chapter ends with a discussion of the reasons of an existing gap between the advanced industrial market segmentation techniques, and the segmentation carried out by the managers of manufacturers.

3.1 Customer needs and benefits

Why does the buying behavior of different customers differ from each other? It is essential for any company developing a market strategy to thoroughly understand the needs of its possible customers. This is so because the needs represent the buying motives of the customers (Peltier and Schribrowsky 1997). In industrial markets, these needs relate to the product, price, and company specific needs.

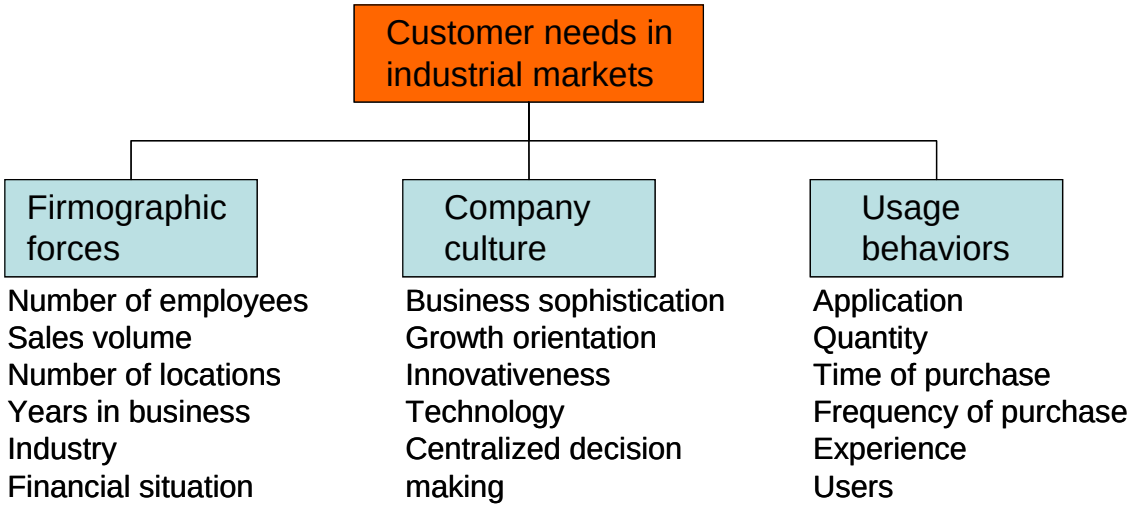

Figure 5 – The drivers of customer needs in industrial markets (redrawn from Best 1997, p. 118)

The forces that shape customer needs in industrial markets can be divided into three categories (see figure 5): firmographic, company culture, and product usage related forces (Best 1997). Many companies use mainly firmographic variables when segmenting their customers, mainly because it's easy to get firmographic data. But it's important to see that there are many other forces too that shape customer needs. Two firms that have very similar firmographic characteristics might have quite different needs, because of differences in e.g. company cultures or usage behaviors (Best 1997). Understanding the forces that shape customer needs is very beneficial, if not a must, when doing the segmentation.

While underlying needs initiate purchase decision process, customers are seeking to gain benefits from the purchase, and these benefits represent the key evaluative criteria the customers are using (Peltier and Schribrowsky 1997). The role of needs is in the beginning of customer's supplier seeking process, and benefits are evaluated when finally selecting the supplier from whom to purchase (see page 32: "reverse segmentation"). There are segmentation methods that are based on the customer needs or sought benefits; some of these methods will be discussed later.

3.2 Requirements of effective industrial market segmentation

The purpose of industrial market segmentation as stated by Freytag and Clarke (2001 p.475): "Segmentation should identify the main reasons buyers buy." How to identify these reasons is a problem of defining segmentation criteria, for which there exist quite a

few models in the literature. Some of these models will be discussed in the following chapters.

There are unlimited amounts of ways to segment the markets. But only few of them are useful in developing an effective marketing program. Kotler and Keller (2008, p. 268) have defined the requirements for customer segments (table 6) – the segments need to be measurable, substantial, accessible, differentiable, and actionable. When companies are developing their marketing programs, this framework can be used to review the usefulness and effectiveness of the segmentation.

Table 6 - Requirements for the identified customer segments (modified from Kotler and Keller 2008, p. 268)

Criteria	Description
1. Measurable	The size, purchasing power, and characteristics of the segments can be measured.
2. Substantial	The segments are large and profitable enough to be served with a tailored marketing program.
3. Accessible	The segments can be effectively reached and served.
4. Differentiable	The segments can be conceptually distinguished, and they respond differently to different marketing programs.
5. Actionable	Effective programs can be developed to attract and serve the segments

3.3 Segmentation based on descriptive vs. causal variables

A number of different kinds of segmentation variable bases to use in segmenting industrial markets have been suggested by researchers. In table 7, the two most common types of those are presented: the identifiable/accessible group and the needs/benefits group (Bonoma and Shapiro 1983, Sharma and Lambert 1994, Powers and Sterling 2008). Haley (1968) calls these groups descriptive factor based (identifiable/accessible), and causal factor based (needs/benefits). The previous is based on easily accessible criteria, and answers to the question: **Who** is the customer (Peltier and Schribrowsky 1997, Albert 2003). While the latter is based on criteria describing customer needs, and

answer to the question: **Why** is the customer buying the product or service (Peltier and Schribrowsky 1997, Albert 2003). Frank *et al.* (1972) present two segmentation methods: one based on independent (descriptive) factors, which they call macro segmentation; and the other based on dependent (causal) factors, called micro segmentation (see Chapter 3.4.2).

Table 7 – Two types of industrial market segmentation

	Segmentation models type 1	Segmentation models type 2	Authors
The name of the group	Identifiable / accessible	Needs / benefits	Bonoma and Shapiro (1983), Sharma and Lambert (1994), Powers and Sterling (2008)
Variable type	Descriptive: independent	Causal: dependent	Haley (1968), Wind and Cardozo (1974), Wind (1978)
Based on	Customer characteristics	Customer response	Kotler and Keller (2008)
Answers to the question	Who is the customer?	Why is the product or service bought?	Peltier and Schribrowsky (1997), Albert (2003)
Data acquisition	Easier	More difficult	Many
Usefulness of the segmentation	Lower	Higher	Many
Segmentation stage	Macro	Micro	Frank *et al.* (1972), Wind and Cardozo (1974)

The ease of use is the obvious benefit of the identifiable/accessible group, which has been in use by practitioners for a considerably longer time (Haley 1968). However, there are also two major problems. First, the variables used (mostly demographic) are supposed to represent underlying customer needs, but in many situations the relationship is unclear (Sharma and Lambert 1994, Powers and Sterling 2008). Second, the identified segments

(based on e.g. company location) might not suggest any marketing strategies (Sharma and Lambert 1994).

The situation with the needs/benefits group is quite the opposite: Acquisition of the required data of customer needs is costly and time consuming; some times not even possible (Powers and Sterling 2008). The customer segments though certainly represent groups of customers with similar needs. Each segment suggests different kind of marketing strategies, which makes this kind of segmentation approach more desirable than the ones using descriptive factors (Peltier and Schribrowsky 1997). Actually the "true" market segments exist, because customers have different kind of needs and pursue different kinds of benefits (Haley 1968).

Some authors suggest using the strategy of the customers as a basis for segmentation. Verhallen *et al.* (1998) see that industrial buying behavior is primarily driven by strategy. The purchase requirements of industrial customers depend on whether the company is pursuing cost leadership, differentiation, or focus strategy (Sudharshan and Winter 1998). This point of view comes relatively close to the needs/benefits segmentation group. Thus, it has also the same kind of limitations: the strategy of a customer company is in many cases quite difficult to define from outside, and doing it requires very intimate knowledge of the customer.

3.4 Different models of industrial market segmentation

According to Sharma and Lambert (1994) there exist three types of models for the selection of industrial market segmentation bases:

1. No normative models – the base selection is unordered
2. Two-stage models – based on organizational and decision-making characteristics
3. Multi-step models

Next a widely referred multi-step segmentation model is presented: "Nested approach" by Bonoma and Shapiro (1983). Later a well known example of two-stage models is given, namely "Macro-Micro segmentation" introduced by Frank *et al.* (1972) and further developed by Wind and Cardozo (1974). "Need-based segmentation" is also a two-step segmentation approach, and it will be discussed also in this chapter.

3.4.1 Nested approach

The problem of industrial segmentation is to find most suitable variables for doing the segmentation (Shapiro and Bonoma 1984). There are some trade-offs related to this, like the one between the usefulness of the segmentation in developing a marketing approach and costs in acquiring the needed data for segmentation. Bonoma and Shapiro (1983) presented a well-known nested hierarchy for choosing the segmentation variables (see figure 6). They identified five general segmentation criteria that are, starting from the most visible and moving towards less visible: 1) Demographics, 2) Operating variables, 3) Purchasing approach, 4) Situational factors, and 5) Personal characteristics.

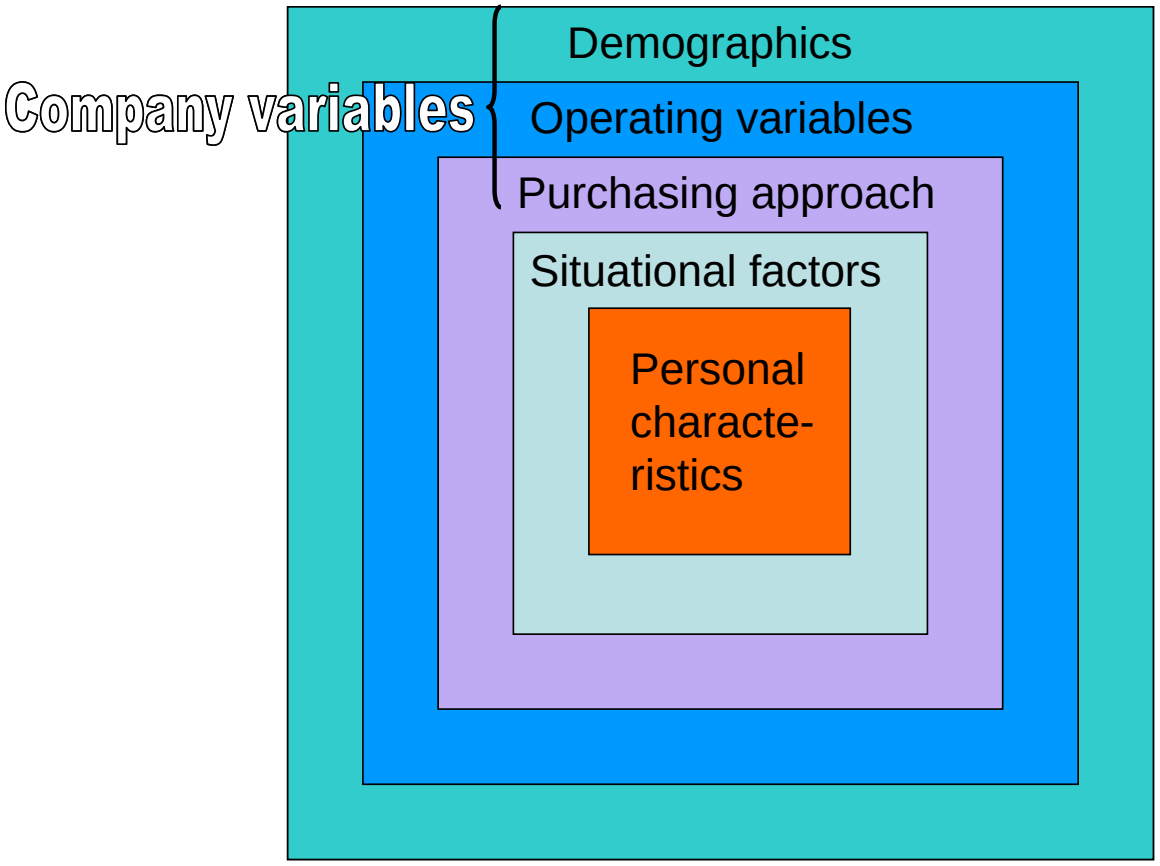

Figure 6 – The bases of nested approach (redrawn from Shapiro and Bonoma 1984)

The three outer most criteria are variables related to the customer company. They are more visible and permanent, and require less intimate knowledge of the customer than the inner ones (Bonoma and Shapiro 1983). Therefore Bonoma and Shapiro (1983) suggest that managers start the segmentation from the demographic variables and work their way inwards, in order to benefit from the more useful inner nests (see figure 7).

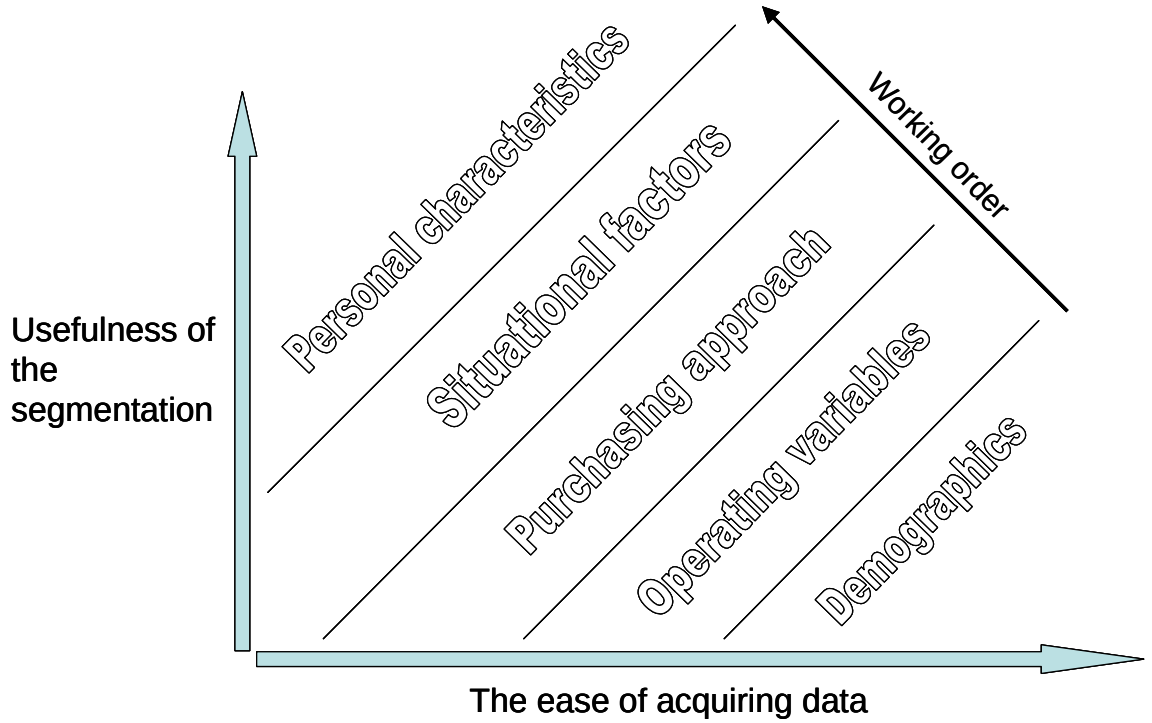

Figure 7 – Usefulness of the segmentation vs. the ease of data acquisition (Bonoma and Shapiro 1983)

Demographics are the most general segmentation criteria and they give a less precise description of customer needs, therefore they are often only a beginning (Bonoma and Shapiro 1983). Demographics include variables like customer's industry, company size, and location. Operating variables, like company technology, product-use status, and customer capabilities, are generally stable and offer a more precise identification of customers (Shapiro and Bonoma 1984). According to Bonoma and Shapiro (1983), the purchasing approaches are one of the most neglected, but still valuable segmentation variables. Purchasing function organization, buyer-seller relationships, general purchasing policies, and purchasing criteria belong to this category.

Situational factors are by their nature temporary and offer more detailed knowledge of the customer than the operating variables. This group involves urgency of order fulfillment, product application, and size of order (Bonoma and Shapiro 1983). Buyer-seller similarity, buyer motivation, individual perceptions, and risk-management strategies belong to buyer's personal characteristics, and are the least visible and require most intimate knowledge of the customer. Bonoma and Shapiro (1983) recommend that managers strive for a balance between the simplicity and low costs of the outer nests and

the richness of the inner ones. Clear and disciplined process as well as making the choices explicit should help in this.

3.4.2 Macro-micro approach to industrial segmentation

Balancing the need to have relevant data of customer needs in order to develop actionable marketing plans, and the costs of acquiring the data, has proven out to be difficult for managers. Trying to solve this Frank *et al.* (1972) introduced – and Wind and Cardozo (1974) further developed – a two phased macro-micro approach to segmenting industrial markets (see figure 8). According to Wind and Cardozo (1974) firms should begin the segmentation by grouping customers based on some demographic characteristics. In some cases these macro segments can be used as a basis for developing marketing strategy, but otherwise the managers should further divide these segments into micro segments by e.g. studying the key characteristics of decision making units (Wind and Cardozo 1974).

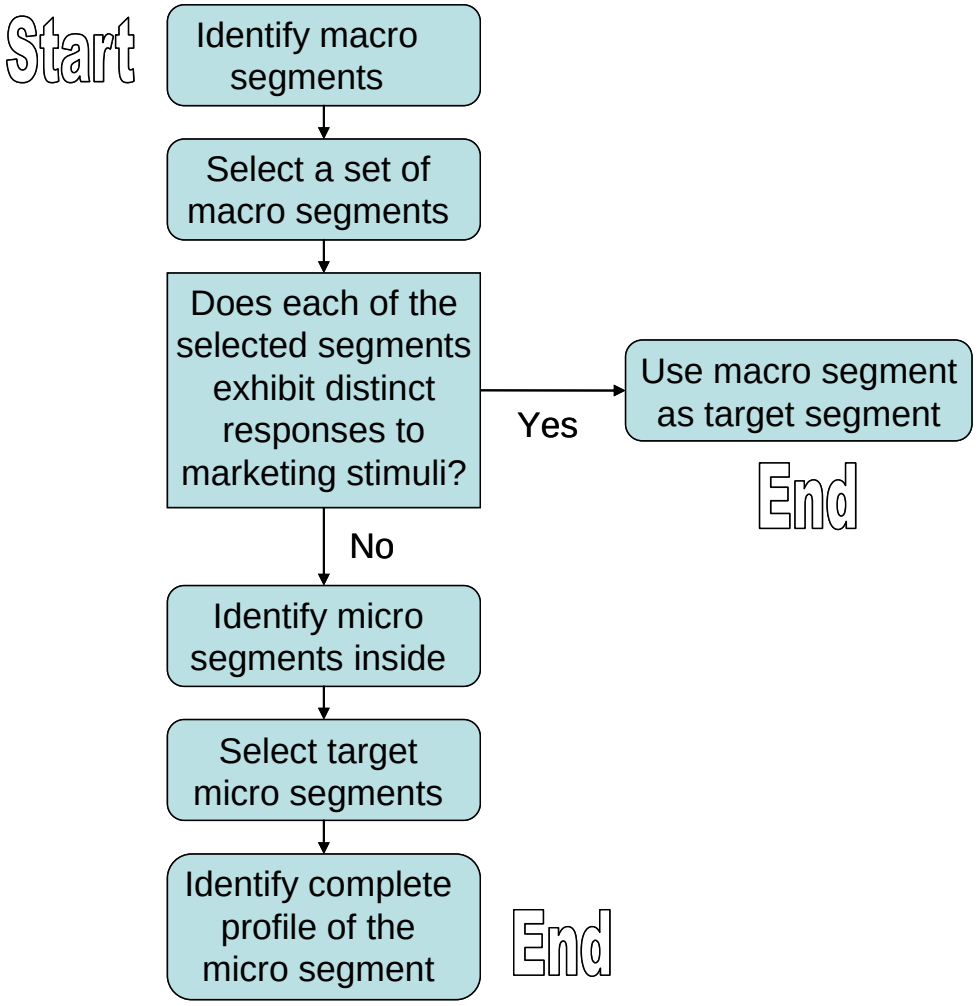

Figure 8 – Macro-micro segmentation process (modified from Wind and Cardozo 1974)

In the first phase of segmentation, homogenous macro segments are formed based on the buying organization and buying situation characteristics like product application, industry, organizational structure, and company size (Wind and Cardozo 1974). These macro segments can then be evaluated, based on data mostly from secondary sources, and the most attractive ones chosen for further evaluation (Wind and Cardozo 1974, Wind 1978). Because not all of the macro segments need to be studied to discover customer needs, a considerable amount of work and costs can be eliminated (Wind and Cardozo 1974).

The selected segments are studied to discover their responses to marketing stimuli (Frank *et al.* 1972). If they meet the criteria of actionable segments (cf. chapter 3.2), the segmentation is ready; otherwise the segments are further divided into micro segments. This is done based on information of causal factors, like criterion used in choosing

suppliers (cf. "Reverse segmentation" in chapter 3.4.3), personal characteristics of purchasers, and decision rules used in purchasing (Frank *et al.* 1972). Finally, target micro segments are selected based on the costs and benefits related to serving each segment with a specific marketing mix and the complete profiles of the segments are composed using organizational and decision making unit characteristics (Frank *et al.* 1972, Powers and Sterling 2008).

3.4.3 Need-based segmentation – integrating the benefits

As discussed, both type of segmentations – the one using descriptive variables and the one using causal variables – have their limitations. The idea with need-based segmentation is to combine these two approaches in order to benefit from the usefulness of the causal-variables-based customer segments and the easily available descriptive variables.

Need-based segmentation takes the question "Why is the product or service bought?" as a starting point (Best 1997, Peltier and Schribrowsky 1997). The customer segments are first defined based on the needs of the customers, and the benefits sought (Albert 2003). Usually there will be three to seven segments of customers, whose combination of needs are different (Haley 1968). Many customers in different segments value of course also the same kinds of benefits, but the relative importance of the valuations is decisive.

After defining customer segments based on customer needs, the customer characteristics in each segment are studied. Doing this, the descriptive variables that characterize them, will be discovered (Best 1997, Powers and Sterling 2008). When approaching new possible customers after this, it will be possible to predict in which customer segment they belong to, by using only easily acquired descriptive data of those customers (Haley 1968). This kind of an approach combines the benefits of basing the customer segments on customer needs, and using mainly descriptive data when dividing the customers into segments (Powers and Sterling 2008).

Peltier and Schribrowsky (1997) suggest that it is also possible to do the segmentation the other way around, namely first segmenting the market using descriptive variables and after that having a closer look at the customer needs (cf. chapter 3.4.2: Macro-micro approach by Wind and Cardozo 1974). This kind of an approach is definitely in use in

some companies, who have started from doing the segmentation using the easy way, and afterwards are trying to further develop it. The problem with this is the vast amount of customer segments: If there are e.g. 6 variables used, and each has 3 categories, there will be $3^6 = 729$ customer segments, whose needs then have to be defined (Best 1997).

Reverse segmentation

When segmenting industrial market, suppliers group the potential customers, and seek customer groups that best fit their business targets. Mitchell and Wilson (1998) point out that at the same time customers are seeking for potential suppliers using mostly the same kind of criteria (e.g. quality, financial stability, delivery reputation etc.) that the suppliers use themselves. Suppliers will definitely benefit from excelling by the criteria the customers use – "reverse segmentation criteria". Looking from the suppliers' side, the use of specific "reverse segmentation" criteria can become a segmentation variable (Mitchell Wilson 1998).

The idea with reverse segmentation is that the supplier can segment its potential customers based on the requirements the customer places on the suppliers. Reverse segmentation is especially useful in case of long-term supplier-customer relationships (Mitchell and Wilson 1998). As an example of reverse segmentation can be seen Sharma and Lambert's (1994) study of the customer service requirements of companies in the high technology industry. Two customer segments were identified: one required that the suppliers offered extensive customer service; the other didn't (Sharma and Lambert 1994). The market was then segmented by using these requirements of the customers.

Another example of the reverse segmentation described by Anderson *et al.* (2007) is Baxter Healthcare's situation, where one group of its customers was focusing on transactional buying with many suppliers, and the other was developing relationships into more strategic type with fewer suppliers. These customer groups require different services and pricing from suppliers, based on which Baxter Healthcare segmented the market and developed its service offerings (Anderson *et al.* 2007). All in all, reverse segmentation can be seen as one form of needs-based segmentation.

3.5 The gap between the theory and practice of industrial market segmentation

Segmentation literature presents many techniques for industrial market segmentation, but much less is discussed of how to carry out the task: e.g. evaluate and select customer segments (Freytag and Clarke 2001, Palmer and Millier 2004). Millier (2000) points out that there seems to be a big gap between these theories and the segmentation done in practice by industrial companies – or as Mitchell and Wilson (1998) put it: what is theoretically meaningful may not be managerially possible. This is actually a fundamental difference, because usually the managers are interested in solving problems regardless of the technique used, whereas academics care much more about the theoretical sophistication and validity of the technique than its practical applicability.

According to Millier (2000) this gap might be due to the fact that there are too many models to choose from, and in case the market doesn't exist yet, the companies do not know how to handle the segmentation. There is also a trade-off between the usefulness of the segmentation and the ease of acquiring the data needed (Shapiro and Bonoma 1984, Mitchell and Wilson 1998), which obviously affects the way industrial companies do the segmentation. E.g. in case of need-based segmentation, the discovery of customer's real needs will consume a lot of time and resources. And because segmentation is static by its nature but the markets are dynamic, every segmentation study will start to decay as soon as it is ready (Palmer and Millier 2004). To tackle this, Freytag and Clarke (2001) suggest that there should be a system for continuously monitoring and scanning for changes in the markets.

A hidden prerequisite for most of the segmentation models is the hypothesis of perfect markets. But when we look at a situation where the conditions of perfect markets do not exist, e.g. there are only a few customers, some models – especially those relying heavily on vast amount of data – end up with difficulties. And the industrial markets rarely are perfect (Millier 2000).

How to fulfill the gap between the theoretical models and industrial market segmentation in practice? Millier (2000) sees that the marketers in industrial companies base their segmentation decisions mostly on their own expertise – the intuition. This might cause

some problems, because the decision making process will not be transparent, and thus convincing other people that decisions are good will be difficult. When the segmentation is overly dependent on the management intuition, some relevant customer data might be overlooked, which endangers the validity of the segmentation (Palmer and Millier 2004).

Millier (2000) suggests the problem is not that the intuition is used in decision making, but that the way the decisions are made is usually unclear in case of intuition. Therefore managers should use some rationalization techniques to support their intuition. These techniques will not be addressed closer in this thesis, but they include logical tests, matrixes, and segmentation trees. The idea of combining intuition and rationalization techniques is also to make a first model of segmentation visual, so that it can be communicated, evaluated, criticized, and further developed (Millier 2000).

After segmenting the market and identifying customer needs, service offerings should be developed to address the identified needs. The development of after-sales service offerings will be discussed in chapter 4.

4 The development of after-sales service offerings

Customer value management is a term introduced by Anderson *et al.* (2007), which has two basic goals: 1. Deliver superior value to targeted customers, 2. Get an equitable return on delivering the value. The development of after-sales service offerings is discussed in this chapter using customer value management as a reference point. The chapter starts with presenting the dimensions and main components of a service offering, and continues with discussing the construction of value offerings, after which methods used in new service development are presented. The last part consists of describing the possible earning logics in after-sales services.

4.1 Service offering – dimensions and main components

Service offering consists of many interrelated parts, some related to e.g. value provided, the processes carried out by the service provider, and its resources. According to Brax (2009) service offering consists of service outcome and three dimensions (see figure 9) that contain sub dimensions. The resource dimension includes physical goods, client, competence, context, and organization, while concept dimension involves models for value capturing, value proposition, and value creation. Management, maintenance, integration, production & delivery process, and client process are sub dimensions of the process dimension (Brax 2009).

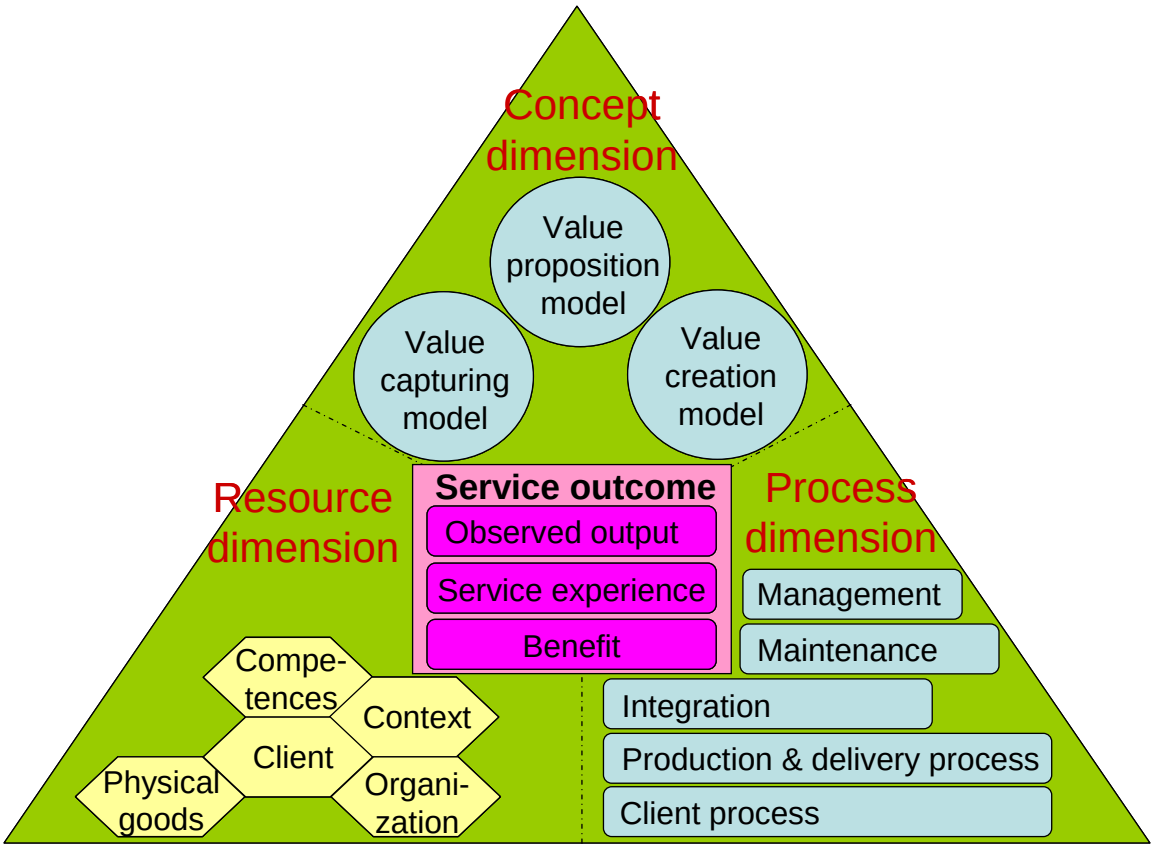

Figure 9 – Service offering – a system view (redrawn from Brax 2009)

Physical goods related to the service offering include tools, contracts, equipment, object of service, and material components delivered. "Client" contains individuals involved and their relationships, as well as customer knowledge. Knowledge, organizational culture, motivation of employees, and quality systems belong to the competences of service provider. Service offering context involves environment, image & reputation, and several situational factors. (Brax 2009).

The value capturing model of the service offering contains performance criteria used, pricing, value delivered, and costs; while service elements and their combination, process model, and resource model belong to value creation model. The value proposition model comprises of the idea of value creation, target markets, quality concept, and product strategy. (Brax 2009). The focus in the fourth chapter is on the concept dimension of the service offering, and mainly on its value proposition model; though service engineering (see chapter 4.3.3) also relates strongly to the process dimension.

4.2 Construction of value offerings

4.2.1 Ways of creating customers value

The main reason behind offering customers after-sales services is usually trying to earn money from creating customers value. Anderson *et al.* (2007, p. 24) define value in business markets as "the worth in monetary terms of the technical, economic, service, and social benefits a customer firm receives in exchange for the price it pays for a market offering." There are some methods available to discover, how to deliver the value and shape the offerings, of which customer value research, value innovation, and value curves are discussed here.

Discovering the sources of customer value

Based on a global research with companies from over 30 countries and from approximately 30 industries, Kim and Mauborgne (1997) state that the main thing characterizing high growth companies is that they continuously focus on creating new markets by shaping the competitive factors of their industries, whereas other companies take the environment as given and try to adapt themselves. Value innovation is a systematic way of looking for opportunities to create new market space – services and products for which there exists no direct competitors (Kim and Mauborgne 1997).

Value innovation is an ambition to dominate market space by developing quantum leaps of value delivered, which can take place in a) Products, b) Services, or c) Delivery (Kim and Mauborgne 1997). Kim and Mauborgne (1997) suggest not concentrating on the differences, but the commonalities between what customers value, to develop offerings of superior value. What parts of the offering customers will value? Customer value research (Anderson *et al.* 2007) enables supplier as well as customer to learn how supplier's offering could provide more value to customer.

Customer value research can be carried out by arranging focus groups or by "spending a day in the life of the customer" (Anderson *et al.* 2007). In focus groups some knowledgeable individuals of target customers are exposed to various offerings, and are asked to make trade-offs between different service elements. Based on the gathered knowledge, supplier will have insights on, what changes to the offerings would be most valuable, and how it could differentiate itself from competition (Anderson *et al.* 2007).

Focus groups require previous knowledge of the potential sources of value and customer's latent needs (Matthing *et al.* 2004); but when these sources are explored, spending a day in the life of the customer might be a good choice. The purpose here is not asking the customer to articulate its needs, but to try to discover characteristics previously never recognized in the industry as an opportunity to improve (Anderson *et al.* 2007).

Shaping offerings to deliver value

When shaping the offerings towards more value delivering ones, suppliers should think how their customers make trade-offs between alternative choices (Kim and Mauborgne 1999). Value curve is a tool by which these trade-offs can be visualized. An illustration of value curve is given in figure 10.

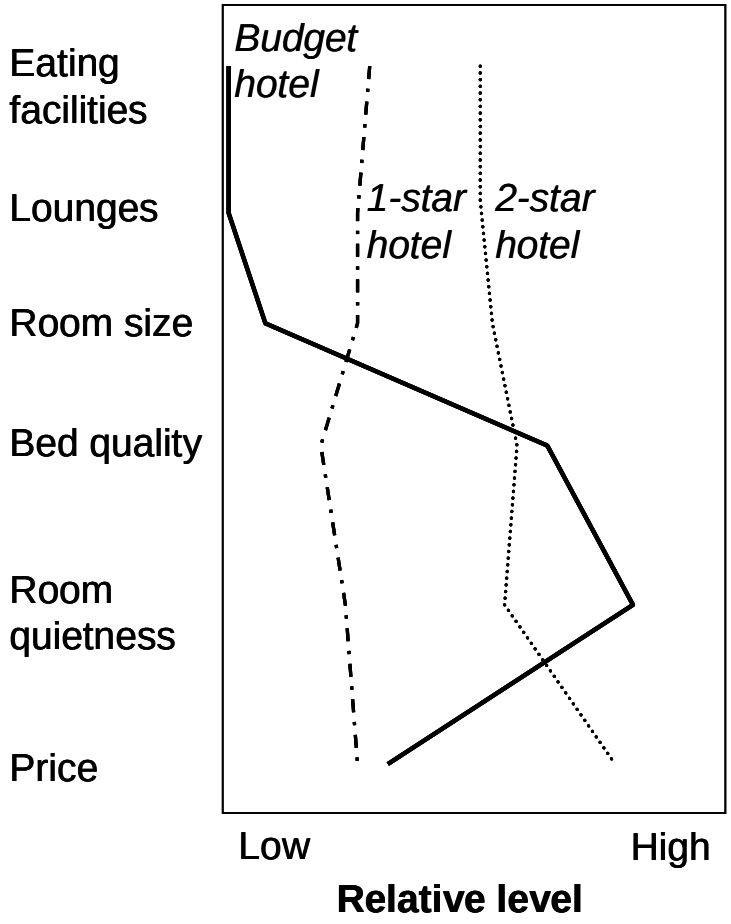

Figure 10 – An illustration of value curve: budget hotel (modified from Kim and Mauborgne 1997)

Traditionally travelers seeking a relatively inexpensive hotel had two choices: cheap one-star hotel, with low quality of services, noisy rooms, and uncomfortable beds; more expensive two-star hotel with more advanced services, and rooms enabling better sleep.

When some forerunner hotel chains discovered that in many cases people were seeking only a good night sleep with a decent price, budget hotel concept was introduced. This was a real value innovation in hotel industry: customers were offered considerably more value with a smaller price.

In order to create new value innovations and encourage out-of-box thinking Kim and Mauborgne (1999) suggest the use of value curves jointly with asking four questions:

1. What factors should be **reduced** well below the industry standard?
2. What factors should be **raised** well beyond the industry standard?
3. What factors should be **eliminated** that the industry has taken for granted?
4. What factors should be **created** that the industry has never offered?

Asking these questions puts the focus on different elements of service offering and their relative importance for customers. The service providers should develop offerings that deliver the decisive advantages of both of the alternative choices of customers in a specific situation (Kim and Mauborgne 1999), which was the case with budget hotel: price & sleeping comfort.

4.2.2 Demonstrating and documenting the value delivered

Providing offerings with superior value is one thing, but this value also has to be communicated to customers in order to benefit from it. Often customers do not understand, what supplier's offerings are worth them, and on the other hand suppliers are used to talking about benefits, but not their monetary worth (Anderson *et al.* 2007). Anderson *et al.* (2007) present an equation that can be used in assessing the value of two competing offerings; "fundamental value equation":

$(Value_f - Price_f) > (Value_a - Price_a)$, in which f = firm in question, a = next-best alternative.

The equation enables supplier to demonstrate and document in monetary terms the net benefits of the offering compared to the next-best alternative, which is essential to make value propositions persuasive to customers (Anderson *et al.* 2007). According to Anderson *et al.* (2007) documenting the value delivered as a percentage of price can help the customer in comparing the net benefits of alternative choices.

Documenting the value delivered is as important as demonstrating it in the beginning. Related to this, Anderson *et al.* (2007) identify two major problems: value claims (no proof) and "spreadsheet mania". In the latter case the value delivered is presented using various spreadsheets and complicated equations, and even the person presenting the results may find it hard to understand the presentation. Bearing manufacturer SKF has developed a "Documented Solutions Program", a tool for proving that it can save its customers real money (Anderson *et al.* 2007). The company has even made contracts, for which it will be paid based on the proven savings its customers have received (SKF, Laatuyhdistys 2008).

4.2.3 Service product portfolio

Industrial companies need to offer various kinds of after-sales services in order to meet the wide variety of customer needs. When serving the market, suppliers have to make trade-offs between customization and expenses of delivering the customized services. Anderson *et al.* (2007) see that inside the customer segments there always remains variation in the requirements, no matter how finely the segmentation is done, and therefore suggest offering "naked solutions" with options. The supplier develops a naked offering that entails only those elements every customer requires, and all the other services are offered as additional options. This is aimed at maintaining a sound profitability, which can not be done in case of customizing every service individually (Cohen *et al.* 2006).

The after-sales services offered by a manufacturer can be viewed as a portfolio of service products that are designed based on customer focused metrics (Cohen *et al.* 2006, Reinartz and Ulaga 2008). There is a delicate balance with the number of service products offered, because offering either too many or too few of them reduces profits and service quality (Cohen *et al.* 2006). According to Cohen *et al.* (2006) the portfolio should be represented using the most important parameters in service products: response time and price (see figure 11). The response needed and the willingness to pay for it, are the variables that govern after-sales services from the point of view of customer (Cohen *et al.* 2006). Shorter response time can be achieved by stocking bigger entities in locations closer to the installed base, which usually is of course more expensive.

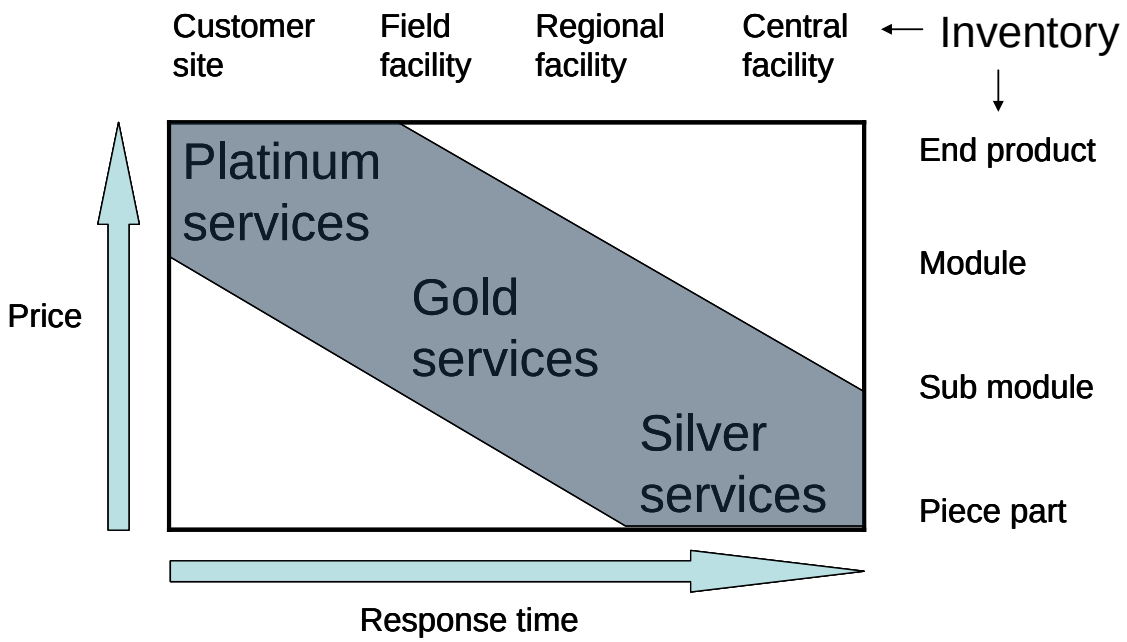

Figure 11 – Range of service products (modified from Cohen *et al.* 2006)

One of the main ideas for the service product portfolio of Cohen *et al.* (2006) is that the customers should be prioritized. If customers are served as first come first served basis, service resources are easily in heavy use by some low-profit customers, and customers requiring fast response, and also willing to pay for it, remain with poor service because of long waiting times. Though, high service level for one ("platinum") customer might require low level for another ("silver") customer (Cohen *et al.* 2006).

4.3 New service development

New services can require large inputs of capital and other resources, but often the failure rate is high (de Brentani 1995), thus success in the development of new services is critical for the company's overall success in business. Furthermore, developing new services is important for the continuing success of an industrial service firm. Next, six main types of new services are presented, as well as the development process. Methods for designing new services – service engineering (Shostack 1984) and service blueprinting – are discussed.

4.3.1 Different types of new services

The competitive landscape requires that new market space is created by designing new services (Cooper and Edgett 1999, Kim and Mauborgne 1999). Cooper and Edgett (1999) have identified six basic types of new services:

1. New-to the-world service
2. New service line
3. Addition to existing service line
4. Improvements to existing services
5. Repositionings
6. Cost reductions

First type of new services is major innovations that had never before been offered to the marketplace: e.g. interest rate swap in corporate finance. This is the rarest and riskiest type of new services. New service line is new to the company, but not to the market, and they include for example new budget hotel concept of a hotel chain, and carry high risk. The most common type of new services is addition to existing service lines. This type of services is new to the company, but fits well to existing service lines: e.g. new airline routes. (Cooper and Edgett 1999). Naturally, they involve less risk, and according to a study by de Brentani (1990) new services that closely fit the core offering of the company are more likely to be successful. Improvements to the existing services are usually low-risk, and produce little new revenue, but are needed to retain existing streams of revenue; minor changes to mortgage plans belong to this category (Cooper and Edgett 1999). Repositionings mean that existing services are offered to new customer segments. Cost reductions of services can be achieved by making modifications that usually are invisible to the customers, and although their market risk is low, these services use a considerable amount of internal resources (Cooper and Edgett 1999).

4.3.2 Main elements of service development process

The development of new services is usually carried out in three phases: service formation, development, and piloting and evaluation (Edvardsson 1997, Heikkinen and Still 2005). In the first phase the necessary service elements are indentified and designed, next the service is further developed, and finally tested and evaluated with customers (de Brentani

1990). De Brentani (1995) has identified three critical success factors that are common for all new service development projects: I) Service offering matches market needs, II) New services offer synergies with company's existing resources, III) New services are developed according to a structured process.

When developing new services some firms rely on their own strengths and capabilities, while some focus on the cost structures and strategic imperatives of target customers (Anderson *et al.* 2007). Customer is often viewed as a co-producer of value in services (e.g. Holmström *et al.* 1999, Matthing *et al.* 2004), thus some authors point out the importance of customer participation in new service development: training customer as a co-producer (Edvardsson 1997). According to a study by Matthing *et al.* (2004), this enables developing more innovative ideas, because in some situations customers are able to access their latent needs (cf. chapter 4.2.1: "spending a day in the life of the customer"), which can not be done with traditional customer research, where customers are objects of study rather than actors in the development process.

Edvardsson (1997) divides service development into five part processes (see figure 12): The development of a) Core services that satisfy main customer needs; b) Support and extra services that satisfy secondary customer needs; c) Service system's resources and structure in relation to the customer's resources like knowledge, equipment, mental models, and cognitive structure; d) Service processes in relation to the customer's process in the form of learnt behavior, actions, and cognitive spirit; and e) Adjustment and development of the infrastructure of the service company as well as of the customer.

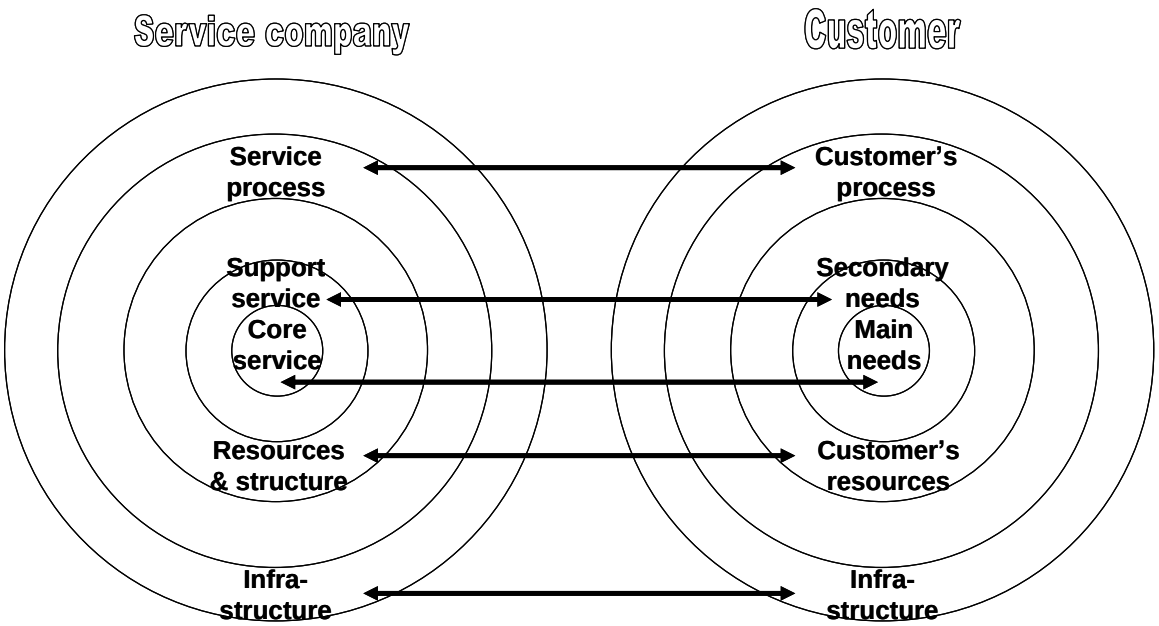

Figure 12 – An integration model of service development process (Redrawn from Edvardsson 1997)

4.3.3 Two methods: service engineering & service blueprinting

Edvardsson and Olsson (1996) see service design as a form of architecture that involves processes as its building blocks. Bullinger *et al.* (2003) criticize the currently prevailing ad hoc nature of this architecture: lack of corporate structures and processes that should be in place to enable the efficient development and market launch of new services. Service engineering is a technical discipline that views processes as the raw material of services, and tries to systematize the development of services as R&D objects (Shostack 1987, Bullinger *et al.* 2003). According to Bullinger *et al.* (2003) the design of the development system is also one part of service engineering, though the development of new service offerings as products is its key focus.

Service engineering involves various kinds of methods and models, basically of three types: resource models, product models, and process models – of which service blueprinting (Shostack 1984) is the most well known (Bullinger *et al.* 2003). Resource and product models are not further discussed in this thesis. As a process model, service blueprint describes how the outcomes of service are achieved efficiently (Bullinger *et al.* 2003), and takes also into account the interaction with the customer (Shostack 1984). It systematically and objectively quantifies the service process steps to test the

completeness and rationality of the service as well as that the service process fulfills the original objectives (Shostack 1984). Service blueprint is illustrated in figure 13.

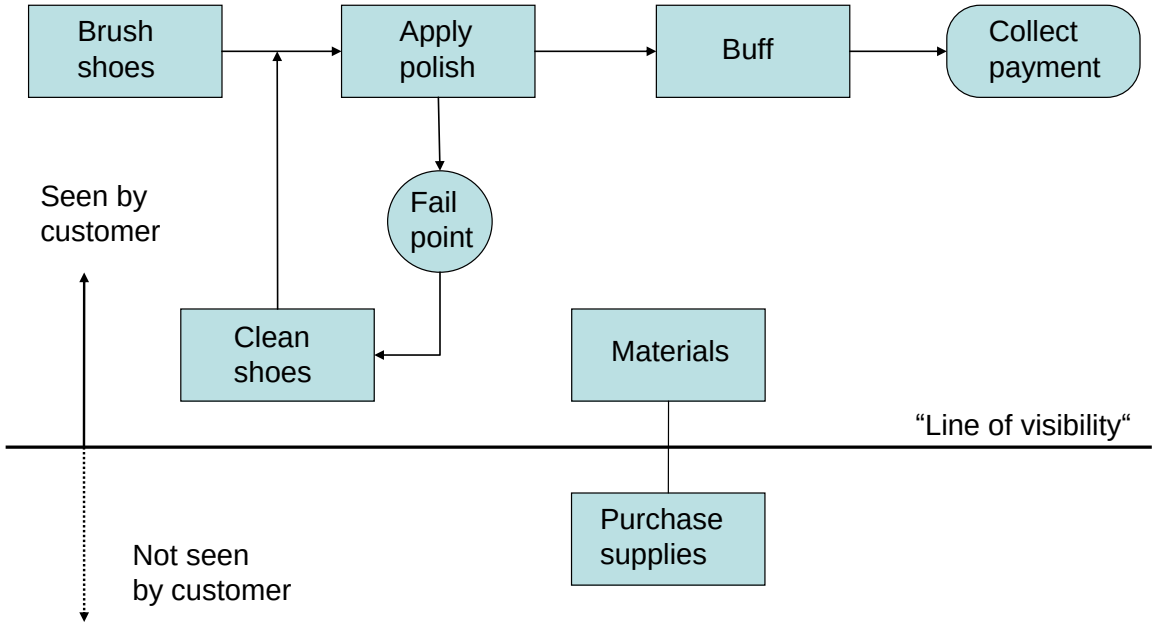

Figure 13 – Illustration of service blueprint: shoeshine (modified from Shostack 1984)

The service process of a corner shoeshine can be broken into sequential and parallel steps: brush shoes, apply polish, possible wrong choice of wax color and therefore needed cleaning of shoes, buff, and collection of payment. The duration of each step could also be presented in the service blueprint. "Line of visibility" (Shostack 1984) divides the service process into service steps seen by customers, and steps not seen by customer, although necessary to performance. Based on the information of durations and costs of the part processes, profitability can be calculated in different scenarios. According to Shostack (1984) service blueprint involves the consideration of

1. Identifying processes
   - Inputs needed and steps covered are revealed, when the components of a step are identified.
2. Isolating fail points
   - Enables higher service quality by reducing failures with analysis of fail points.
3. Establishing time frame
   - Standard vs. highest acceptable execution time.
4. Analyzing profitability

- A delay may affect profitability significantly.

Service blueprint allows developers to work out service details ahead of time, and it enables the control and management of service process (Shostack 1984). It is most useful in the development of new services and it offers the pricing department a basis for cost analysis, for distribution a map of the process, and for marketing visible portraits to be presented for customers (Shostack 1984, Shostack 1987). By using service blueprint, new ideas can be tested on the drawing board before expensive market tests, and in a much more precise manner than only with verbal presentations would be possible (Shostack 1987). Service blueprinting enables the measurement of capacity and productivity (Shostack 1984), as well as changing service structures by increasing/decreasing divergence and complexity of the processes (Shostack 1987).

4.4 Revenue from value delivered

Providing superior value to customers is seen as extremely challenging by suppliers, but retaining also a fair return on the value provided can be even more difficult. Price premiums are the most common way of trying to reach this, but there exists also other ways (Anderson *et al.* 2007). Next, two alternative earning logics in after-sales services are discussed and four business models presented.

Possible earning logics in after-sales services

There are basically two ways to capture revenue from service sales (Cohen *et al.* 2006, Oliva and Kallenberg 2003) of which the focus here is on the latter:

1. Charging for time and materials consumed.
2. Selling performance-based service contracts.

Traditionally services have been priced according to the costs of the service provider: the hours of service engineer work, and the spare parts and other materials consumed during the maintenance. Pricing service contracts based on the value received by the customer (e.g. opportunity cost of a machine failure) is another possible option (Auguste *et al.* 2006). The choice of basis for pricing is crucial, because it drives the incentives of all players (Cohen *et al.* 2006). According to Cohen *et al.* (2006), performance-based models align incentives usually better than ownership-based ones, because the rewards are based on outputs (benefits) rather than inputs (costs). In performance-based contracts service

supplier has incentives to minimize the costs of providing the services, whereas in traditional model it gets paid according to the costs generated. Service contracts should be performance-based, when a) product is expensive, b) supplier can bear the ownership risk, and c) manufacturer and customer can both monitor the outcomes (Cohen *et al.* 2006). One form of prepaid performance-based contracts – warranties – has also been an element of the traditional service offerings.

Pricing is an important element of the earning logic, but unfortunately in many cases it is done using only intuition, and rules of thumb (Cohen *et al.* 2006). The pricing can be based on the value delivered, by rearranging the value equation (page 39) of Anderson *et al.* (2007): $Price_f < Price_a + \Delta Value_{f,a}$. By sharing parts of the incremental value with its customers, supplier actually gives them value, which can be done in order to e.g. penetrate the market (Auguste *et al.* 2006, Anderson *et al.* 2007). On the other hand, sometimes services should be priced higher in order to facilitate product upgrades (Auguste *et al.* 2006).

Skill- vs. scale-based competition

When entering the service market, companies have to resolve some strategic questions. Among the first ones is the basis for competition: Is the competition skill- or scale-based (Auguste *et al.* 2006). This is crucial, because the needed strategy and the company structure depend on the competition base. In case of economies of scale, high volumes, standardization, and consolidation of service delivery assets are required (Auguste *et al.* 2006). If economies of skill are decisive, companies should strive for the development of process innovations, best practices, and providing access to the most up-to-date information (Auguste *et al.* 2006).

Four downstream business models

There are various ways how after-sales services are organized and provided, but Wise and Baumgartner (1999) have found four basic forms of successful downstream business models:

1. Embedded services
2. Comprehensive services
3. Integrated services
4. Distribution control

The first three concentrate on providing new services to customers, while the last one is about gaining control over the distribution channels (Wise and Baumgartner 1999). According to Cohen *et al.* Agrawal (2006) the choice of business model depends on customer's service level requirements, and criticality of the product. Some services can be built into the products making them "smart products", and eliminating the need of actual additional services: SKF has developed an automatic lubrication system that does the lubrication of bearings optimally and fully automated removing the need for a service engineer visit. Some manufacturers like GE are offering services taking care of customer concerns related to a particular aspect of the use of their products; GE capital offers full range of financial services for e.g. locomotive buyers (Wise and Baumgartner 1999). According to Wise and Baumgartner (1999) integrated services are products and services that have been combined into a seamless offering matching all the equipment and service needs of a customer group. Moving forward in the value chain and taking control of the distribution channel is the fourth type of successful downstream business models (Wise and Baumgartner 1999).

Part II – Empirical study

5 Research methods

This chapter introduces the research method used in the empirical part: design science. How the empirical research was carried out in practice, is also presented.

5.1 Design science

Design science is called among others action science, action research, action innovation research, participatory action research, participatory case study, and academe-industry partnerships (Holmström *et al.* 2009). In design science the scientists are viewed as active problem solvers in addition to observers and theorists; the focus is on describing how things ought to be, not how they currently are (Niiniluoto 1993 and Simon 2002). Holmström *et al.* (2009) define design science as research that seeks to

1. Explore new solution alternatives to solve problems.
2. Explain this explorative process.
3. Improve the problem-solving process.

According to Niiniluoto (1993) design science creates instrumental knowledge to be used in producing and manipulating different kinds of systems. The value of design science comes from its ability to integrate the exploratory and explanatory research, by starting from a specific problem situation and creating new theoretical knowledge as "a means to an end" artifacts (see figure 14) that can be applied in other similar situations (Niiniluoto 1993, Holmström *et al.* 2009). This is valuable, when trying to close the gap between managerial relevance and theoretical contribution.

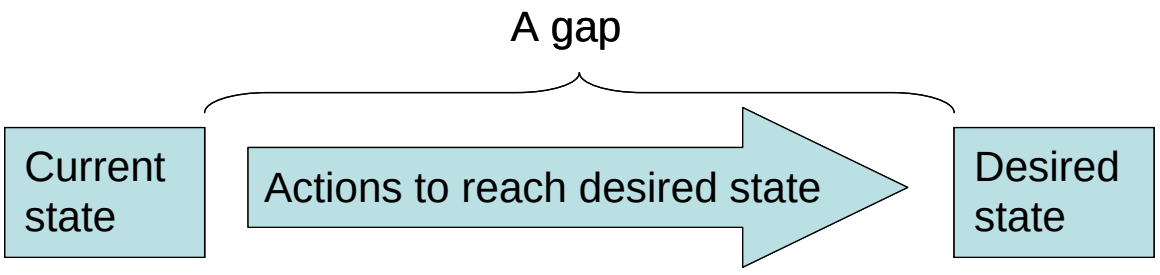

Figure 14 – Means-end analysis in design science (adopted from Holmström *et al.* 2009)

According to Holmström *et al.* (2009) existing literature is considerably biased towards problems that can be well defined. Though, most problems that business managers come

across are "ill-structured" (Simon 1997); defining what the actual problem is, might be even harder to achieve than developing a solution after the problem definition. Design science concentrates on tackling these "ill-structured" problems in a systematic manner, by first creating the artificial phenomenon to be analyzed, and then developing "a means to an end" artifact to solve the problem, and thereby contributing to the theoretical understanding (Niiniluoto 1993, Holmström *et al.* 2009).

General research phases and design science

General phases of empirical research can be described as follows (Holmström *et al.* 2009):

1. New ideas – Solution incubation
2. Tested ideas – Solution refinement
3. Mid-range theory – Substantive theory
4. Formal theory

In phase 1, the problem is framed and a basis for potential solution developed. Phase 2 is an iterative, trial-and-error type process, where the solution is refined. It consists of design improvements, implementation and evaluation. Theoretical relevance will be established in phase 3: the solution is examined and evaluated from theoretical point of view. Theoretical justification and demonstration of theoretical utility are sought, by introducing the solution in several contexts. In the last phase, the researchers seek for broader generalizations, whose applicability is not limited to the empirical context of the study. (Holmström *et al.* 2009).

Contemporary operations management research is focused on the last two phases (theoretical science), while design science concentrates on the first two, and thus generates raw material for theoretical research. Problem solvers in industry are likely to stop after the first two phases, when design scientists will continue to the 3rd phase, as a minimum requirement (Holmström *et al.* 2009).

5.2 The process of the empirical research

This study started with a literature review of the themes "Service provision of industrial companies", "Industrial market segmentation", and "The development of after-sales service offerings" (see figure 15). Overlapping, preliminary interviews of key persons in

Case Company's Product Support were carried out to get a picture of the starting situation. External benchmarking of companies in aerospace, automotive, and bearing industries was done, in order to develop new ideas and evaluate the service business potential of Case Company.

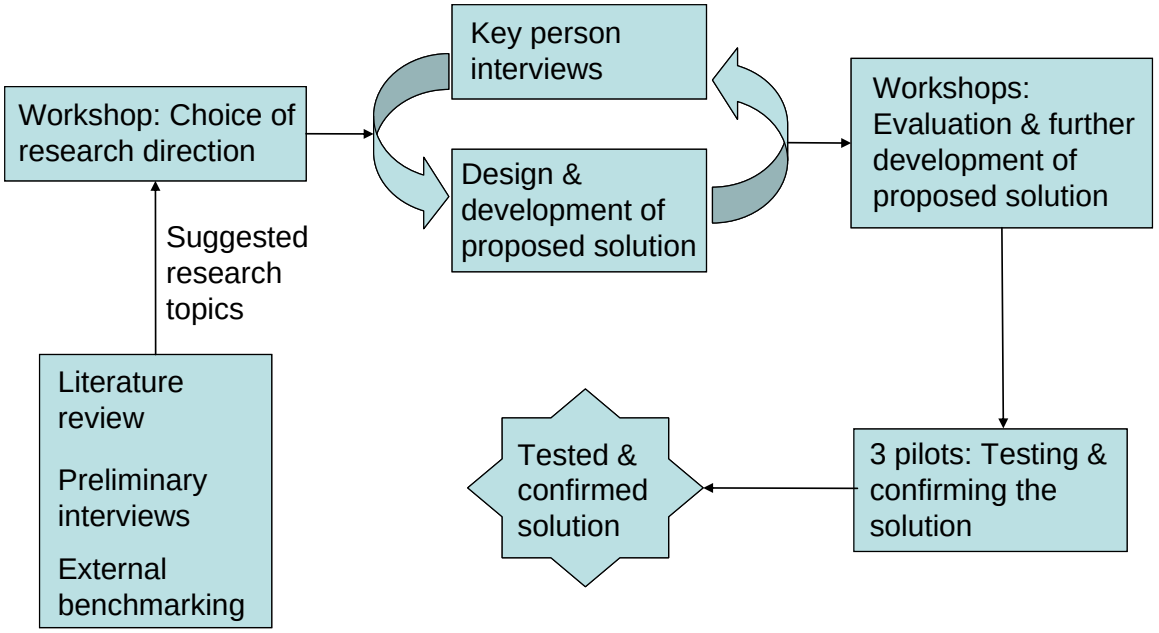

Figure 15 – Empirical research process

Based on the preliminary interviews, literature study, and external benchmarking, possible research topics were suggested in a workshop with Case Company's key decision makers, who ultimately decided on the research direction. Key persons from Case Company factory were interviewed to develop an understanding of the business, and a proposal for solution was designed. The solution proposal was further developed intertwined with other interviews and one meeting with a buyer of a Danish OEM customer. After the iteration, the solution proposal was evaluated in workshops with Case Company Product Support employees. The details of the solution were defined in these workshops.

Finally, the designed solution and its practical applicability were tested in three pilots with employees of Case Company's sales organizations in Germany, Sweden, and Finland. The validity and practical usefulness of the solution was confirmed in the pilots and no further refinements were made. Each step of the empirical research was carried out with people from different parts of Case Company organization to avoid situations, where

same people first participate in developing a concept and afterwards evaluate the very same concept. Some challenges related to the implementation of the proposed solution were identified all the way during the research, and needs for further research as well as new concepts came out mainly during the pilots.

6 Empirical findings

The empirical findings of the study are presented in this chapter, starting with the business situation of Case Company in the beginning. Goals of the research and solution proposed (OEM need-based segmentation framework & service platforms) are introduced. The solution was tested in three trials, which is also discussed. The chapter ends with evaluating the proposed solution among others by using Technology Acceptance Model (Davis 1986, modified by Davis *et al.* 1989), and creating two scenarios to map the service revenue potentials.

6.1 Situation in Case Company

6.1.1 The OEM business

Case Company has traditionally been selling its products mainly directly to end users (~85% of sales), and in lesser extent to manufacturers of other products – OEMs – who use Case Company's product as a component of their own product. Lately the situation has changed completely, and currently most of the sales (~85%) go to OEMs. Thus, Case Company has moved away from being an OEM into being a supplier of OEMs, which causes many challenges especially from the point of view of service sales. Case Company is servicing only its own products in this market, and thus works in captive markets (Glueck *et al.* 2006).

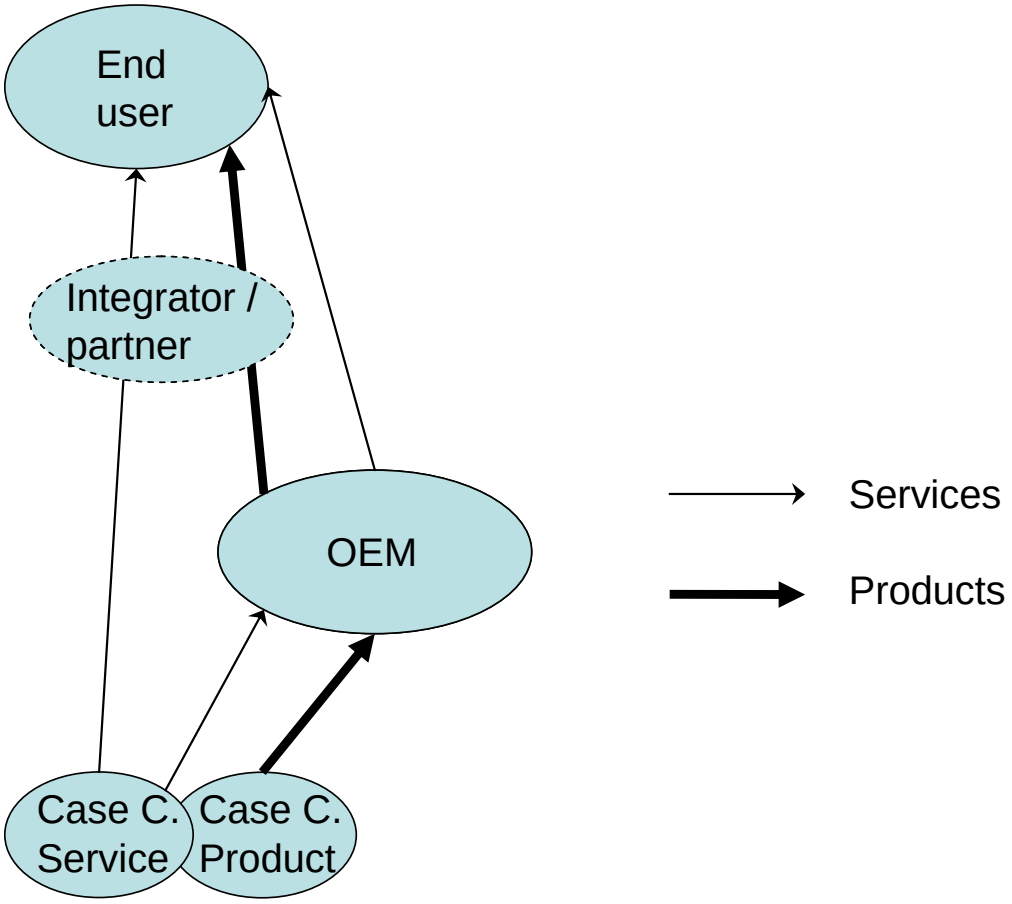

Figure 16 – Main parties in OEM business

In case of OEM customers, Case Company sells its products always to the OEMs, who use those as components of their own products that are sold to end users (possibly via a systems integrator). Services on the contrary are delivered through three main channels (see figure 16): via OEM, via integrator/partner company, or straight to the end user. In some cases the OEM takes care of servicing the installed base of its products (in end user premises), but in some situations end user maintains the installed base. Another case is, when a third party (e.g. systems integrator or external service provider) does the maintenance.

6.1.2 The effects of Case Company becoming a supplier of OEMs

As the share of sales to OEM customers (indirect channels) has grown from ~15% up to ~85%, the new situation has brought along challenges. The visibility to the installed base has reduced significantly from the point of view of Case Company, since it has become a supplier of OEMs, who supply end users. Thus the distance between Case Company and

end users is longer in the new situation. Some Case Company employees see that the reason behind reduced visibility is that, because of competitive reasons, the OEMs do not want to share much customer knowledge with their suppliers. During the research was discovered that this actually is the case with only few large global OEM customers. Possibly more relevant reasons for the reduced visibility are e.g. limited attempts to discover the installed base (IB) information, and too little support from IT systems in gathering end user data.

The effects of reduced visibility to the IB and the lack of systematic development of the service supply chain are e.g. that warranty obligations come sometimes surprisingly to Case Company Product Support, and that delivery of spare parts and field engineer services takes a long time and is relatively unreliable. In the beginning of the project, Case Company was working locally even with some OEMs that have global service supply chains, and the cooperation with Case Company's local units in selling and delivering services was very limited. Clear prioritization of customers was missing as well as a total picture of the OEM market potential. Service offerings were created rather case-by-case than systematically, which presumably caused great variation in profitability of different customer relationships. The business challenges were related to both the back-end and front-end, and they occurred during and after product warranty. Because of the vast amount of these challenges and limited research resources, the decision was made to concentrate on the challenges with the front-end occurring after the warranty's expiration.

Despite the challenges (or probably because of them), the OEM service market was identified as important, and some resources were mobilized to solve the problems. Trying to structure the OEM service market, two Case Company employees were developing a segmentation based on whether the OEM was operating locally, regionally, or globally, and whether it had no service strategy, a basic one or an advanced one (in which case services was seen as core business by the OEM). By the start of the project, one service offering was created that was designed for end users: "Total care".

6.1.3 Case Company service provision in the beginning

The OEM service market hadn't received systematic development efforts by the start of this research – development was carried out case-by-case, based on customer requests. Case Company was actively selling services directly only to a "handful" of OEM customers. The service sales were mainly reactive: spare parts were sold when end users had broken units and Case Company was called for spares. Few service offerings were developed for OEMs, solely case-by-case. Examples of possible services provided by Case Company are presented in Product-Service portfolio, in figure 17. In the beginning of the research, Case Company local organizations were responsible of delivering immaterial services and handling most customer contacts in spare part sales also. Product Support was responsible of creating new services, delivering spares, and taking care of key accounts. Case Company was offering Service suitcases (see figure 17), which are one type of product-service combination for preventive maintenance: service parts needed for the maintenance or troubleshooting of a specific product are packaged into one suitcase. Case Company didn't offer any complete solutions for OEMs by the beginning of the research.

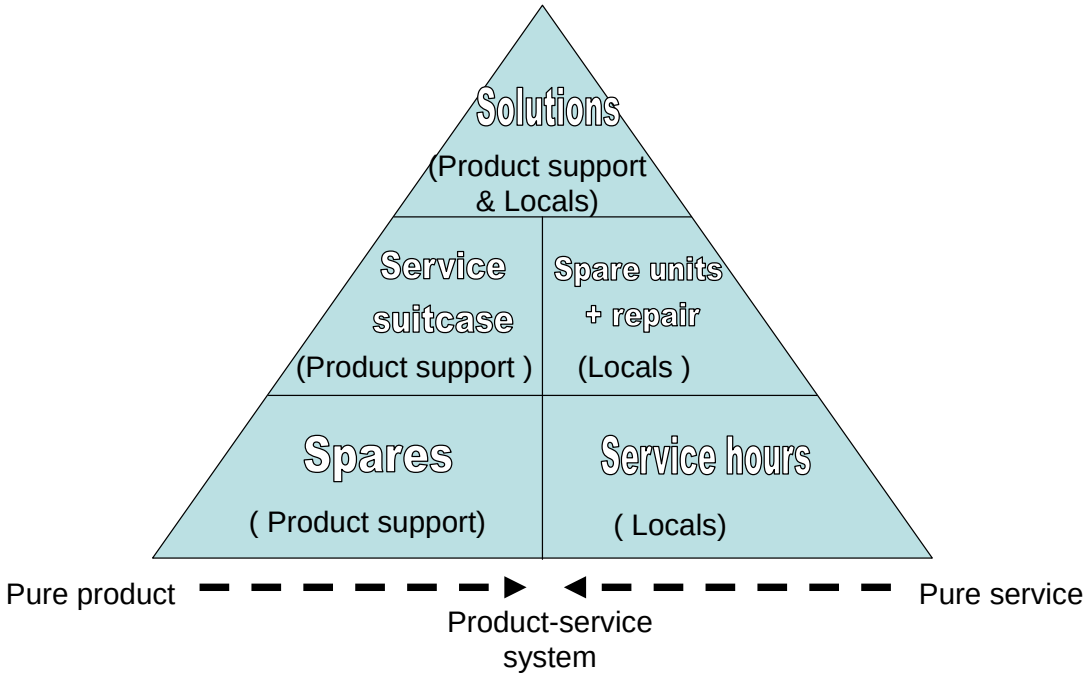

Figure 17 – Examples of possible services represented in Product-Service portfolio

One existing service concept with an OEM customer was identified during early phases of the project: On request of a Finnish OEM customer Fin1, Case Company had developed a specific way of working. Service business is very important for this customer, who maintains its own as well as its competitors' products. Case Company provides Fin1 service engineers with exchange units for its products. Fin1 engineers replace malfunctioning units with the exchange ones, and send the malfunctioning units to Case Company that repairs or reconditions them.

6.2 Goals of the empirical research

The root cause of the occurred problems – reduced visibility to the installed base – was tackled independently of this study by creating an information system that enabled gathering information of the end user and the installed base. In addition to this, the identified challenges required decisive actions. The disorganized OEM market view needed structure to enable the identification of possibilities for new service sales, and prioritization of service customers. Service offerings for customers in this market had to be designed. Need-based segmentation of the OEM customers was planned to discover the service needs and to group OEM customers according to these needs (see figure 18). Service platforms needed to be developed to match the needs.

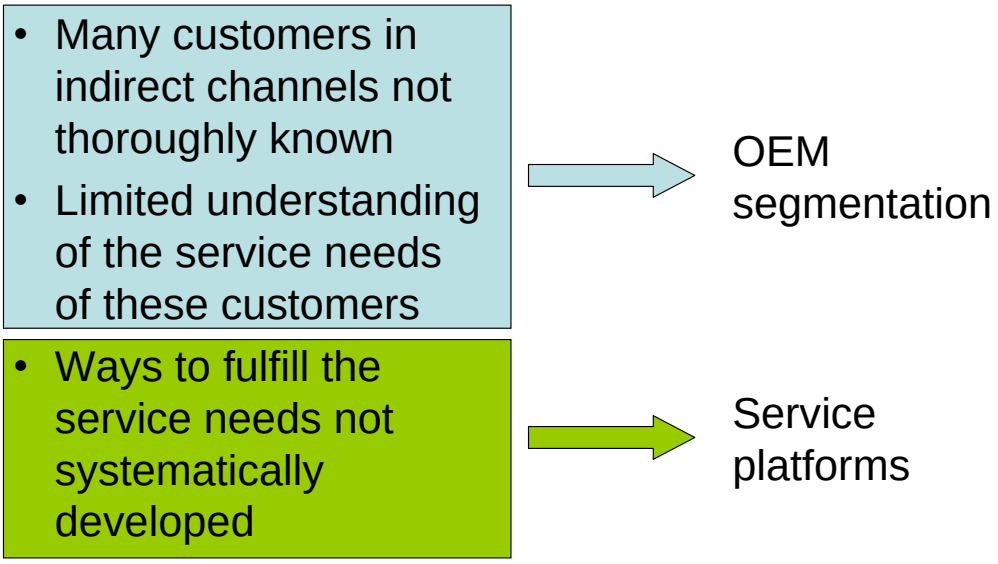

Figure 18 – Main challenges, and how to tackle them

6.3 Solution proposed

6.3.1 OEM need-based segmentation framework

During the interviews with Case Company employees, the basic ways to do the maintenance of Case Company products together with an OEM customer were discovered: the maintenance can be done solely by Case Company, or there can be either the OEM or an external service provider involved too. In latter case OEM / service provider handles the customer contact, but has three choices to carry out maintenance related tasks. The simplest way is to exchange the unit of Case Company product, as it gets broken, with a new or repaired one. In this case, the malfunctioning unit is sent to Case Company for repair and preventive maintenance. The OEM / service provider has also the option to carry out preventive maintenance, which consists of replacing some aging components in specified time intervals. Third possibility is that the OEM repairs and does the preventive maintenance of the units in its own service workshops, which requires large investments in service resources.

A literature review on industrial market segmentation was carried out (see chapter 3) in order to map the possible service segmentation models. Based on the review and preliminary interviews, need-based segmentation was chosen for the study. Some criteria relating to Case Company product, OEM customer's maintenance needs and resources, and the business situation of the OEM were identified as the basis for segmentation. A model for segmentation was designed based on these criteria. The model was evaluated and further developed in interviews with Case Company employees. After the interviews, a suggestion for an OEM need-based segmentation framework was developed, and then improved in a number of workshops. The final version of the developed OEM need-based segmentation framework is presented in figure 19.

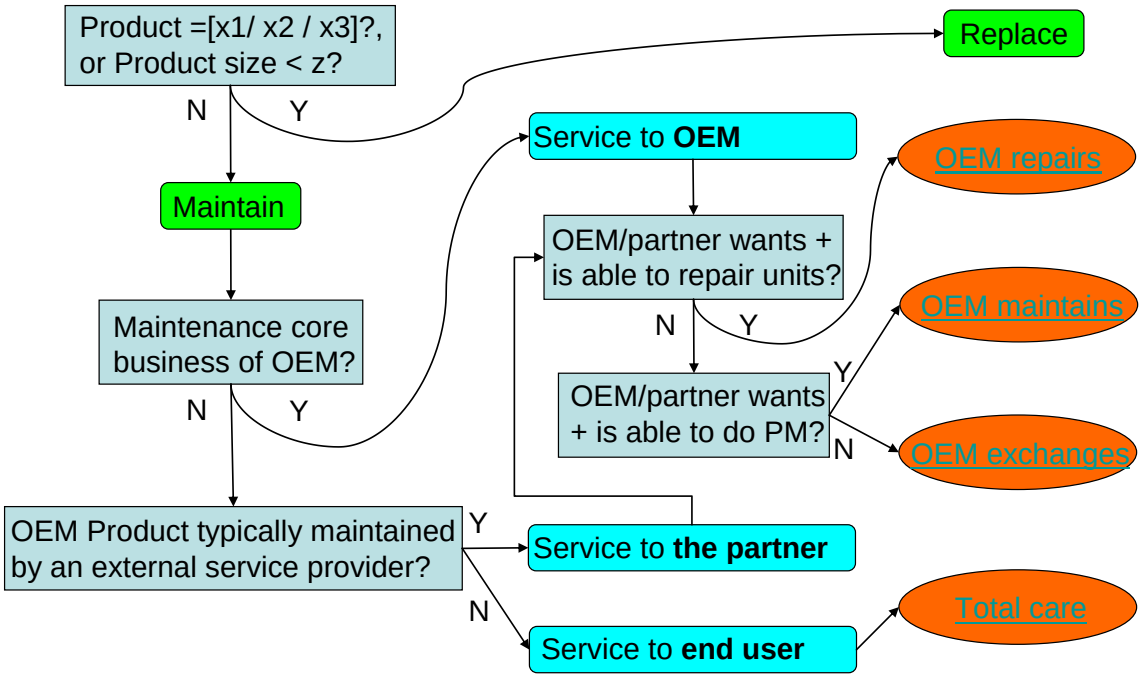

Figure 19 – OEM need-based segmentation framework

The OEM need-based segmentation is done per product per OEM, and it indicates the way of working in maintenance with an OEM ("service platform"), as well as service delivery channel, and whether the product should be maintained or replaced when broken. The inputs required for the segmentation, their types, and the outputs from the segmentation are presented in figure 20. The way of working represents the service platforms (output 3.), presented in chapter 6.3.3: In case of "Total care", services are always delivered straight to end user, but in "OEM repairs", "OEM maintains", and "OEM exchanges" service delivery channel (output 2.) can be either the OEM or an external service provider. In addition, the framework separates products that need maintenance (responsibility of Case Company Product Support) and products that should be replaced when broken (responsibility of Product Sales). Whether the product should be maintained or replaced, is output 1. in figure 20. Using the framework requires both technical information of the product as well as expert judgment on the OEM. Thus, the segmentation is done by an individual (or a team), who has enough expertise to answer reliably to the questions on OEM service strategy.

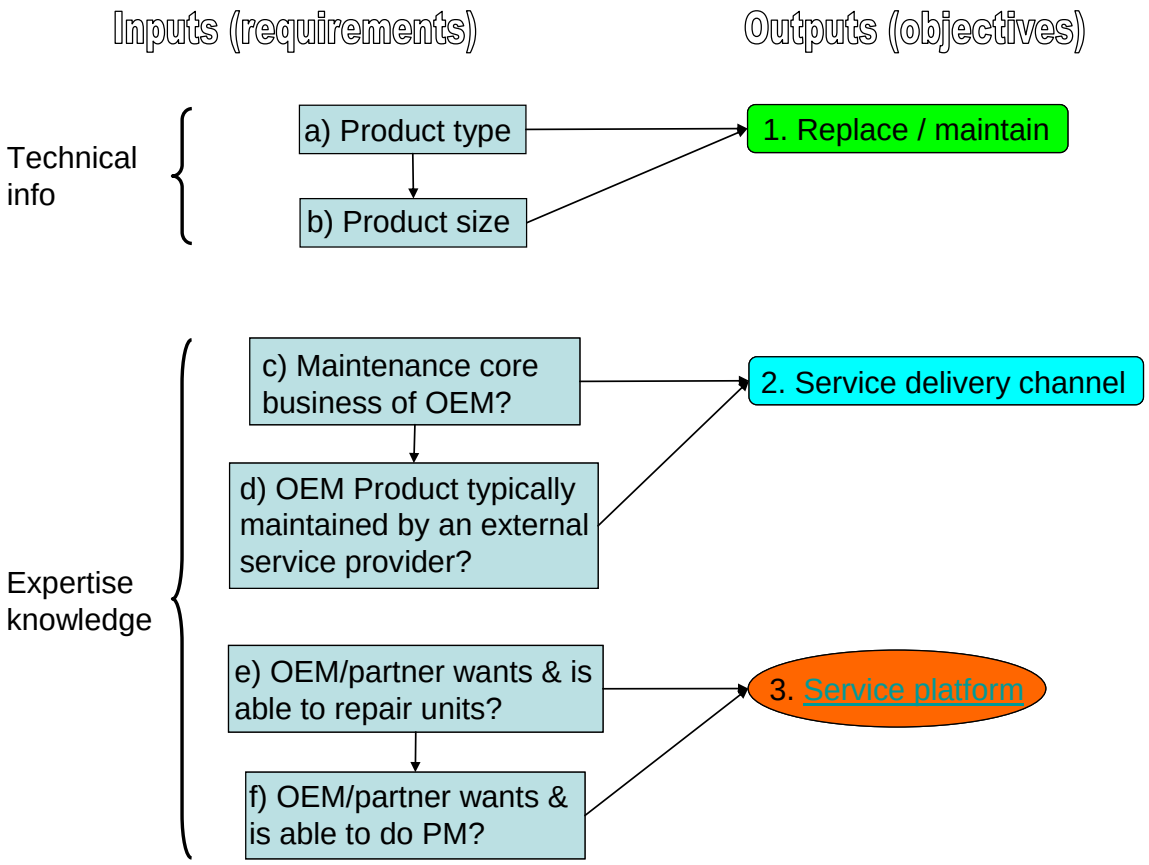

Figure 20 – Required inputs for the OEM segmentation framework, and the outputs

6.3.2 OEM segmentation – steps to be done after the research

The OEM customers can be segmented using the OEM need-based segmentation framework. The segmentation is then based on OEM service needs that service platforms are designed to match. The framework identifies five main types of OEM service needs: products that should be replaced, "OEM repairs", "OEM maintains", "OEM exchanges", and "Total care".

During the research, a basis for OEM segmentation was developed. Before a "final" segmentation of the OEM customers of Case Company is ready, there remain additional steps as can be seen in table 8, which presents a framework of the steps in industrial market segmentation (Kotler and Keller 2008, p. 268). This study contributed most to the steps "1. Needs-based segmentation" and "5. Segment positioning" (see chapter 6.3.3). Things as, which demographics are characteristic of OEMs in a specific segment, and how profitable each segment is, still need to be defined and remain the responsibility of Case Company after the research.

Table 8 – A framework of the steps in industrial market segmentation (modified from Kotler and Keller 2008, p. 268)

Step	Description
1. Needs-based segmentation	Group customers based on similar needs and benefits sought.
2. Segment identification	For each segment, determine which demographics make the segment distinctive and identifiable.
3. Segment attractiveness	Determine the overall attractiveness of the segment by using predetermined criteria.
4. Segment profitability	Determine segment profitability.
5. Segment positioning	Create a value-proposition for each segment, and product-price positioning based on the segments unique needs.
6. Segment "Acid test"	Create "segment-storyboard" to test the attractiveness of the positioning strategies.
7. Marketing-Mix strategy	Expand positioning strategies to include all marketing-mix elements.

6.3.3 Service platforms

Service platforms refer to how the maintenance of Case Company products is arranged together with an OEM, defined by the OEM need-based segmentation framework. The platforms are complete service offerings for identified OEM customer segments regarding the maintenance of a specific Case Company product. As Case Company is maintaining the machines it has sold, it is in skill-based business. In this kind of a situation companies should develop databases for knowledge management (which Case Company already has existing) and provide semi-standard solutions (Auguste *et al.* 2006), which service platforms in this case are. Service platforms are intended to match the service needs of different type of OEMs relatively well, but they obviously need customization (cf. page 67 "Customization of service platforms"). Semi-standard solutions are needed in order to prevent the service delivery costs eating up the service margins (Reinartz and Ulaga

2008). The platforms consist mainly of elements of Case Company's service provision for OEMs (see table 9) that existed already before this study.

Table 9 – OEM service elements of Case Company, before the project

Service element	Pricing	Responsibility of contents and availability
Spare parts	List price	Product Support
Preventive maintenance kits	List price	Product Support
Exchange units	List price	Product Support
Maintenance & Repairing	Depends on local units	Locals
Reporting & IB management	Free for key accounts, list price for others	Product Support
Technical support	Depends on local units	Product Support & Locals
Reconditioning	Case-by-case	Product Support & Locals
Global dispatching (identification and coordination) of service engineers	Free (available only during warranty)	Product Support
Product related training	List price	Product Support

Service platforms in general

The logic of the service platforms and Case Company's role in different platforms are presented in figure 21. Case Company offers a complete set of after-sales services for end users in "Total care", where the OEM doesn't offer any maintenance at all related to Case Company product. In the second service platform, the OEM exchanges malfunctioning units, and Case Company is responsible for repair and preventive maintenance as well as providing exchange units for the OEM. The situation is alike in "OEM maintains", except that the preventive maintenance is done by the OEM. In the fourth service platform, "OEM repairs", the units are even repaired by the OEM, and Case Company only supports the OEM in maintaining and repairing the units.

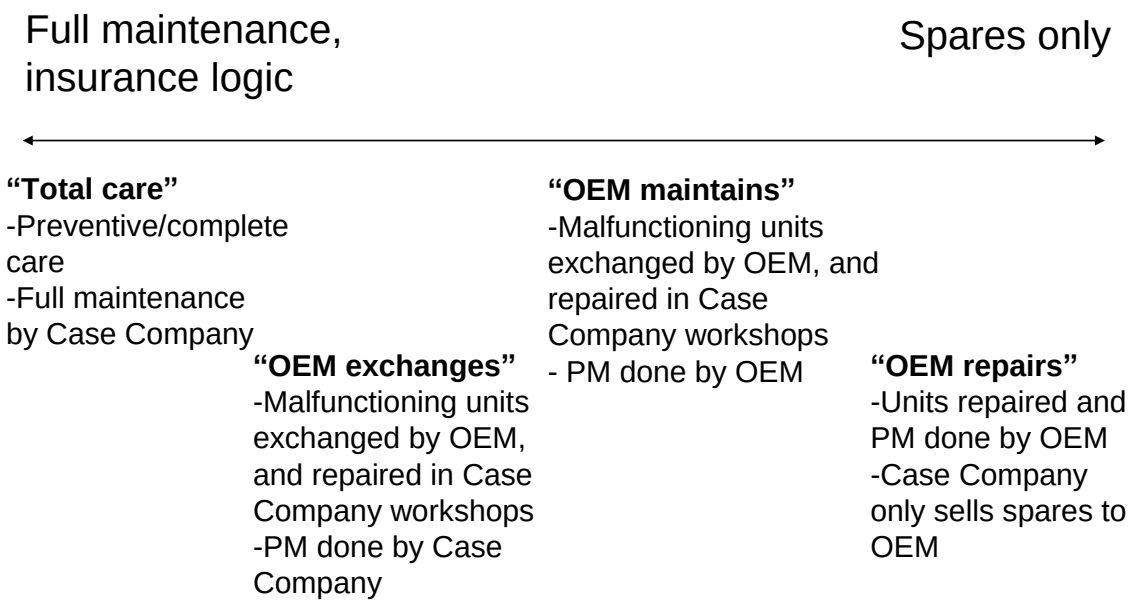

Figure 21 – Case Company's role in different service platforms

The service platforms required that a couple of new services were created, which all are immaterial services. "Global dispatching of service engineers" existed already before the study as a free of charge service during warranty, but was extended after warranty for the service platforms (see page 65). After warranty expiration the pricing of this service changed from free to fee. Service platforms "OEM maintains" and "OEM repairs" also entail a package of training, instructions, and installed base management to enable the OEMs to maintain and repair Case Company products optimally.

Service platforms in detail

Next the contents and pricing of different service platforms is presented, as well as the requirements for the OEM. In "Total care" Case Company takes full responsibility (including risks) of maintenance of the IB of its products. This platform constitutes of spare parts, preventive maintenance kits, maintenance & repairing work, reporting & installed base management, and technical support (see table 10). This service platform has a fixed price per year, which is based on the installed base of Case Company products in end user premises. Because the OEM doesn't have a role in maintaining Case Company products in this service platform, no requirements for the OEM are posed.

Table 10 - Service platform Total care

Service element	Pricing	OEM requirements
Spare parts	Fixed price / year (based on the installed base and customer specific discounts)	-
Preventive maintenance kits		
Maintenance & Repairing		
Reporting & IB management		
Technical support		

In case of "OEM exchanges", the OEM is trained to be able to exchange the units/modules of Case Company products (see table 11). Case Company also provides the OEM with exchange units and technical support. "Global dispatching of service engineers" is designed to be especially useful for OEM customers operating globally and possibly in developing countries, where service resources are limited. Exchange units and training have a list price, whereas the pricing of technical support depends on Case Company local organizations that provide this service. The pricing of service engineer dispatching depends on the number of installed units of Case Company products. As the OEM will do some maintenance related tasks, Case Company requires that it has proper tools needed in exchanging the units and its service engineers have gone through training course offering basic product knowledge.

Table 11 - Service platform OEM exchanges

Service element	Pricing	OEM requirements
Exchange units	List price	Basic tools needed in exchanging units, basic training course xx (to learn basic product knowledge)
Exchange training	List price	
Technical support	Depends on local organizations	
Global dispatching (identification and coordination) of service engineers	Depends on installed base: 1-499 → x € 500-999 → y € 1000- → z €	

Service platform "OEM maintains" is somewhat more extensive from the point of view of the OEM. In addition to the service elements in the previous platform, preventive maintenance kits and a "Total maintenance program" are offered (see table 12). The latter contains immaterial services to provide the OEM with knowledge needed in maintenance: maintenance instructions, maintenance & exchange training, and reporting & installed base management. "Total maintenance program" has a fixed price per year, which is based on the amount of service engineers receiving the training. Preventive maintenance kits contain the parts needed for preventive maintenance of a specific Case Company

product. The OEM is required to have basic tools for exchanging and maintaining the units, and its service engineers maintaining the units need to have carried out the training courses related to exchanging and preventive maintenance.

Table 12 - Service platform OEM maintains

Service element	Pricing	OEM requirements
Maintenance instructions	"Total maintenance program": fixed price / year (based on the trained service engineers)	Basic tools needed in exchanging & maintaining units, basic training course xx & preventive maintenance course yy
PM & exchange training		
Reporting & IB management		
Preventive maintenance kits	List price	
Exchange units	List price	
Technical support	Depends on local organizations	
Global dispatching (identification and coordination) of service engineers	Depends on installed base: 1-499 → x € 500-999 → y € 1000- → z €	

Most extensive services are offered in service platform "OEM repairs" (see table 13). In addition to the previously presented service elements, spare parts, technical package and a "Total repair program" are provided. The latter consists of the same elements as "Total maintenance program" plus repair instructions and training. Its fixed price is based on the trained service engineers and the amount of OEM workshops where the units are repaired. The technical package contains the tools for repair workshops. In this case, OEM requirements are the tools (technical package), repair training course, and a laptop as well as electrical static discharge (ESD) protection for each service engineer.

Table 13 - Service platform OEM repairs

Service element	Pricing	OEM requirements
Repair instructions	"Total repair program": fixed price / year (based on the trained service engineers and amount of OEM workshops for repairing)	Basic tools needed in repairing units, laptop, ESD protection, repair training course zz
Repair training		
Maintenance instructions		
Maintenance training		
Reporting & IB management		
Technical package (needed in repairing units)	Fixed price / year (per repair workshop)	
Spare parts	List price	
Preventive maintenance kits	List price	
Technical support	Depends on local organizations	
Global dispatching (identification and coordination) of service engineers	Depends on installed base: 1-499 → x € 500-999 → y € 1000- → z €	

Customization of service platforms

As mentioned previously, service platforms need to be customized to match the service needs of each customer. This can be done by changing the main customizable variables identified:

1. Service response time
2. Area of services
3. Exchange unit option
4. Specification of technical support

OEM customers require various response time of services depending mainly on end user down time costs and OEM service strategy. The applications of Case Company products

vary a lot, and the down time costs are of completely different level in e.g. process industry than in air conditioning of offices. Some OEMs have chosen to provide the end users with short response time and thus the same requirements are posed in these cases to Case Company. Where the services should be available, depends on the installed base and OEM maintenance resources. In some developing countries service resources are very scarce, and the importation of spare parts into these countries can be very time consuming. The option to use exchange units or modules can offer value added for some customers, especially those requiring short response time. In which countries technical support should be available, depends on the installed base and it should be offered in those languages preferred by service engineers carrying out the maintenance.

6.4 Trials

To evaluate the proposed solution, two pilots were planned: one in Case Company's sales organization in Germany and one in Sweden. The purpose was to introduce the concept to persons responsible for OEM customer service sales, and to carry out the segmentation of few customers using the OEM segmentation framework. During this process, feedback of the framework and its usefulness would be gathered. Originally the plan was also to develop (based on the segmentation and service platforms) a service proposal for two OEMs, one in each country, which proved to be impossible mainly due to a very tight schedule. Furthermore, the Swedish organization withdrew from the pilot, and therefore it was decided to carry out the second pilot in Finland. The pilots were intended to have three phases (in Finland phase 3 would be left out), in which feedback would be collected:

1. Introduction to local sales people → first impressions
2. Segmenting OEMs → feedback from local sales people
3. Service proposals → feedback from OEM customers

6.4.1 Results from trials

The early feedback in each country was very positive as the concept was presented. The local sales people agreed on the logic behind the concept and thought it might give new insights to their OEM service sales. In Germany and Sweden, the tight schedule was seen as very challenging right from the beginning. In Finnish and German pilots phase 2 was

carried out, and altogether seven OEM customers were segmented: four in Germany and three in Finland. Some new service needs were discovered. The results of these pilots are summarized in table 14.

Table 14 – The results of OEM need-based segmentation in pilots in Germany and Finland

		Ger A	Ger B	Ger C	Ger D	Fin A	Fin B	Fin C
"Replace" products			X		X		X	X
"Maintain" products	**OEM repairs**			X			X	
	OEM maintains							
	OEM exchanges		X					X*
	Total care	X				X		

The number of customers who have a notable amount of units needing maintenance was found to be surprisingly low. Because the focus in the proposed solution is on those customers exactly, OEMs suitable for the pilots were relatively hard to find. Four out of seven OEMs in the pilots had Case Company products that should be replaced when broken, and one of them (Ger D) didn't have maintenance needing units at all. Based on the analysis, services should be delivered to the OEM for four (Ger B, Ger C, Fin B, and Fin C) of the analyzed OEM customers, and in two remaining cases (Ger A, and Fin A) straight to the end user. None of the segmented OEMs should be offered service platform "OEM maintains", but the other three platforms ("OEM repairs", "OEM exchanges", and "Total care") would each be ideal for two OEMs. Customer Fin C has refused to buy any services from Case Company, because it doesn't see any service needs related to Case Company products. This is probably because they have been using the products only for less than three years and thus far there hasn't occurred significant amount of failures.

Though, the customer was identified as a potential target in the future for service platform "OEM exchanges".

6.4.2 Challenges confronted and excuses given

In the two originally planned pilots difficulties were confronted and phase 3 had to be cut out. Because of very limited time left by the beginning of the pilot in Finland, phase 3 was decided to be left out also in the last pilot. The German contact person was lacking time, and would have needed at least 2-3 months more time to be able to execute phase 3. They were very satisfied in the current service sales in Germany, thus it would be debatable if the German pilot could be executed even with a longer time schedule. With the Swedish pilot, big challenges were encountered already after phase 1: reaching the contact person was extremely hard and the project didn't seem to be moving on at all, or the progress was at least very slow.

Finally, when the ultimate deadline for the pilot was close, Swedish contact person told that unfortunately they had to withdraw from the pilot. First reason given was that the OEM intended for the pilot bought only smaller products that should be replaced, and therefore wasn't adequate for the pilot. Later the contact person was interviewed to discover the real reasons behind the withdrawal decision. It came out that the time schedule was much too tight, and that local service sales people had already met their financial targets, and thus didn't have enough motivation to stretch themselves for the pilot. They would have needed even 12 months more time for the pilot, which obviously wasn't an option. Another challenge in Sweden was that they were lacking OEM customers, who would buy considerable amounts of maintenance needing units. On the other hand, Swedish sales organization has traditionally been focusing on serving end users, and thus might not have enough relevant knowledge of all the OEMs.

6.5 Evaluation of the proposed solution

The idea with the service platforms is to actively support the OEMs, service providers, and end users in maintaining the installed base. The service platforms need active sales and marketing efforts, while Case Company local service sales people are currently accustomed to and busy with passive sales: they just respond to customer orders. This change of the sales people mindset proved to be quite difficult and it would definitely

consume some time. In addition to this, the organizations in Germany and Sweden had already reached their sales targets, and thus the busy sales people were lacking the need to do any significant changes. These two matters and the tight schedule make the confronted challenges understandable. It can also be argued that the contact persons weren't the best choices for the pilots, but in many cases the researcher had to rely on the suggestions of other people, who knew the organizational structures and the responsibilities of employees in their countries.

6.5.1 Interpretation of the results using Technology Acceptance Model (TAM)

The results of the trials are evaluated here using Technology Acceptance Model (TAM) by Davis (1986, modified by Davis *et al.* 1989). The model was originally tailored for modeling, explaining and predicting user acceptance of information systems (Davis 1989), but it is here applied to the acceptance of a new service concept (OEM segmentation & service platforms). The model describes the basic determinants of the actual use of a new system and their causal relationships (see figure 22).

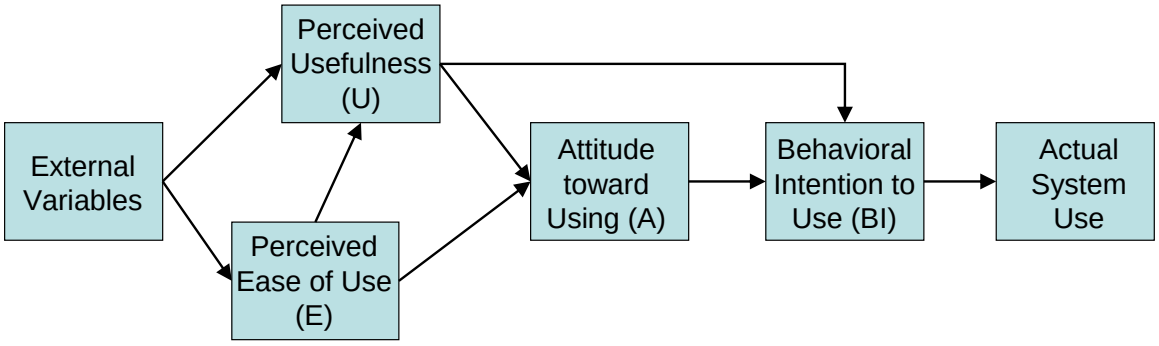

Figure 22 – Technology Acceptance Model (TAM) (redrawn from Davis *et al.* 1989)

Davis *et al.* (1989) suggest that actual system use is defined by user's behavioral intention to use the system (BI), which is caused by attitude toward using (A) and perceived usefulness (U) of the system. Perceived usefulness and perceived ease of use (E) determine the individual's attitude toward using. Perceived usefulness is determined by perceived ease of use and external variables that also define solely perceived ease of use. External variables can be either system features or factors like training, documentation and user support consultants (Davis 1986, Davis *et al.* 1989). Davis (1986, p. 82) defines perceived ease of use as "The degree to which an individual believes that using a

particular system would be free of physical and mental effort". The definition for perceived usefulness: "The degree to which an individual believes that using a particular system would enhance his or her job performance" (Davis 1986, p. 82).

Actual System Use and Behavioral Intention to Use (BI)

Actual use of the proposed solution (need-based segmentation & service platforms) in future can be forecasted based on the results of the pilots. According to the TAM, behavioral intention to use the system defines the actual system use. When first presenting the concept in all of the three pilot countries, the researcher was receiving the image of relatively strong behavioral intention to use the proposed concept. As the pilots continued, the BI factors observed were declining in Germany and Sweden. In Finland the pilot was far more rapidly carried out and the BI factor seemed to be relatively high all the time. One can forecast, based on the results, very low actual use of the proposed solution in Germany and especially in Sweden, but relatively high use in Finland. This is the case if no further measures will be taken. The actual use can of course be affected by taking corrective actions: influencing the service sales people's perceived ease of use and perceived usefulness of the concept.

Attitude toward Using (A), Perceived Usefulness (U), and Perceived Ease of Use (E)

Attitude toward using affects behavioral intention to use, and it is determined by the perceived ease of use and perceived usefulness (Davis 1986). U seems to have stronger influence, and E affects mostly through U (Davis 1986, Davis *et al.* 1989, Davis 1989).

In the beginning of the pilots, the OEM need-based segmentation framework was seen as rather easy to use. The process is simple and easy to understand; only questions related to OEM service strategy require considerable mental effort from the users. When the process continued, the solution was seen as more difficult to use. Both service sales persons in Finnish pilot had to call another person to be able to answer some of the questions related to OEM's strategy. Implementing the whole concept would require a complete change of mindset from reactive to proactive service sales, which caused that the concept was perceived somewhat difficult to use. This declined perceived usefulness and worsened attitude toward using, which explains part of the observed low BI factor.

Another major determinant of BI is perceived usefulness. In Germany and Sweden, the sales targets were already met before the pilot and sales people were satisfied with current sales, thus they didn't see a new concept very useful. In addition, the German contact was emphasizing the needs to tackle the challenges with current service sales before introducing a new concept. This obviously lessened perceived usefulness in Germany, which worsened the BI factor both directly and through worsened attitude toward using.

If Case Company sees supporting the actual use of the proposed solution as important, they have to focus on perceived ease of use and especially perceived usefulness of the proposed solution by changing the factors affecting those. Namely, service sales mindset has to be changed into proactive approach, and simultaneously service sales targets should be revised. Current challenges with e.g. service delivery lead time and reliability have to be solved. Service Sales will also need more resources in the implementation phase of the proposed solution.

6.5.2 The effects of the proposed solution

The proposed solution will have effects on all the parties involved: Product Support, Case Company local units, OEMs, and end users (see table 15). Case Company will benefit from increased service sales revenue as well as improved satisfaction of biggest customer group (OEMs), which will support sales of new products. The OEMs on the other hand will have an opportunity to increase their service business and receive optimal support from Case Company in doing the maintenance. In addition, especially service platform "OEM exchanges" will enable OEMs to do this without having to invest much in their service resources. The end users will receive faster and more reliable service, which will be optimized, based on best available knowledge, and thus the overall equipment efficiency (OEE) will be maximized.

Table 15 - Identified costs and benefits of the solution & needed new incentives

	Benefits	Costs	New incentives needed
Product Support	Increased revenue from service sales. Support product sales to biggest customer group.	Management of the process globally. Training and information sharing. New incentives to the locals and OEMs.	–
Local units	–"–	Service provision and management of customer relationships.	Revision of performance measures and objectives. Bigger share of margin.
OEMs	Possibility to increase service sales without large investments into service resources.	Integration of Case Company's and own offering. Some additional service provision.	Discounts on spare parts. Other incentives?
End users	Faster & more reliable service. Higher OEE.	Higher cost of service?	–

The proposed solution will naturally pose some new costs. Product Support will have to manage the whole process globally, arrange training and take care of sharing information, as well as give new incentives to local units and OEMs. The local organizations have to provide the services, sell them to the OEMs and manage the customer relationships. On the other hand, they should receive new incentives, and their performance measures have to be changed in order to enable better coordination of the global process. OEM customers have to integrate Case Company's offering into their own offerings, and provide some additional services. They will receive bigger discounts on material prices, and probably some other incentives need to be developed (which is outside of the scope of this study). The end users' cost of services might increase, but this will be much more than offset by reduced downtime and exchange product costs.

6.5.3 Service revenue potential of the proposed solution

Service platforms presented in chapter 6.3.3 include various kinds of immaterial as well as material services, while currently Case Company is selling mostly spare parts and other material services. In addition, Case Company is currently serving only a fraction of its products sold via OEM. Thus, service platforms offer potential to increase service revenue from indirect delivery channels. To evaluate this potential in Finnish OEM market compared to current service sales, two scenarios were constructed: A scenario to show the theoretical maximum of service revenue potential, and another scenario to show a realistic target in the near future.

100%-penetration-scenario – Theoretical maximum

In the first scenario (figure 23), maximum revenue potentials of different service platforms with 100% penetration in the installed base of Finnish OEM customers are compared each to current service sales (sales in 2008: index 100). If the whole installed base is served with "OEM maintains" platform, the service revenue was 432,82 points (432,82% of service sales in 2008). In case of serving 100% of the IB with "OEM exchanges", the maximum revenue is 607,06 points. Respectively in case of "Total care", the maximum revenue potential is 1794,60 points. This scenario with 100% penetration is of course unrealistic, as the current penetration in the Finnish OEM market is around 40%. As unrealistic is the assumption that the whole market will be served solely with only one of the platforms. However, this scenario sets the theoretical upper limits for service revenue potentials of different service platforms in the current Finnish OEM market. Service platform "OEM repairs" is not discussed in this scenario, because it offers only little more revenue compared to current service sales as it consists mostly of material sales.

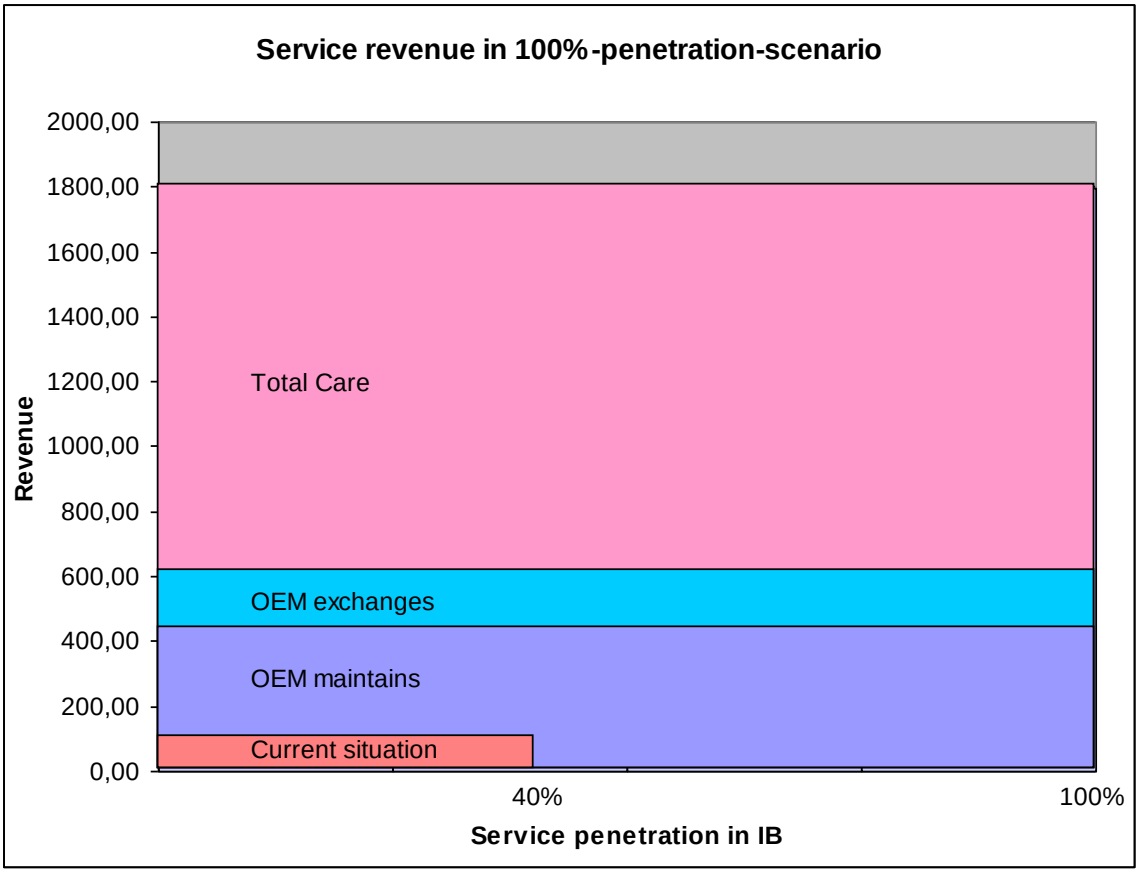

Figure 23 – Service revenue in maximum penetration scenario

75%-penetration-scenario – Realistic potential in the near future

Another, more realistic, scenario was constructed (see figure 24) to show the real revenue growth potential for Case Company Product Support in the near future (~3-5 years). In this scenario 75% of the installed base is served by Case Company, and 25% either served by another party or not served at all. Service platform "OEM repairs" will be offered to only few very big global OEM customers, who in this scenario constitute 5% of the total IB of Finnish OEM market; the revenue contribution is 12,39 points. "OEM maintains" and "OEM exchanges" are offered to many mid-size OEMs. Their share of IB and revenue potential in this scenario are 15% & 64,92 points; and 30% & 182,12 points respectively. Most of the OEM customers are rather small companies with no or very limited own service provision. In these cases (25% of IB), the end users of the OEM products are offered "Total care" and the revenue contribution is 448,65 points. The total revenue potential in this scenario for Case Company Product Support is 708,08 points,

which is 7,1 times the service sales in 2008. This shows that by implementing the proposed solution, Case Company can increase revenue from service sales significantly.

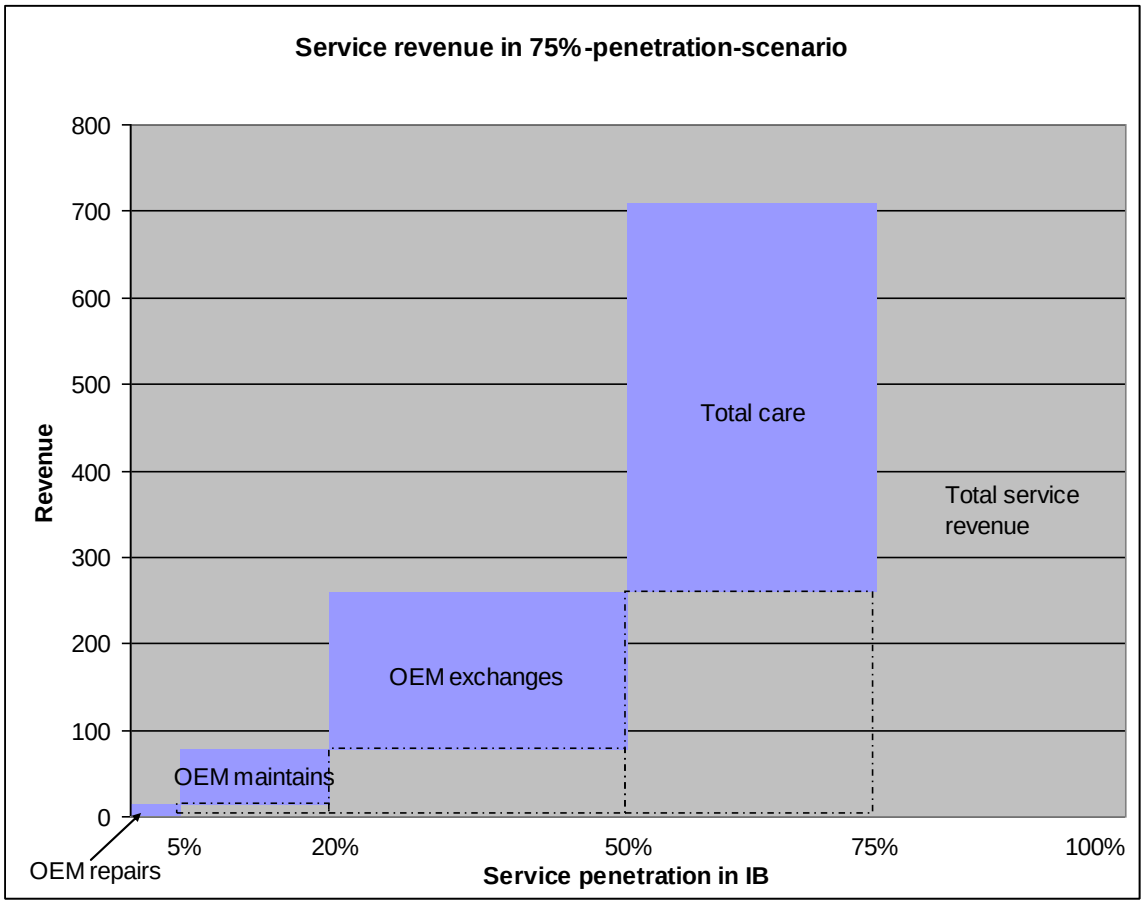

Figure 24 – Service revenue in 75%-penetration-scenario

6.5.4 Remaining challenges and planned actions

After this study, Case Company Product Support will have some challenges remaining related to the OEM services. Pricing of the service elements is currently an issue that needs to be tackled also with other customers than OEMs. On the other hand, some incentives have to be developed for the OEMs so that they will be willing to buy the services intended. The service contracts with OEM customers can be made either locally or globally, and the ownership of global contracts is a hot potato for different Case Company local organizations. In addition, what kind of marketing is needed for the new concept needs to be designed. Case Company has decided to carry out a business study to tackle the preceding challenges.

Many internal issues are identified as issues needing attention, mostly internal research, decisions and communication. These include among others the development of incentives to local units, and agreeing on the responsibilities between different organizational units. Questions needing decisive attention are also, what is the service quality Case Company can provide in different locations, and do the locals have overlapping offerings with the proposed solution. During the study, it was discovered that Product Support has very limited resources to develop OEM services, and a need for an OEM service team inside Product Support's organization was discussed.

6.5.5 Identified need for new services

During the three pilots, feedback was gathered from the proposed solution. While this was done, the interviewed people brought out some customer concerns relating service sales in general, not the proposed solution. Two major issues were highlighted: the response time of services, especially in applications where the downtime (DT) costs are significant, and servicing the installed base of smaller exchangeable units. Some customers burdened with high downtime costs had asked Case Company's German sales organization for a guaranteed response time of services. During the pilots was discovered that this option had actually been delivered to one of the Finnish pilot OEMs, customer Fin B. Offering this service involves some major challenges like mapping Case Company's service resources in different locations (see table 16). Therefore the contract was currently made only for installed base located in Finland. The purpose is to extend the contract to include some other countries in future. Servicing the products that should be replaced was seen as very important in Sweden and Finland. Three types of new services were proposed to respond to the identified service needs (see table 16).

Table 16 - New services proposed

	Value for end users	Business potential	Main challenges
Guaranteed response time	A huge value added for end users with high DT costs.	Delivery of high margin solutions.	Mapping of own service resources. Contract matters: a) internal, b) external.
Replacing broken smaller products	Shorter down time.	Combine extended warranty with "Total care"?	How to develop big enough IB? Customized units a big challenge.
Exchanging "old" smaller products	Optimal OEE by using Case Company's expertise.	Additional sales and improved customer satisfaction.	Whose responsibility?

The guaranteed response time would give a huge value added for customers who have significant down time costs, and Case Company would probably be able to put a high margin on this kind of a solution. However, mapping of Case Company service resources in different locations to be able to agree on the response times might consume significant amount of time and resources. Handling of the contract matters and responsibilities between different Case Company local units and the OEMs might pose an even bigger challenge.

Servicing the installed base of smaller products needing to be replaced can be done either reactively or proactively. Replacing broken units with new ones is a reactive approach that necessitates an inventory close to the IB to keep the response times moderately short. The IB apparently needs to be big enough to match the inventory carrying costs, which is challenging in case of many OEMs, who buy deeply customized products. This option could relatively easily be added as one service component to the service platform "Total care", which is discussed currently in Case Company.

The products can also be exchanged proactively based on the calculations of the probability of breakdowns and the down time costs. This option would provide Case Company additional product sales and improved customer satisfaction because of optimized overall equipment effectiveness (OEE). Should this service be the responsibility of Product Sales or Product Support? Currently Product Sales sells new products, but Product Support is responsible for providing exchange products for units under warranty.

Part III – Contribution

7 Conclusions

In this chapter the key findings and research implications of the thesis are presented, as well as their relation to the body of knowledge. Generalization of findings and managerial implications are discussed. Suggestions for further research are given at the end of this chapter.

7.1 Development of after-sales services in indirect channel

This thesis concentrated on studying the after-sales service provision of a manufacturer in indirect channels. The particular interest was **how to develop service offerings that can be combined in different situations with the offerings of OEMs to match the after-sales service needs of end users**. Based on the research, a check-list of the whole development process was developed for managers of manufacturing companies, who are planning to develop their after-sales service market in indirect channels (see figure 25).

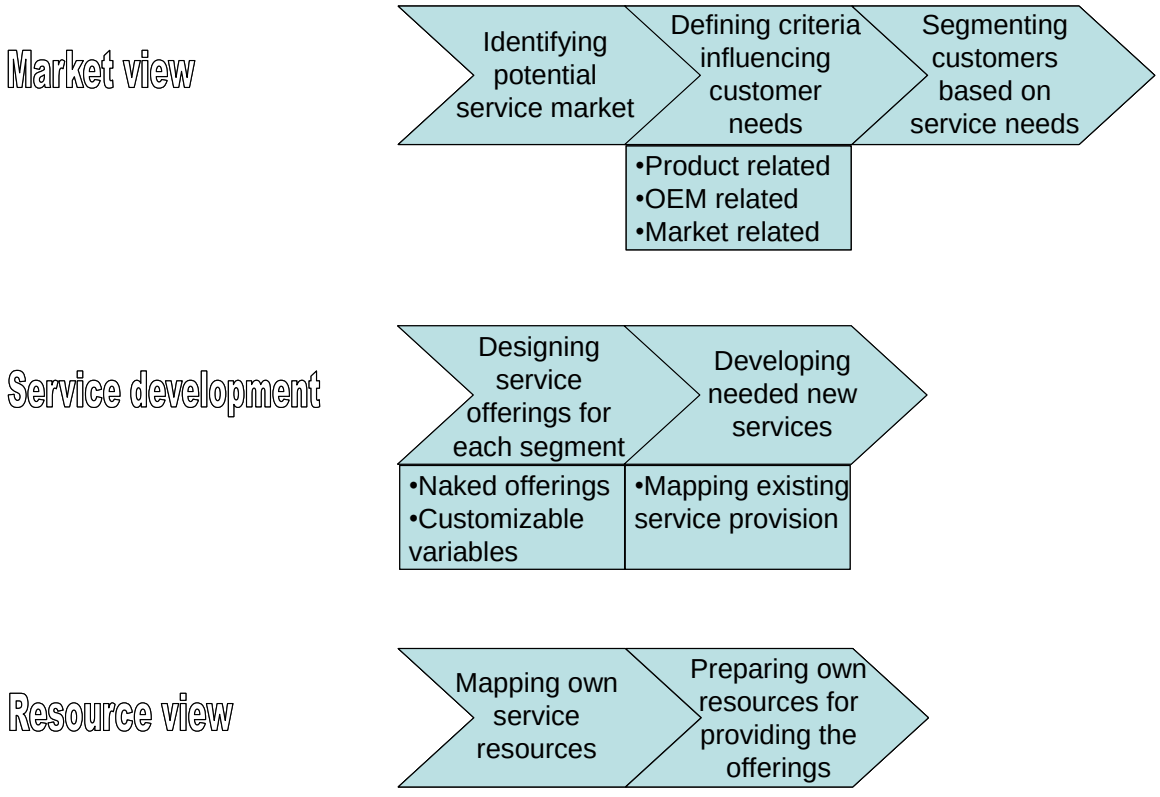

Figure 25 – A check-list for managers: Development process of after-sales service market in indirect channels

The development process is viewed from three points of view: a) the market, b) service development, and c) the resources of service provider. All these three areas should be paid attention in order to develop profitable after-sales service business in indirect channels.

The process starts with the identification of potential market. Namely, who the customers are, how they use the products, and what the installed base (IB) looks like. The need for after-sales services is totally dependent on the IB (e.g. Auramo and Ala-Risku 2005); hence the type and number of products, as well as their locations should be identified. This information is needed for designing suitable service offerings. Second, factors influencing customer needs have to be defined (c.f. Peltier and Schribrowsky 1997, Best 1997). The criteria are related to the manufacturer's product, OEM strategy, and the market; e.g. parties involved. Third, customers are segmented based on their service needs (Haley 1968, Albert 2003) – the variables identified in the previous step.

As the OEM customers are segmented, service offerings matching the needs of each segment are designed as Anderson *et al.* (2007) suggest. Using semi-standard solutions as service offerings helps when trying to benefit from economies of scale (Reinartz and Ulaga 2008), and preventing service provision costs from eating up the margins. Naked offerings and customizable variables (c.f. Anderson *et al.* 2007) are defined based on customer requirements and market characteristics. The semi-standard solutions constitute of existing service provision and probably some new services. Existing service provision has to be mapped to identify, what kind of new services should be developed (c.f. Kim and Mauborgne 1997, Anderson *et al.* 2007). The manufacturer's own service resources should also be mapped to be able to promise customers certain services and service levels in different parts of the globe. Finally, the manufacturer's service resources have to be prepared for providing the designed service offerings to the identified customer segments.

7.2 Need-based segmentation of customers in indirect channels

Customer segmentation is the first part of developing service offerings matching the needs and capabilities of OEMs (Peltier and Schribrowsky 1997, Best 1997). Accordingly, first research question of this master's thesis was focused on customer segmentation:

- How to segment Case Company's (OEM) customers in indirect channels based on their after-sales service needs and capabilities?
  - What are the main factors shaping OEM customer needs?
  - How to develop a segmentation model based on these needs?
  - How should the segmentation be carried out?

Needs-based segmentation was chosen as the segmentation method for the empirical part of this research. OEM customers are divided into segments based on their service needs and capabilities (c.f. Best 1997, Albert 2003). OEM need-based segmentation framework was constructed for Case Company to segment customers in indirect channels. The segmentation is carried out per OEM per product type, because the service requirements depend on the OEM's needs, but also on Case Company product in question. The framework is based on the factors shaping OEM service needs:

1. Case Company product in question and its size
2. How OEM sees maintenance business (core business?)
3. Whether OEM product is typically maintained by an external service provider
4. OEM / service provider wants and is able (has enough resources & skills) to repair Case Company products
5. OEM / service provider wants and is able (has enough resources & skills) to do the preventive maintenance of Case Company products

OEM need-based segmentation framework identifies five types of situations, of how to operate in maintenance business with OEM customers (c.f. chapter 7.3). The empirical research validated clearly the benefits of needs-based segmentation, i.e. that the customer segments are based on real customer needs and requirements (c.f. Haley 1968, Peltier and Schribrowsky 1997). Whereas, Best's (1997) presentation on drivers of customer needs (c.f. chapter 3.1) offered very little value, when developing the segmentation for Case Company. This is because the drivers are not visible, and thus not well suited for segmentation. Likewise, segmentation models relying on demographic factors were identified as undesirable, mainly because the link between them and the real customer requirements is vague (Peltier and Schribrowsky 1997), which causes that the segments will not be a good starting point for the development of a marketing strategy (Sharma and Lambert 1994).

7.3 After-sales service offerings in indirect channels

After segmenting the customers in indirect channels and discovering their service needs, service offerings are developed to match these needs (Anderson *et al.* 2007). Now, the second research question covered service offering development:

- What kind of after-sales service offerings should be developed to these customer segments?
  - How to build service offerings that can be combined with the service provision of OEM customers to match the after-sales service needs of end users?
  - Is there a need to develop new services? What kind of services?

Five OEM segments per Case Company product type were identified in the OEM need-based segmentation. In case of smaller products that should be replaced there is practically no need for maintenance. But for the four other OEM customer segments, service offerings (called here service platforms) were designed:

1. OEM repairs – OEM carries out preventive maintenance and also repairs the malfunctioning units.
2. OEM maintains – OEM exchanges the malfunctioning units that will be repaired by manufacturer, but preventive maintenance of the products is carried out by the OEM.
3. OEM exchanges – OEM services end user by exchanging units of manufacturer's products, and sends the units to manufacturer for repair and preventive maintenance.
4. Total care – Manufacturer provides full maintenance of its products straight to end user.

The service platforms are semi-standard solutions that should be customized to match the service needs of each OEM (c.f. Anderson *et al.* 2007, Reinartz and Ulaga 2008). The customization is done by using four identified variables: a) Service response time, b) Area of services, c) Exchange unit option, and d) Specification of technical support. The service platforms consist mostly of service elements that Case Company was providing already before this research, only three new immaterial services were created (c.f. 6.3.3).

7.4 Research implications

7.4.1 Generalization of findings

Reliability of the study's results has been ensured by:

- Interviewing and informally discussing with dozens of decision-makers from different parts of Case Company organization
- Evaluating each development step of the proposed solution by Case Company employees
  - None of the people evaluating the solution were same as those participating in the development
- Piloting the solution with Case Company sales organizations in different countries

The validity and reliability of the proposed solution is ensured with several iterations of development and evaluation with decision-makers from many parts of Case Company organization. The steps of the development work might have been dissimilar to current, if the people participating in the research had been different, but the final results arguably would have been the same.

Final evaluation of the practical usability of the proposed solution was carried out in three pilots, in which a few further challenges hindering the full utilization of proposed solution were identified. Most significant of these was the currently prevailing reactive approach to service sales while more proactive mind-set would have been required. This is the major issue limiting the implementation of the proposed solution inside Case Company.

Furthermore, Case Company is struggling with some very basic issues in offering services in indirect channels. First, the installed base is unknown in many cases. Second, the customer needs are discovered only by receiving feedback from the customers, not by actively studying the market (c.f. Kim and Mauborgne 1997, Anderson *et al.* 2007). In the prevailing situation, the first priority of Case Company Product Support is not to segment the existing market of indirect customers, but rather to (after identifying the customers & IB) discover the underlying customer needs and develop service offerings to match these needs. Only after these basic issues are taken care of, segmenting the market becomes relevant. The root cause of these challenges is that, as a manufacturing company broadening the focus into services, Case Company is burdened with goods-dominant

logic (c.f. Vargo and Lusch 2004, Vargo and Lusch 2008). Changing the logic into better involving services is a requirement for changing service sales from reactive to proactive.

The results of the research apply with some limitations to other manufacturers serving their customers in indirect channels. First, the proposed solution obviously applies only in industrial markets with products having significant maintenance needs. Second, the customer segmentation is based on the assumption that the main parties in the market are I) Manufacturer, II) OEM, III) End user, and IV) External service provider, and that their relationships are basically similar to figure 16 (page 54). Third, maintenance of the products is done as follows: a) repairing always in workshops and b) preventive maintenance in workshops or on-site. Repairing and preventive maintenance can both be done by Manufacturer, OEM, or External service provider, but usually not by End user (because they lack expertise and resources).

The results of this study can be generalized into situations, where the former three preconditions apply. The details of the development of after-sales service offerings obviously depend on the manufacturer's service resources, but their main characteristics are as presented in this thesis. The empirical research brought evidence of a gap between industrial market segmentation theory and practice (cf. chapter 3.5 & e.g. Mitchell and Wilson 1998, Millier 2000). While the literature is abundant of sophisticated techniques, Case Company can achieve little benefits from applying those directly in its business situation, which is consistent with Millier's (2000) arguments.

7.4.2 Managerial implications

This thesis has focused on a theme that has not previously received attention in the operations management literature: The design of industrial service offerings in indirect channels. Managers of manufacturing companies can benefit from the results of this study (segmentation & service offering development) if the three preconditions stated in chapter 7.4.1 apply. The experiences from the three pilots (c.f. chapter 6.4) proved clearly that efficient utilization of the solution proposed here requires proactive approach to service sales. In case service people mindset is reactive, the benefits of the proposed solution are very hard to capitalize. Thus, obtaining maximum benefits from selling services requires

changing the whole mindset as e.g. Glueck *et al.* (2006) and Anderson *et al.* (2007) stated.

This thesis offers manufacturers a structured way to develop service offerings that can be combined with different kinds of OEMs' service offerings to match the after-sales service needs of end users. The whole process and its phases from the point of view of a) market, b) service development, and c) company resources, are described in figure 25 (page 81). Implementing the solution will benefit manufacturers by supporting product sales and increasing service sales revenue (c.f. Wise and Baumgartner 1999, Markeset and Kumar 2003). Based on a scenario created in chapter 6.5.3, service sales can be multiplied (7,1 times in the scenario) in a few years by implementing the proposed solution.

7.4.3 Further research areas

During the research, following three areas were identified as requiring further research: a) changing service sales mindset from reactive to proactive, b) service platform commercialization, and c) mapping own service resources. The first subject was identified as most severe hurdle in implementing the proposed solution in a manufacturing company that is burdened with goods-centered mind-set. The other two topics relate to the figure 25 (page 81). The emphasis of this thesis was on segmenting customers and developing after-sales service offerings, whereas those two topics remain to be studied in further research. Accordingly, open questions related to the above mentioned themes are:

- **How can a manufacturer efficiently change its service culture from reactive to proactive sales?** What kind of effects will this change have on service sales and profitability? What kind of new requirements are posed to sales people in proactive service sales?
- **How to commercialize the service platforms presented in this research?** What kind of business logic and incentives are needed? How to prepare manufacturer's resources for service delivery?
- **Which service platforms can be provided in different locations?** What are the existing resources & skills in the locations? What are the best practices and strengths in the locations?

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