Lappeenranta University of Technology
Industrial Engineering and Management

MASTER'S THESIS

Service Productization and Product Servitization In The Contract Manufacturing Company

Examiner Professor Janne Huiskonen
Professor Timo Pirttilä

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Kirsi Lehto

ABSTRACT

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Kirsi Lehto

Service Productization and Product Servitization in the Contract Manufacturing Company

Thesis for the Degree of Master of Science in Technology

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92 pages, 32 figures, 4 tables and 10 appendices

Examiners Professor Janne Huiskonen
Professor Timo Pirttilä

Keywords: Product-Service System, Productization, Servitization, Service, Business Model generation, New Service Development, contract manufacturing, subcontracting

The role of contract manufacturing and subcontracting has been seen in black and white in product and service point of view. It used to be seen either as a product or a service. In the thesis product-service system, offering combining products and services, was discussed. Theory was created from two perspectives; Service productization via Business Model generation and product servitization via New Service Development process.

Target for the case study was to point out new ways of service thinking and ways for changing business environment in contract manufacturing, especially in customer satisfaction and profitability point of view. The case study is following the New Service Development process phases. First ideas were collected from literature and via sales management interviews. Service offering and tool for service requirement evaluation was created. Last financial results of example service scenarios were calculated. It is recommended to take service offering into internal use and further develop it into modular service model. It is also recommended to take created customer service requirement evaluation tool into use for capturing customer service needs but also for communicating those internally.

TIIVISTELMÄ

Lappeenrannan teknillinen yliopisto
Tuotantotalouden tiedekunta

Kirsi Lehto

Palveluden tuotteistaminen ja tuotteiden palveluistaminen alihankitayrityksessä

Diplomityö

2013

92 sivua, 32 kuvaa, 4 taulukkoa ja 10 liitettä

Tarkastajat Professori Janne Huiskonen
Professori Timo Pirttilä

Hakusanat: Yhdistetty tuote-palvelu tarjoama, tuotteistaminen, palveluistaminen, palvelu, liiketoimintamallin luominen, uuden palvelun kehittäminen, sopimusvalmistus, alihankinta

Alihankkijan ja sopimusvalmistajan rooli on tähän asti nähty mustavalkoisesti joko tuotteen valmistamisena tai palvelun tuottamisena. Teoriaosuudessa yhdistettyä tuote-palvelutarjoamaa lähestytään kahdesta näkökulmasta. Ensimmäinen näkökulma on palveluiden tuotteistaminen liiketoimintamallin kehittämisen avulla. Toinen näkökulma on lisäarvopalveluiden tuottaminen uuden palvelun kehittämisprosessin avulla.

Tutkimuksen tavoitteena oli osoittaa uusia palvelunäkökulmia, joilla voidaan muuttaa sopimusvalmistukseen vaikuttavaa liiketoiminta-ympäristöä. Näkökulmissa korostetaan erityisesti asiakkaiden tarpeiden huomioimista ja kannattavuutta. Käytännön osuus toteutettiin uuden palvelun kehittämisprosessin mukaisesti. Aluksi karoitettiin nykyiset palvelut ja kerättiin ideoita haastatteluin ja kirjallisuuden avulla. Esimerkki yritykselle rakennettiin palvelutarjoama ja työkalu asiakastarpeiden kartoittamiseksi. Lopuksi tehtiin esimerkkilaskelmia palveluiden taloudellisten vaikutusten ymmärtämiseksi. Yritykselle suositellaan palvelutarjoaman käyttöönottoa ensin sisäisesti ja mallin jatkokehittämisen jälkeen myös asiakasrajapintaan. Laaditun asiakastarpeiden kartoitustyökalun voi ottaa heti käyttöön asiakasrajapintaan ja sisäisen tiedonkulun työvälineeksi.

ALKUSANAT

Haluan kiittää kaikkia niitä, jotka ovat auttaneet ja olleet tukenani opiskellessani töiden ohessa Diplomi-Insinööriksi. Kiitokset haluan osoittaa työni ohjaajalle Lappeenrannan Teknillisen Korkeakoulun Professorille Janne Huiskoselle sekä työn teettäjän edustajina esimiehelleni Vice President Erik Skogströmille ja työni ohjaajalle Vice President Juho Koskiselle, jotka inspiroivat minua työn aikana.

Erityisen kiitoksen ansaitsee mieheni Juha Lehto, joka on tukenut ja kannustanut minua koko opiskelujeni ajan. Ilman sitä panosta opiskelu töiden ohessa ei olisi ollut mitenkään mahdollista. Kiitos kuuluu myös lapsilleni Lauralle ja Laurille, jotka ovat antaneet minulle aikaa ja mahdollisuuden työn tekemiseen. Haluan kiittää kaikkia sukulaisia, erityisesti isovanhempia, jotka ovat tarjonneet ja antaneet apuaan opiskelujeni aikana, sekä kaikkia ystäviäni ja työkavereitani, jotka ovat kannustaneet minua matkan varrella.

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1 INTRODUCTION

Already at the end of the 1960s, Theodore Levitt made a statement that is still valid for current industrial applications: “People don’t buy products; they buy the expectations of benefits.” The problem of this statement is to measure the expectation of benefit and to gain the highest profit out of it. A classical product can be demonstrated, calculated and validated by its technical functionality. If you want to work with Levitt’s statement you have to develop similar methods and tools for this solution providing. (Levitt T. 1969)

1.1 Background

In the year 1988 Clarke and Clegg stated that the engineering industry is currently undergoing a transition from being the product provider to being the provider of customer value and product-related value-added services (Clarke, T., Clegg, S. 1998, Kalliokoski 2003, p. 9). Later on Hyötyläinen et al 2002 faced the fact that enterprises have proclaimed and tried to undergo this transition but have failed in reality in several respects. Some of the product-related services are partly implemented with technological solutions, but most of the Industrial Services are only pilot schemes. This trend has been going on already sometime, but companies have succeeded in only some areas. E.g. in engineering industry service business has been seen mainly as after sales services or consultancy. Because of limited view and understanding services companies have not been too successful. (Hyötyläinen et al. 2002).

Subcontracting or contract manufacturing has not considered being a service or it is considered to seen as operation service or purely as product sales. In the thesis service is wanted to be seen as any added

value for customer that is not in the physical product itself. It can be for example short lead time, flexible operations or ability to act as supply chain partner in addition to e.g. assembly service. These examples create value for customer but at the same time create costs for contract manufacturer. Today customer is not really paying for those value adding elements and usually it is not even requested.

Situation in contract manufacturing is similar like in baking business some twenty years ago. Banks were not charging for ATM or Internet services. Customers were not willing to pay for those either. Today there is no fee or it is quite moderate for using services. On the other hand using same services in the counter desk are quite expensive. There is quite wide understanding that some fee is acceptable for all services, and especially the personal service in the counter desk should cost more. The new pricing mechanism has been accepted.

“It is not enough anymore to follow strategy. You must try change the business environment to become successful.” This was said by Juha Murtopuro, Managing Director of Turvatiimi. Also the author believes that business model and earning logic will change in contract manufacturing in few years like it has changed in banking business. Similarly Juha Murtopuro and his team have changed the business environment in the security business. They created new services that are not actually related to security, but the same personnel could provide those services at the same time when doing security controlling..

Once companies will be more aware of supply chain total costs, they will accept the costs caused based on their own needs. Like vice they are not willing to pay for any extra for some other customer’s services.
In that kind of surroundings contract manufacturing companies are either forced to serve similar customers with similar supply chain

needs or they must adapt new model of serving customers in different ways. It also means that revenue streams and costs must be differentiated depending on customer's needs and given service. Customers with needs of efficient supply chain aren't willing to pay for flexibility if they do not need it.

Companies that want to serve different types of customers must adapt new ways of thinking and working. In reality it means increasing awareness of services, building up of service models and processes, new ways of cost and offer calculation. Service productization has been studied quite a lot in ERP or other IT system point of view. In advanced companies they are able to make e.g. ERP replacement in few months in case if requirements are not very unique ones. It means that there must be very structured process to analyze customer needs and make system up and running. Similarly in any B2B business there is a need to analyze quickly what are actual customer needs and then ramp it up as soon as possible.

In reality we unfortunately run quite often into the situation that given service is not the same as expected service and therefore customer is not satisfied. It means that our customer process is not structured enough to find out what customers really want. One important target for the thesis is to find out ways how customer requirements are captured in early phase, so that processes can be planned accordingly in early phase.

1.2 Research problem and objectives

Most manufacturing companies are quite well aware of their product offering as well as direct cost of their products. That's why focus is now on services, especially on those services that are created with product delivery. Figure 1 illustrates typical financial view into cost of product and service. Costs of product manufacturing are usually defined as direct cost while costs of service level are causing indirect cost. In reality offering is defined only for products, even though there are quite many services available, usually free of charge. Both products and services add value to customer. Therefore company could get revenue streams based from both. In this thesis the focus is on service offering, value added to customer and how service offering is turned into revenue streams.

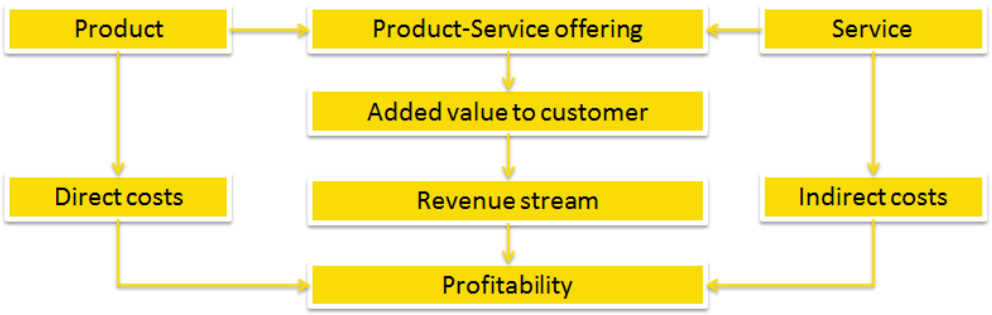

Figure 1. Typical cost and revenue logic in contract manufacturing

There is two ways to get closer into service business. Those are described in figure 2. One way is servitization via business mode generation. Another is productization via New Service development (NSD) process. Servitization is making shift from selling products to product-service systems as well as shift towards understanding customer needs and making services more visible. Business model is the tool for future business planning. Productization is a way of

differentiation with services in addition to tangible product. It also means defining of new and existing services in more systematic way. NSD process is a tool to capture service ideas, create a concept of those, plan and carry plans into actions. Both servitization via business model generation and productization via new service development process are needed to be able to create successful Product Service System (PSS). Business Model generation is strategic tool to ensure that offering, resources, customer view and finance views are in line. NSD process has some strategic elements, but is more operational a tool to take new services into offering in systematized way. This systematized way is called productization of services.

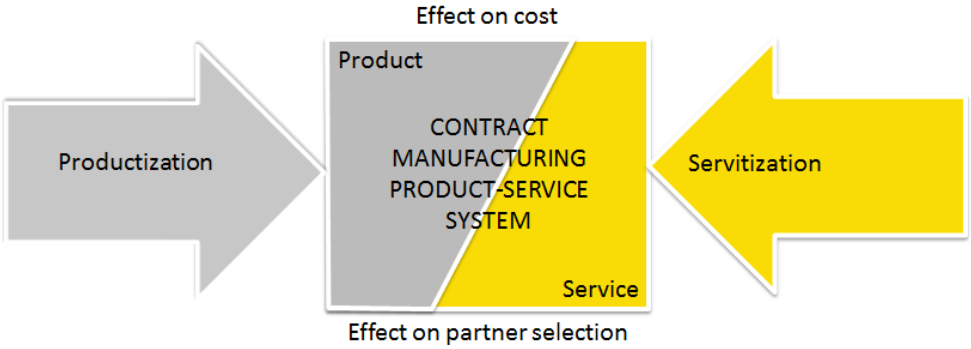

Figure 2. Productization and servitization for PSS

Usually the product itself has bigger effect on total cost of product-service system compared to service. The author believes, that in the contract manufacturing business, given service already before contract closing, has much bigger influence on partner selection compared to product. Products have become order qualifiers (Vargo and Lusch, 2004, p. 8) - a necessity to play a part in the market - with services becoming order winners that can differentiate the product-service package from the competition. (Lockett et al. 2011, p. 5) Customers are expecting acceptable level in quality of product, delivery accuracy and price. Once those basic requirements are met, service is the one which actually makes the difference. Usually it is assumed that in B2B

business people work in rationalized way. Author believes that by taking customer requirements into account and working systematically towards creating value to customer, there is better possibility to win the battle. There are always humans who are making decisions after all.

In the thesis focus is in following topics

- ***How product servitization can add value to customer and how to structure service offering via service productization?***
- ***How to capture customer service needs?***
- ***What are financial consequences of product servitization and service productization?***

Target of the study is to

- ***Create service offering model of current and potential services***
- ***Create a model that supports to evaluating customer expectations of service delivered with product***
- ***Point out new possible ways for customer satisfaction and profitability***

1.3 Research methodology, structure and restrictions of the study

Research methodology and structure of the thesis is described in figure 3. The research methodology part defines process structure and high level content of thesis. The theory and the case study parts define more detail content of the thesis. First preliminary plan was carried on in September, year 2012. Theory collection and case study were carried on during year from September 2012 to September 2013.

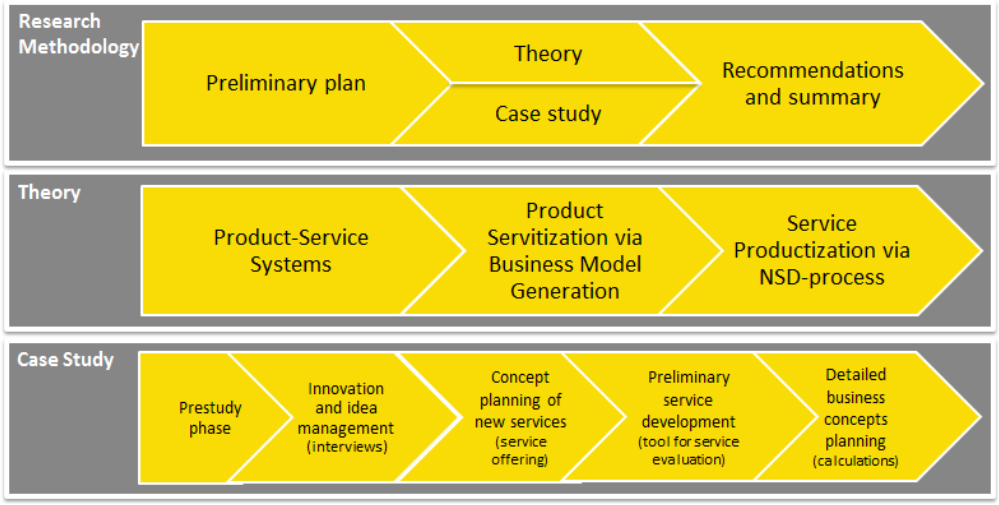

Figure 3. Research methodology and structure of the thesis

Theory is divided into three parts. In chapter 2 Industrial Product-Service Systems are presented with relevant terminology and benefits. In chapter 3 theory of Business Model Generation is presented with the idea that it can be used for product servitization. In chapter 4 theory of NSD process is presented in the way that services can be productized via the process.

Case study is presented in chapter 5. The chapter is divided into five parts. First is prestudy phase. Then first four phases of NSD process. First phase is innovation and idea management, where ideas were collected via interviews and literature. Semi-structured interviews were

conducted with the case. Sales and marketing management and customer service managers were interviewed. This covers sales of two sites and few persons in group sales. Total amount of interviewed persons was thirteen. Information from the survey and interviews were used to analyze the needs of current and potential customers as well as internal readiness for change.

To maintain the anonymity of interviewees, interviews are referred with letters from A to I. A group interview is summarized in one letter. Interviews were carried out between September and November 2012. One full day was reserved for all interviews in each site. In addition three separate 1-2 hours interviews were arranged for group sales persons. Total time used for interviews was about three working days.

In the third phase of the case study, concept planning of new services, service offering was created based on Business Model and results of interviews. In fourth phase of preliminary service development and engineering service requirement evaluation tool was created. In the fifth phase detailed concept planning was done via example calculations of selected service scenarios. Finally recommendations were given and the summary of the study is done. References, tables and appendices can be found in the end of the thesis.

There were no clear plans or decisions how and when to go forward with services. Therefore it was decided that all practical actions related to concepts and operative process planning as well as service implementation and delivery are out scoped. Exceptions to that is example service requirement evaluation tool and financial analysis which were mentioned earlier. Later on if decided to go forward, created offering model can be used as starting point to modular service packages.

1.4 Case study company presentation

Fortaco was established in the end of 2012 with the merger of business units from Komas and Ruukki Engineering. Equity firm CapMan played an instrumental role in the merger and was to continue as the majority shareholder in the new company. Fortaco offers highly specialized engineering competencies across the entire supply chain through our production sites in Finland, Estonia, Poland, Hungary and Slovakia. Service portfolio includes welded components and structures, operator cabins, assemblies and machining. In the company there are about 2,500 employees and 220 million Euros turnover.

Once master's thesis started author worked in Ruukki Engineering. Interviews and some of theoretical studies were done in the time of Ruukki Engineering. Further theoretical studies, service model creation and example calculations were done during Fortaco times. Idea of service concept changed at some extent on the way, but basic idea behind the study remained the same; How to deliver more value for customer by delivering services with the product.

2 INTRODUCTION TO PRODUCT-SERVICE SYSTEMS

Product and service development is considered as a new arena for the co-operation of enterprise networks (Hemilä 2002, p. 3) and industrial services can be seen as the optimization of customer assets. (Kalliokoski et al. 2003, p. 10) As a result of this development, companies are moving closer to their customers, which entail the need for new product concepts and service models. A product requires services, and those services add value to the product (Tomlinson, 1997, Jansson et al. 2003, Hyötyläinen et al. 2002).

2.1 Product-Service System studies and terminology

To be able to identify and understand product-service system (PSS) there is the need to identify terminology. Traditionally, many people have considered products separately from services. However, recent years have seen the 'servitization' of products and the 'productization' of services (Baines et al. 2007, p. 4). In chapters 2.1.1 – 2.1.3 focus is on defining products and services as well as productization and servitization. There are very close concepts like customer value, service dominant logic, integrated product and service offering and life cycle engineering that need to be clarified to be able to understand the full nature of product –service systems. These concepts are defined in chapter 2.1.4.

2.1.1 Products and services

All readers have some reasonable understanding of what is product and service even though they are not necessarily able to define it exactly. Goedkoop et al. (1999) defined product and service in following way

- *Product:* A tangible commodity manufactured to be sold. It is capable of 'falling on your toes' and of fulfilling a user's needs
- *Service:* An activity (work) done for others with an economic value and often done on a commercial basis

The distinction between products and services is limited as most offerings combine physical and non-physical elements (Shostack 1982). Levitt (1981, p. 94) stated: "Everybody sells intangibles in the marketplace, no matter what is produced in the factory".

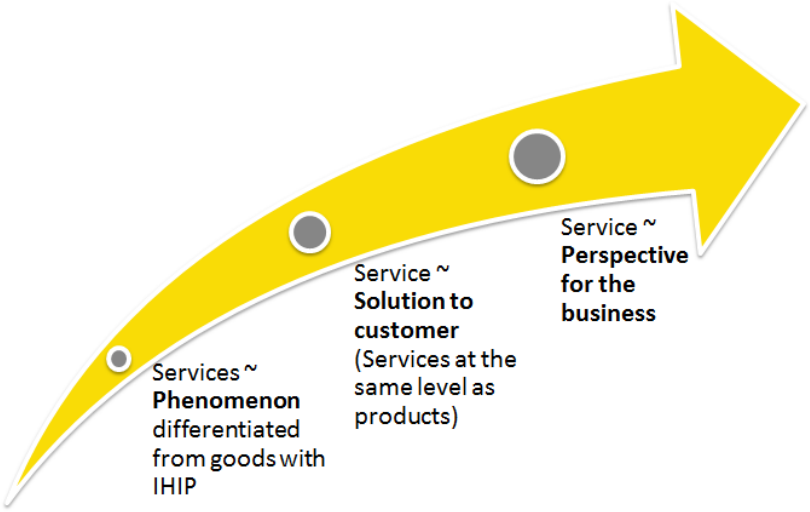

Figure 4. Different service interpretations in the literature (Turta 2011, p. 31)

Turta (2011, p. 31) has combined models of Laine (2009) and Grönroos (2008) into single model presented in figure 4. It points out three levels or aspects for the service. The first stage is to see service as an activity different from products. IHIP stands for intangibility,

heterogeneity, inseparability of production and consumption, and perishability originally defined by Zeithaml et al. 1985, p. 33) The second point is to think service as a perspective on the customer's value creation. The third stage according is to think service as perspective on the provider's activities and business logic hence the levels of the classifications are fundamentally same.

2.1.2 Productization

According to Jaakkola et al. common characteristics of services are immateriality, processness and that customer is participating value creation process. Special characteristics related to services are fluctuations in demand, quality and inefficiency of the process, business increase and profitability. Productization is a way to decrease all these issues and way to improve compatibility. Sometimes productization is defined to be fully standardized process like products are (Jaakkola et al. 2009, p. 1). New and existing services are created and executed in more systematic way. In addition to that process is at least partly fixed. (Jaakkola et al. 2009, p. 1) Design opportunities in this approach may be found in the packaging of the intangible service. (Jung and Nam 2008, p. 11) Fixed part can be related to processes that are internal or seen to customer or both. Target of productization is to make services visible, renew and develop service business in the way that customer value added is maximized and profitability increases at the same time. (Jaakkola et al. 2009, p. 1)

2.1.3 Servitization

The term servitization of business is originally defined by Vandermerwe and Rada (1988) in the management literature as modern corporations "intents" to increase the role of services in their offerings, which can include a mix of goods, services, support, self-service, and knowledge.

Baines et al. (2009a, p. 554) collected a number of definitions for the term servitization and have combined two bodies of research, which both have discussed a similar phenomenon but have been developed and evolved separately. On one hand, they take into account the research body of servitization. On the other hand, they see that the research body of PSS. Based on studies, Baines et al. (2009a, p. 555) have built their own, comprehensive definition for the term servitization: "Servitization is the innovation of an organizations capabilities and processes to better create mutual value through a shift from selling products to selling PSS." Because of the background servitization is sometimes used as a synonym for product-service system or integrated product and service offering. (Schmitt and Hatfield 2008, Sakao and Shimmomura 2007)

In this thesis servitization is seen in two points of view. First it is seen as shift from selling products to product-service systems. It means that organization must take it into consideration in their strategy and change their way of thinking, processes and resources accordingly. Secondly it is seen as a shift towards understanding customer needs and actual value added in the customer point of view.

2.1.4 Related terminology and studies

There have been several researches going on in the fields of more or less similar to each other's. The customer value view was primarily brought to consideration by marketing researchers; it specially focuses on customer needs (Guiltinan et al. 1996) thereupon, the concept of service-dominant logic evolved also from the marketing perspective, stating that customers mainly create value through service experiences and relationships (Vargo and Lusch 2004, p. 1 – 2).

The concept of integrated product and service offering views from a life cycle perspective. It aims to offer a solution with a combination of products and services that satisfies an identified customer need. (Sundin and Bras 2005, Arai and Shimomura 2005, Lindahl and Ölundh 2001) Life cycle engineering and many related concepts focus on sustainability and how to develop, e.g. energy efficient products. (Seliger et al 2008)

2.2 Introduction to product-service systems

The term Product-Service System (PSS) has been established for integrated business, where the traditional separation between material and service components is given up and both are considered as potential means to fulfill customers' needs (Weber et al. 2004, p. 1) The term PSS emphasizes the sale of use rather than sale of product, and thus integrates the services to the core product to make extensions in the traditional use and functionalities of the product (Baines et al. 2007, p. 1). In this chapter first shift from product and services into integrated product-service offering is discussed. Secondly benefits of product-service system are described.

2.2.1 Shift towards product-service system

Durugbo et al. (2009, p. 1) has created probably most easy illustration of PSS presented in figure 5. According to them PSS is a system consisting of product and service systems as well as productized services and servitized products. Servitization in PSS is a practice which closely links and incorporates services with offered products for servitized products just as productization does the converse for services. Products are tangible and domain specific whereas the service offering is made up of intangible artifacts or services such as upgrades and recycling.

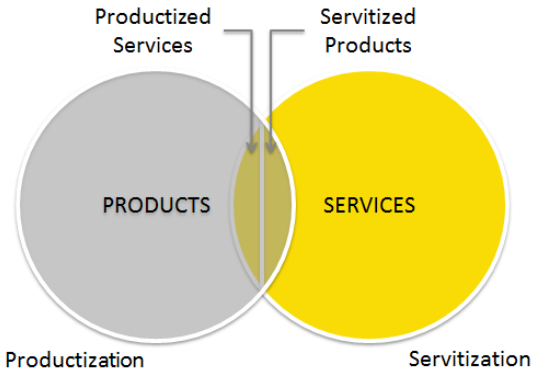

Figure 5. Product-Service System model (Durugbo et al. 2009, p. 1)

Morelli (2003) sees servitization as the evolution of the product identity based on material content that is inseparable from service system. Similarly, productization is the evolution of the service component to include a product or a new service component marketed as a product. The convergence of these trends is the consideration of a product and a service as a single offering – a PSS presented in figure 6 left side model. (Morelli, 2003) Later on the model was further developed by Hockert and Weaver (2002) and Neely (2008) presented in figure 6 right side model.

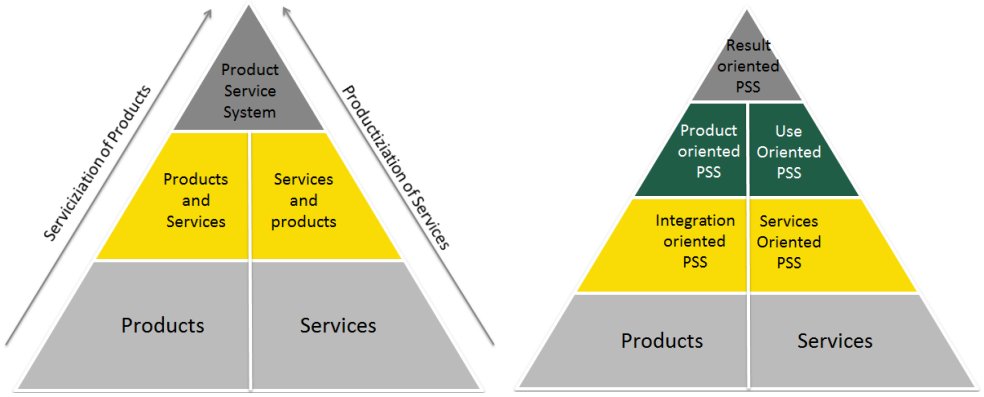

Figure 6. Evolution of the Product Service-System concept (Morelli 2003, Neely 2008)

In terms of customer intimacy, manufacturing companies' position themselves differently in terms of their industrial services offerings and operations. Salkari et al. (2007, p. 7) defined in BestServ Forum six different supplier positions in relation to customer intimacy presented in figure 7. Original model was presented by Kalliokoski et al. (2003).

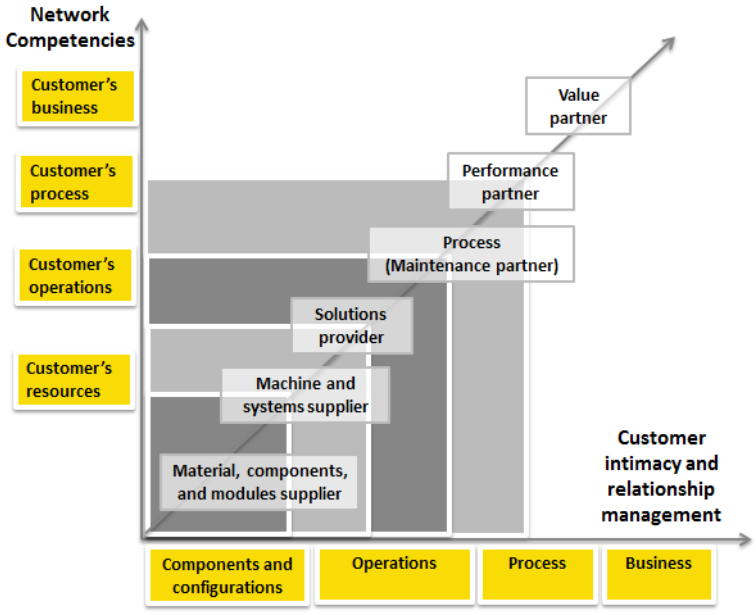

Figure 7. Business model analysis according to customer intimacy (Kalliokoski et al. 2003)

Material, component and module suppliers focus on working as networked operative partners for specific machine components. Machine supplier's business relationships focus on delivering specific

pieces of machinery or equipment meeting customers' technical specifications. Solution providers business is focused on system delivery, for example production lines usually designed for specific customer processes. Maintenance partner's business focus expands to include ongoing supplier involvement during the entire lifecycle of the delivery with contractual after-market elements. Performance partners are closely involved in operating their customers' technical processes. Value partners are directly involved in their customers' business, for example through 'operate and maintain' agreements. (Salkari et al. 2007, p. 6 - 7)

2.2.2 Benefits of Product-Service System

In this chapter benefits of servitization, productization and product-service system benefits are discussed together. Lockett et al (2011, p. 6) have summarized benefits of servitization. To see the full scope of potentials' Lockett et al table has been modified by author with the views of Mont (2002) and Mathieu (2001). Summarization is presented in appendix 1. Benefits are grouped for revenue enhancing i.e. financial benefits, value enhancing benefits and sustainable competitive advantage i.e. strategic benefits.

There is an ongoing debate in the literature of servitization about the financial consequences of the decision to servitize. Some authors present compelling evidence of the benefits of servitization, often basing their analyses on in-depth investigations in particular firms (Visnjic and Van Looy 2009). Others argue that until firms achieve specific levels of service revenue they will fail to recoup superior financial returns (Fang et al. 2008). Yet others highlight the challenges of servitization, arguing that the cultural and organizational shifts required mean that often firms fail to capitalize fully on the

opportunities services afford (Gebauer et al. 2005) It has been observed in successful cases that when organizations gain insight into their customers' needs, they are able to develop more tailored offerings (Mathieu 2001, Malleret 2006)

It seems that servitization benefits and disadvantages are more discussed in litterature. In this context where productization is seen as formulation of services or make those more visible, it is important also highlight productization benefits.

Productization benefits are summarized in following

- Extend and diversify the service (Mont 2002, p. 5)
- Safeguard market share by bringing the service component into the offer that is not so easy to copy (Mont 2002, p. 5)
- Facilitate communicating product-service information, because it is easier to convey information about more tangible products than about intangible services (Schneider 1999)
- Safeguard a certain level of quality that is difficult to change product (Mont 2002, p. 5)
- Productized services is message of experience in company (Jaakkola et al. 2009, p. 1)
- It is easier to sell productized service once customer sees what elements belong to the service and what it cost (Jaakkola et al. 2009, p. 1)

In the end it is worth of highlighting that the adoption of a new product-service strategy requires investments on capacity building such as the acquisition of new peoples' skills, capabilities and technologies, etc. (Reinartz and Ulaga 2008). Therefore in the shorter term, it might be challenging for organizations to make huge revenues out of a new PSS transformation; It may only be in the longer term that a new PSS strategy delivers on its promises. (Martinez et al. 2010, p. 3)

2.3 Contract manufacturing as a service

It can be argued weather contract manufacturing is a service or product. Some see that it is purely related to goods dominant logic, since product is a result from production. Others see it purely service-logic bases. In literature it has been widely recognized that line between services and products is not clear anymore. According to Kalliokoski et al. (2003, p. 17) contract manufacturers have not always been considered to be service companies. It is also remarkable that PSS's are often are marketed as products. (Manzini 1993) According to author this seems to be case also in contract manufacturing today. Already 1993 Manzini stated that, it makes it challenging that designers' activities usually have focused on material artifacts, rather than on systemic solutions including service.

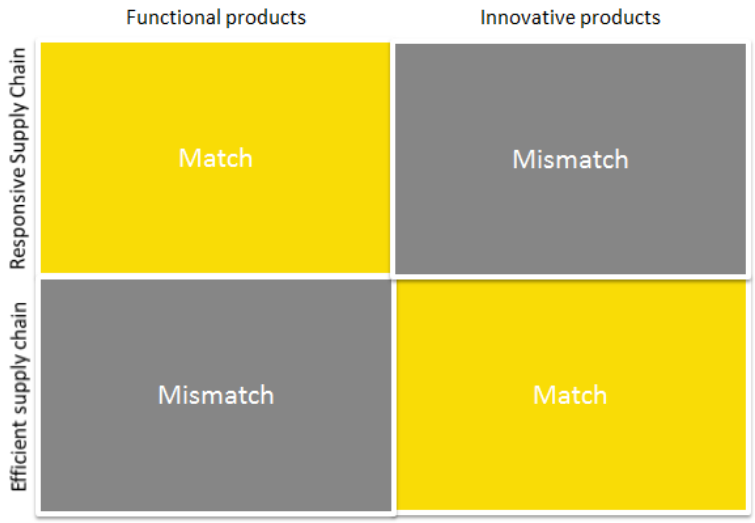

Figure 8. Matching Supply Chains with products (Fisher 1997, p. 109)

Turbulent global markets, afflicting the increasing requirements concerning flexibility, quality, delivery dates, and prices, make customers concentrate on their core competences and outsource secondary tasks (Meier et al. 2011, p. 1176). This trend may also create new possibilities of services in contract manufacturing in

service point of view. In this thesis the original models of Morelli (2003) Evolution of the Product Service-System concept and Hockert and Weaver (2002) Product-Service System with extension of Neely (2008) were presented in chapter 2.2.2. Author modified that model to suit it better for the new kind of service view in contract manufacturing. Now the model of PSS was created by author for contract manufacturing and subcontracting purposes. The new model got influences also from Fisher's model (1997, p. 109) of different kind of approaches of supply chain presented in figure 8. In the figure 9 Supply Chain PSS and Value Added PSS were added as new features to earlier model.

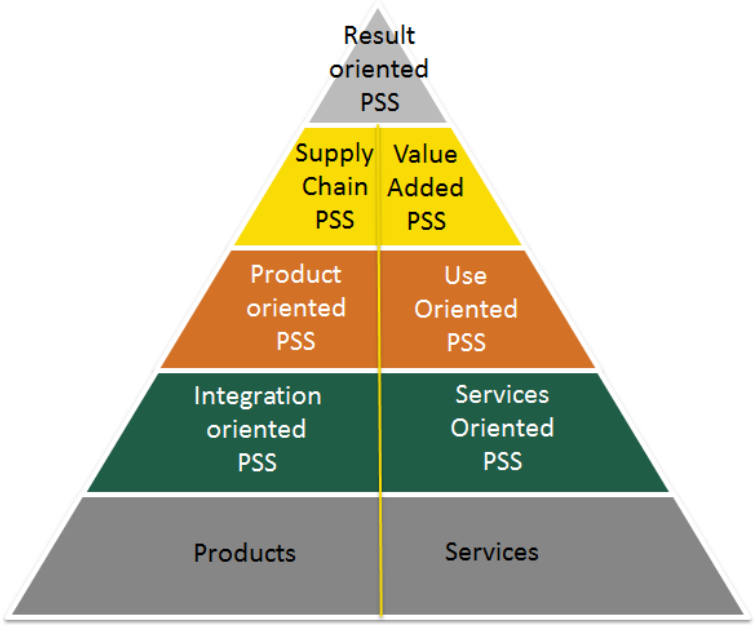

Figure 9. Extended model of PSS

In Supply Chain PSS focus is on making product efficiently and economically as possible. The Value Added PSS is focusing instead on service and total cost view, although product is manufactured according to customer specification like in Supply Chain PSS. Customer business and philosophy are defining what kind of approach is taken. Examples can be found e.g. in flexibility. It is quite obvious

that bigger flexibility causes more costs to suppliers. Supply Chain PSS approach is to manufacture as economically as possible. Therefore weekly quantities remain the same and overtime is not used. In Value Adding approach weekly quantities may vary a lot and therefore flexible working time and also over time working is accepted to be able to be flexible. In both cases the choice is seen in costs and therefore should be seen in pricing and revenues. Similar approach can be taken into any services customer might appreciate. In neither case result oriented PSS is not even a target, but instead serve customer in desired way.

3 PRODUCT SERVITIZATION VIA BUSINESS MODEL GENERATION

Servitization is the innovation of an organizations capabilities and processes to better create mutual value through a shift from selling products to selling PSS." (Baines et al. 2009a, p. 555). Business model describes the value an organization offers to various customers and portrays the capabilities and partners required for creating, marketing, and delivering this value and relationship capital with the goal of generating profitable and sustainable revenue streams. (Osterwalder and Pigneur, 2010)

First product-servitization is discussed in chapter 3.1. In the chapter 3.2 business models, value proposition and offering, and finance view are discussed. The focus on how servitization can be done via business model generation. To be able to build up offering it is essential to understand how business model effects on offering, what adds value for customer, how value proposition is created and what are building blocks of offering. To be able to be successful it is also essential to understand how product-service processes effect on financial streams, cost and revenue streams in the company. Companies are usually able to define product offering and direct costs. That is why in this thesis focus is on services and indirect cost allocation related to value added for customer. In the last chapter critical success factors of servitization are discussed. In context of contract manufacturing it needs to be noted that sales cases differ from each other's. Therefore in addition to success factors focus is also in the gap between proposed value and expected value.

Servitization and the transformation towards services must be seen as a change process, which is not accomplished in days, weeks or

probably not even in months. It needs thorough modifications not only to the product offering of the company but also to organizational elements of a company (Tapio Turta 2011, p. 40). Gebauer et al. (2010, p. 108) see that different kind of service strategies need modifications in organizational design elements, such as corporate culture, human resource management, organizational structure and service development.

3.1 Product-Servitization

Product services are additional services and benefits supplementing the tangible product in order to make product differentiation (Framback et al. 1997)**.** The concept of product-servitization is often referred to as PSS in manufacturing and product design field. PSS refers to “a marketable set of products and services capable of jointly fulfilling a user’s need” (Goedgoop 1999). Other similar terms include “product service combinations”, “product-to-service”, “integrated product-service offerings”, “integrated product and service engineering”, and “servicizing” (Sundin 2007, Lindahl et al. 2007). The service elements considered in product-servicization are much more related to the use of the product, rather than creating a totally new service scheme. The notion ‘service’ in product-servicization refers to intangible benefits or values ‘added-on’ to existing products (Jung and Nam 2008, p. 4).

3.2 Business Models

The business model elements provide a tool for future business planning. The essential elements of a networked business model emphasized are the service, customer, network, resources and activities, cost and revenue structure, as well as dynamics of the business environment (Palo & Tähtinen 2011, p. 377 - 388). By analyzing each element, the key changes and challenges can be determined, which provide the basis for planning the service business. Secondly, the service itself is the basis for developing and changing the business model. It determines the actors and roles in the business model, the necessary resources and activities, as well as the cost and revenue structure. Hence, the study supports the development of service-based business models (Wallin et al 2012, p. 83)

A PSS business model allows firms to create new sources of added value and competitiveness, since those

- fulfill client needs in an integrated an customized way, hence allowing clients to concentrate on core activities,
- can build unique relationships with clients, enhancing customer loyalty, and
- can probably innovate faster since they follow their client needs better. (UNEP 2002, p. 9)

In this chapter focus in on offering, value proposition and financial view with costs and revenue streams. Osterwalder and Pingneur (2010, p. 44) Business Model in figure 10 has been used as a reference. It has four main elements: offer, infrastructure, customer and finance.

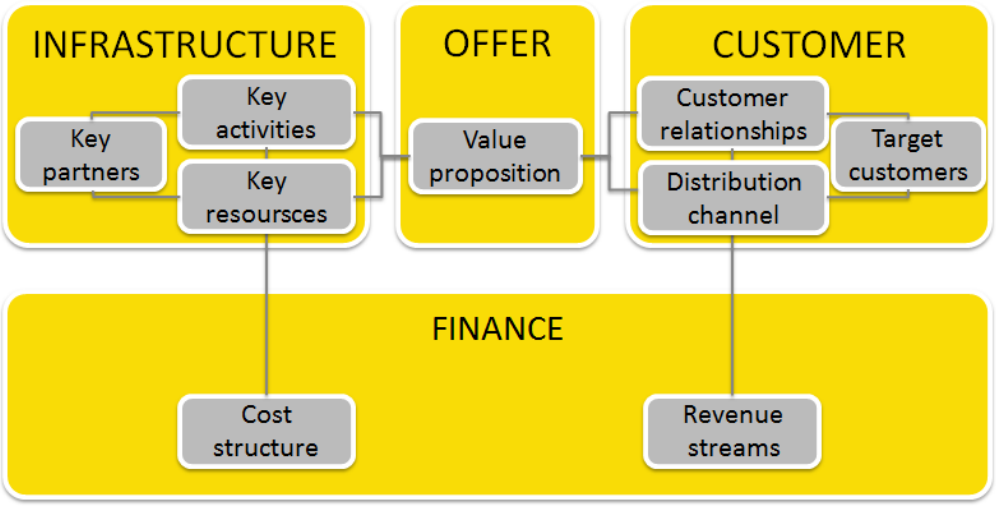

Figure 10. Business Model (Osterwalder and Pigneur 2010)

Offer contains value proposition and target is to solve customer problems and satisfy customer needs. Customer part contains decision of customer segments, channels for delivery, communication, distribution and customer relationship level for each customer segment. Infrastructure element contains key resources and activities, and key partners required for carrying on those activities. Finance element contains revenue streams resulted from value propositions and cost of infrastructure. (Osterwalder and Pigneur 2010, p. 16 - 17). In this thesis more attention is paid to offer and finance elements.

3.2.1 Value proposition and offering

The customer value view was primarily brought to consideration by marketing researchers: it specially focuses on customer needs and the effects of customer orientation. (Slater et al. 1994, Guiltinan et al. 1996)

There are various ways to define offer and value proposition. According to Votta (2003) offer and market value of the PSS, includes aspects of tangible or objective value and intangible or subjective

value for the consumer. Vargoand Luch (2006, p. 3) devides views into Goods-Dominant (G-D) and Service-Dominant (S-D) logic meaning tha G-D logic is based on the value-in-exchange and S-D logic is tied to the value-in-use. Osterwalder and Pigneur (2010, p. 23) divides value propositions into quantitative (e.g. price, speed of service) or qualitative (e.g. design, customer experience), where mix of elements is gathered.

Osterwalder and Pigneur (2010, p. 21) has listed different value adding views: Newness, performance, customization, getting the job done, design, brand/status, price, cost reduction, risk reduction, accessibility and convenience/usability.

According to Osterwalder and Pigneur (2010, p. 23), value proposition is giving an answer to following questions

- What value do we deliver to the customer?
- Which one of our customer's problems are we helping to solve?
- Which customer needs are we satisfying?
- What bundles of products and services are we offering to each Customer Segment?

Anderssson et al (2009) have focused on value added in differentiating point of view. They have divided value propositions into three types: All benefits, favorable points of difference, and resonating focus. In all benefits case, simply all current and known value adding elements are listed. However it is relative simplicity has a major potential drawback: benefit assertion. Such features can be listed that provide no benefit to target customers. If each firm is saying essentially the same thing, how the customer is making the choice? Second type of value proposition recognizes favorable points of difference meaning that customer has an alternative. 'Why should our firm purchase your offering instead of

your competitor's", is a more pertinent question than 'Why should our firm purchase your offering (Andersson 2009, p. 92 - 94).

Last view resonating focus acknowledges that the managers who make purchase decisions want to do business with suppliers that fully grasp critical issues in their business and deliver a customer value proposition that's simple yet powerfully captivating. Therefore suppliers must focus on the few elements that matter most to target customers, demonstrating and documenting the value of this superior performance, and communicating those forward by highlighting customers priorities. Some companies even document value case histories to demonstrate the cases where supplier has been able to add value or create cost savings. (Andersson 2009, p. 95 - 96).

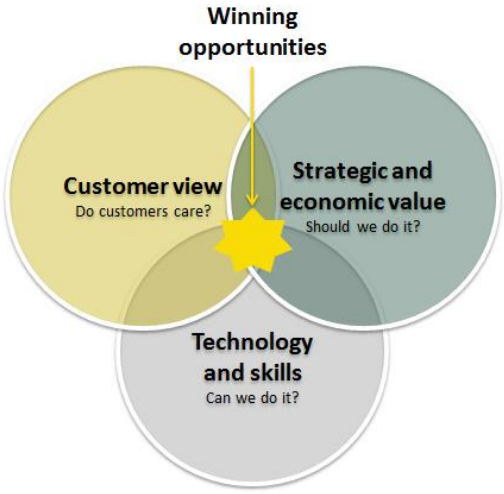

Figure 11. Views into winning opportunities (Matheson 2013)

Development of total offering and services are part of strategy work. The desired offering is defined and goals for developments are set. As a perquisite, the existing offering portfolio needs to be known (Salkari et al. 2007, p. 15). Strategic Portfolio Management model in figure 11 describes how offering should be built up. Value adding view basically answers question: 'Does anybody care?' Strategic and economic

value view answers the question: ’Should we do it?’ Technology/Product solution view describes the facts if company is able to manufacture certain product or deliver service. Winning opportunities can be found when company is capable to provide products and services in such a price that is economical for company and customer is willing to pay for. (Matheson 2013)

3.2.2 Cost structure and revenue streams

In this chapter business model view for cost structure and revenue streams is discussed. Osterwalder and Pigneur (2010, p. 31) focuses on customer view by making question in finance part of business model. For what value are our customers really willing to pay? For what do they currently pay and how they are paying? How much does each Revenue stream contribute to overall revenues? Similarly the focus is on main streams when defining defining cost strucure in business model. What are most important costs inherent in our buisiness model? Which key resources and activities are most expensive?

According to Osterwalder and Pigneur (2010, p. 33) there are two ways to set up pricing: fixed pricing and dynamic pricing. List price, product feature dependent, customer segment dependent, volume dependent pricing methods are fixed pricing methods. Negotiation (bargaining), yield management and real-time-market methods are dynamic pricing methods.

The cost structure describes all costs incurred to operate a business model. This building block descrbes the most important cost incurren while operating undes a particular business model. Creating and delivering value, maintaining Customer Relationships, and generating revenue all incur costs. Such costs can be calculated relatively easily

after defining Key Resources, and Key Partnerships. Some busines models, though, are more cost-driven than others. (Osterwalder and Pigneur 2010, p. 40)

Naturally enough, costs should be minimized in every busines model. But low Cost Structures are more important to some business models than to others. Therefore it can be useful to disguish between two broad classes of business model Cost structures: cost-driven and value-driven. Cost-driven business models focus on minimizing cost when ever possible. This approach aims at creating and maintaining the leanest possible cost structure, using low price value propositions, maximum automation, and extensive outsourcing. Typical example is Ryanair. Some companies are less concerned with the cost implications, and instead focuse on value creation. Premium value propositions and a high decree of personalized service usually charasterize value-driven business models. Examples are luxury hotels. (Osterwalder and Pigneur 2010, p. 41)

Next discussion is on cost structure charasteristics. Fixed cost remain the same despite the volume of goods or services produced. Variable costs vary with the volume of goods or services produced. Economies of scale is cost advantage that a business enjoys as its output expands. Larger companies, for instance, benefit from lower bulk purchase rates. This and other factors cause average cost per unit to fall as output rises. Economies of scope is cost advantage that a business enjoys due to larger scope of operations. In a large enterprise, for example, the same marketing activities of distribution channels may support multiple products. (Osterwalder and Pigneur 2010, p. 41)

Last human point of view should be highlighted. LaSalle and Britton (2003) argue that society is shifting to an experience economy

(Grinyer 2003). Turning ordinary produts into extra ordinary experiences. By creating such intangible added value, the provider makes the client willing to pay more than would be justified on the basis of 'rational' calculation. This allows the provider to charge more. (Tukker 2004, p. 251) In B2B business this can not be the case exatly, but on the other hand similar decision making rules still applies, since individuals are making the decisions. Then easyness, reliability, friendliness or other soft service factor may play role instead of rational decision making.

3.2.3 Insights into cost allocation

In this chapter different views into cost allocations are discussed. While most firms know the customer revenues, many firms are unaware of all costs associated with customer relationships. In general, product costs will be known for each customer, but sales and marketing, service, and support costs are mostly treated as overhead. Consequently, some customers incur more relationship costs than others, leading to different levels of customer profitability. It is considered good industrial marketing practice to build and nurture profitable relationships with customers. To be able to do this, a firm should know how current customer relationships differ in profitability, as well as what customer segments offer higher potential for future profitable customer relationships. Customer Profitability Analysis (CPA) can deliver such knowledge. (Raaji et al. 2003, p. 573)

The direct benefits of CPA lie in the insight it provides in the uneven distribution of costs and revenues over customers. First, CPA uncovers opportunities for targeted cost management and profit improvement programs. Published figures show examples where 20% of customers generate 225% of profits (Cooper & Kaplan 1991), where

more than half of the customers is unprofitable (Storbacka 1997) or where the loss on a customer can be as high as 2.5 times sales revenue (Niraj et al. 2001). Second, CPA provides a basis for well-informed pricing decisions, bonus plans, and discounts to customers. Third, CPA opens up possibilities for segmentation and targeting strategies based on cost and profitability profiles. (Cooper & Kaplan 1991)

Devine et al (2005) have highlighted the cost allocation via their next generation ABC model as Raaji et al (2003, p. 574), but in investment and asset point of view. Assignment of assets to activities and ultimately to products and customers will allow managers to analyze customers and products with the same attention to return on investment that has been used for evaluating business units nearly 100 years. The extension of ABC to the allocation of assets is most appropriate in those situations in which products or services have the significant differences in the utilization/consumption of company assets such as equipment/ consumption of company assets such as equipment and machinery, tooling, inventories, and receivables (Divine et al. 2005, p. 2). Once cost of each customer's and products actual cost are know it obviously should have an effect on pricing.

3.3 Critical success factors of servitization

There seems to be different success factors of servitization depending on the cases and industry. Product-service systems seem to be more common in IT sector and over there are various examples how transformation from product sales to product service system sales has been carried on. Success factors of three different cases and studies are presented table 1. The first is by Case IBM, where change was basically a survival game. Second is based on studies of Martinez et al. (2010) and third Wallin et al. (2012) views about success factors of service orientation. The table highlights the points that company has to consider when moving to product-service oriented organization.

Table 1. Summary of critical success factor when moving towards PSSs

	Case IBM (2012) (Wallin et al 2012, p. 63 - 64)	Wallin et al (2012, p. 81, 94)	Martinez et al (2010, p. 8 - 9)
Understanding of customer needs	X	X	X
Common and deep understanding of services	X	X	X
Service strategy and high level executive support	X	X	
Communicating vision	X		
Product-Service minded culture and capabilities	X	X	X
Service acquisitions and supplier relationships	X	X	X
Capability to redefine the organization and ways of working, allocation of resources to services	X	X	
Ability to create service sales and production processes based on offering		X	X
Ability to calculate offerings, cost and revenues		X	X
Ability to productize services		X	
Ability to create modular offering with possibility for customization		X	

Most of these themes are related to also contract manufacturing PSS systems. Some of those requirements are highlighted in the below based on Martinez et al. (2010). Embedded product-service culture

highlights the importance of the product-service culture that traditional manufacturing companies need to embrace and develop into a passion for service, in order to meet customer expectations. This has proved to be a difficult challenge (Martinez et al. 2010, p. 9).

Introduction of new types of offering can cause issues in terms of their definition (in contracts, in negotiations, in understanding of what is required). Misunderstandings may occur on the part of both the provider and the customer, and this may lead to an imbalance in expectations. There is a tendency in the organization to revert to a focus on product, rather than the whole integrated offering. In the process of transforming towards provision of an integrated offering it has become clear that without specific infrastructure an organization will not be able to deliver what has been promised to the end customer. It is important that organization share a common language and mindset, to allow a service provider to think like a customer (Martinez et al. 2010, p. 10 - 11).

In the end, theme of metrics must be raised, since that is not mentioned in the studies above. According to Whindhal and Lakemond (2006) metrics that were designed for measuring outputs of “product oriented” organizations are not sophisticated enough to measure an integrated offering. Therefore it is required to re-evaluate metrics and performance systems to support performance in services.

3.3.1 The gap between value proposition and expected service

One reason for poorly perceived service is the mismatch between what the organization intends to provide (its strategic intent) and what its customers may require or expect (Goldstein et al. 2002). The mismatch between customers‟ expectations of a service and their perception of its delivery may be a result of a gap between customer

expectations and service delivery (gap 1), or between service delivery and perception of service (gap 2). Possible provider related reasons for the gap 1 include lack of understanding of customer expectations, inappropriate specification, poor service design, and insufficient resources. Provider related reason for gap 2 is basically incorrect delivery in all of its forms. Customer related reasons for gaps 1 and 2 are inappropriate expectations and inappropriate perceptions respectively (Johnston & Clark 2005, p. 109 – 110)

Before, during, and after service delivery, service organizations set customer expectations. These expectations relate to the nature of the service package, as well as to the nature, duration, and customer flexibility during the service encounter. To ensure that the service package and service encounter fit the needs of the customer and the service organization itself, organizations must focus on the design and delivery of their service concept. (Goldstein et al. 2002). Service design and service concept are more discussed in chapter 4.3. New service development process.

4 SERVICE PRODUCTIZATION VIA NEW SERVICE DEVELOPMENT PROCESS

The engineering industry has been undergoing a transition from having been a product provider to its new role as a provider of customer value and product-related value-added services. The challenge is to identify critical customer processes and develop services to support these processes (Salkari et al. 2007, p. 5). In this chapter first concept of service productization is defined in chapter 4.1. Secondly New Service NSD process is discussed in more details in chapter 4.2. Last success factors of servitization are defined in chapter 4.3.

4.1 Service productization

A classical product can be demonstrated, calculated, and validated by its technical functionality (Meier et al. 2011, p. 1). The very nature of intangible services makes it difficult for the customer to comprehend and/or recognize the value, because customers cannot perceive it by sensory means (Radford 2004). The term service-productization usually refers to making the service offering more or less product like, i.e. defining the core process and its outcome so that they become more stable and visible (Valminen & Toivonen 2007). Similar methods and tools need to be developed for solution providing as for products (Meier et al. 2011, p.1). Service-productization puts emphasis on the ‘delivery’ of service, thus tangible media of the service can be a good way for productization. In short, making the intangible service visible and stable in various ways is the key to service-productization (Jung and Nam 2008, p. 6).

It has been observed that at least in financial services one of the barriers to rapid innovations is an unfocused strategy, i.e. the lack of clarity in strategic direction (Drew 1995). In order to make innovation efforts successful, the management of a firm needs to have a clear direction as to where the innovations are aiming to (Johne & Davies 2000). Successful product and service business is based on company vision. Market, product and service strategies and respective road maps should be derived from the vision. Strategies and road maps seem to be more important with services than with products. In a traditional product business, shortages in strategies, road maps and customer input can be compensated in many ways, for example by following market trends and competitors. In a services business, direct customer contacts are most important and cannot be compensated by any other actions. (Salkari et al. 2007, p. 9)

Service Productization starts off with an understanding of customer value creation. The next step is to create an offering, designed to capture value (Salkari et al. 2007, p. 20). To archive cost efficient and automated operations, standardization and systematic structuring of the offer of a fixed Service Product catalogue is required (Salmi et al. 2008, Grave and Fänrich 2008). In this model, as customers consider the value for their business, they are ready to pay for these as well. Business relations are typically long-term and income is accrued over a longer period of time, thus long commitments may also create some risks. (Salkari et al. 2007, p. 20)

4.2 New service development process

New Service Development process is the “overall process of developing new service offerings” (Johnson et al. 2000) and is concerned with the complete set of stages from idea to launch (Cooper et al. 1994). This view is shared by other writers including Edvardsson et al. (2000), who extend the scope of NSD to encompass strategy, culture, and service policy deployment and implementation.

In literature various productization or new service development models are presented. De Jong et al. (2003, p. 12) present model based on Scheuing and Johnsson (1989) earlier model consist of two parts search stage and implementation stage. The model stresses the idea of continuous NDS and that the model is service sector independent. Johnson’s et al. (2000, p. 26) the cyclic model recognizes that the whole process of NSD revolves around the design and configuration of the service concept elements and different people, technology, and systems-based resources enable the process. Froehle and Roth (2007) presented their model dividing resource oriented NSD practices and NSD process. Similarly to De Jong’s et al. (2003) approach, the goal was to develop a generic framework which does not accommodate industry specific practices. Froehle and Roth’s (2007) model is called the Resource-Process Framework of NSD in which the process oriented practices are the same as in Johnson’s et al. (2000) model.

NSD process in figure 12 by Salkari et al. (2007, p. 38) is presented here in more details to support case study. NSD process is divided into five main phases, each of which interacts with customers. Those are Innovation and idea management, Concept planning, Service development, Business concepts and Service implementation and delivery. In the case study focus is in three first phases and example

case related to fourth phase. Therefore theory is discussed accordingly and emphasize is on first three phases and last two phases are described shortly.

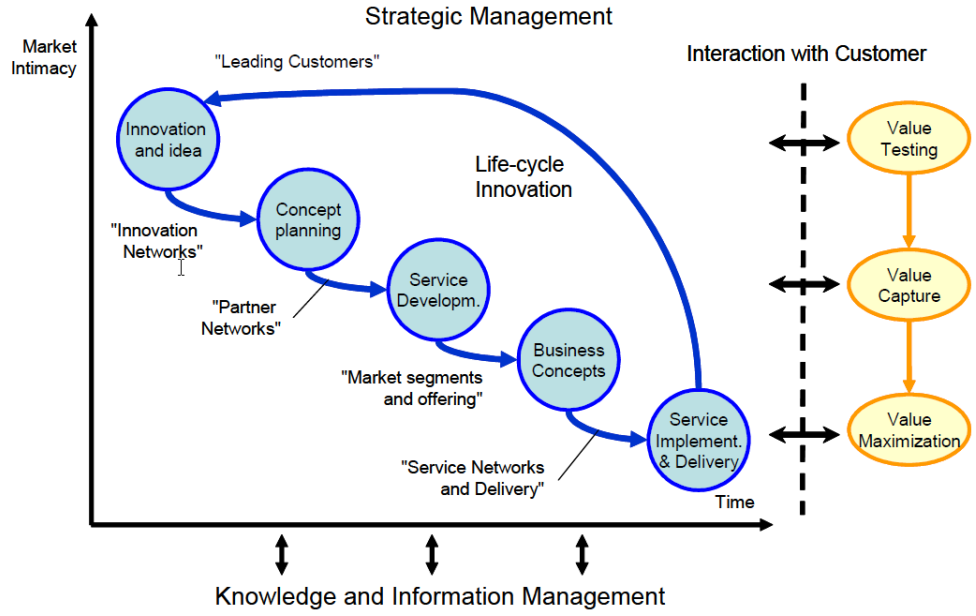

Figure 12. New service development process (NSD)

Kalliokoski et al. (2003, p. 38) NSD is presented using co-ordinate axes. One is market intimacy and another axis presents the time perspective of the new service development process. The NSD process is based on customer-value creation. This means that companies should have a common value model for discussion with the customer about the potential value of the new services for customer business (e.g. process improvements, cost-effectiveness or new product features).

One of the main components of the model is the continuous interaction with the customer about the developed services. The interaction is based on the common value model. The value management process, which is composed on three main phases, can depict the interaction process. The phases are Value Evaluation Testing, Value Capture and Value Maximization. (Kalliokoski et al. 2003, p. 38)

Product development processes are currently widely used in industrial companies. The main development challenges of new service development are related to a lack of the systematic approaches and tools to manage the service development process. The real challenge for industrial companies is to manage the customer service level by offering the optimal customer-specific application. This means the optimal combination of products and services to apply to the selected service level. (Kalliokoski et al. 2003, p. 38 - 39)

In the case study focus is in three first phases of NSD model and example case related to fourth phase. Therefore theory is discussed accordingly and emphasize is on first three phases (Innovation and idea management, Concept planning and Service development) and last two phases (Business concepts and Service implementation and delivery) are described shortly.

4.2.1 Service innovation and idea management

The first phase of the overall NSD process is *Innovation and Idea management.* This phase contains techniques and tools for managing idea generation and screening different sources (for example customers or field technicians). The main objective of this phase is to manage the wide range of ideas and evaluate them based on business and offering strategy. The idea evaluation and screening should be a cross-organizational process. In this phase, the potential value for a new customer should be tested in co-operation with the customer. (Kalliokoski et al. 2003, p. 38)

4.2.2 Concept planning of new services

The second phase of the model contains the overall *Concept Planning of new services*. The service concept has been defined in many different ways. Heskett (1986) defines it as the way in which the "organization would like to have its services perceived by its customers, employees, shareholders and lenders", i.e. the organization's business proposition. According to Kalliokoski et al (2003, p. 38) concept planning means high-level planning of basic features of the services, decisions about the standardization of tailoring issues, and the enabling of technology infrastructures. This phase is targeted to decide the potential and the development activities of screened services.

Understanding customer value and customer benefits is very important in business. Especially, in designing new services and creating a service concept it is outmost importance. After understanding the customer value, the service concept can be developed. (Edvardsson 1996, Cowell 1984) Service concept has certain elements in common with service blueprint and business model (Ackerman 2011). Business Model was described in chapter 3.2 and blueprint is shortly commented in chapter 4.2.4.

There are various service models for creating a concept. Some those are discussed shortly and Johnson and Clark (2005) model is presented in more details. Earlier service concept models by Edvardsson and Olson focus has been on the gap between expected service and customer experience. The customer outcome highlights the fact that the customer is ultimately the recipient and judge of the service in terms of value added and quality. Hence, it is not enough if only the service providers feel they did a great job. The customer process points out that the customer participates and has an effect on the results and quality of the service (Ackerman 2011 p. 26).

Models from beginning of this century by Clark et al. (2000), and Johnston and Clark (2001) have focused on process way of thinking having service operations, experience, outcome and value of the service phases. Later on (Goldstein et al. 2002 and Johnsson and Clark, 2005) focus has turned more into strategic intent and value added to the customer. According to Goldstein et al. (2002) there have been two major deficiencies in the service design literature. One is in linking business strategy and service design, i.e. service design planning. The second is the lack of consideration for measuring the financial performance of a service design (Goldstein et al. 2002). Based on that thinking Goldstein has developed concept model of his own, that was further developed by Johnson and Clark (2005), see figure 13. Original Goldsten et al. (2002) model and Johnson and Clark's (2005) models are quite close to Business Models presented in chapter 3.

According to Goldstein et al. (2002) designers and managers must first establish a shared vision and definition of the service concept before design processes can begin. Service design planning is the first step in the process of service concept execution. Recall that the service concept includes the service strategy of what to deliver (market position and type of customer relationship) and how that strategy should be implemented. The how is carried out by the design of the service delivery system (Goldstein et al. 2002, p.124). The smaller arrows represent the integrating nature of the service concept and the biggest arrow represents the ultimate goal of providing services in a company: meeting customer expectations. (Johnston & Clark 2005,)

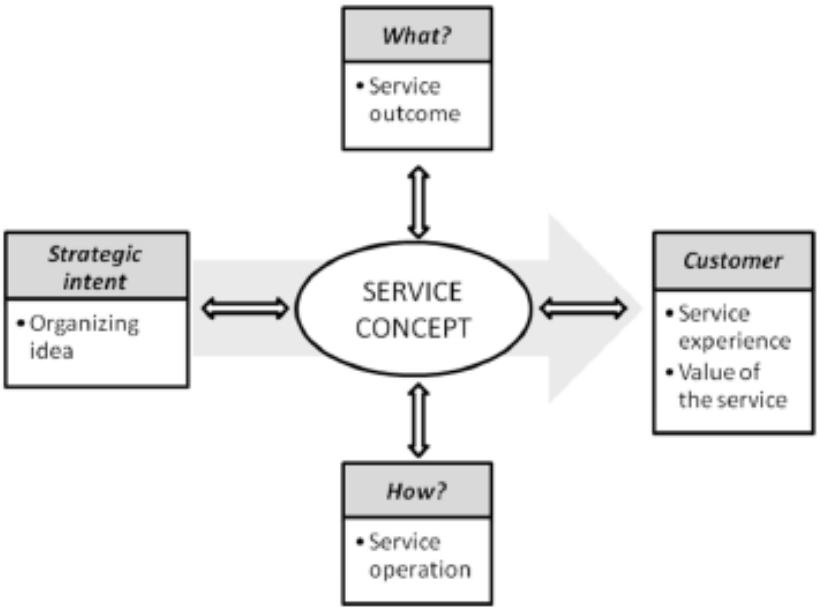

Figure 13. The elements and context of the service concept

Last benefits of concept planning are discussed in customer and communications point of view as well in decision making. It does not matter whether the service organization has explicitly defined their service concept; the customers will have an image of the service concept anyway. However, this image might not be the one wanted by the service organization. By having a clear understanding of the service concept inside the organization the image of perceived customers can be better affected. By developing the service concept it can ensured that the service package fits the needs of the customer and the service organization itself (Goldstein et al. 2002, p. 122)

Goldstein et al. (2002) proposes that the service concept can be the key driver of service design decisions at all levels of planning; in strategic planning, operations level planning and in service encounter interactions. By defining the service concept companies can align their marketing and operations to work seamlessly (Johnston & Clark 2005) The service concept and its associated goals for both customers and the service delivery organization can be employed to help determine

the most appropriate performance measures for a particular service. (Goldstein et al. 2002). Therefore performance measuring should be also based on service concept.

Many researchers have underlined the communication aspect of the service concept. In internal communication, if the service concept is not clear or it has not been articulated at all, the result will be an increased heterogeneity in services provided (Brax 2007, p. 33). The service concept can be used as a communication construct internally among managers and employees of different functions and also externally as a communication tool to attract customers (Clark et al. 2000). Goldstein et al. (2002, p. 123), too, noted that the service concept is in the interface between service operations and service marketing. One can view the service concept to be the mutual language of different functions in an organization.

4.2.3 Preliminary service development and engineering

In Kalliokoski et al. (2003, p. 39) model the third phase, preliminary *Service Development and engineering* is carried out. The main issues in this phase are related to the detailed planning and conceptualization of developed services. This phase contains the specification of detailed services and also issues relating to the customer offering. The modular development approach should ensure the management of different market segments and customers. Special attention is now focused on modularity which refers into structure, resources and processes which lead into outcome. Needs of customers may be taken into account as small variations in the core service, or through modularization. Different combinations of modules can satisfy the customization systemically (Valminen 2007). Since the provision of the services should be standardized, all customer-specific changes in

functionality and sizing had to be defined in advance (Brocke et al. 2010, p. 2).

Close co-operation with customers are the key factors in ensuring the personalization of developed services. Service development can be seen as the main development phase of new services, customer added values and revenue logic. This service development phase is that of customer-value capture for the basis of preliminary business concept planning. (Kalliokoski et al. 2003, p. 38)

Typical properties of products are weight, safety and reliability, aesthetic properties, but also things like manufacturability, assemblibility, testability, environmental friendliness and – last but not least – cost. While the characteristics can be directly determined by the designer, the properties are a result of the chosen characteristics and can't be directly influenced. (Weber 2004, p. 2) Similarly in service design desired outcomes should be pointed out and design of the service to be built accordingly. In addition it is important to make sure that product and service are matching to each other's. E.g. very complicated one timer product with very short lead time seems to be mismatch.

4.2.4 Detailed business concepts and operative process planning

The fourth phase of the new service development process is the d*etailed Business Model and operative process planning*. In this phase, service market introduction and commercialization is planned based on the created business concept and models. The business model contains the service offering model for market and customer segments, pricing, personalization and tailoring of the services. Based on the business concepts, detailed service processes are planned to

support the successful implementation both locally and globally. (Kalliokoski et al. 2003, p. 38) NSD requires considerations on service heterogeneity as well. The developers need to decide on how much variation they allow into the service process (Johne & Storey 1998, p. 188). An effective service business model and effective operative processes ensure the maximization of customer value. (Kalliokoski et al. 2003, p. 38)

Specific representation techniques have been developed for product design, which highlight specific aspects of the product. Product designers are able to produce a blueprint of a product that will be unequivocally interpreted by those who will manufacture and/or buy the product, or will provide some of its components. The blueprint of a PSS should contain indications about potential functions, interaction between actors, and functionalities and flows of events. (Morelli 2002, p. 13) In contract manufacturing blue print should cover all customer related processes meaning starting from the sales contact into offering and contract, continuing to New Product process and Order to Cash (OTC) processes.

4.2.5 Service implementation and delivery

Finally fifth phase, the *Service Implementation and Delivery* phase takes place in this new service development process. In this phase the developed services are implemented locally and globally. The idea of this phase is to assure the cost-effective implementation of the developed service. The important issues to manage are related to service network creation, management and updating as well as the organizational design of service business processes. In many cases there are technological solutions designed to support service processes. The profitable implementation of technology (e.g. operative systems, remote diagnostics or mobile solutions) requires

standardized business processes and interfaces between the systems. (Kalliokoski et al. 2003, p. 38)

4.3 Success factors of Service Productization

Salkari et al. (2007, p. 9) and Gebauer et al. (2006) have listed critical competencies and success factors for achieving high service revenues. Those are also valid for service productization.

The most critical competences defined the BestServ Forum in 2005 are knowledge of customer processes, acquisition of new competences needed, ability to sell and produce services as well as integrate own processes into customer processes, network build-up for PSS packages and finally competence management by way of development and knowledge transfer from the customer. Key account managers play an essential role in maintaining customer relations, continuously updating customer needs and ensuring correct customer business information and understanding. (Salkari et al. 2007, p. 9)

The success factors that Gebauer et al. (2006, p. 379) see for achieving high service revenues are market-oriented service development and clearly defined service development process, service offering focusing on the value proposition to the customer, relationship marketing, service strategy, separate service organization and service culture.

As last personnel related points are highlighted. Three important aspects in personnel are planning service staff for future, personnel competences for service interaction with customer and finally the support to personnel to ensure performance (Fähnrich et al. 1999).

5 CASE STUDY

Case study has been formulated with six chapters. First background of the study is defined in chapter 5.1 and preliminary plan and execution is presented in chapter 5.2. After that case study follows Kalliokoski et al. (2003) New Service Development (NSD) model with chapters of 5.3. Service innovation and idea phase, 5.4 Concept planning of service, 5.5 Preliminary service development and engineering and 5.6 Detailed business concepts and operative process planning phase. Service implementation and delivery is not covered at all. It is worth to mention that any of those phases are not fully covered. Coverage has been done only in selected areas that are suitable for the case study.

In Innovation and idea phase ideas were collected from external sources as well as internal interviews. In concept planning of service phase, service offering model was created with current and potential services. Customer requirement evaluation tool was defined in Preliminary service development and engineering. Last some practical example calculations were done in financial point of view in the chapter of detailed business concepts and operative process planning.

Target of the case study was to increase awareness related to services, point out new ways of service thinking, define what kind of services were available and what kind of services there could be in future. Target was also to increase understanding what gap of expected and given service may cause and how the gap can be avoided. Last target is to point out how service level is effecting to costs and how it should effect on pricing. In this thesis focus in on assembly business, although case could be easily expanded into other areas of the company.

5.1 Background of the study

The idea of master thesis was created by master thesis worker, who had been working in Ruukki Engineering for years, later in Fortaco Group. Idea came up during the studies related to management accounting and service process development. Also it is related to the economic situation and challenges with profitability.

In the company there is quite traditional way of thinking about revenues and costs, even though in offer calculation pricing and costing is separated from each other's. Costing focuses mainly in direct costs related to product itself. Service level or services delivered with the product are not really taken into consideration either in costing or pricing.

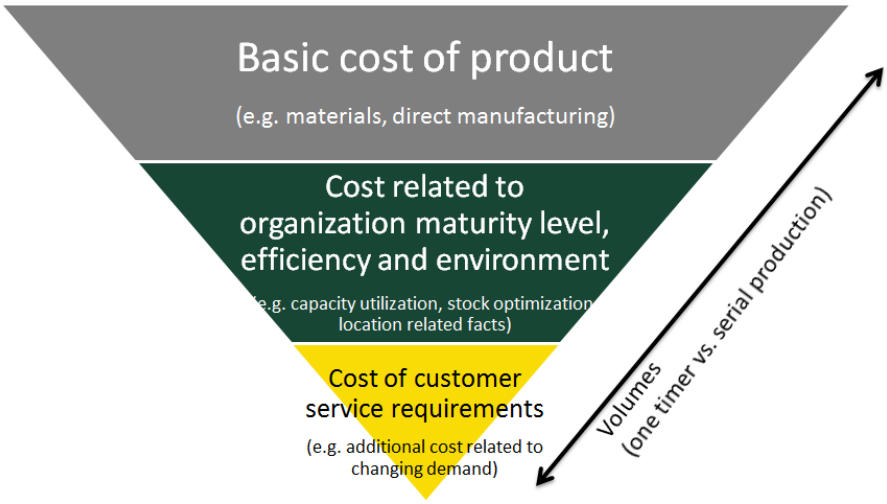

Figure 14. Different layers in costing

Figure 14 illustrates new approach to costs and customer value in contract manufacturing point of view. Basic cost of production in first layer is related to minimum material and production cost. In all manufacturing companies some cost is caused by materials and manufacturing. That approach is quite theoretical, since exact basic

cost can't be identified without knowing all basic costs of all companies in the industry.

In the second layer cost is related to organization maturity level, efficiency and environment e.g. factory location. Examples related to factory location are cheaper labor, raw materials and logistics cost, in the case when factory is located close to either customers or raw material sources. It is obvious that manufacturing cost is lower per unit in case organization is very efficient or if wage level is lower. Also if company has very skillful sourcing organization with big volumes they are able to buy with smaller unit prices that some others. Basically costs in the second layer are always results of company performance and decision making.

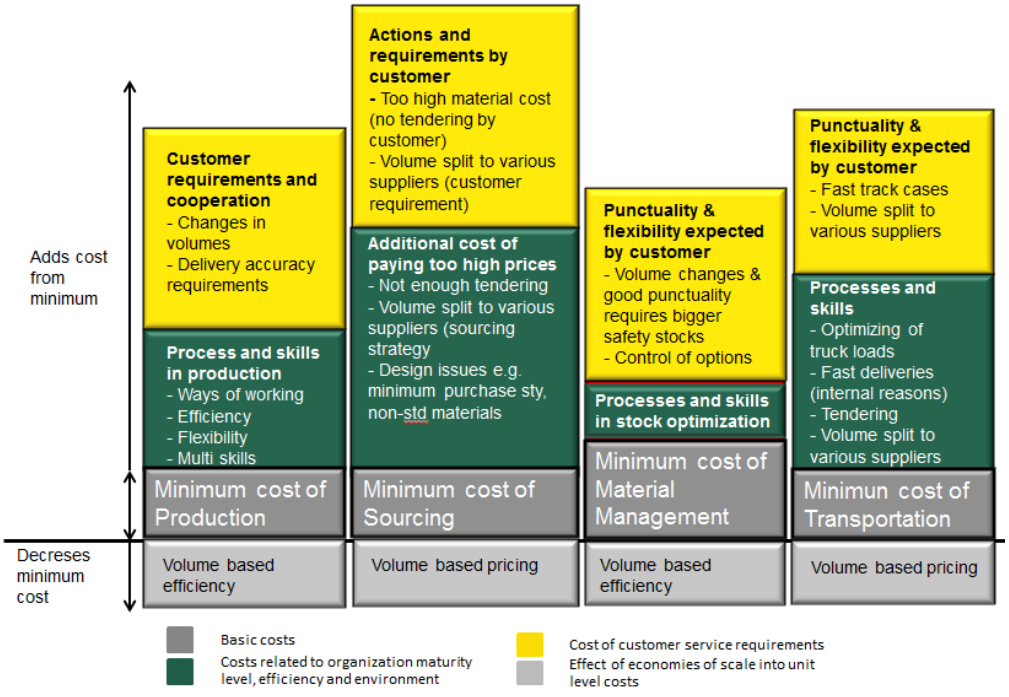

Figure 15. SCM related costs in different cost layers

Third layer is related to customer service requirements related costs. If customer is requesting very flexible production volumes, it can cause much higher costs in production and material management compared to another customer with stabile flow of demand. Currently in the case

company this third layer has not really been taken into consideration when calculating costs, setting up prices or service level to the customer. In practice it means that some customer with high service requirements is paying the same price compared to another customer with modest service level requirements. In addition to that purchasing volumes haven't been really taken into account when setting up prices. In this thesis focus is on the third layer, cost of customer requirements.

To make it more clear, figure 15 is illustrating some Supply Chain Management (SCM) related examples in the third layer: production, sourcing, material mangement and transportation. Minimun cost of those is related to first layer, basic cost of production. Other two layers are defined accordinly. Other two layers are always adding cost to the minimum layer and it is up to company and it's customers how much. In this figure there is one layer more compared to figure 14. This new layer is below minimum cost and means that when there are bigger volumes, it is also possible to dercease costs in unit level. It is call economics of scale.

5.1.1 Preanalysis phase

Since autor had been working in the case company for long time preanalysis was done by observations done during years. First it was analyzed how offer process (in Fortaco time Customer Case Management (CCM) process), New Product process (in Fortaco times New Product Implementation (NPI) process) and Order to Cash (OTC) process (in Fortaco time Oder to Delivery (OTD) process) effected on profitability and customer satisfaction. Analysis was done at this stage only for cabin business since other assembly played very moderate role. Observations in preanalysis phase are based on experience in one site, even though later on two sites were involved.

Figure 16 illustrates the situation in the beginning of the study. Two major issues were pointed out. First of all customer service expectations, available services and service level agreements were not clear and therefore not taken systematically into consideration in pricing and in service process itself. This caused gap of given and expected service already in offer phase, even though results are realized later on. Secondly production volumes have not been taken into consideration in pricing, at least not systematically.

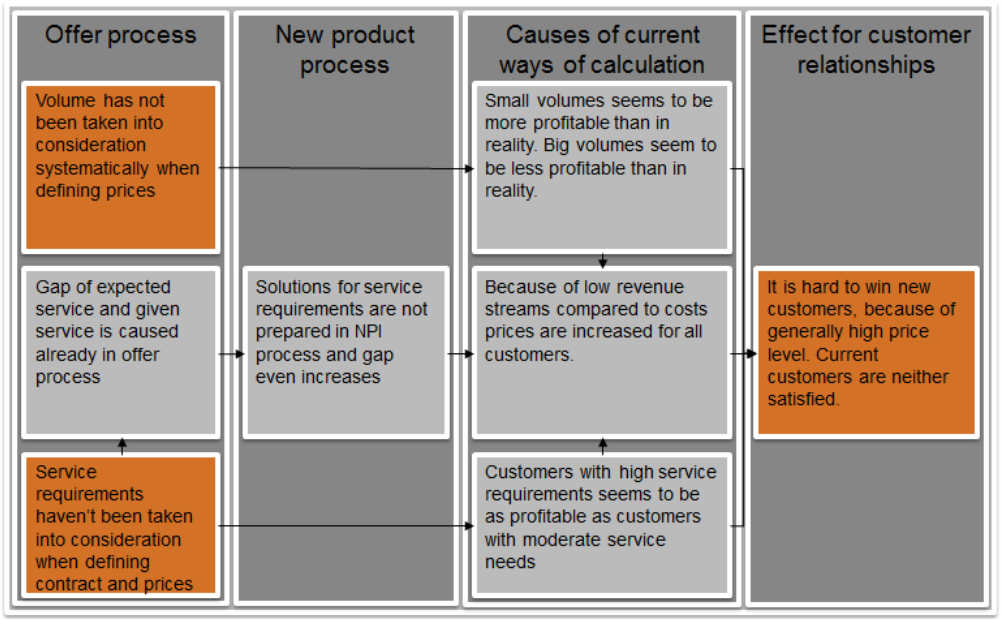

Figure 16. Service and customer view in the beginning of the study

Service requirement related preparations during NPI process and ramp up are not done is wide extent, since service requirements are not identified in the first place. For example safety stocks are not in correct level since demand deviation requirements are not known. In some cases safety stocks are totally too high causing extra costs and even obsolete materials. In some other cases safety stocks are too low causing delays in deliveries.

All indirect costs are allocated based on blue collar headcounts and space required in production. As a result in calculation point of view cabins with small volumes seems to be profitable and high volume cabins not so profitable. In reality low volume cabins create much more indirect cost than big volume cabins. Customers with high service requirements seem to be as profitable as customers with low service requirements. As a result customers with high service expectations are paying too low price compared to service level and customers with low service expectations get disappointed because of high prices. It is difficult to win new customers, since hourly prices are generally just too high because of few demanding customers

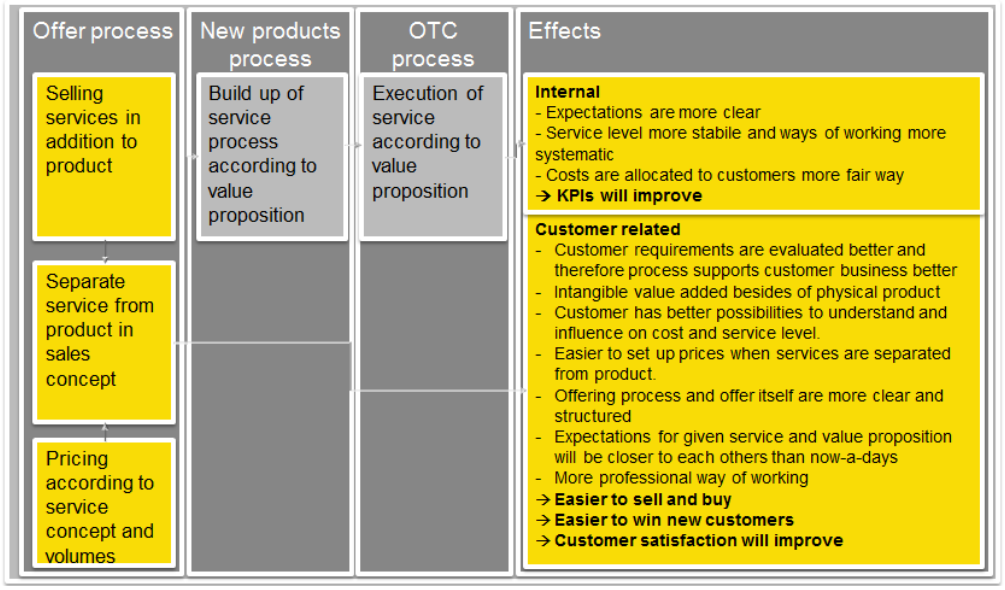

Figure 17. Predefined proposal for the service and customer view issue

Predefined proposal for solving issue is presented in figure 17. First it should be clarified what kind of services can be sold in addition to products and what are actual costs of those. Service process should be built based on value propositions. Execution of service is done according to value proposition during OTC process.

Assumed advantages and effects are listed in the figure 17. Once it is clear what kind of service level customer is expecting it is also possible to set up price tag for it and build a process accordingly. Once expectations of customer services are cleared out with each customer, expecations internally are also more clear, if communicated clearly enough to all related personnel. Service to customer is more systematic and also ways of working are more systematic in offer process but also in new products process and OTC processes. Then costs are also allocated to customers in more fair way. In the end of the day profitability and customer satisfaction are increasing once done what has been promised.

In customer point of view service should improve since customer requirements are evaluated better and therefore process supports customers business in better way. Gap of expected service and given service should decrease. Customer has better possibilitied to understand and influence on cost and service level. It is e.g. possible to make proposal for customer to have short lead time with bit higher price or long lead time with basic price. Then customer could choose weather they are willing to pay for short delivery time, which gives them for example more flexibility in their own process. Once customer have made a decision of that on their own, they are more committed to it is easier for them to understand, why to pay extra for e.g. fast track deliveries when they understand the cost of it.

In generally it is more professional way to work once company is able to provide different alternatives to customer. The feedback from customer is that they are expecting different kind of proposals from supplier e.g related to costs and quality. Once services are productized it is easier for sales to sell and for customer to buy. More professional way gives possibilities to win new customers. As a result customer satisfaction is improving.

5.1.2 Customer satisfaction

There have been few customer interviews recently, one in Ruukki times and another in Fortaco time done by external consulting company. Since in this case study it was out scoped to make interviews for customer, some case study related comments by customers are presented. Because of privacy reasons, origins of customer survey are not listed in case study.

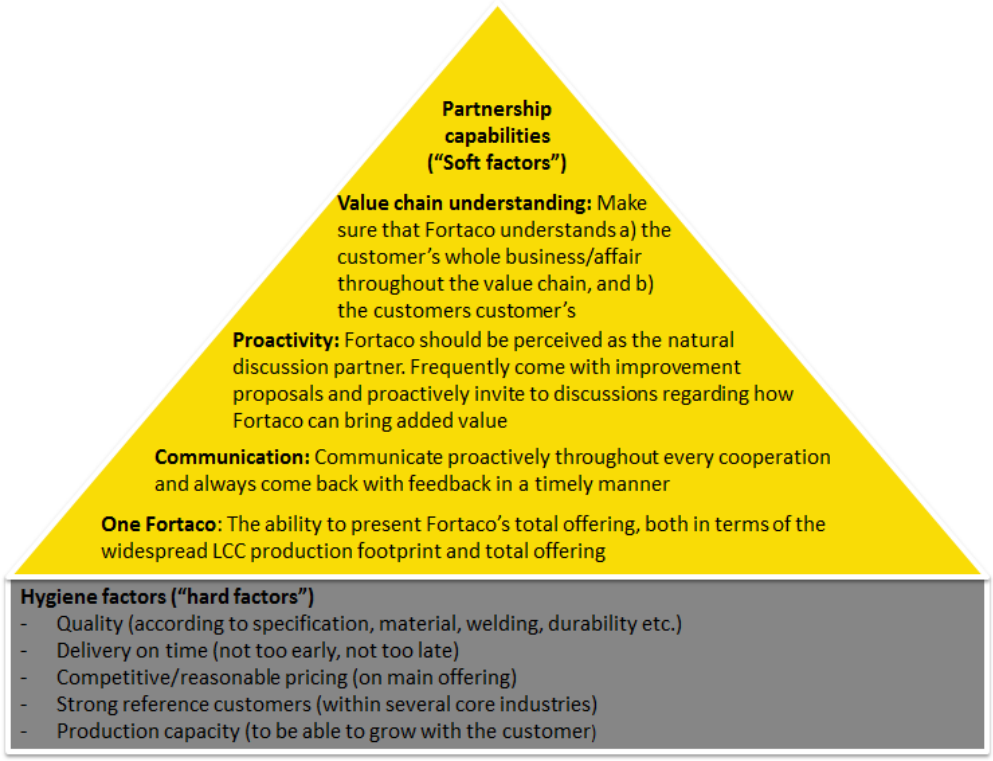

Figure 18. Result of customer interviews done by Vaderstra (2013)

According to recent interviews, Fortaco's hard factors i.e. product related factors are in acceptable level in many cases. To be able to become preferred partner the company must focus on value chain understanding, proactivity, communication and one way of working in the company. Most of these soft factors are related to service customer is facing. By clarifying customer service requirements also

value chain understanding increases. Once understanding of customer service requirements and value chain increases it is also easier to be proactive. Once there is structured way of working in sales process as well as formulated way to find out customer service requirements, also communication improves internally and externally. Clarification of offering in product and service point of view is clear approach of being one Fortaco. Based on these interviews, clarifying offering, structuring ways of working so that service requirements are captured will effect on customer satisfaction. Assumption is that customer satisfaction and structured ways of working, will effect on revenue streams as well. Results of the interviews are summarized in figure 18.

5.2 Preliminary plan and execution

Like always in reality preliminary plan and actual execution of the project are different from each other's. Preliminary plan is presented in chapter 5.2.1 and execution of the project in chapter 5.2.2. Differences of the project scope and in time line are presented.

5.2.1 Preliminary plan of the case study

Masters thesis topic was approved by case company in May 2012 and preanalysis presented in chapter 5.1.1 was structured before approval. Actual work started in October 2012 with preliminary plan. Preliminary plan is illustrated in figure 19.

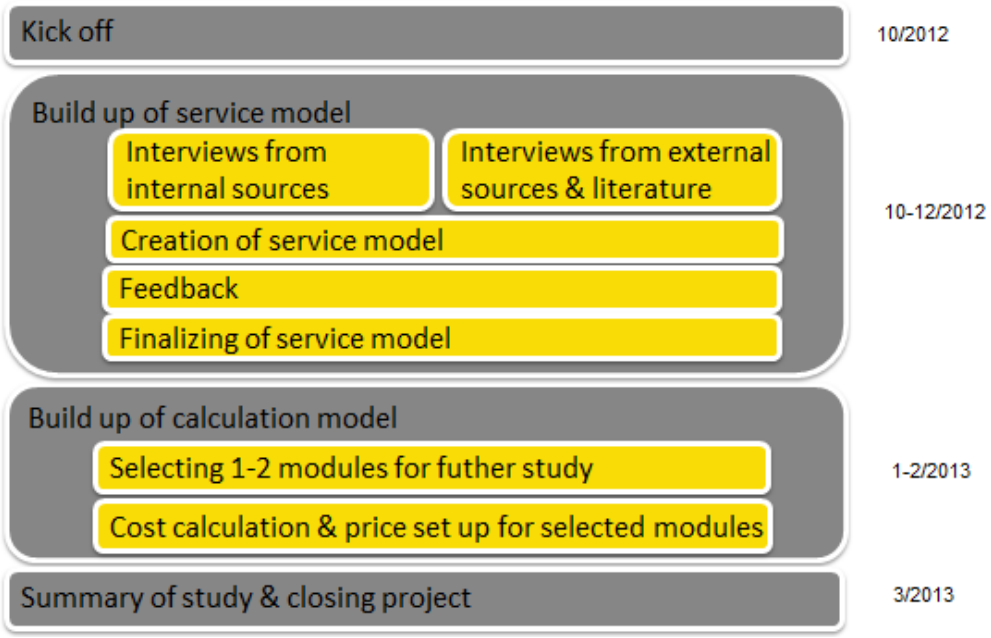

Figure 19. Preliminary plan of the case study

The plan was to star project with kick off meeting for relevant participans, especially personnel working in sales. Second phase was to build up service model (later offering). Service model bulding consits five steps. First two steps were to make internal and external interviews as well as make get familiar with service models in litterature. Third step was to create a draft of service model, fourth to collect feedback and last step was to finalize the model. In the third phase the plan was to select from one to two modules as an example and make cost calculation and price set up for those. Last step was to make a sumary and close down the project. Original planned time line is also presented in figure 19.

5.2.2 Execution of the case study

Thesis work started according to the plan in October 2012. Example service models from litterature were found, internal interviews were held and first service model draft was created. Since then both content

of the study and planned schedule changed. Content of the study changed only in pratical actions point of view, even though service idea remained the same. Planned timeline basically doubled. Excecution of the case study with the time line is presented in figure 20.

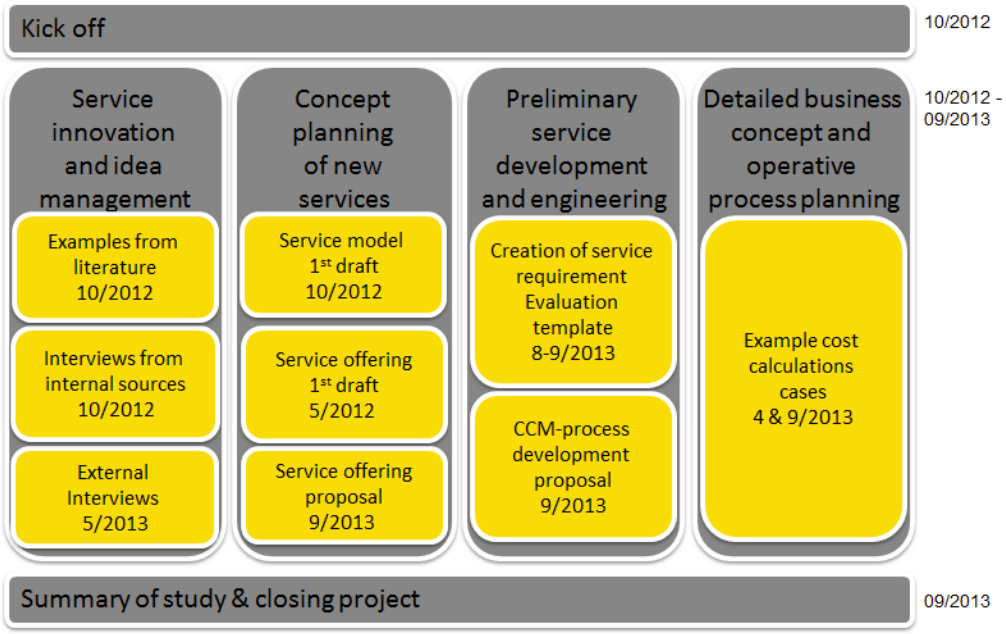

Figure 20. Execution of the case study

After interviews it was clear for author that most persons in the organization were not ready yet for that kind of service minded thinking and especially modularised service model with module based service pricing. After the interviews in November 2013 integration of Ruukki Enginering and Komas was announced, and autor had to postpone the plans related to the study because of the integration. Also it was decided that interviews from external sources are not carried on.

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After the integration autor decided to continue the work, but in slightly different point of view. Even though modular service costing and pricing seemed to be too advanced thinking at the moment it would be possible to define costs caused by certain service by case examples.

That way it was possible to include service costs into pricing in the future. Therefore financial focus was in selected example calculations. Deliveries in different kind of demand deviation was chosen to be example service. Calculation results are presented in chapter 5.6.

Some kind of awarness related to service view was increasing. Now some saw contract manufacturing as pure service while others still as deliveries of products. Also at that time some service evaluation elements were added into the CCM process template by author. Later on actual service evaluation tool was created and proposed as part of the masters thesis.

Around the same time author created product offering for this newmerged company, although it was not included into the thesis scope. Once product segmentation was done it also clarified views in service point of view. Similar approach could be used for defining service offering. First draft of service offering was created in the spring 2013 and final proposal in September 2013.

5.3 Service innovation and idea management

Innovation and idea phase is split into two areas. In chapter 5.3.1 ideas of service offering were collected from literature. In chapter 5.3.2 execution of interviews is presented.

5.3.1 Product-Service system examples in literature

In this chapter an examples of product related services are presented. Usually services are traditional and they are closely related to the products delivered. The industrial companies often aspire to knowledge-intensive services, which usually require deep

understanding of customer processes. These knowledge-intensive services, however, are only partly implemented. The figure 21 shows different areas of scope on which an industrial company could focus, and which could be the main service business areas. (Kalliokoski et al. 2003, p 17)

Figure 21. Scope of the Industrial Services (adapted from Tamglass and Wärtsilä) (Kalliokoski et al. 2003, p.17)

This Kalliokoski et al. (2003) example presents most typical examples of in steel technology industry. Kowalkowski et al (2009, p. 16) have created very similar list as Kalliokoski et al (2003). Only inspections are mentioned in addition. Konecranes offers in their web-pages life time analysis services and remote controlling services in addition. In Schaffler Web-pages various detailed services are presented like vibration measurement, balancing, thermography and alignment services. Those can be considered as operations and quality control services. Rekola & Rekola 2003 and Katainen 2007 mention services like ramp down and certifications services.

Konepaja Häkkinen presents typical example in steel technology subcontracting industry. They provide project management, different kinds of operation services like welding and machining, as well as

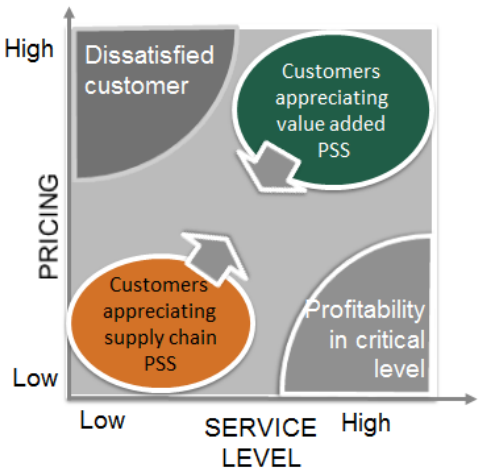
spare parts and maintenance. MTI welding and SteriPack Group have been able to present their services in web-pages in more systematic way and in wider scope although neither there real packaging is done. Like these three examples, many companies have been able to list and group services in some extent.

To be able to serve customers in more systematized and cost efficient way bundling of services is required in addition to grouping. According to Kowalkowski et al bundles can be simple combinations of individual services or can include facilitating goods. A bundled service implies an increased service scope compared to an unbundled one. Bundled services are generally associated with some form of legal arrangements like service level agreements (SLAs) or general framework agreements (Kowalkowski et al 2009, p. 42-63).

Exceptions can be found in big global companies like Kone. Their web-pages present that four types of services are available: design, construction, maintenance and modernization services. Example of bundling can be found once evaluating maintenance services. Three types of bundled service maintenance and controlling services are available; KONE Care Premium, KONE Care Plus and KONE Care Standard. Author believes that listing and grouping of services is the first step towards service business. Once service minded thinking have become part of the company culture, it is easier to go forward with more systematized and cost efficient way via bundled or modularized offering like Kone has been done. Because of different nature of contract manufacturing, it also means that there must be various service areas with different levels of service to choose from. As simple model as Kone has wouldn't work in various different customer needs.

5.3.2 Preparations for interviews

In the kick off meeting it was important to increase understanding of service business in the context of contract manufacturing of combining pricing and service level, flexibility and cost efficiency. Fisher (1997, p. 109) model was modified to fit into company business environment. This model is presented in figure 22 and 23. It is important for sales to understand business facts meaning which are possible and inpossible combinations in business. Simple and clear example can be found in shoe business. Shoe maker can make tailored shoes i.e. service level is high. At the same times tailoring makes price of shoes high as well. Shoe factory can make shoes much more cheaper, but variations are quite limited. Like vice it is usually impossible to be very flexible and cost efficient a the same time. By having very low flexibility and low cost efficiency, company will usually run out of business.



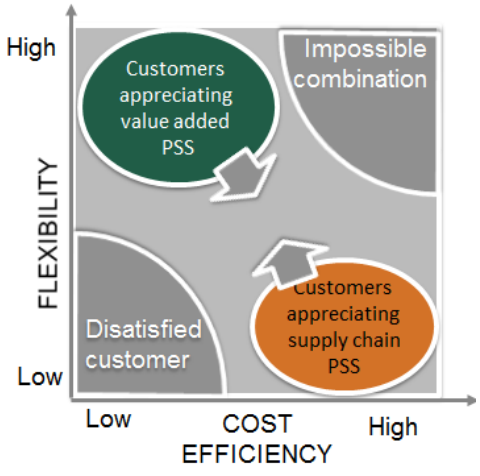


Figure 22 Combinations of cost effixiency and flexibility

Figure 23 Combinations of price and service level

In figure 9 value added PSS and supply chain PSS were presented. Now those same roles of contract manufacturing are linked to customer needs in previous figures 22 and 23. Two theoretical customer segments can be seen, defined with green and brown

circles. One segment is consisting customers that are appreciating Value Added PSS. They are appreciating for example fast delivery time, flexible capacity, suppliers own R&D and special services just designed for them. They are also willing to pay for such services. Another segment is Supply Chain PSS customers that are appreciating very efficient ways of working. The price is the main driver by all means. In reality most customers are somewhere in between those two ultimate customer segments, still those customer segments can be call Value Added PSS customers and Supply Chain PSS customers. They are appreciating services, flexibility and cost efficiency in some extent. Value Added PSS customers put more emphasis on services while Supply Chain PSS customers highlight the price. Arrows in the figures 22 and 23 present this reality.

Dynamic pricing based on basic level service and volumes			
Materials (purchase price based on different volumes)	**Manufacturing** (manufacturing cost based on different volumes)	**Purchasing and transportation** (based on item qty)	**Warehousing** (based on stock value and item qty)
Capital cost	**Overheads of governance**	**Start up costs** (jigs, training, documentation ect.)	**Ramp down costs** (write down inventory, production lines closing)

Value proposition based pricing							
Service modules	**Module 1**	**Module 2**	**Module 3**	**Module 4**	**Module 5**	**Module 6**	**Customer tailored services**
Area of value proposition	Delivery time	Flexibility and delivery accuracy	Quality control procedures (APQP, PPAP, QAQC)	Usage of customer contracts in purchasing	Options	Spare part services	- Design - DA - Reporting - Training - Other customer related needs
Costs related to value proposition	Capital costs of raw material and wip	Cost of flexible capacity	Cost of quality resources (documentation ect.)	Additional handling & logistics cost	Capital costs and logistics & handling cost	Capital costs and cost of servcice personal	Cost of designers, cost of IT projects etc.

Figure 24. Preliminary model of modular services

To make idea of service model more clear, some kind of preliminary model was built before kick off, to give some views to sales what it would mean in practise. In the model product related direct cost, fixed of one timer costs were tied up to upper part. Modular services that customerrs couldf choose from were defined in lower part. This preliminary model is presented in figure 24.

5.3.2 Interviews

In the interviews the purpose was to find out what kind of cabin related services Ruukki Engineering is offering in the time of the interview and what kind of services there could be in the future. Since mental change towards service business is important also possible show stoppers were asked internally and externally. Practical actions of interviews are defined in chapter 1.3 and next chapter of 5.4.1 summarizes the outcome of interviews.

Interview had three parts. In first part focus was on what kind of services are available today either invoiced or free of charge. Free of charge means in practise that it is included into product price.

Part 1 questions

- Name services we are offering for customer today (invoiced or free of charge)?
- Name services we could offer, that we are not offering today? What services our competitors are offering?

Target for part two was to find out what kind of elements are seen as basic or must have service and excitement elements that customer is willing to pay for. Kano model (Sauerwein et al. 1996, p. 314) in picture 25 was used as tool to help an interviewer. Model was modified so that some examples of basic elements and excitement elements were added.

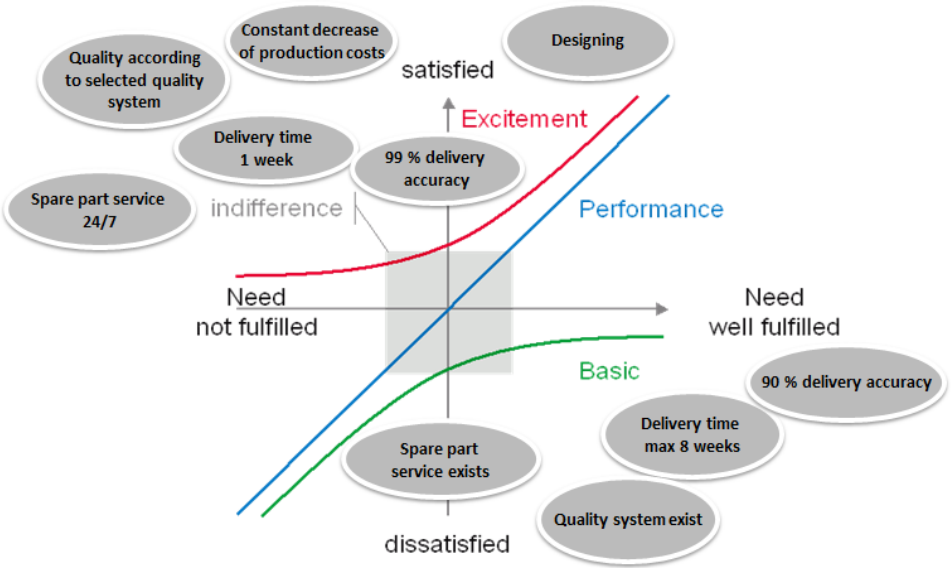


Figure 25. Modified Kano satisfaction factor model

During interviews it was found out that Kano model is too simple to use as such since different customer segments are seeing basic elements in different way than others. For example in quality some customers are seeing ISO standards as basic elements and e.g. in mobile industry APQP standard is seen as must. Also they are not willing to pay for any extra in case of APQP.

Part 2 questions

- What elements can be seen as basic (must be) elements? (See modified Kano model in figure 25)
- What elements can be seen as excitement elements?
- Are our competitors having mentioned excitement elements? What elements could differ from competitors?

Target for part three was to find out attitude and possible resistance towards this new approach. Example of modularized service offering was presented. They were asked of positive and negative comments

about model presented in figure 25. Also it was asked what could be show stoppers and risks of the model internally and externally.

Part 3 questions

- Name three positive points of this preliminary service model?
- Name three negative points of this service model? Name shows stoppers internally, and define how risks are mitigated. Name show stoppers externally and define how risks are mitigated
- What is basic servce level that should be given to customer and what are such exitement elements that customer is willing to pay more.

5.4 Concept planning of services

Target of concept planning was to define Fortaco current and potential service offering for assembly customers based on the interviews. In interviews it was find out that some kind of Ruukki Engineering (later on Fortaco) way of working needs to be built, although it was not the time to go forward into modular of bubdledservice packaging with pricing as planned in first place. Service understanding in the organisation was not in such a level that it would be possible. Once that was find out new approach was taken. Instead it would be better to identify all services, list and group those as service offering. Once service understanding and better awareness of customer requirements are reached, later on it is possible to continue to build up modularised service offering with fixed ways of calculating prices.

Product offering defines what is delivered and Service offering defines how it is delivered. Product delivery content is generally clear for customer, since they have either designed the product themselves or they product design rights, also they have defined the right quality level themselves. Therefore customer expectation is that product is

acceptable once it is delivered. Biggest gap in customer expectation is the gap is caused in service offering and expected service level. Since service offering is not formulized or even not written as service level agreement, given service and expected service may vary a lot. Once there is more clear service offering, gap of given and expected service should decrease. Once gap is smaller customer satisfaction is bigger.

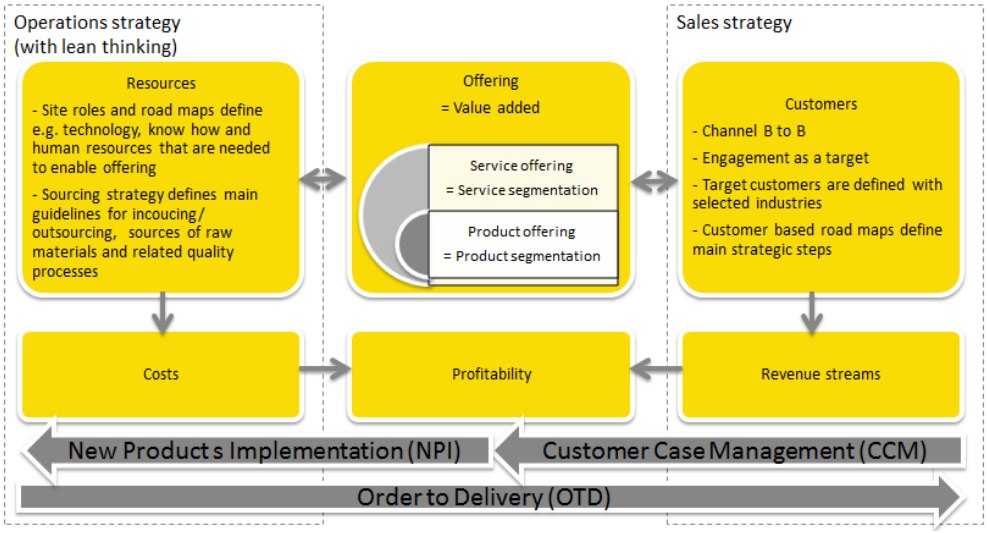


Figure 26. Company business model with product-service offering

In some literature concept planning is seen to be the same thing as business model creation. In this case study company business model in figure 26 is defined in offering point of view based on Osterwalder's and Pigneur's model presented in chapter 3.2. Since product offering has been defined in the company already, in this study focus is on defining service offering. Some examples of financial consequences are also given in chapter 5.6. Sales strategy nor operations strategy are not covered.

5.4.1 Results of interviews

Part one in the interviews focused on current and future services as well as collecting ideas from competitors. Created offering summarizes of current and potential services presented and discussed in the next chapter. Part two focused on finding out what services are seen as basic (must be) elements and what services are exitement elements ie. customers would be willing pay for those. Also it was found out which service elements competitors had. Conclusion was that in all cases there is no basic services. Instead it is possible to define default or standard service level for each service. Then customer may choose higher or lower level compared to standard according to their own needs. Details of the interview can be found in appendix 2 - 6. Part three focused on internal and external attitudes related to service modelling. In below positive comment are summarized.

Benefits for the customer

- Deepens cooperation with customer
- Better understanding of customer needs and requirements
- Increases reactiveness via new proposals for customer
- More clear price setting
- Easier to sell and make proposals for customer
- Easier to make harmonization of customers internal needs

Benefits for service provider i.e. case company

- Better profitability, in case able to create tempting model
- Improves internal communication
- Improves customer commitment
- Increases internal cost awareness
- Makes offer process faster

- Standardizes of ways of working (more professional way, less mistakes, better efficiency and transparency, capturing of silence knowledge)

Other benefits

- Starts discussion and opens door for improvements

When the results are compared with customer evaluations of partner capabilities presented in figure 18, many links can be found. Value chain activity increases once customer service needs are evaluated. Proactivity increases once customer needs are known better and once standard ways of working are defined. Standard ways of working increases communication internally and externally. Clarified service and product offering, presents one Fortaco, and Fortaco way of working. Also in the interviews it was mentioned by few participants that some kind of common and structured way of working is needed. It means clarification of basic service elements with some minimun service level, even though higher level can be selected by customer. In addition to that there must be alternative services as well as tailored services.

Another important finding was that all features defined for value proposition based pricing part was not seen such features that all customers would be willing to pay some extra. Some customers expected e.g. APQP quality system as basic for automotive industry. Therefore it is important for sales to recognize and find out when it is possible to take services into price discussion and when it is better to just add costs into the product price.

Life cycle related service management was something that needs to be taken into consideration. Value proposition can and should change over the product life cycle e.g. related to production volumes like

presented in figure 27. Delivery time of a product in new product development process is longer compared to order to cash process. Well before ramp down discussions must be started to agree how ramp down is handled, if not agreed yet in contract phase. In after sales phase spare part cabin delivery time and price is usually confirmed case by case instead of fixed delivery time and list price, since parts are not stored anymore. On the other hand there is a possibility to offer spare part cabins in short lead time if customer wants to and is willing to pay for it.

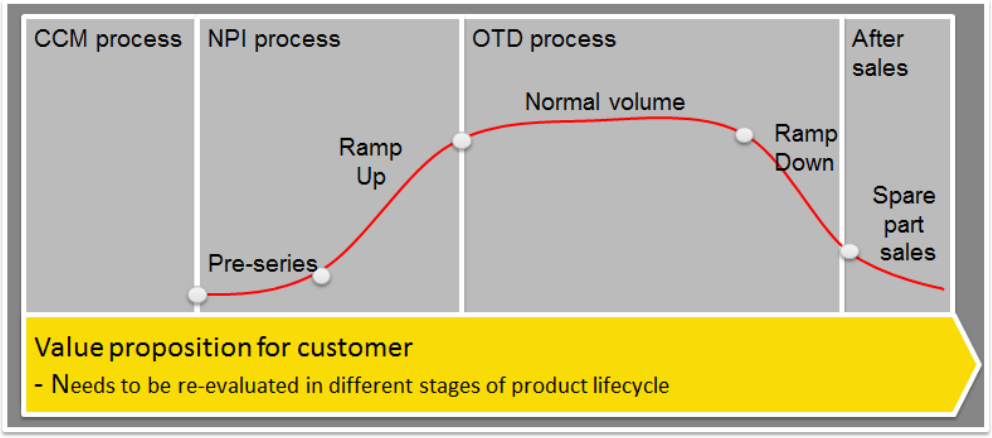


Figure 27. Value proposition phased in product life cycle

In the end of interview discussion it is also reasonable to summarize negative points, risks and treads of service concepting. Ways of mitigating risks were asked. Main risks are discussed in below and more detailed answers are seen in appendix 7. Biggest risk mentioned in various interviews was internal service orientation and change resistance. These risks can be mitigated by open internal discussions and clarification of future plans and targets. Also it was seen as a risk that current customers are not accepting new ways of pricing, especially if current way is very beneficial for them. It would be easier to start with new customers, although it propably requires an open book type of policy. It was seen as a risk that executing processes would take even longer and requires more administrative work. Some

were also suspicious weather given service promises could be kept, and weather there are skilled enough personnel to make alternative offer calculations for customer, build and improve processes accordingly. Last to mention is that building up new service model should not take take the focus from customer needs, which is the most important.

5.4.2 Service Offering

In the interviews it was pointed out that some default service level should be given. On the other hand some services were such a kind of that all customers are not even requiring those. Therefore to be able to define service offering it is also important to understand different kind of service types. Identified service types are following

1. **Mandatory services** are such a services that customer should always decide a level if it. Example of this is delivery accuracy or packing. Even though customer selects no packing, it must be found out.
2. **Alternative** services are always chosen by customer. Some customers want such a service and some select not to need it. Example of such a service is spare part service and packing.
3. **Tailored** services are always chosen by customer and defined and calculated separately case by case. Example of such a service is design. Most of mandatory and alternative services have also tailored choise.

Service offering in appendix 8 was identified based on interviews and based on author's own experience. Since product segmentation i.e. product offering was done in hierarchy mode, the same kind of approach was taken also defining service offering. The thesis was limited into cabin business in the beginning. Since cabins were

merged with all assembly services in business unit point of view, the new approach was to cover all assembly business with the same offering. Services were grouped into NPI process related services, OTD process related services and after sales services.

New Product Impementation services

NPI services are divided into New product project services, New product design services, Tailoring design services and Design change services. New product project services and design change servives are mandatory services, therefore used at some extent. New product design and tailoring design services are used when customer does not have their own design, wants to do it together with suppliers design or wants to supplier to do the entire design of the product. New product design is used when totally new cabin model is created. Tailoring design is used when some part of the cabin is redesigned for specific order.

Order to Delivery services

OTD services are linked to the OTD process of the product. Those are divided into Quality servives, Capital services, Risk bearing services, Supply chain services, Flexibility services, Customer service, Documentation service and Delivery services. OTD services are typically mandatory services that customer is using those in some extent. The wider the scope is, the bigger profit should be.

After sales services

Last service group is after sales services. Those are divided into Production support, Maintenance, Spare parts and Consultancy. So far the other services have been free of charge except spare part services.

5.5 Preliminary service development and engineering

It was decided that tool for evaluating customer service requirements was created with the focus of OTD services. That could be taken into use even though going forward with modular service model was questioned. When the tool was planned alternative approaches how certain service solution is build had to be analyzed at some extent. Therefore creating a tool also required preliminary planning for services. Tool was planned based on offering and was created based on result seen by customer. It is worth to mention that this tool does not cover all the relevant parts for the preliminary service and engineering, but instead can be used as a starting point if decided to go further in service business.

5.5.1 Customer service requirement tool

After receiving request for quotartion (RFQ) there is a need to analyse customers PSS related requirements and expectations. Some of that information is attached to RFQ, but quite often it contains only hard value information related to product like tolerances, dimensions, raw materials and estimated annual volumes. That’s why it is important to contact to customer and make further study about their requirements and assumptions. In reality it varies a lot how much service expectations are discussed with customers. Some sales presentatives discuss requirements a lot, some barely at all. By creating service evaluation tool it is a way to standardize customer service evaluation process, at least set some mimimum level for it. That is the first stage to avoid the gap between given and expected service. Also it is professional approach which is effecting on final decision in contract closing.

Created tool is presented in appendix 9. The structure in the tool was based in service offering structure presented in appendix 8. In each service segment alternative service levels were defined, if possible. Since service implementation and delivery were outscoped, also testing of this form was excluded. Testing can be done at the same time when starting to use it, thus modifications for the template are very easily done.

5.5.2 Communicating service requirements

Created tool can be used for customer's service requirements communication externally and internally. First tool is used to evaluate customer service needs. Secondly phase service requirements are passed forward into sollution designers and offer calculators, to be taken into consideration in solution designing, costing and pricing. Thirdly in the contract phase service requirement evaluation tool information should be reevaluated and updated and then passew forward. Service level agreement could be created based on created tool, even though that is not in used yet.

Further in other value adding processes tool should be used for internal communication. It should be as an imput for NPI process as well as OTD process. The template itself can be delivered to NPI project team as well as all important persons related to OTD process like customer service, purchasers, production planning and supervisors. That way it is easier to ensure that all customer expectations and promises are met. So far there hasn't been any standarded way of communicating customer expectations nor contract inofrmation into organization. To make it complete customer satisfaction survey should be done to ensure that created customer requirement evaluation tool has recognized all possible service needs and also that process is really working in desired way.

5.5.3 Linking customer service requirement tool into customer case management process

Current CCM Process is presented in figure 28. Expectation in current process is that customer identifies all their product and service related needs in RFQ. In reality that is not the case. That is why service requirement evaluation tool, presented in last chapter, was created.

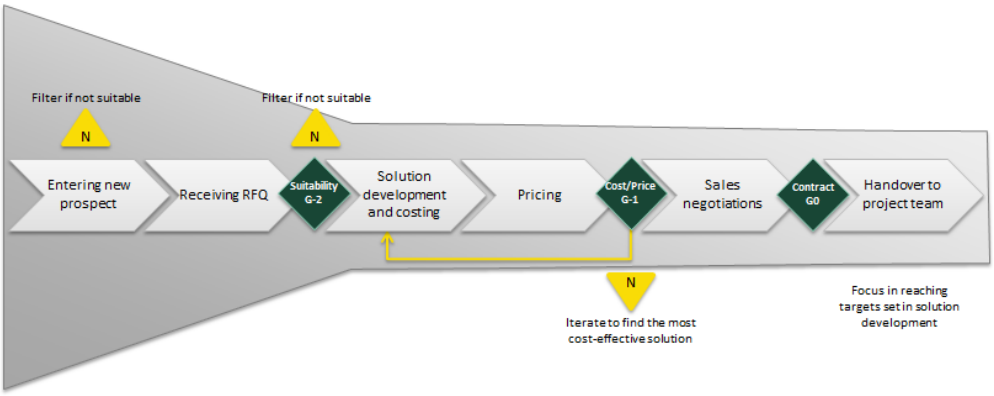


Figure 28. Current Customer Case Management process

To be able to take this new tool into practise, it must be a part of CCM process. To highlight importance of customer value adding view, service requirement evaluation is proposed as an own new step in CCM process. It is proposed to add service evaluation after receiving RFQ and making suitability review, but before creating solution and calculating costs. That way service requirements can be taken into consideration in solution development, costing and pricing. Proposed CCM process is presented in figure 29.

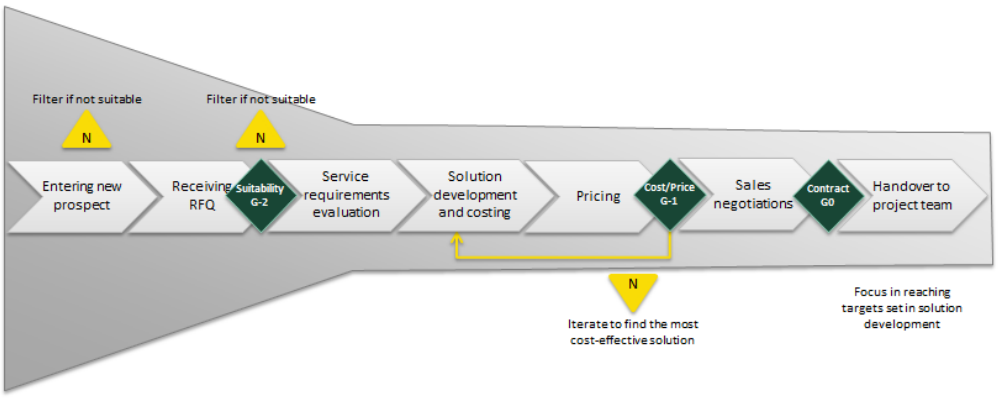


Figure 29. Proposed Customer Case Management -process

As it was pointed out in the interviews life cycle view should be taken into considerations. Also expectations by customer may change over time once personnel, business environment or customer needs change. It is recommended to evaluate customers requirements also to existing customers time after time in addition to new sales cases. Good evaluation point to do it is before price discussions to ensure the right price level.

5.6 Detailed business concepts and operative process planning

In this chapter focus is on operative process planning in finance view. Flexibility for customer demand deviation service as part of flexibility services was chosen to be a focus theme of example calculations. When customer is expecting to supplier to bear high demand deviations, it might cause also major costs for supplier. There must be some additional assembly and welding capacity to be able to bear the situation, even though flexible agreement with blue collar personnel is agreed and multi skilled persons are available. Usually bigger safety stocks are required even though good forecasts were available. Purchasing time of components vary from few weeks up to half a year

or even more while delivery time for customer is from a week to few months depending on the model.

Target of the case calculation was to define labor costs and cost of capital related to raw materials and work in progress (WIP) for different scenarios. In addition volume simulation was done to emphasize the importance of volume based pricing. This issue is relevant especially when forecast in RFQ has been too optimistic, there is remarkable change in the market situation compared to contract closing time or when product is in the end of the lifecycle. An example is calculated based on real customer case of configured cabin model. Assumption was that all option materials must be available like any standard component. In calculations configuration makes difference only when cabin frame must be safety stocked. Then assumption was that 75% of frames are standard and 25% of frames are specials, two frame types as total. Order to delivery process of the case is presented in appendix 10.

5.6.1 Capital cost of demand deviation

Material capacity costs were calculated with nine different scenario (A-I) of demand deviation and delivery time scenarios. Delivery time was either two, four or eight weeks. Demand deviation alternatives were no demand deviation, demand deviation +/- 50 % and +/- 100% Table 2 defines all scenarios.

Table 2. Different scenarios in material capital cost calculations

Scenario	A	B	C	D	E	F	G	H	I
Delivery time [weeks]	2	2	2	4	4	4	8	8	8
Demand deviation [+/- %]	0	50	100	0	50	100	0	50	100

Average weekly volume for selected model was six cabins in a week, so that was used as no deviation scenario. Actual quantity varied between 3 - 9 pcs/week for demand deviation of +/- 50% and 0 – 12 pcs/week with deviation of +/- 100 %. Demand deviation was simulated so that real demand of weeks 9 – 23 in 2013 were used and that was up- and down scaled into +/-50% or +/-100% deviation.

Some assumptions had to be done in calculations to avoid too big complexity. OTD process is illustrated in high level in appendix 10 to be able to see full picture. In following assumptions are described

- Components arrive just before any of main operation (welding, painting, assembly) starts. If those are received earlier, capital cost is slightly higher.
- When it is possible to puchase material into order (PTO) that possiblity is used. Otherwice all other materials are purchased to stock (PTS).
- Safety stock is not rewquired if there is no demand deviation. In reality some safety stock is required because of delivery accuracy of suppliers.
- Operations lead time is the same despite of actual delivery time for customer and that operations are started as late as possible. If real operations time could be decreased, also some capital would be released. In vice versa if production is started earlier than assumed, capital cost is even higher. Because of safety stocks it is possible to double work in progress time. Then cost of WIP is doubled as well.
- All materials for options need to be available like standard materials. In this cabin type there were only two frame options, which made it more simple in frame safety stock calculation point of view. Assumption was that 75% of frames are standard frames and 25 % are special frames, two frame models as total.

If there vere various frame model, like it is possible in reality, cost of frame safety stock would be much higher.

Safety stock calculation

First demand deviation was simulated into purchased material level so that cabin weekly quantity was multiplied with bill of material quantity. Demand deviation for each material was calculated by STDEV function in Excel. Total purchasing time (supplier lead time, transportation and goods receiving), price and lot size were taken from ERP system for each material. Safety factor 1.64 (95 %) was used for all scenarios. Total safety stock was calculated in following way

- Safety stock (pcs) = Safety factor x demand deviation x SQRT(total purchasing time in weeks)
- Total safety stock value = ∑ safety stock (pcs) x price

Cyclic stock calculation

All materials are purchased to stock if delivery time is two weeks. In case of four and eight weeks delivery time part of materials are purchased to stock and part to order. Cyclic stock was calculated in following way:

- Average stock (pcs) = Lot size / 2
- Total cyclic stock = ∑ average stock (pcs) of the item x price

Work in progress safety stock

Once delivery time was two weeks, safety stock for frames had to be held. In other two scenarios it was possible to manufacture to oder (MTO). Safety stock quantities were calculated in the same way as defined for raw material safety stock calculations.

Work in progress (WIP) stock

Normal WIP stock was calculated similarly as cyclic stock.

- WIP = Cabin value / 2
- Total WIP = ∑ WIP of one material

Capital cost of stocks

All above mentioned stock (raw material safety stock , raw material cyclic stock, WIP safety stock and WIP stock) were calculated together. Finally total capital cost was calculated with 6% of capital cost. Capital cost of different scenarios are presented in figure 30.

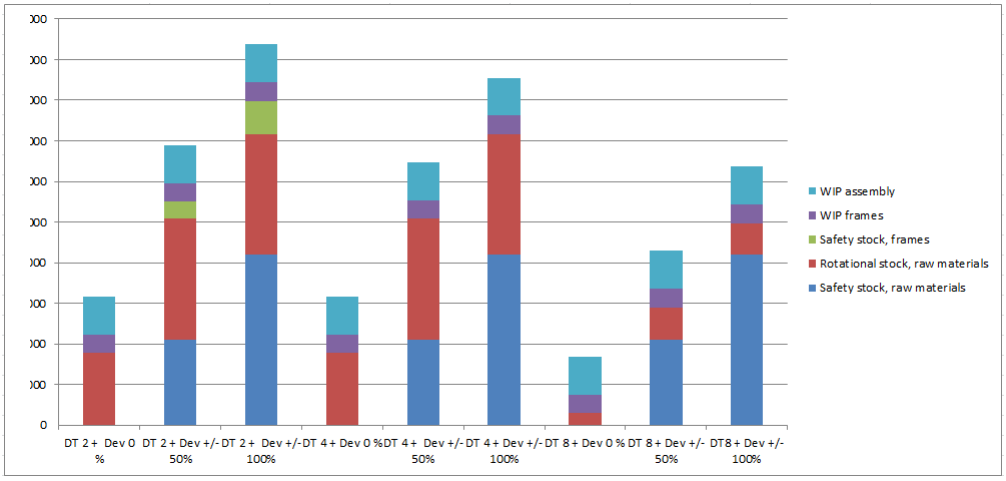


Figure 30. Material related capital cost in different scenarios

The lowest capital cost in a year was the scenario with eight weeks of delivery time and no demand deviation. Highest capital cost was the scenario of two weeks delivery time and +/- 100 % of demand deviation as could be assumed without calculations. Intereresting find was that scenario with lowest capital cost was less than 20% compared to highest scenario. Another finding was that there is minor difference in the capital cost of two andd four weeks devery. The reason is that only monor amount of materials can be purhased to order in case of four weeks of delivery.

5.6.2 Capacity cost calculations

Capacity costs were calculated with another nine (A-I) different scenarios presented in table 3 in demand deviation and flexibility point of view. In the capacity cost calculations assumption is that contract manufacturing company should be able to bear some deviation. Flexibility can be created by cross using multi skilled workers in different production lines or cells, when demand is deviating from one line or cell to another. I addition flexible contracts with blue collar workers are required. Since it is impossible to say how flexible supplier should be or how flexible it can be, it was desided to analyze flexibility up to 100 %.

Table 3. Different scenarios in capacity cost calculation

Scenario	A	B	C	D	E	F	G	H	I
Demand deviation [+/- %]	0	50	50	50	100	100	100	100	100
Flexibility [+/- %]	0	0	25	50	0	25	50	75	100

Eighteen blue collar workers are needed in welding and assembly in case weekly quantity is six cabins. Quantity of blue collar workers was scaled accordingly when demand changes over the weeks.

Assumptions used in calculations

- In case demand was high and there was not enough flexibility, there was a need to work over time. Cost of over time working is double compared to standard working time.
- In case demand was low and there was not enough flexibility, available capacity was lost, which means normal hourly cost in calculations.

As a result it was found out that labour cost can be over 30 % more when no flexibility is compared to the case with 100% deviation. When weekly volumes are low (less than 10 pcs), deviations can be +/-100% if those are not controlled in any meand. Results of all scenarios can be seen in figure 31. Demand deviation is important topic in contract negociations, but also it is important to ensure flexibility internally. Training people to be multiscilled and planning resources in effective way are management topics to ensure. Leadership topics related to flexibility are employee satisfaction and leadership skills in generally.

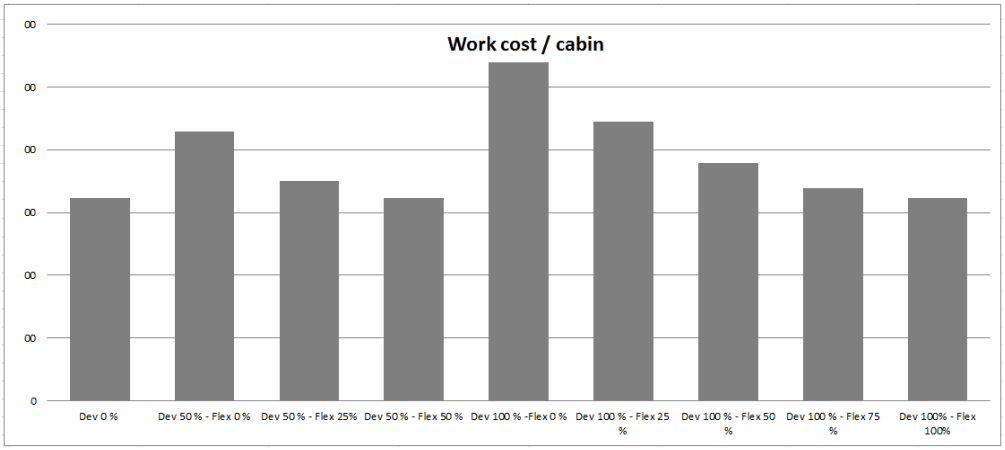


Figure 31. Labor cost of cabin in different demand deviation and labor flexibility

Some discussion and analysis is needed for evaluating total results. In some cases high demand deviation in suppliers factory is caused by customer's changes in their own manufacturing plan. Some orders are postponed, others are drawn back. That causes abnormal deviations once it is not balanced. Assumption is that shorter deliery time by supplier could also eliminate some deviation. Cost related to safety stocks of frames is reasonably small compared to cost of labor when high flexibility is required. Therefore it is worth of calculating in which cases, capacity in welding should be balanced with frame safety stocks.

Now all calculations were done based on one configurable cabin with two alternative cabin frames. If there are more frame types cost of

frame safety stocks is bigger. If demand deviation limits (upper and lower) were agreed with customer, also it would be possible to decrease safety stocks from calculated level for all materials. Cost of risk has not been taken into consideration. Shorter delivery time can be bigger risk. Although it is possible to make risk decreasing contracts with customer e.g. forecast, material and demand deviation related commitments. As a summary demand deviation will always create additional cost to supplier when flexibility is smaller than demand deviation.

5.6.3 Volume simulation

In preanalysis phase it was noted that that there is no volume based priging. Volume simulation was done to highlight that issue. In this case volume based simulation was done for one cabin, the same as used in earlier calculations. Direct material and labor cost were calculated according to the case example. Real indirect cost for example cabin was not know, but evaluated based on profit and loss (P/L) calculations. Therefore results of simulation are just indicative.

Simulation is based on the case where deliery time is two weeks, like it is in reality. In calculation assumption is that there is no flexibility of labor. Labour and material costs were treated as direct costs and therefore known in cabin level. Indirect cost were calculated so that site's total indirect costs were devided with annual qty of all cabins to get average indirect cost for one cabin. Assumption was that in the calculation volume of 200 pcs presented averagvolume of that model. Then it is simulated what if volume increases or decreases from estimated average. The result is that indirect cost is more than 100% when 275 pcs is compared to 125 pcs presented in figure 32.

5.6.4 Costing and pricing

In pricing point of view it is important first to understand what services customer is appreciating and what adds value for them. In costing point of view it is important to understand what are major cost and which customers are causing them. Costing of all service elements is quite complicated and would require lot of calculations and recording of those. It might even require total change of calculation methods. Instead it is possible to take service level into account in pricing, at least in rough level. Default service is defined in the service requirement evaluation form. Based on that it is possible to make some kind of rough evaluation weather there is higher or lower services included compared to default.

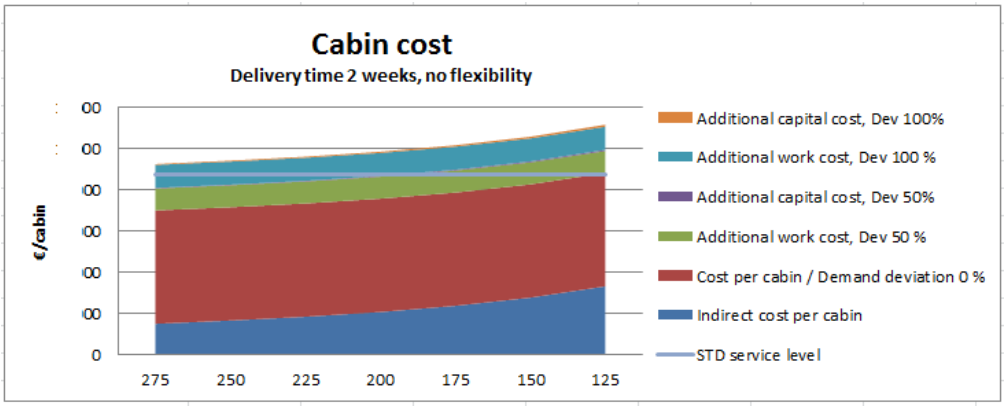


Figure 32. Different costs for one cabin

Figure 32 presents cost of the cabin with few different scenarios and volume effect. It can be seen that capital cost does not play major role, but instead volume and labour effects are significant. Labour cost effect of 50 % demand deviation is roughly 15 % and with 100% demand deviation roughly 30 %. If volume was 125 pcs instead of estimated 200 pcs, total cost of the cabin is roughly 15 % higher. As a conclusion biggest attention should be paid into demand deviation

even at cost of tied up capital. Secondly attention should be focused in creating volume based pricing.

Table 4. Margin expectations

Margin expectations compared to standard margin target		Volume [pcs/year]		
		High > 500	Average 50-500	Low <50
Required customer service	Low	Max - 5 %	- 1 - 5 %	+ 1- 15 %
	Default	- 0 - 5 %	STD-margin target	+ 5 - 25 %
	High	+ 1 – 15 %	+ 5 – 15 %	+ 10 – 100%

The table 4 presents the idea of taking service level and volume into account in pricing. Percentages are just indicative examples for illustrating the idea.Targted margin for customer case with default customer service and average volume should have a standard margin target. In customer case of high volume and moderate services pricing target can be 5 % lower than target of standard case. Like wice customer case with low volume and high service requirements should have at least 10 % higher margin compared to standard margin. In case of spare parts cabins the right level might be even more than 100% of standard margin target. As a result customer service tool related information is needed in costing and pricing, despite wether service related cost is taken into consideration in costing or pricing.

6 CONCLUSION AND RECOMMENDATIONS

In the beginning of the case study pre-analysis phase it was identified that two major issues are existing. One is that customer service expectations are not taken systematically into consideration. It caused gap between given and expected service already in offer phase and it expands into NPI and OTD processes later on causing finally poor satisfaction among customers. Another issue pointed out was that volumes were not systematically taken into consideration when making offers. Later on it was seen as profitability issue, when volumes are changing either because of market trends or product life cycle. In the beginning of the study all practical solutions and processes were built based on product selling. For example pricing and costing was mainly focusing on working hours and materials required for manufacturing product itself. In this chapter of recommendations the focus is on how to turn focus from product selling into product-service selling and at the same time increase customer satisfaction and profitability.

6.1.1 Customer satisfaction related recommendations

Product offering had been defined the case company, but service offering was missing. The first recommendation is to take defined service offering into use, presented in appendinx 8. In the first phase offering model can taken in to use as a tool for internal communication. Later on the model should be developed futher to be able to present company's total product-service offering for the customer. Before that it must be evaluated in customer service and finacial point of view what services should available. There is also a need to bundle offering. E.g. material ownership, inbound logistics, purchasing and sourcing responsibility should be combined into one

service package with different service levels. Once decision of available services and budling of services is done, service processes must be designed and taken into use according to New Service Development –process.

The second recommendation is to take created service requirement evaluation tool into use and integrate it as part of the CCM process. The tool is presented in appendix 9. Purpose of this tool is first to standardize way of evaluating customer service requirements. Secondly it can act as internal tool for communicating customer needs as an input for different phases in CCM, NPI and OTD processes. That way it can be ensured that processes are built based on customer needs.

Customers are requesting suppliers to have better value chain and customer needs understanding and proactivity. When proposed tool is used, value chain understanding and communication with customers' increases. Once value chain understanding and understanding of customer needs increases, it is also easier to be proactive. Even the template itself is simulating to make proposals for customer. The tool should be futher developed in a way that it would also contain contract closing and service level agreement (SLA) related information, once SLA is taken into use.

6.1.2 Profitability related recomendations

First is is important to highlight that satisfied customer usually brings better revenues. Therefore recommendations in previous chapter are as important as economical results discussed in this chapter. The way how cost topics are discussed with customer has an effect on profitability. Based on answers in the interviews, it was stated that for

example quality is not such an element that customers are willing to pay for any extra, since it is seen as perquisite, even though requirements may vary customer by customer. Therefore things that are seen as perquisites should not be taken into price discussion, but instead just include into costing.

New kind of services may also create new possibilities for revenues. To be able to build up profitable business, understanding of service possibilities and cost structure related to services are vital. In understanding service related cost allocation plays important role. Since changing the way of calculation is a big effort and time consuming project, at this stage, some easier sollutions and recommendations are given. Although in the future it is worth evaluating and investigating weather new way of cost allocation according to customer service use is required like presented in 3.2.3.

In the case study demand deviation was chosen to be one possible new service and therefore taken as an example. Various different scenarios were calculated based on demand deviation and delivery time. In the case example it was found out that labour cost can be over 30 % higher in the case of no demand deviation compred to the case of 100% demand deviation. In addition to labour cost there are at least logistics and capital related cost to take into consideration. When service level is taken into account in addition to profitability, general recomedation is that cabins with fixed bom or with reasonable amount of options should be delivered with short lead time from one to two weeks. Based on case calculation it does not any value to customer nor cost to supplier if delivery time is four weeks, like it is for various customers. For the cases with large variety of options it is beneficial to propose long delivery time, so that most of options can be purchased in order lead time.

Today calculation is based on standard costing and variations to that. It is not separated what is actual direct cost and indirect cost in material level. Therefore all volume based calculations were based on estimation of indirect costs. In the case calculation it was found out that when volume was ~62% of planned, total cost of the cabin is roughly 15 % higher. Information is only indicative, but still important. First of all prices should be tied up with e.g. annual rolling volumes to be checked quarterly. This has an effect especially when forecasted quantity in RFQ has been overestimated, there is dramatic change in the market or when product is in the end of it's product lifecycle and volumes collapse. Another important recomendation is that volume simulation should be done when making offer calculations. That way at least risk of volume changes would be recognized.

During the interviews it was found out that it is too early phase to take service modules and module based pricing into use. One hand organization is not ready for that kind of a change and on the other hand it is not well enough known either what are such a services that customers are willing to pay for. While awareness of service costing and pricing is increasing, it is recommended that margin based general recommendations are given for pricing, presented in table 4. Awareness of service costing can be increased e.g. by making service based cost calculations and sharing those among organization.

6.1.3 Effects of recommendations

Summary of recommendations and effects of those are presented in figure 34. The figure is based on assumptions and proposals done in pre-study phase (figures 16 & 17), but modified according to observations during the study. Focus is on internal and external effects when given recommendations are in use. Internal effects can be seen as better knowledge of customer expectations and more structured internal processes and ways of working. Price setting is easier, if service costs aren't part of hourly rates. As a result key performance indicators like profitability and customer satisfaction will improve. With structured ways of working and more fare way of cost allocation it is easier to sell and win new customers.

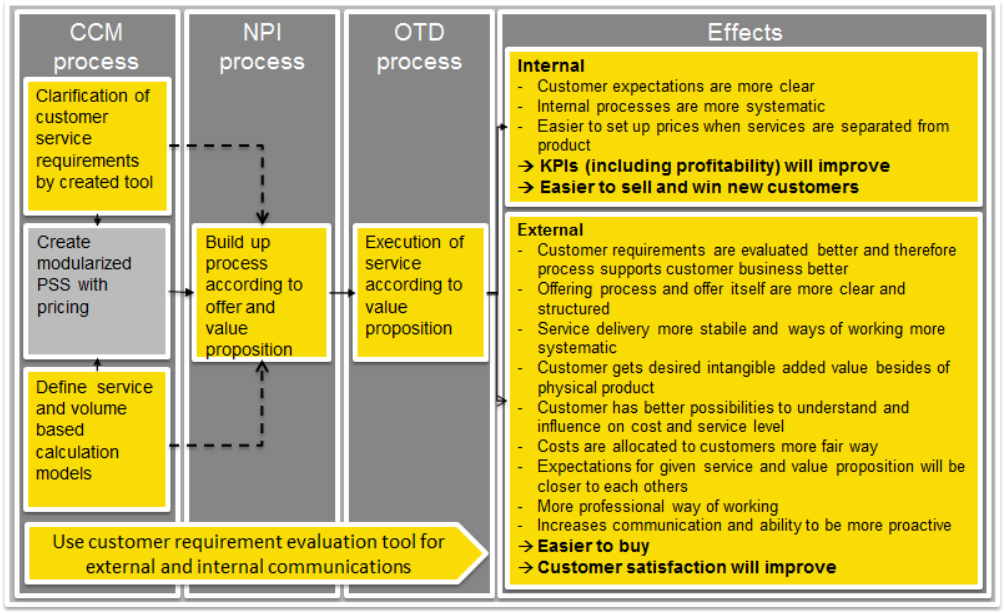


Figure 33. Summary of recommendations

Similarly externally can be seen more structured and professional way of working; Customer requirements are evaluated better, service delivery is more stable and gap of expected service and given service is smaller. In cost point of view, customer has a possibility to influence of price level by modular service package.

According to literature there are various benefits of transformation from product sales into product-service system sales. Those can be revenue changing benefits, value enhancing and sustainable advantage benefits. It is worth to mention also that more companies have failed when transformation is planned and executed well enough. To be able to carry it successfully there must be clear vision where to head at. Customer needs and understanding must be in the focus all times. Transformation requires significant changes in organization, culture, skills and processes as well as ability plan and carry those into actions.

7 SUMMARY

Product-Service System (PSS), a combination of product and service offering, has been discussed already in late 90's, but very rarely in contract manufacturing point of view. Author created new PSS model with contract manufacturing theme, based on two earlier models; Morelli's (2003) Product-Service System concept and Fisher's product matching supply chain. The new model contains two aspects. Supply Chain PSS focuses on making product as economically as possible. The Value Added PSS is instead focuses on service and total cost view of original equipment manufacturer (OEM). Based on that idea the thesis focuses on new ways of service thinking in contract manufacturing business.

In the theory PSS is approached from two directions; Product servitization via business model generation and service productization via New Service Development process. Servitization makes services more visible or product like. Business model is the tool for future business planning. Productization seeks for more systematized ways of working. NSD process covers a process from idea phase to service concept and service delivery. Benefits of PSS were identified as well as success factors of productization and servitization in revenue adding, value enhancing and competitive advantage point of views. Special attention was paid to the gap between given and expected service as well as financial view and cost allocations.

In the case study pre-analysis it was evaluated that customer service needs are not systematically evaluated and there is no volume based pricing in use. The result was seen in customer satisfaction and profitability. After pre-study, the case study was following phases of NSD process. First interviews were carried on and literature was studied. New service and revenue potentials like flexibility and risk

bearing services were identified. Also readiness for change from product minded thinking into PSS thinking was observed. Current and potential service offering was identified and the tool for evaluating customer service requirements was created. Last examples of financial consequences were shown by calculating different scenarios of demand deviation and delivery time.

Even though modular service offering with pricing was not build up yet, this thesis was a kick off for internal understanding of services. In the service management interviews it was found out that new service approach was seen to deepen cooperation with customer by better understanding customer's requirements and enabling better reactiveness. Internally it increases commitment to customer, communication and cost awareness as well as harmonizes the ways of working. Finally this all opens door for improvement and enables better profitability. Similar views were highligted in the customer interviews done by Vadestra (2013). OEM's expect better value chain understanding, proactivity, communication and ability to present total offering. Creation of PSS is an answer for the need to present total offering. Value understanding increases once customer resvice needs are evaluated. Proactivity increases when offering is clarified and there is better understanding of customer needs. All these actions improve communication internally and externally.

Author believes that new ways of thinking of service business can be a potential way of changing business environment in challenging way. Product-Service offering with customer service evaluation tool and systematized ways of working will definitely decrease the gap of given and expected service. That can be also success element into customer satisfaction and better profitability.

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APPENDIX 1. Benefits of product service system

	Penttinen and Palmer (2007)	Olica and Kallenberg (2003)	Vandermerwe (2000)	Desmet et al. (1998)	Cohen and Whang (1997)	Vandermerwe and Rada (1988)	Mont (2002)	Mathieu (2001b, 455-459)
REVENUE ENHANCING BENEFITS								
Provides additional sources of revenue		X		X			X	X
Creates more stable sources of revenue		X						X
Services tend to have higher margins		X						
VALUE ENHANCING BENEFITS								
Customers are demanding more services		X		X		X		X
Allows better understanding of customer needs								
Allows establishing and maintaining relationships with customers over the product life-cycle	X				X	X	X	
Allows more comprehensive solutions to customer needs with customer value add view	X		X	X			X	X
Improves after-sales service	X			X	X			
Proves transparency of life-cycle costs for the customer				X				
Acts as communication tool							X	X
SUSTAINABLE COMPETITIVE ADVANTAGE BENEFITS								
Service is a differentiating factor	X			X	X	X		
Services are more difficult to imitate		X	X	X		X	X	
Facilitates customer lock-in			X		X	X		
Product-Service packages can facilitate the diffusion of innovations						X		
Provides strategic opportunities or competitive edge							X	X

APPENDIX 2. Interview, part 1, question 1

Name services we are offering for customer today (invoiced or free of charge)?

A	- Flexibility - Free space & capacity - Safety stock of materials and components - On time delivery-delivery accuracy >95% - Spare parts servise/sales - Agreed delivery time - Quality system - Designing (high prices compared to competitors)
B	- Process and product quality - Designing - Spare part service - Technical support for customers, e.g. instructions how to change windows. Qantity of inquiries about 1-2/bigger customers, various inquiries as total in a week - Bill of material transfer to Auric - Delivery reporting to customer web support system - Barcode printout to packing documentation - Delivery reporting vial Anilinker
C	- Designing - Complete supply chain package in cabin (control and cost of supply and purchasing, capital, workforce, machines, processes, development, transportations, production). It must be clearly defined how we can develop our processes in the way customer wants to. - Pricing service (Design assignment cases). It used to be 1-2 days response time for price inquiries some years ago. - Design change service (design, documentation, material management). When change is based to customer requirement, we should be also set a price tag for that. In case it is because of poor quality or because of better productivity

	customer is not willing to pay for that. - System integration with customer - Reporting to customers systems or data extract from customer systems e.g. forecasts, home calls, invoicing - Transportation arrangement and loading - Option services for configured products
D	- Cabin design - Design assignments - Spare part service - Consulting in new cabin cases - Special packing - Special labeling for packages - EDI in the future - Project management - Own sales contact for each customer (Customer Service Manager) - Supply chain controlling / Material Management instead of customer (sourcing, purchasing, processing, capital cost)
E	- Proto model pricing - Design - Supply controlling (delivery planning, factory logistics, supplier contracts) - Tool manufacturing and design - Testing - Basic sales materials, e.g. picture of some Ruukki designed cabins are difficult to find in internet. - It is expected by customer to create ideas in different development areas related to new and existing customers - Quality, it is expected that Ruukki is able to define what is our basic quality procedures e.g. testing and tools so that sales is able to define missing procedures
F	- Design - Feasibility study - Spare parts - Maintenance design

	- Option design

G	- Product itself is a service
	- Design assignment cases
	- Ability to control and sell options
	- Concept design
	  - How to share responsibilities between Ruukki and customer
	  - Industrial design by Ruukki with separate payment or included in product pricing
	  - Pricing of cabin
	  - Cost estimate via design
	  - Comparison of manufacturing techniques / components / supply chain alternatives
	- Fast track possibilities

H	- Design - Drawing updates from one standard to another - Jig design and manufacturing - Proto and 0-series production - MOK up proto manufacturing or 3D simulation - Spare part sales - Documentation (spare part documentation, work orders, testing, quality) - Kit services - Testing - Certificates
I	-

APPENDIX 3. Interview, part 1, question 2

Name services we could offer, that we are not offering today? What services our competitors are offering?

A	– Safety stock of finished products (frames, cabs,...) – Growth&investments according customer's growth – Outsourcing – focus on core business – More flexible technical support – Yearly decrease of production costs – common program/project – Designing in „right“ price level – Regular meetings and calls as a standard service and support – Yearly action/workshop for customer's purchasing/ sourcing and R&D – information about news and improvements in our company/unit + informal evening event – Plastics processing
B	– Fast track delivery would be possible (would not work now because of process low quality) – Ruukki’s own products (subsystems or features) that could be used for different customers cabins – E.g. signal light system, universal systems for remote controlling, cleaning sets, storage facility set – Own subsystems would also help standardizing processes and common parts – Own service – E.g. inspections for insurance company, window changes – More active after sales / spare parts service – Inquiries with customer own part numbers/names – Package offer instead of only one part (window with nuts

	and seals) – Flexible volumes as pricing mechanism – According to customer feedback our competitors are offering better quality and delivery accuracy now a days
C	– In Case of fixed bill of material flexibility in delivery time could be possible and customer could pay for it – Possibility to deliver configured products – Special note, trends for outsourcing and in-housing are changing over the time. Therefore it would be interesting to investigate those cycles, how long those usually take.
D	– Maintenance services e.g. window changes. Customer is willing to pay this kind of service for some extent, but service needs to be available locally so that it would be possible to arrange in decent price. – Plug and play cabin services (including assembly & testing & design Assignment), although some customers want to keep expensive component or option assembly by themselves – Assembly services with final testing and delivery to customer like drilling rig – Design consulting
E	– Spare part service to be developed further, e.g. 24/7 service like franchising functionality (share of profit for customer) – Packing for customer packing materials – Some customers have their own air condition or plastic parts planning – Designing is definitely advantage e.g. visualized example cabin – Service packages – Design drafting – Design planning

	– Productization – Testing services e.g. wear out testing, electrical functional testing, vibration testing – Jig design (in product price or separately) – Supply service (purchasing, sourcing, quality etc.) – Bill of material maintenance – Change maintenance – Version control – Traceability – Spare part documentation – After service e.g. maintenance services in addition to spare part services – Delivery accuracy guarantee
F	– Our competitors are better in some areas like jigs, plastic, profiles – We could offer world class soundproofing, air conditioning, ergonomics (customer focus is in this today) – Spare part service 24/7, but it must be kept in mind that customer wants to keep their share of profit – Special packing – Delivery time choses
G	– Ability to offer different kind of choices (price, quality, product structure, mechanism) with real arguments as part of offer process – Usage of common components → cost savings – Delivery accuracy or ramp up guarantee – Different lead times e.g. – 70 % of capacity reserved for normal orders – 30 % of capacity reserved for rush orders – Customers are expecting commitment for pricing, currently competitors are better in keeping their price level promises

	– Currently competitors are handling their basic processes in better way, partly because they are having some subassemblies manufacturing in their own hands
H	– Spare part sales to end customer – Different kind of testing, basic package for all customers and special testing for those that are requiring it
I	– Different lead times – Flexibility – Rush order service

APPENDIX 4 Interview, part 1, question 3

What elements can be seen as basic (must be) elements? (See figure 25)

A	– Flexibility – Free space & capacity – Safety stock of materials and components – On time delivery-delivery accuracy >95% – Spare parts service/sales – Agreed delivery time – Quality system – Designing
B	– Speed of offer process – Delivery accuracy > 90 % – Max delivery time is related to customer's own service time. If they have very short delivery time, it must be accordingly in Ruukki and vice versa. – Sales from customer stock → Ruukki delivery time max 2 weeks – Configured products → Ruukki delivery time max 8 weeks – Designed products → Ruukki delivery time max 12-16 weeks – When defining configured products options we must be in cooperation with customer's sales function to be able to make satisfactory model for both parties – All customers are not expecting ISO9001 and/or ISO14001 – Spare part sales at some extent – Basic customer service means – Answers for basic inquiries in an hour in working days from 8 to 16. Currently there are complaints that they

	can’t get answers for basic inquiries. – Quality claims reply in an hour in working days from 8 to 16. Reply means that case has been taken under investigation but not solved. – Development proposals should be handled in monthly meetings (not valid to ramp up or R & D cases) – Follow up of related laws, directives and patents. Active follow up could be seen as excitement elements, if we could e.g. give warnings for customers beforehand to make preparations early enough. Who is responsible for patent issue in case design is in Ruukkis’ responsibility but customer owns the product?
C	– Delivery accuracy must be more than 70 %, 95 % is seen as excellent – ISO9001 is basic in quality area. Other quality systems can be also must depending on customers. Only military customers could be willing to pay some extra for additional quality system follow up. – Basic spare part service for listed materials, requirements for other materials is additional service – Basic delivery time is impossible to define since it varies over the product life cycle and economic cycles
D	– Delivery accuracy 95 – 100 % is satisfactory level – Delivery time is depending on customer own delivery time – Same delivery time despite of options or design assignment, so that customer is able to confirm easily for their own customer – Configured product delivery time 4-8 weeks – Claim service is the basic need even though we have not been able to cover the need. Customer is expecting to have some feedback in a day. In case if quality issues go further to end customer, issue solving must be much

	faster compared to when issue has been noticed in our customer. Currently also problem is that we do not have really any quality persons to improve quality / prevent claims, partner for customers SQA persons. – Decent time in new product projects, currently times are too long – Basic quality documents
E	– Quality according to customers requirement – Basic spare part service e.g. that there is no special delivery agreement time – Promised price level must be kept
F	– Basic elements are not the same for all customer – Quality, knowledge of APQP is must even though all customers are not requiring it – DA > 90 % is very good – Delivery time is depending on cabin type and volumes – e.g. 1 week is excitement in some cases – weeks is very long for basin cabin – Continuous improvement is must (efficiency in production, new versions of components, new functionalities etc.) – Some basic level designing – Some basic level spare part service
G	– Quality – Delivery accuracy > 90 %, some customers like Nacko and Cat are expecting over 98% accuracy – Customers are expecting credible suppliers with long cooperation – Supplier should be able to develop their own processes continuously (price, quality, efficiency) – Reactiveness, currently we are not enough
H	– DA > 95% in daily measured level – Delivery time 4 weeks for basic cabin

	– Few S's from 5S model – ISO 9001 & 14011 – Basic spare part service – Decent price level compared to competitors – Continuous follow up of costs – Continuous decrease of sales price
I	– ISO 9001 & 14001, quality requirements are different in different customer segments and therefore basic is related to strategy, which customers segments we are choosing – Delivery time max 6 weeks for normal configured product – Basic spare part service must exist – Delivery accuracy > 95% – Fast & on time R&D to ramp up and serial production, in worst case we can't keep our promises in that – In addition, we have to find our selling arguments e.g. testing systems to be able to make selling more efficient

APPENDIX 5. Interview, part 2, question 1-3

What elements can be seen as excitement elements? Are our competitors having mentioned excitement elements? What elements could differ us from competitors?

A	– Safety stock of finished products (frames, cabs,...) – Growth&investments according customer's growth – More flexible technical support – Yearly decrease of production costs – Designing in „right“ price level – Regular meetings and calls as a standard service and support – Yearly action/workshop for customer's purchasing/sourcing and R&D – information about news and improvements in our company/unit + informal evening event – Fritzmeier, SIAC have mentioned exitement elements, we want to be No.3? – We have to try do all services minimum on the same or higher level as our competitors
B	– AP/QP quality system is a must to get some customers, although they are not willing to pay any extra for it – Customer might pay for exceptionally short time in case it is not must requirement in first place. Customers are appreciating in case we are able to offer something additional compare to their expectations (quality, price, delivery time)
C	– Packing for customers branded packages – Value added is strongly depending on how successful we are in basic elements. If we are successful in basic elements then we are able to carry on discussion to excitement elements with customer. Success in basic

	elements can lead into price discussions (=profitability) in excitement elements. – We must network with different organizational levels and areas to be able to make good service. Also informal meetings are required to make good relationship with customer. These informal meetings will improve feeling of service even though it is not actually making practical service any better. – To be able to make service with customer language can be seen as good service
D	– In good service Design Assignment case delivery time is as short as possible and delivery time should be fixed – If shorter delivery time is proposed than customer minimum requirement, they might pay for extra short delivery time – Rush order service
E	– Shorter delivery time than customer is expecting in first place – Flexibility – Different kind of options (price level-lead time, price level–flexibility), to be selected by customer
F	– Delivery time is depending on cabin type and volumes – e.g. 1 week is excitement in some cases – weeks is very long for basin cabin – Design – World class knowledge in areas that customer appreciate – Ability to handle big amount of options – Bigger purchase volumes for smaller customers in theory, but not possible with current way of working and volumes – Control of big manufacturing process

	– Special note, we must be able to have different sales arguments for those that are planning outsourcing and those that are already buying cabins externally – Service productization helps to get to know customer and therefore excitement elements are easier to define
G	– Cases when supplier has been able to exceed customer expectations e.g. with some claim case or when customer have needed some special urgent help – Design assignments and new features – E-coating, good paint quality in product and process point of view – Language skills, service with customer language – Professional outcome with offers of alternative choices – It could be excitement element to be able to improve process services via listening customers. E.g. Frizmeier seems to be some way arrogant to customers. How to effect on human decision making in addition to facts? – Basic product and process quality must be ok, to be able to get into excitement level. Currently product quality is in the same level with competitors. We are now in critical path when talking about keeping our promises to customer.
H	– Quality required by customer – Delivery always on time – Risk taking in behalf of customer – Mass tailoring / option design – It is important that ‘basic package’ works in reliable way to win new contracts
I	– Additional quality, although customers are not paying any extra for it – Flexibility e.g. fast track service – Design

	– Quick changes in engineering – High strength steels/special steels – It is important to understand what excitement elements are, but also weather customers are willing to pay for some extra for it. – It is depending on customer what element is basic and what is excitement

APPENDIX 6. Interview, part 3, question 1

Name three positive points of this preliminary service model?

A	– Start discussion – Improvements for the future – Brainstorming → more new ideas how to be interesting for new prospective customers
B	– Deepens cooperation with customer e.g. we could be make a proposals for some things that their purchasers have not taught before – It increases reactiveness that our customers are highlighting already today – Better profitability via different price set up
C	– Dynamic pricing (customer understands that) – Dynamic pricing enables better profitability
D	– Ramp down cost could be one potential in future in pricing – Longer delivery time could be possible discussion topic with cheaper price – Model would give better influence on customer in case we would be able to provide such alternatives
E	– Alternatives for customer → pricing → profitability – More clear model for sales, no need to discuss about basic with production – More clear understanding of customer needs and requirements, also easier to communicate those internally
F	– Different ways of working and cost for those have been defined beforehand and therefore it makes offer process faster – Might help to improve profitability, special service → special price – Helps to communicate agreed service internally

G	– Tailored offer / contract increases customer commitment – Profitability, in case we are able to create tempting service packages – It increases internal efficiency and cost awareness in case we understand pig picture of customer needs
H	– Standard ways of working (more professional way, less mistakes, transparency, capturing of silence knowledge) – Easier to sell, easier for customer to understand and harmonize their internal needs and requirements – Common Ruukki way of working
I	– Harmonizing business perquisite ‘Ruukki way of working’ – To understand better way how customer can benefit from us

APPENDIX 7 Interview, part 2, questions 1-3

Name three negative points of this service model? Name shows stoppers internally and define how risks are mitigated. Name show stoppers externally and define how risks are mitigated

A	– I don´t know – Show stoppers internally – Lack of interest, not customer oriented employees, not motivated employees - How risks are mitigated –change employees' mind-everyone must be customer oriented, open internal communication about future plans and targets – Show stoppers externally – Crisis, lack of interest
B	- It might be difficult to change price set up for existing customers since they do not want to pay for something that they have got before for free - Fear of inflexible process, does this make process walk though even longer? - If we are making some promises for customer that we are not able to keep - Internal challenges o Change of mindset o Change of current way of working - External challenges o Can be met with pricing in case of open book procedure
C	- Requires more administration work that also costs - Internal challenges o To understand customer behavior in history

	- External challenges
	  o To make new way of approach to customer. It would be easier to start with new customer. It requires open book policy with customer.
	  o Price level is highly related to market trends. It is easier to increase prices in high season. In low season we just must 'share the cost of miserable times'

D	- Customers do accept longer delivery times with cheaper price, but are not willing to pay extra price for current delivery time - Advantage of longer delivery time might be lost internally, meaning that we are not able to improve our own processes accordingly - Risk is that we can't keep our promises to customer because of internal reasons - Currently now we are not able to make such alternative calculations. Support from production organization is very week, basically bill of material is only support. Currently also after calculations are in quite weak level. Those are calculated case by case for biggest volume cases.
E	- Customer might over react of price level in case services are defined to be too expensive - It might be difficult to build up model internally, especially for production ➔ biggest risk - Needs to be carefully defined what are real choses for customer and what is real basic level, risk in case not defined carefully enough - Risk is also that current level of service and internal flexibility is very low - Risk of internal resources in new sales cases

F	- Risk of model structure; Are we able to find out the model that suits both cabin units or are we forced to build up two different models? - It must be understood clearly what services are new for customer and what is just part of internal development - Risk is that all customers are not the same and price set up must be linked to customer needs (price set up is not cost+ type of working) - Too fixed model might be restricting - Risk is that model itself gets too much focus instead of customer needs - Sales argumentation for current customer - It must be understood that market situation can be different in different areas - Sales <-> production conflicts - Internal resistance is not a problem, if benefits are clearly defined
G	- It might crease process more complex/increases work o Creates more cost o We might end up to situation that we can't keep our promises to customer → Customer is not satisfied o Stock rotation will decrease, we might end up increasing stocks because of better service - Show stoppers internally o Current ways of working are not good enough o We are not good enough familiar with cost structure o Resource issue, current 'fire fighting' way of working takes all resources - Show stoppers externally o Risk is that customers are not willing to pay for defined services ▪ Customers are not able to forward this kind of

	costs to their own customers ▪ Is customer willing to pay e.g. R&D efforts? o Market price level might put idea down
H	- Change resistant - Final closing of customer requirements. There must be standard path to follow to make closings with customer so that it would work.
I	- Coordination and communication internally, if we fail to do what we have promised - Implementing good ideas / processes → RE is not good at carrying idea into practice - Negative attitude internally - Units are not in basic level yet and it is required first

APPENDIX 8. Service offering proposal with current and new services

APPENDIX 9 Service requirement evaluation tool

Service descriptions		
Quality services	Delivery accuracy	Delivery accuracy expectations by customer 1. 100 % delivery accuracy 2. > 98 % delivery accuracy 3. 95-98 % delivery accuracy (default) 4. 90 - 95 % delivery accuracy 5. Tailored delivery accuracy ageement
	Process quality	Process quality expectations for quality systems. 1. ISO 9001 and ISO 14001 (default) 2. PPAP 3. FMEA 4. MSA 5. SPC 6. APQA 7. APQP 8. Other or tailoded
	Traceability	Traceability is defined accordinf to customer needs 1. No traceability 2.Traceability for heating numbers (default) 3. Traceability for main components 4. Traceability for all components 5. Tailoded traceability
	Functional testing	1. Funcitonal testing is done according to suppliers standard way of working 2. Tailored testing
	Quality inspection	1. Quality of each product is inspected according to suppliers standard way of working 2. Tailored quality inspection
Capital services	Material ownership	Material ownership can be selected from full ownershp by customer to full ownership by Fortaco. 1. Full ownership by Fortaco (default in cabins) 2. B & C materials + stel parts ownership by Fortaco (~50 % spend, ~ 80 % item qty) (default in subassembly) 3. C-materials + steel parts owned by Fortaco (~20% of spend, ~50 % of items) 4. Accessories (bolts, nuts, oils, liquids) ownership by Fortaco (default full assembly) 5. All materials owned by customer
	Purchasing terms of payment	Average terms of payment in purchasing contracts for Fortaco owned materials (see material ownership and sourcing responsiblity) 1. 120 days 2. 90 days 3. 60 days 4. 45 days (default in calculation) 5. 30 days 6. Other term of payment
	Sales terms of payment	Expected term of payment in sales contract 1. 30 days 2. 45 days (default in calculation) 3. 60 days 4. 75 days 5. 90 days 6. 120 days 7. Other term of payment
	Space & other investments	Required space is evaluated by product volume, size and lead time.
Risk bearing services	Supplier product and processquality	Supplier risk service is usually tied up with sourcing responsibility. 1. Fortaco is responsible for costs related all product and process quality issues related materials sourced by Fortaco. Responsibility is limited to direct defaults in the product itself. Customer is responsible for all costs caused by process or product quality issues for Fortaco, customer itself or end customer. 2. Tailored responsibility agreement
	Material commitment	Target for material commitment is to optimise total cost for both parties, especially avoif obsoleme materials. Assumption is that with version and revision changes old materials are used first and then new materials are taken into use. 1. Full material + cost commitment (covers logistics, warehousing, materian handling ect. ~30% of spend) by customer (default) 2. Full material commitment 3. Full material commitment for A & B-materials 4. Full material commitment for A-materials
	Forecast & volume commitment	Target for forecast commitment is to make total cost optimisation for both parties. Forecast is used for capacity planning, material planning and furher to supplier forecasts. Assumptions related to forecast and volume commitment are * Forecast is given for rolling 12 months, 1st quarter in weekly quantities, 2nd - 4th quarter in monthly quantities or in more details * Forecast is given for 1st quarter in weekly bases and 3rd to 4th quarter in monthly bases or more frequently * Forecast is given in sales item level or product family level with percentages of item level split * In case of options, separate options forecast (option based percentage) is given in quarterly bases * Ramp downs and version/revision changes are informed well enough (at least 6 months earlier) to be able to plan and optimise costs for both parties. Forecast and volume commitment alternatives

Supply Chain services	Material handling	1. Material handling service goods receceiving, storage movements, inventory and add hoc quality checking after goods receival (default) 2. Tailored service
	Purchasing	Purpose of sourcing service is to do home calls/purchase orders, do optimization of costs, capital and service in the stocks, to be in control of supplier process and product quality, including claims 1. Fortaco has full purchasing responsiblity 2. Fortaco has purchasing responsiblity for B & C items and steel parts 3. Fortaco has purchasing responsibility for C items and steel parts 4. Fortaco has no sourcing responsiblity 5. Tailored responsiblity in sourcing
	Sourcing	Purpose of sourcing service is to do total cost optimisation so that customer and Fortaco would both benefit. Responsibility should be divided based on entire supply chain optimisation. Usually sourcing responsibility is linked with material ownership. 1. Fortaco has full sourcing responsibility 2. Fortaco has sourcing responsiblity for B&C items and steel parts 3. Fortaco has sourcing responsibility for C items and steel parts 4. Fortaco has no sourcing responsiblity 5. Tailored responsibility in sourcing
	Inbound logistics	Inbound logistics is arragend by the party that can do it in most economical way 1. Fortaco is paying the freight, FCA 2. Carriage paid to Fortaco factory (DDP) 3. Other terms of trade
	Outbound logistics	Inbound logistics is usually arranged by customer 1. Fortaco is paying the freight, terms of trade FCA (default) 2. Carriage paid to Fortaco factory (DDP) 3. Other terms of trade
Flexibility services	Delivery time	Delivery time expectations 1. < 4 weeks (default for cabins with fixed bom) 2. 4-6 weeks (default for configured products) 3. 7-10 weeks 4. > 11 weeks (default for tailored and project cabins)
	Demand deviation	Expectations for demand deviation. The higher the deviation, the bigger is the cost. 1. No deviation (default for project and tailored cabins) 2. Deviation < +/- 15 % (average weekly qty > 100 pcs for cabins with fixed bom and options) 3. Deviation +/-15 - 20% (default when avg weekly qty is 10-50 pcs for cabins with fixed bom and options) 4. Deviation +/- 20 - 40 % (average weekly qty < 10 pcs for cabins with fixed bom and options)
	Fast track delivery	Fast track delivery requirements are defined based on customer needs 1. No need for fast track deliveries
	Order change service	Order change services are other changes than delivery time services and need to be agreed case by case depending on manufacturing completeness and material availability.
	Stocking services	Stocking services are always tailored
	Capacity reservation services	Capacity reservation services are always tailored
Customer service (default has been defined, other possibilities are tailored services)	General customer service	Inquiry handling times (default) - Order and delivery statuses for configured and fx cabins 3 working hours - Order and delivery statuses of project and tailored cabins 6 hours
	Order handling	Order handling times for different product segments (default) - Cabins with fixed bom 24 hours - Cabins with options 48 hours - Tailored cabins in 3 days - Project cabins agreed case by case
	Claim handling	Standard claim handling times (default) - 1st response in 3 working hours - 2nd response with quck sollution e.g. delivery of new parts in 2 days - 3rd response with final solution in 7 days
	Electronic documentation handling	Standard is that there is no electronic handling. Tailored alternatives are 1. Sales order EDI 2. Sales order and order confirmation EDI 3. Tailored way
	Customer contacts	1. Single contact person is used (all communiction is via one single person with substitute) 2. Multi contact persons are used (separate persons for order handling, claims, quality etc.)
	Cooperation planning	Cooperation is planned in following way. - Weeky meetings by order handling - Quarterly development meetings by site sales or management
Delivery services	Packing	Expectations for packing 1. No packing 2. Customer owned resycled packing 3. Pallet packing (default) 4. Cage packing 5. Sea packaking 6. Tailored packing
	Labeling	Expectations for packing 1. Standard labeling (default) 2. Tailored labeling
	Delivery planning and reporting	Expectations for planning and reporting 1. Supplier is making delivery planning and reports to customer about transportation 2. Customer is responsible for delivery planning and reports to supplier about transportation
	Invoicing	Invoice is sent via 1. PDF via E-mail 2. Electric invoice (default) 3. EDI invoice 4. Reporting into customers system 5. Tailored invoicing system
	Kitting	Expectations for documentation 1. Packing and shipping list 2. Testing documentation 3. Manufacturing documentation 4. Change documentation

Appendix 10. OTD process and order penetration simulation