



**UNIVERSITY
OF OULU**

FACULTY OF TECHNOLOGY

**Productisation of services: A case study in a
manufacturing company**

Jing Chen

PRODUCT MANAGEMENT

Master's thesis

August 2019



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ABSTRACT FOR THESIS

University of Oulu Faculty of Technology

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Abstract <p>Purpose: This thesis examines service productisation in the context of manufacturing companies. The study focuses on understandings, process, challenges of service productisation in the case Business Area. The aim is to figure out how manufacturing companies can improve their service business performance through service productisation. Three research questions are framed: 1) what is service productisation and what is its process according to the literature? 2) What is the current situation in the case BA regarding service productisation? 3) What are the recommendations on service productisation in the case BA?</p> <p>Methodology/approach/data: The thesis applies a qualitative single-case study design. Literature review on the topics serves as the theoretical support for realising the case study. The case study is conducted from two levels of analysis: the case Business Area and the case service. Data is collected by semi-structured interviews, observations, material learnings, and meetings.</p> <p>Findings: The previous literature of service productisation can work well in the case manufacturing company, from perspectives of perception, best practices, processes, benefits and challenges. Five practices are designed for productising the case service. A general framework for service productisation in the case company is put forward. Productisation facilitates the evaluation of a service product in a systematic way, which allows for discovering new business opportunities throughout the service productisation process.</p> <p>Research limitations: Generalisation of findings is concerned as they are from a single case study. The whole service productisation process is not fully implemented in the case Business area due to the time limit. Practical outcomes need to be further validated.</p>			
Keywords: Service productisation, productisation process, industrial service, manufacturing			

PREFACE

I started the master thesis work since March 2019. It took almost six months to finalise the thesis. The whole journey was not always going smoothly. For example, I was confused about the objectives and unable to define the scope, especially in the beginning. Discussions with supervisors and more in-depth understandings about the case company help me overcome the difficulties. In particular, I would like to show my warmest thanks to Prof. Haapasalo for sharing his wisdom and experience on this thesis work.

My special thanks go to my bosses, Hannu Oja, and Risto Silvola. Thanks for offering me this great opportunity to work on this interesting topic. I feel very privileged to have been able to work with so many inspiring people in such an incredible working environment. I am also grateful for their patience, guidance, support, and kindness throughout the journey.

Lastly, I want to express my sincere gratitude to my parents, who have held my back all the time. When I decided to quit from the previous job and start a new journey, they supported me both mentally and financially. Without their love, I cannot achieve where I am now. I also want to thank myself for hard-working and bracing new challenges bravely.

Hyvinkää, 13.8.2019

Jing Chen

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ABBREVIATIONS AND DEFINITIONS

BA	Business Area
e.g.	exempli gratia (for example)
etc.	et cetera (and so on)
IHIP	Intangibility, Heterogeneity, Inseparability, Perishability
IoT	Internet of Things
i.e.	id est (that is)
PDCA	Plan, Do, Check, Act
RQ	Research question
SP	Service Productisation

Blueprinting

Blueprinting is a method to visualise service processes. It portrays the service system and reveals the relationships or activities among the stakeholders. It can be used to map an existing service process or to plan a new service process.

Concretisation

Concretisation is an approach to make a service less ambiguous and more concrete to understand, communicate and evaluate. It can be achieved for example by describing the service content and displaying the process.

Industrial Service

Industrial services are services related to industrial products or industrial systems, developed and provided by industrial suppliers or manufacturers of industrial equipment, and marketed to industrial clients or clients with industrial production.

Modularisation

Modularisation is an approach to design and produce smaller subsystems which can be configured into complex products/services. Every part has a certain functionality yet functions together as a whole.

Service Productisation

Service productisation is a methodology to make either the existing service or a new service more concrete to sell as well as more effectively and efficiently to produce, with a rational degree of systematisation and modularisation.

Standardisation

Standardisation is the process of developing standards to guide the creation of products/services based on the consensus of all stakeholders. It can be applied to any processes, activities or systems.

Systematisation

Systematisation is an approach to organise something in or according to a system or a rationale.

Tangibilisation

Tangibilisation is an approach to make a service/product more tangible and visible to customers. It can be achieved by adding tangible features e.g. physical materials.

1 INTRODUCTION

1.1 Research background

Linking services to manufacturing is not a new trend. Traditionally, manufacturers offer complementary services along with core products, such as maintenance and repair services. The recent trend is that manufacturers are not only augmenting their products with services but are also developing new service offerings in which the product itself is no longer the core of value proposition (Kindström and Kowalkowski, 2009). Today, more and more manufacturing firms are increasingly expanding their service business as a core strategy and a key growth source (De Brentani, 1995; Herterich et al., 2015; Schmitz et al., 2015; Valminen and Toivonen, 2009).

However, in contrast to the increasing demand for industrial services, the knowledge of how to develop and manage industrial services has not received relatively adequate development. Manufacturing companies have difficulties in understanding the nature of service and service production (Schmitz et al., 2015; Valminen and Toivonen, 2009). Moreover, the manufacturing industry is subject to substantial technological changes. There is a lack of standard and systematic approaches to exploit service potential successfully and to react to the changing environment. (Schmitz et al., 2015) In addition, low service productivity due to the specific nature of services is another issue which affects the growth of services (Järvi, 2016).

To overcome these challenges, productising service has been brought up to the discussion. Jaakkola et al. (2009, p.3) argue that productisation is one way to systematise the development and delivery of service so that to achieve a competitive and profitable service product. Nevertheless, Harkonen et al. (2015) point out that the general discussion on the service productisation in the literature seems to be lacking depth and the terminology utilised is not unambiguous. Comparing to productising other services, limited researches on industrial services are conducted. Hence, there is a strong need to study service productisation in the context of the manufacturing industry.

1.2 Objectives and research questions

The main motivation for this research has arisen from the practical challenges of developing service business in manufacturing firms. The objective of this study is to figure out how manufacturing companies can improve their service business performance through service productisation. In particular, this thesis will focus on examining the service productisation inside the case Business Area (BA) from the case company. To achieve this goal, the research objective can be framed into the following three research questions (RQ) in a chronological order:

RQ1: What is service productisation and what is the process of service productisation according to the literature?

This RQ is aiming to define the term service productisation (SP) and to find out how to implement SP according to the existing literature. Answers to this question can provide theoretical guidance for the following case study and discussions.

RQ2: What is the current situation in the case BA regarding service productisation?

By mapping the current state, the aim is to evaluate the environment and capability of the case BA to implement service productisation. To achieve this, analysis will focus on reviewing the current SP level to recognise the best practices and identifying the challenges to design better solutions. Additionally, an in-depth study of the case service will be conducted to discover the detailed obstacles. To better answer all of these, three sub-questions are formed as follows:

1. What are the best practices of SP recognised in the case BA?
2. What are the challenges in daily routines and the challenges in SP in the case BA?
3. What are the obstacles for the case BA to better develop the case service?

RQ3: What are the recommendations on service productisation in the case BA?

This is to figure out how to further implement service productisation in the case BA based on the analysis of the current situation and literature synthesis. Firstly, the recommendations on productising the case service to overcome the specific obstacles

should be given. Then, the study will focus on how to apply the learning experience from the case service productisation into general service productisation in the case BA.

Apart from the RQs, the comparisons between the case study findings and the literature are also made. This is aiming to evaluate the practical case study. On the other hand, the literature, especially in the context of SP in the manufacturing industry, will be enriched.

1.3 Research approaches and thesis structure

Qualitative research can be conceived as a set of interpretive activities which seek to understand the situated meaning behind actions and behaviours (Sinkovics and Alfoldi, 2012). It is argued that a qualitative approach is the most appropriate way to attain a holistic perspective and obtain in-depth-knowledge about certain objects (Sinkovics et al., 2005). Taking this into consideration, in the present study, a qualitative research method is utilised.

In particular, this study applies a qualitative single-case study design, focusing on the investigation of one case company. Case study research enables the researchers to collect data from a variety of resources, to converge the data to illuminate the case, and to answer “how” and “why” type questions (Baxter and Jack, 2008). Therefore, the case study approach is used in this study. According to Yin (1984), case studies can employ an embedded design, which is multiple levels of analysis within a single study (see e.g. Eisenhardt, 1989). The same design is applied. The case study is conducted at two levels of analysis: the case BA and the case service. Case studies typically collect data through archives, interviews, questionnaires, and observations, with either qualitative (e.g., words) or quantitative (e.g., numbers) evidence (Eisenhardt, 1989). The present case study consists of data collection methods including interviews, observations, material learning, and discussion workshops. In addition, a semi-structured interview is selected, which means it narrows down the scope to several specific topics and has space for open discussion as well. It provides flexibility to allow for the discovery or elaboration of information that is important to participants but may be ignored previously by the research team (Gill et al., 2008). More detailed information about the case study approaches used in this study is going to be explained in section 3.1.

The thesis is structured as follows. It starts with reviewing the relative literature, to understand the theoretical background. Literature synthesis is made, and the first research question is answered accordingly. Then a case study within the context of the case BA is conducted via semi-structured interviews, observations, material learning, meetings and data analysis. Particularly, a service is analysed as the sub-case, too. Recommendations on productising the case service and implementing general SP in the case BA are given based on the findings of the case study and literature. Discussions are conducted via comparisons between the findings and literature, and conclusions as well as further suggestions, are given in the end. Figure 1 illustrates the process and structure of this research.

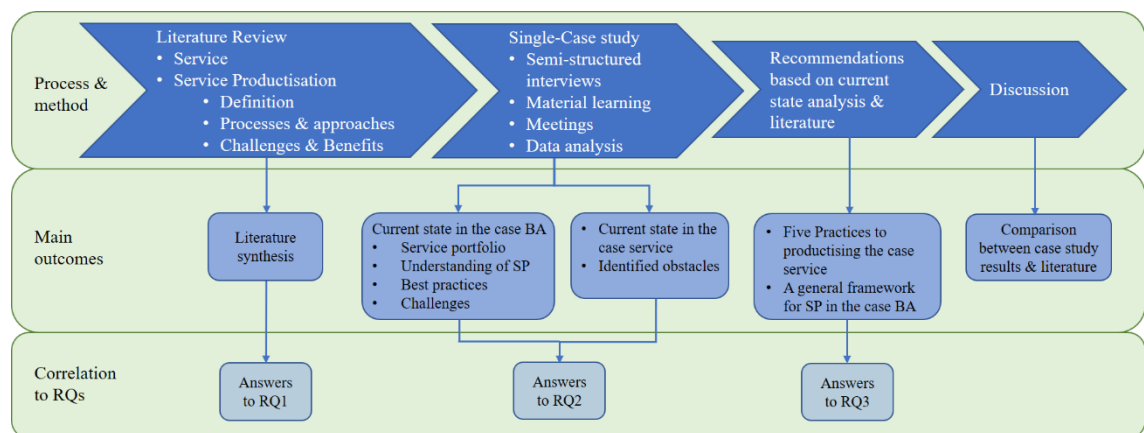


Figure 1 Research process and thesis structure.

2 LITERATURE REVIEW

2.1 Service

In this section, the definitions and characteristics of service as conveyed in the literature are described shortly. It is not aimed to conduct an extensive literature review on all existing definitions but to present different perspectives under this topic and draw a basic picture of the diverse nature of service. This also applies to the description of industrial services in sub-section 2.1.2.

2.1.1 Nature of service

The service concept has been defined by scholars in many ways (Edvardsson et al., 2005; Ylitalo, 2011). Three different aspects of the service concept are used widely in the literature. The first aspect is defining service as an activity or a process. (Grönroos, 2008) Edvardsson (1997) view service as part of the wider concept product, which is the result of a production process. The object of service consumption is the process rather than the outcome (Grönroos, 1998). Solomon et al. (1985) argue that service marketing refers to the marketing of activities and processes rather than physical goods. The second aspect of service is related to a perspective on the customer's value creation (Grönroos, 2008). Edvardsson et al. (2005) conducted research of service portraits based on literature review and interviews with leading scholars in the service research field. The findings suggest that service is used as a perspective on value creation rather than a category of market offerings and the focus is on value through the lens of consumers (Edvardsson et al., 2005). Lastly, service can be referred to a perspective on the provider's activities i.e. business logic (Grönroos, 2008). Vargo and Lusch (2004) define service as the application of specialised competences e.g. skills and knowledge, through deeds, processes, and performances for the benefit of another entity or the entity itself i.e. self-service. Lovelock et al. (2015, p.7-8) capture the meaning of services as economic activities which provide time, place, form, problem-solving or experiential value to the receiver.

Although the discussion about the notion of service has difficulties to reach a prevailing definition, characteristics of service can separate itself from goods. Zeithaml et al. (1985) identify the IHIP attributes to describe the distinctive nature of services in general, which

stand for Intangibility, Heterogeneity, Inseparability of production and consumption, and Perishability. Intangibility means, in contrast to products, services are rather activities or processes, without a physical body (Edvardsson et al., 2005; Zeithaml et al., 1985). Intangible elements make it difficult for customers to visualise and understand service and consequently harder to evaluate (Lovelock et al., 2015, p.14). Heterogeneity refers to the potential high variance in the performance of services (Zeithaml et al., 1985). Service providers, service processes, even the service production within a given company, can all tend to be heterogeneous, due to the difference of industries, variation in employees and customer needs (Edvardsson et al., 2005; Ritala et al., 2013). The inseparability of production and consumption describes the fact that service is produced and consumed simultaneously. Perishability means that services cannot be saved or stored in inventories as products do. (Zeithaml et al., 1985) Moeller (2010) further assigns the IHIP characteristics more clearly to certain aspects of service instead of as a single entity, so that to make each characteristic valid and useful.

However, some scholars question the validity and reference of the IHIP characteristics (Edvardsson et al., 2005; Lovelock et al., 2015, p.13-17; Vargo and Lusch, 2004). Lovelock et al. (2015, p.13) mention the generalisation issue that people should not apply equal force to all services. Vargo and Lusch (2004) argue that these characteristics do not delineate services from goods adequately. Edvardsson et al. (2005) point out that the essence of value creation through service, the process and interactive nature of services are not captured by the IHIP characteristics.

Furthermore, Grönroos (2008) argues that the process nature of a service is its most distinguishing characteristic. Grönroos (1998) highlights the fundamental difference between service consumption and physical goods consumption. According to him, consumers perceive the production process as part of the service consumption, not only the outcome of that process as goods consumption. Indeed, customers take part in the service production process and interact with service providers' employees, physical resources, facilities, and systems (Grönroos, 1998; Lovelock et al., 2015, p.14). Value is created during the process by customers and service providers. Both the process and its outcome affect how the quality and value of a service is perceived by customers, whereas only the outcome of the production process counts for customers who consume physical products (Grönroos, 1998). Lovelock et al. (2015, p.7) also point out, the consumption of a service does not result in the ownership of anything.

2.1.2 Industrial service

Although the term of industrial service is adopted frequently in the literature discussion, there is no unambiguous definition of what industrial service is (Schmitz et al., 2015). Industrial services are usually characterised as services offered in a business-to-business context (Rekola and Haapio, 2009, p.25; Schmitz et al., 2015; Valminen and Toivonen, 2009). This means industrial services are marketed to industrial clients or clients with industrial production (Brax, 2005; Jackson and Cooper, 1988). Meanwhile, they are developed and provided by industrial suppliers or manufacturers of industrial equipment (Brax, 2005). Schmitz et al. (2015) summarise that industrial services are services relating to industrial products or industrial systems. According to them, far beyond traditional services such as maintenance, repair, and overhaul, industrial services also include value-added services which comprise activities such as condition monitoring, advanced diagnostics or fleet management.

More and more industrial companies are tempted to adopt a full-service strategy by offering full-service contracts and availability (Rekola and Haapio, 2009, p.30; Schmitz et al., 2015). Advances in technology also have a significant influence on what and how industrial services can offer. For instance, some manufacturers start to provide knowledge-intensive services to support customer's business by utilising their perspective on service production (Valminen and Toivonen, 2009). Development of Internet of Things (IoT) enables the service provider to gain a deep understanding of actual production and to be closer to customer operations and consequently changes the service provider's position in the value chain (Rymaszewska et al., 2017). On the other hand, from the customer point of view, they are willing to buy higher-value services than they did in the past (Schmitz et al., 2015). With new technical progress around the corner, there will be new and more complex applications in industrial services for sure (Aleksy et al., 2009).

2.2 Service productisation

2.2.1 Concept of service productisation

There is not a prevailing shared understanding of what is service productisation in the literature. Some popular arguments in the literature discussion concerning the definition

of service productisation are presented. Table 1 summarises these understandings and corresponding references.

Table 1 Service productisation as conveyed in the literature.

Service productisation is understood as	References
To make services more product-like and tangible	Chattopadhyay (2012), Kim and Yoon (2012), Salmi et al. (2008), Skalen and Hackley (2011), Valminen and Toivonen (2007)
To make services more product-like, and to systematise service components and processes	Järvi (2016), Lehtonen et al. (2015), Nagy (2013), Valminen and Toivonen (2012)
To systematise and standardise services	Andreini et al. (2016), Cusumano (2008), Djellal et al. (2013), Levitt (1972, p.41), Suominen et al. (2009)
Linked to service innovations	Hemple et al. (2015), Valtakoski and Järvi (2016)
To standardise and modularise service and its processes	Bask et al. (2010), Kim (2009), Ritala et al. (2013), Rajahonka (2013)
To get the ultimate form of services ready before launching	Ohvanainen et al. (2013), Simula et al. (2008)
To define and develop services based on customer requirements and needs	Danson et al. (2011), Flamholtz and Aksehirli (2000), Flamholtz (2002)
To specify the entire service portfolio systematically	Ahokas's (2012), Saarela et al. (2014)
Linked to the evolution of the service components to include a product or a new service component marketed as a product	Baines et al. (2007)

Valminen and Toivonen (2007) refer productisation of services to make the service offering more product-like, i.e. more stable and visible, by defining the core process and its outcome. It can be accomplished by associating tangible features with intangible services (Chattopadhyay, 2012). Similarly, authors such as Kim and Yoon (2012), Salmi et al. (2008), Skalen and Hackley (2011), describe service productisation as the process to make service more product-like, to tangibilise and concretise the service offering. Jaakkola (2011) defines this as one of the productisation practices. It is argued that service productisation can make service more product-like and tangible through the systematisation of both service components and service processes (Lehtonen et al., 2015; Nagy, 2013; Valminen and Toivonen, 2012). Not only defining the service content via

transforming existing knowledge into a more marketable form, productisation also considers the company's internal processes by systematising processes linked to service delivery (Järvi, 2016).

When talking about systematising service, the root can be traced back in the 1970s, in which time the issue of efficiency in services was raised (Valminen, 2011). Levitt was one of the first researchers to tackle this issue (Ahokas, 2012; Järvi, 2016; Valminen and Toivonen, 2012; Virtanen, 2013). According to Levitt (1972), to improve the quality and efficiency of the service, companies must apply a manufacturing approach to a service situation, which substitutes technology and systems for people and serendipity. He argues that service production could be carefully planned, controlled, automated, and regularly reviewed for performance improvement and customer reaction as manufacturing is, by applying the same kinds of technological, laboursaving, and systems approaches e.g. technological devices or processes as manufacturing does. In the mid-1970s, researchers advocated facing customers with standardised, procedurally driven operations (Bowen and Lawler, 1992). This line of thinking which links to standardisation and systematisation of service continues by other researchers in the following decades.

Suominen et al. (2009) define the term of service productisation as a standardised process which aims to produce a high-quality commercial service viable in the market from produced information. They emphasize quality, customer demand and market orientation throughout the process. Andreini et al. (2015) term the standardisation of the production and delivery processes of services as productisation. With standardisation of services, the same service product can essentially be replicated repeatedly within minimal variations (Djellal et al., 2013). Cusumano (2008) argues that services need to be productised so that to increase the efficiency of service delivery. According to him, productisation of services can come from the reuse of components and design, computer-aid tools, and standardised process frameworks and training.

Some authors also link productisation to standardisation of services, however, in the context of service innovation. Valtakoski and Järvi (2016) define service productisation as formalisation innovation, which aims to make services less hazy by specifying service characteristics and, where possible, standardising service elements. Hemple et al. (2015) identify productisation as a kind of service innovation, which offers additional value to users by being more useable. The findings of their study suggest that the use of

productisation with standards and specifications plays an important role in managing conflicts in valuable business relationships.

However, complete standardisation, i.e. making different services act similar as possible, is not the aim of service productisation. The aim is to develop basic concepts, prototypes, and processes that can be flexibly applied in various customer situations. (Lehtonen et al., 2015; Valminen and Toivonen, 2012; Järvi, 2016). A certain degree of flexibility is required to meet customer needs (Edvardsson, 1997). Both academic researchers and practitioners are facing this dilemma: customisation or standardisation (Lehtonen et al., 2015). The concept of modularity is developed and recommended to help companies combine customisation and standardisation (Järvi, 2016; Valminen and Toivonen, 2012; Virtanen, 2013). Authors such as Bask et al. (2010), Kim (2009), Rajahonka (2013), Ritala et al. (2013), define the term of service productisation as standardisation and modularisation of the service and its processes.

There are some other voices in the discussion regarding the definition of service productisation. Simula et al. (2008) label “productisation” the activities that firms should perform to rationalize the ultimate formation of a product. It consists of defining, describing, improving, producing and continuously developing the offering so that customer benefits are maximised, and the organisation’s goals are achieved (Simula et al., 2008). Similarly, Ohvanainen et al. (2013) understand productisation as a phase where the actual easy-to-sell and easy-to-acquire service product takes its final form before launching it.

Some authors emphasise more on customer perspectives in the productisation. Flamholtz and Aksehirli (2000), Flamholtz (2002) refer productisation to the process of analysing target customer needs, designing the service, developing the ability to produce, to meet customer needs. Danson et al. (2011) understand productisation as to define services based on customer requirements to the extent that customers can articulate them (see e.g. Harkonen et al., 2017). Saarela et al. (2014) understand the concept in a different way, which is from a portfolio perspective. They argue that the goal of productisation is to clarify the service portfolio, to minimise ad hoc services and to develop more specialised services according to the lifecycle. (see e.g. Harkonen et al., 2017) In Ahokas’s (2012) study, the term “productisation” refers to a process in which the company’s entire service portfolio is specified and structured to a more manageable form. Additionally, Baines et

al. (2007) see productisation as the evolution of the service components to include a product or a new service component marketed as a product.

2.2.2 Processes and approaches of service productisation

According to Rekola and Haapio (2009, p.96), the cornerstones of service productisation can be summarised as follows: the name, the price, the configuration and packaging, the quality, intellectual property rights, the service description or specification, and proactive service contracting. With a uniform name, a service can be recognised by others by employees and customers. A set price from thorough consideration is required. Ideally, service development produces service modules which could be configured to form different service packages (Rekola and Haapio, 2009, p.102). The quality standards are set for follow-up and measurements so that service quality can be evaluated during the productisation. Extra attention should be paid to issues related to intellectual property rights and ownerships, to protect service providers' benefits from competitors and even from collaborators, due to the intangibility nature of service products. As the most important element of service productisation, a service description should provide clear, concise and unambiguous answers to as many service related questions as possible. Lastly, good alignment between the service description and the contract can limit the risk of disputes over the content and scope of the service. Defined terms, proactive planning and careful contracting can be used to achieve that. (Rekola and Haapio, 2009, p.103-110)

With these cornerstones, a service can be reviewed and checked if it is productised well or not. In addition, a good documentation of service related materials, such as service plans, selling methods, contracts, etc., is a requirement for successful productisation as in such way anyone can start to continue to operate (Parantainen, 2011). On the other hand, if questions related to a price of a service product, a composition of a service product and a responsibility of a service product development, cannot be answered, the service product is recognised as poorly productised. This means the pricing bases are missing. Nobody knows about the content of the services nor the experts who make decisions of pricing and development. (Parantainen, 2011)

Not all the service products are worthy to be productised since service productisation is not the universal solution to all challenges. There are some key elements or characteristics which a service should first meet if it is considered to be productised (Tuominen et al.,

2015, p.8; Valminen and Toivonen, 2009). First one is that there must be a real customer need to be answered by the service. The service needs to create value to the customer as well. Secondly, if the service is so complicated that it is difficult to communicate both internally and externally, then productisation is ideal for this service. (Valminen and Toivonen, 2009) Thirdly, this specific customer need should recur quite similarly (Tuominen et al., 2015, p.8; Valminen and Toivonen, 2009). It is also argued that there should be some repetitive work in the service implementation. Moreover, the service is in line with the corporation strategy and it is, or at least could be, economically viable. (Tuominen et al., 2015, p.8-9)

To achieve a well productised service, researchers and practitioners are looking for solutions. Frameworks, processes, or certain practices are developed. Jaakkola (2011) identifies three central practices of productisation based on practitioners' shared perceptions, which are specifying and standardising the service offering; tangibilising and concretising the service offering and professional expertise; systematising and standardising processes and methods.

The process of service productisation varies. It depends on company's objectives of productisation and its strategy (Jaakkola et al., 2009, p.1; Valminen and Toivonen, 2007). Jaakkola et al. (2009) define a productisation process consisting of seven stages: 1) assessing the needs of customers and how they are going to be answered; 2) defining the structure, contents, and process of the service; 3) specifying the degree of standardisation; 4) concretising the service by creating service description, brochures, etc.; 5) selecting the principles of pricing; 6) following-up and measuring the service; 7) anticipating the needs for continuous development.

Some argue that six common phases can be recognised to productise a service successfully. Firstly, some procedures which have worked well in the past are going to stand out and to be replicated by others. Secondly, service gets a name, a certain shape, and price. Thirdly, the service content becomes stable which makes it possible to solidify the price. Fourthly, services start to multiply inside the company. Know-how is shared among employees. Above four phases can be unintended, however, the fifth phase must be done in purpose. In this phase, services should be well documented to be repeated outside the company. Moreover, service is usually divided into modules in the fifth phase.

Lastly, services are ready to be used via the distribution network. (Aapaoja et al., 2012; Parantainen, 2011)

Toivonen (2012, p.5) describes the service productisation process in nine phases (see e.g. Immonen, 2015). Firstly, the scope of service to be productised, e.g. a complete service process or part of it, should be limited. The second phase is to specify the customised service with consideration of customer needs. Then, make a service promise or a commitment which defines the service and explains how and when it is going to be produced. The fourth phase is to design a servicing package which includes a specification of the servicing construction, process, and resources. In fifth phase, generate a service format with a standard operating procedure and agreed partial standardisation. Next phase is the training of the employees and commitment to the service. The seventh and eighth steps are to document the services to the customer and to follow up as well as evaluate the progress of the services. Lastly, a service reconstruction may be needed for further development of the service. (Toivonen, 2012, p.5, According to Immonen, 2015)

Tuominen et al. (2015) categories productisation processes into three types, traditional, agile and iterative process. According to him, the traditional step-by-step productisation proceeds in the checklist type by using traditional project management methods. When a service wants to get to the market as soon as possible, the agile productisation process can be utilised, which focus first on making external elements of the service more visible to the customers. The service can be sold to customers already during the productisation. The iterative productisation process is based on phasing out the service by constantly reviewing, updating and changing in all stages if needed. (Tuominen et al., 2015, p.10-11) The productisation process with six common phases mentioned earlier belongs to the traditional type of process (Parantainen 2011).

During the operation of the LEAPS-project (Leadership in the Productisation of Services), Tuominen et al. (2015) developed an open and inclusive productisation process cycle. It starts with identifying the need of productisation, coming after five main stages, and ends in putting the end product into practice and keeping it alive. The five main stages are as follows: 1) clarifying the objectives of the productisation with consideration of different perspectives; 2) mapping the current situation with relevant knowledge and stakeholders involved; 3) challenging established views to recognise critical elements or new, more efficient ways of working; 4) summarising the vision of the productisation

with a comprehensive understanding of all the groups involved in the service; 5) evaluating and simulating the final output for potential further development. (Tuominen et al., 2015, p.12-13) This process cycle can proceed iteratively when necessary.

Table 2 summarises the above-mentioned productisation processes. As shown in the table, there are similar processes proposed by different authors. Six processes are in common for three-quarters of the authors: assessing customer needs, defining the service content, structure and process, standardising the procedure and/or content, documenting related service materials, following up and measuring, and continuously developing the service. There are three phases mentioned by half of the authors, which are defining the scope of the service, discovering the best practice, and solidifying the price when the content is stable. The rest six phases are supported only by one author.

Table 2. Summaries of Service Productisation processes.

Process of Service Productisation (SP)	Jaakkola et al. 2009	Parantainen 2011	Toivonen 2012	Tuominen et al. 2015
Clarify the objectives of SP				X
Define the productisation scope of target			X	X
Discover the best practice		X		X
Assess customer needs	X		X	X
Set a name, a shape and a price		X		
Make a promise or a commitment			X	
Define the service structure, content and	X		X	X
Solidify the price when content is stable	X	X		
Standardise the procedure and/or content	X	X	X	
Train the employees			X	
Concretise the service	X			
Document related materials		X	X	X
Follow up, measure and simulate	X		X	X
The service is ready to be used externally		X		
Develop the service continuously	X		X	X

Simula et al. (2008) develop a framework which divides productisation between inbound and outbound activities (Figure 2), based on traditional product-based industries and situations where the output that is being sold consists of only service elements are excluded. Inbound productisation is seen as an ability to make repeatedly with reasonable costs, from technology to a core product. In practice, an inbound productisation consists of various engineering related tasks such as final design specifications, manufacturing ramp-up, testing process and quality control, etc. On the other hand, outbound productisation is seen as an ability to sell. The purpose is to improve the visibility and concreteness of the offering for the customers and increase the value of a product perceived by customers. An extended product is the outcome of productisation efforts, which in practice are various marketing related tasks such as branding and naming, brochures and white papers, sales tools and pricelists, etc. A firm should be able to achieve a balance between the ability to make and the ability to sell. (Simula et al., 2008)

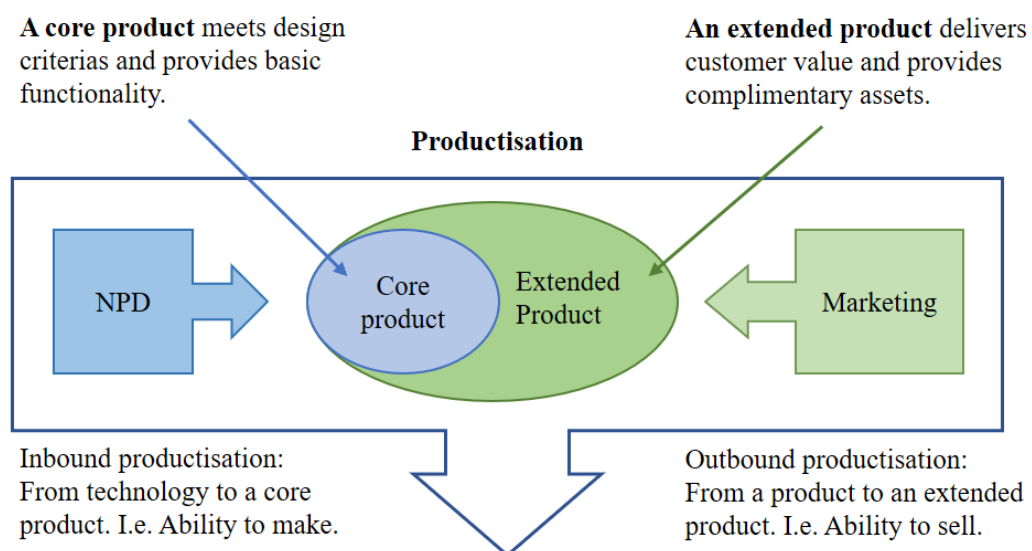


Figure 2. Conceptual illustration of productisation framework (modified from Simula et al., 2008).

Similar to the inbound-outbound framework, Kuula et al. (2018) apply the product management approach in service productisation and divide the process into commercial and technical parts (Figure 3). A commercial service portfolio defines service products, service configurations, service product families and solutions for customers and sales organisations, which can also be called commercialisation. A technical service portfolio structures the technical solutions for service products through specifying how they are going to be engineered, produced, purchased, supplied inside the company and by its suppliers. (Kuula et al., 2018)

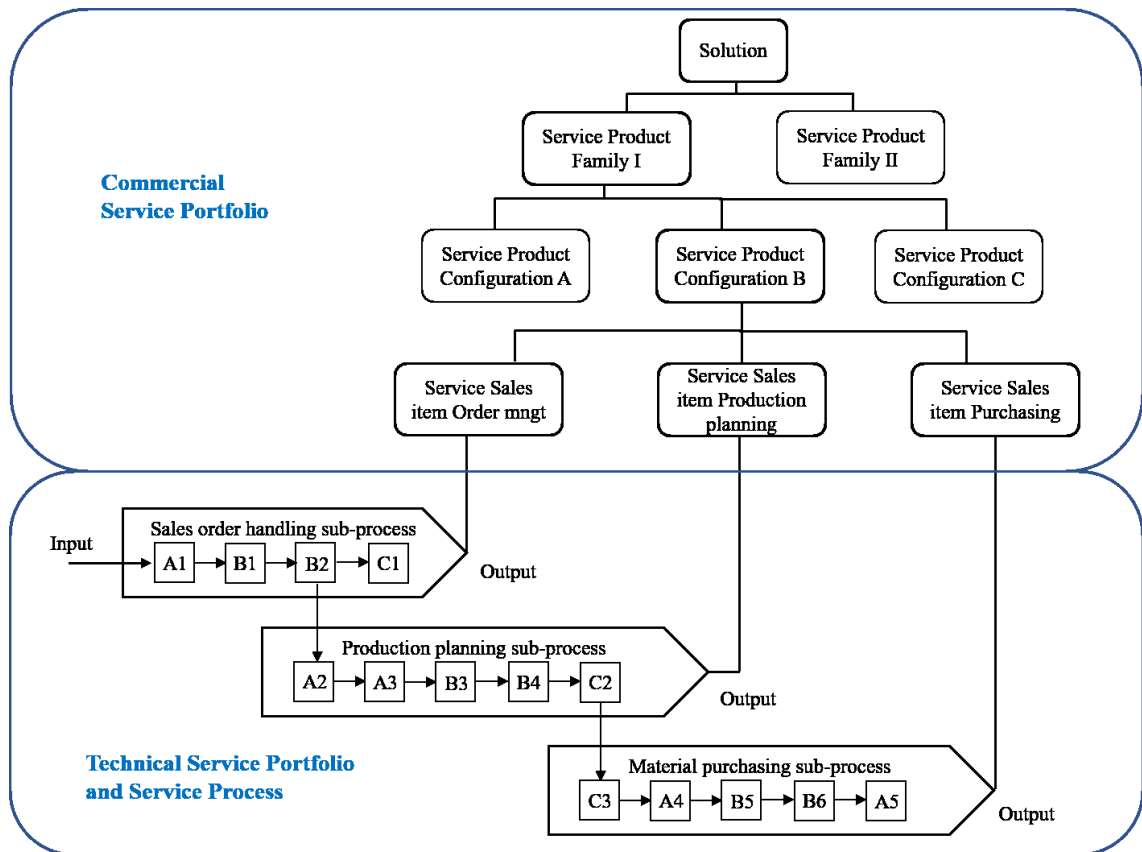


Figure 3. Service productisation based on commercial and technical service portfolios (modified from Tolonen et al., 2015).

In practical terms, service productisation employs various techniques, from the elicitation of employee knowledge to process mapping techniques (Valtakoski and Järvi, 2016). For example, the Six Sigma approach such as PDCA cycle can be applied to manage the quality of service processes and to continuously improve their performance (Valtakoski and Järvi, 2016; Ylitalo, 2011). Service blueprinting (Fließ and Kleinaltenkamp, 2004; Shostack, 1982) has been utilised as a tool or practice to visualise the process in service productisation quite commonly (Geum and Park, 2011; Harkonen et al., 2017; Valminen, 2011; Valminen and Toivonen, 2012; Valtakoski and Järvi, 2016; Virtanen, 2013). For better development of customer understanding, Valminen (2011) applies a customer-orientation approach in service productisation, which divides customer information in three types: knowledge about the customer, knowledge from the customer, and knowledge to the customer.

2.2.3 Benefits of service productisation

Many benefits come along with the service productisation. Chattopadhyay (2012) points out that productisation facilitates the evaluation of the service. According to him, the

increased tangibility and concreteness make it possible for customers to compare the outcome of the service with the promise as well as to compare the value received with the price, which in turn make the service more tempting and easier to purchase. Service productisation eases the customer's buying decision by reducing the fears and risks as the customer can easily understand the value of the service (Sipilä, 1996, p.19). Moreover, Ohvanainen et al. (2013) highlight the importance of visualisation of services as it is difficult to test services internally or externally without making them visible and easy to understand. With this visualisation, service descriptions and other materials created through service productisation allow for agile marketing, which makes marketing and sales of the service easier (Tuominen et al., 2015, P.7).

According to Ahokas (2012), in addition to clarification of the service offering for customers, service productisation increases the internal common understanding of the service and the organisation's core competence. Similarly, Tuominen et al. (2015, p.7) point out that, this common understanding of the service facilitates and harmonises internal communication about the service. Sipilä (1996, p.20) argues that productisation can unify the vision inside the organisation and provide internal descriptions of services for operational purposes.

Apart from making the "what" i.e. the value that the service creates work and visible, Rekola and Haapio (2009, p.10) argue that service productisation creates a service guideline to standardise the "how" i.e. how the value is created as well. Productisation makes the service production repeatable. Creating a common approach and varying degrees of standardisation of various service components enable the service and service process repeatability. Companies do not need to reinvent the wheel every time. (Tuominen et al., 2015, p.7) Proper standardised service processes enable the company to do more with fewer resources and time so that maximise the productivity excellence and efficiency in the end (Ahokas, 2012; Jaakkola et al., 2009, p.1; Ylitalo, 2011). As the service and its process become more manageable, the service organisation can have better control over its service portfolio and clientele (De Brentani, 1991). Jaakkola et al. (2009, p.1) also argue that service productisation can increase growth as well as improve margins and profitability. Consumers of services can benefit from standardisation of services and processes as well, as they obtain greater predictability of what they receive from the service provider. It facilitates comparisons between alternative providers and makes it possible to apply competitive tendering. (Lindberg and Nordin, 2008) Andreini et al.

(2015) further point out that productisation can smooth customer buying process with less price and less time, even it is a complex business service, and in the end can enhance the competitiveness of companies.

However, the benefits of productisation should not be considered only from the perspective of increased efficiency. Valminen (2011) argues one important benefit is the platform for intra-organisational learning that productisation and well productised services provide. According to her, it can be used for the systematic accumulation of user understanding derived from individual customer contacts, and for the sharing of this understanding in the service company. It has been proved that knowledge and experience alone are not enough for high-performance in service companies (Edvardsson, 1997). Therefore, the learning platform is required. Tuominen et al. (2015, P.6-7) emphasise the significance of building such a common understanding and better sharing of knowledge as well as know-how. According to them, this internal information sharing enhances staff engagement and cross-unit collaboration at different stages of productisation, and vice versa. Furthermore, Ahokas (2012) points out that service productisation helps the company become less dependent on individual competence. In addition, Sipilä (1996, p.18) argues that productisation facilitates the induction of new employees as there are already documented guidelines for new recruits to learn and follow.

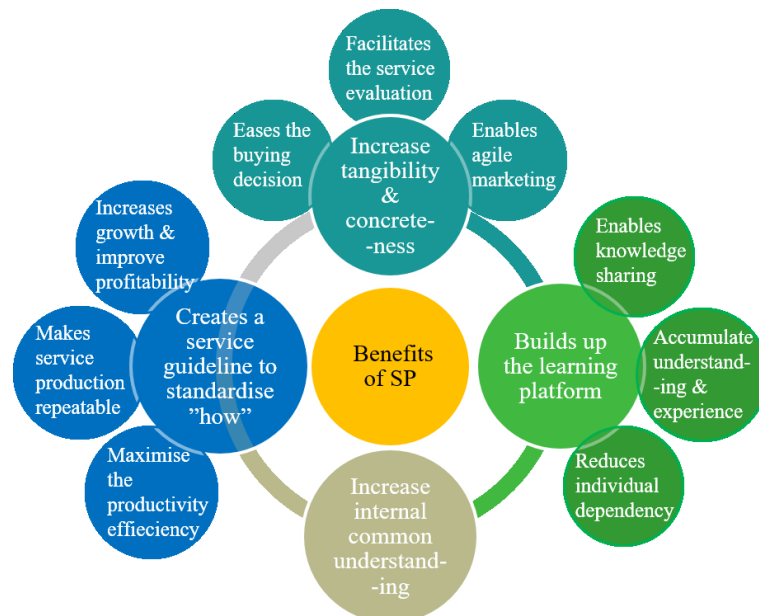


Figure 4. The benefits of Service Productisation.

Figure 4 summarises the above mentioned benefits of service productisation. SP bundles a service into a good-quality entity that is easy to understand, sell, buy, and multiply or replicate (Rekola and Haapio, 2009, p.10). Knowledge, as well as experience, are shared

and accumulated during the process. In the end, service productisation sets the service provider apart from its competitors in a positive way (Rekola and Haapio, 2009, p.10).

2.2.4 Challenges in service productisation

Though it brings lots of benefits, service productisation is not a solution to all problems (Aapaoja et al., 2012). During the implementation of service productisation, several challenges may be encountered by practitioners. Figure 5 illustrates the most common challenges of service productisation mentioned in the literature.

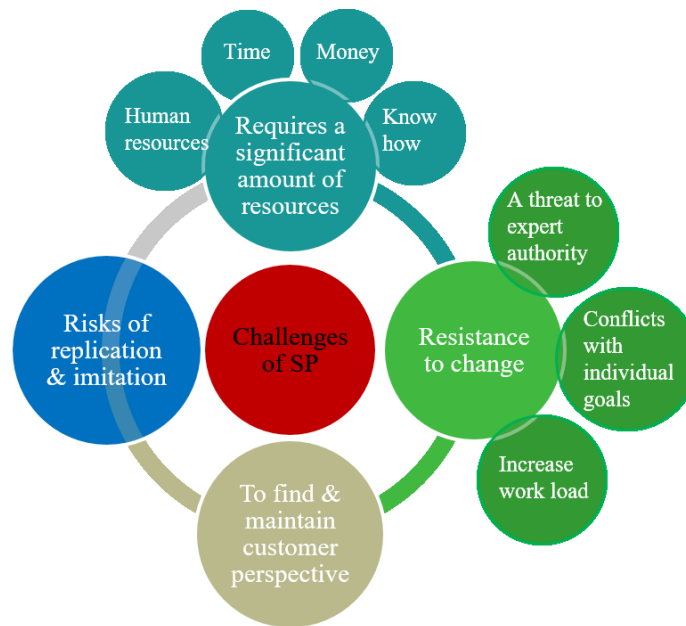


Figure 5. The challenges of Service Productisation.

First, service productisation requires a significant amount of resources (Ahokas, 2012; Valminen, 2011; Wali, 2018; Ylitalo, 2011). Resources can be capital investments, time, know-how, manpower, or anything needed. Congram and Epelman (1995) argue that service productisation is difficult and time-consuming and thus it requires a commitment of resources. Most likely, productisation generates extra workload, especially in the beginning. Lack of know-how will make the situation worse. According to Valminen (2011), in many service companies, even everyday service development is near mission impossible. How to achieve a balance between regular work and productisation task is quite challenging. Running out of resources can simply lead service productisation to failure (Wali, 2018; Ylitalo, 2011).

Second challenge is to find and keep customer perspective throughout the process of service productisation (Ahokas, 2012; Wali, 2018; Ylitalo, 2011). Companies cannot produce a service without customers. However, they can develop the best and right prerequisites for well-functioning customer processes and attractive customer outcomes. (Valminen, 2011) The delivery of service might depend on the presence and co-operation of users, which contribute to the completion of the transaction (Gallouj and Savona, 2009). Though productisation may concern the service company's internal processes, the service concept should be approached from customers' point of view (Edvardsson, 1997). Johnston and Jones (2004) argue that customer inputs have an impact on outcomes, perceived value as well as service productivity. However, maintaining the customer perspective is not an easy task. The balance between efficiency and customer-orientation is a familiar challenge to all service companies (Järvi, 2016). Productisation may lead to the loss of customer orientation (Suddaby and Greenwood, 2001; Tuominen et al., 2015, P.7). There is a high risk that the productised service no longer meets customer needs if the customer perspective is neglected during the process. The rational balance between standardisation and customisation is challenging to achieve. If productisation is based on a one-sided view, then the service will become too rigid and over productised. (Tuominen et al., 2015, P.7) To ensure the service productisation is adhered to customer perspective, continuous customer feedback should be taken otherwise it defeats the whole purpose of productisation (Wali, 2018).

Resistance to change inside organisation is another challenge likely to be confronted during productisation process (Ahokas, 2012; Wali, 2018; Ylitalo, 2011). There is a risk that productised processes are so strictly defined and inflexible that the motivation of participants crumbles (Tuominen et al., 2015, P.7). Some productisation tasks e.g. frequently documentation and continuous development work, may seem like time-consuming and laborious processes, especially for employees who are required to record the things they already know (Jaakkola et al., 2009, p.39). In addition, service productisation may be a conflict with participants' personal goals or for example performance pay (Tuominen et al., 2015, P.24). Productisation can be perceived as a threat to expert authority as well (Jaakkola et al., 2009, p.39; Tuominen et al., 2015, P.7). People may be reluctant to share their expertise and experience since they cannot see what benefits knowledge sharing brings. This unwillingness of sharing may depress the instilling a climate of trust in productisation which consequently affects the chances of productisation success (Valtakoski and Järvi, 2016). Motivation can be conducted by

mentioning not only the benefits of entire company but also the individual benefits, such as reduced routine task and facilitation of personal growth as well as advancement (Jaakkola et al., 2009, p.40; Rekola and Haapio, 2009, p.147).

Managing risks of replication and imitation from competitors is identified as one challenge of service productisation (Ahokas, 2012; Jaakkola et al., 2009, p.40; Ylitalo, 2011). Well-productised service and knowledge are vulnerable to piracy and can be easily imitated (Jaakkola et al., 2009, p.40; Suddaby and Greenwood, 2001; Ylitalo, 2011). Sipilä (1996, p.119) argues that a successfully productised service may raise the interest of competitors and decoy to replication. To deal with this issue, companies can use nondisclosure agreements and contracts with a confidentiality clause in addition to formal protections (Jaakkola et al., 2009, p.40; Rekola and Haapio, 2009, p.103).

2.3 Literature synthesis

To summarise, there is no single uniform definition of service productisation achieved among scholars and practitioners. Different definitions can be seen as different objectives to some extent. According to the literature, service productisation is more or less related to tangibilisation, standardisation, systematisation, modularisation of service contents or process, and service product portfolio management. In the present thesis, a broader definition of service productisation is adopted. It is seen as a methodology to make either the existing service or a new service more concrete to sell as well as more effectively and efficiently to produce, with a rational degree of systematisation and modularisation. In such a way, the added value is created and delivered to both companies and customers eventually. Above answer the first part of research question one, which is “what is service productisation according to the literature”.

Various productisation processes are developed in the literature by different authors, depending on the objectives. Some process follows a rigid sequence while others can be iterative. It is believed that four sub-processes mentioned in the literature could be generalised in all circumstances. This means, for every service productisation project, people should clarify the objectives of service productisation and define the scope of productisation first, then map the current situation and discover the best practice if exists and document all necessary materials throughout the productisation. Depending on the scope and time, usually, following-up and continuous development of the service are

needed regardless of the objectives. Table 3 outlines the common sub-processes and the specific sub-processes for service productisation. Seven common sub-processes are applicable to service productisation under different objectives while the other six sub-processes are specific to certain objectives, for example, to tangibilise and satisfy customer needs.

Table 3. Summaries of common and specific sub-processes for Service Productisation.

Common sub-process	Sub-process to tangibilise and satisfy customer needs	Sub-process to standardise and systematise
Clarify the objectives of SP	Assess customer needs	Define the service structure, content and process
Define the productisation scope of target service	Make a promise or a commitment	Standardise the procedure and/or content
Discover the best practice	Concretise the service	Train the employees
Document related materials		
Set a name, a shape and a price (if not yet)		
Follow up, measure, evaluate the output		
Develop the service continuously		

The above list does not mean exclusive but just to give an idea what are the processes for service productisation according to the literature and how to apply them depending on the objectives. Generally speaking, the process is quite flexible. In this study, different sub-processes will be applied based on the case situation and objectives. Additionally, the seven cornerstones of productisation defined by Rekola and Haapio (2009, p.96) can be used as a checklist, to quickly review how is the current condition of a service product in the context of service productisation. Above two paragraphs and Table 3 answer the second part of research question one, which is “what are the processes of service productisation according to the literature”.

3 SERVICE PRODUCTISATION IN THE CASE COMPANY

3.1 Case study approaches

The case study is conducted through semi-structured interviews, discussions, material learning and data analysis. The purpose is to collect empirical data as the preparation of answering research questions – “What is the current situation in the case BA regarding service productisation” and “What are the recommendations on service productisation in the case BA”.

A total of seven interviews was carried out within an average of 45 minutes each. The language of interviews is English. Interviewees were selected based on their job responsibilities and potential involvement with the case service and service productisation. Table 4 illustrates the background of the interviewees and interviews.

Table 4. Background of the interviewees and the interviews.

Interviewee code	Job responsibilities	Gender	Date of interview	Duration of interview
A	Service Marketing Manager	F	June 11	43 min
B	Service Product Manager	M	June 13	56 min
C	Vice President, Technology	M	June 14	29 min
D	Service Project Manager	F	June 17	1h 04 min
E	Director, IT and process development	M	June 17	33 min
F	Service Product Manager, Service portfolio development	M	June 18	1h 12min
G	Director, Technical support	M	June 28	32 min

The interview topics are mainly about service product portfolio, the process of service development and delivery, understanding of service productisation and practical challenges the interviewees are facing. Detailed interview questions can be found in APPENDIX 1. All the interviews are recorded and carefully transcribed.

Apart from the interviews, over twenty meetings were facilitated with employees from different departments in the case company regarding the thesis topics. Discussions across the functions help the author to get a comprehensive understanding of the whole company. For example, information such as how collaboration works across organisations, what the group strategy is, and what resources are available, is attained through these meetings. Extra materials are provided after discussions, including presentations of group-level strategies, handbooks, brochures, etc. Moreover, a certain amount of customer usage data from the case service is gathered as secondary data for further analysis. Figure 6 summarises the approaches and related resources utilised in the present case study.

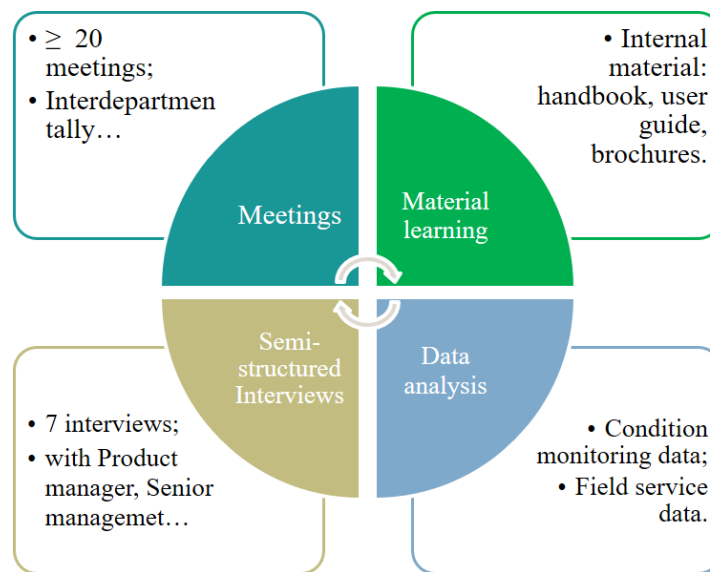


Figure 6. Case study approaches.

3.2 Introduction of the case company

The case company is a world-leading group in the manufacturing industry headquartered in Finland. As a large global company, the Group has approximately 17,000 employees at 600 locations in 50 countries. There are three business areas in the case company, which are Service, Industrial Equipment and the case BA. It serves a broad range of customers, including the general manufacturing, metal production, automotive, chemical industries, container transportation industry, etc. By continuously providing equipment, services as well as solutions, the case company is dedicated to improving the efficiency and performance of customer businesses in all types of industries. It also has a class A share on the Nasdaq Helsinki. In 2018, the case company achieved total sales of over 3,000 million euro, with a slight increase than 2017. Among the total sales, sales from Service

business area account for the most which are 36%, following by the sales from Industrial Equipment business area with 34%. The rest 30% of the total sales come from the case BA.

This study is conducted particularly for the case BA in the case company. The case BA offers a full range of equipment for ports, backed by a complete range of dedicated services globally. It also offers a consulting service and a suite of software products for operation. In the case BA, sales from equipment selling take a commanding lead, comparing to sales from service selling.

3.3 Current state in the case Business Area

3.3.1 Current service product portfolio

The case BA currently offers ten types of service products, including inspections, preventative maintenance, training, operational support, planned repairs, retrofits, modernisations, on-call assistance, consulting and engineering (Figure 7). This categorisation is made based on the content and activities of the service product per se. Each category of service products contains several different products dedicated to specific customer groups.

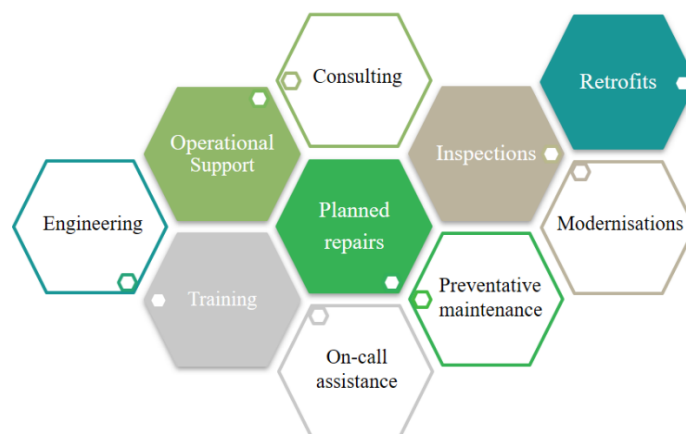


Figure 7. The original service product portfolio in the case BA.

A new portfolio structure was developed in the case BA since last year. There are three service product families classified based on the functions, which are automation products, uptime products, and environmental products. At the time of writing this thesis, a fourth

cluster is under development, which is digital service. Figure 8 describes the new developed portfolio structure.

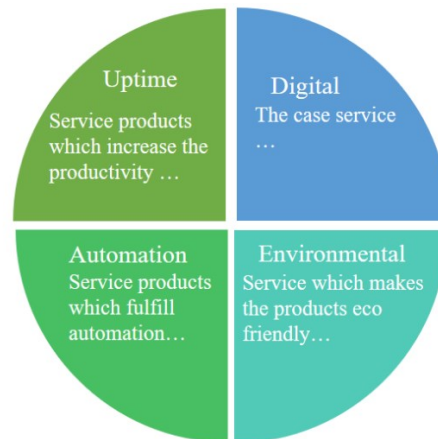


Figure 8. The new service product portfolio in the case BA.

The new portfolio was developed because the case BA wants to simplify the illustration of its capabilities and to make offerings more related to customer journey so that it is easier for customers to understand. In addition, from promotion point of view as well as internal alignment point of view, to develop certain groups where new service products can be fit into, it is easy to maintain and manage the service product portfolio. Otherwise, with the development, there will be too many products flowing around.

However, the new portfolio structure is not mature yet. It is more like a concept or a direction of development. This structure does not cover all ten types of service products. At least, half of the service products are beyond the scope of the structure. Potential changes on contents and personnel, also make it difficult to implement corresponding promotion materials. The preparation of materials is undergoing, though. The first mentioned categorisation is mainly used for marketing purpose, meanwhile, the new one is used as the supplementary information. Moreover, some argue that “Uptime” as the name of one product family is too general, not clear enough to the customers. A further modification is needed. For example, it can be split into more detailed categories of functions such as component upgrade, improvement of the lifetime, etc.

Four product managers are assigned to be responsible for corresponding service products included in the new service portfolio structure. They handle the development of service products, maintain and update service products at the technical level. They gather

information about customer needs from frontlines and salespeople, then interpret them into technical requirements. Product managers are technique experts on their specific service products so that they can be able to answer customers' individual questions as well as be consultants for salespeople and local team when it comes to service product specific questions. Additionally, product managers need to make sure all the documentation is in place, all the requirements are fulfilled, and the launches are prepared as well as conducted.

One product manager also takes the responsibility of new service development. It starts with investigating the market, collecting customer requirements and feedback from frontlines. After frontlines do the pre-screening, the product manager then put all the new ideas in a list, review and rank them from four perspectives which are business potential, strategic value, engineering efforts, and competition level. For some simple cases, the product manager will do preliminary engineering design, calculate the budget and write a short description, in which way to give an idea for customers how it will look and work. Since the request comes from customers, customers' capabilities for using new service products are considered.

3.3.2 Internal understanding of service productisation

People in the case BA share a wide range of different understandings in term of service productisation. Perceived definitions of service productisation can be summarised into five categories. Table 5 lists the categories and corresponding interviewees who support the understanding.

Table 5. Understandings of service productisation perceived by the interviewees.

Service productisation is understood as	No. of interviewees	Interviewee code
1) To define and develop service products to be ready and sellable	5	A, B, E, F, G
2) To package service offerings with a certain degree of modularisation	2	C, D
3) To Systematise service content and process	2	C, E
4) To Standardise service content and process	1	F
5) To tangibilise and concretise service products	1	A

1) To define and develop service products to be ready and sellable

Most of the interviewees interpret service productisation as the activities to define and develop the service product into a sellable form. This means that a service product should be ready both at commercial level and technical level. From the commercial point of view, a service product needs a name to be differentiated from others, a set of functions to fulfil specific customer needs and a price to be sold with. Two interviewees also point out that documents such as specifications should be available, and salespeople should know what and how to sell. On the other hand, from the technical perspective, service productisation refers to design, produce and deliver service products. To achieve this, firms need to have the ability, i.e. know-how, and capacity such as manpower, time, materials, to implement schedules, to manage risks ultimately and to make delivery efficient. According to one product manager's saying, in the end, through productisation, a service product should be so much ready that engineers and sales know what to do and product managers do not need to interfere but only maintain the service product.

2) To package service offerings with a certain degree of modularisation

Two interviewees perceive service productisation as packaging service offerings with some certain degree of modularisation. A service product can be combined with one or several modules, and some space to be partially tailored when offered to customers. A module which consists of certain pre-defined components or processes can be dedicated to fulfilling specific customer needs. In this way, it is easier to sell service products since flexibility is created. One interviewee also mentions that packaging and modularisation are internal operation tools. There is no need to tell customers this is a modularised package because they do not want to know how the company internally manages that. What matters is the flexibility, adaptivity, optionality a firm shows to the customers.

Furthermore, one interviewee highlights the importance of considering customer perspective when managing offering packages. Firms should understand customers and their needs comprehensively and timely. Questions such as what type of services over the lifecycle of the equipment is needed, what the added value to customers is, should be answered carefully. It is argued that, depending on the lifetime of the equipment, companies can develop more predictive packages with certain content active to the customer needs rather than only responsive to what they ask for. This proactive action towards customers is beneficial for more engagement with customer relationship.

3) To Systematise service content and process

Two interviewees mention that systematisation is one part of service productisation. It refers to systematic mind thinking, processes and approaches utilised in the lifecycle of service products. For instance, service product portfolio should be defined and managed in a systematic manner. The content of service offerings is rationalised. A firm needs to understand the drivers of customers' benefits, possible use cases, opportunities out of those and its limits. This can be achieved by systematisation, and in return, customer commitment is strengthened.

4) To Standardise service content and process

One interviewee refers to service productisation as the activities of standardisation. The objective of standardisation can be the content of service products, such as standard components, standard engineering approaches, and standard cost calculation templates. It can be the service process as well, either the development process or delivery process, such as standard new service development process and standard inspection process. The interviewee also mentions that documentation is one way to implement standardisation and, in a turn, standardisation eases the workload of documentation.

5) To tangibilise and concretise service products

Only one interviewee talks about tangibilisation and concretisation in term of service productisation. According to the interviewee, a service product with a clear description and well-defined specifications can be more tangible and concrete to customers, which may be easier for marketing people to promote and sell. However, the interviewee argues that productising a single service product may not bring too many benefits for marketing per se. This is because customers are more interested in the added value and the promised outcome of the service rather than service descriptions and specifications. Only if customers get attracted by the benefits, they start to wonder how to achieve that. Currently, in the case BA, marketing focuses more on the promotion of an entire solution which consists of several service products to illustrate an overall picture of outcomes and benefits to customers.

To summarise, there is no uniform perception of service productisation shared in the case BA. Understandings can be categorised into five ways of descriptions. They are getting

the service ready and sellable, packaging offerings, systematisation of service, standardisation of service, tangibilisation and concretisation of service.

3.3.3 Best practices of service productisation

In general, service products offered by the case BA share the same uniform product codes and descriptions aligned with the whole corporation. Each service product has its own price model. Cost calculation templates are utilised for some service products. There is a uniform and standard process developed at the company level, which should be followed at the operation level by each business area.

There are two practices related to service productisation which can be recognised in the case BA. First one is the systematic way of documentation for service products. Service product managers have developed a set of service product documents. They are: 1) function descriptions for customers; 2) installation instructions including manhours required for maintenance and installation team; 3) offer templates for salespeople; 4) cost calculation templates including material specification for salespeople and frontlines; 5) material such as booklet and PowerPoint presentation for marketing; 6) maintenance and operator manuals; 7) parts list including recommended spare part package and catalogue; 8) reference list for new equipment. If it is a service product without physical components, then exclude the material specification. Templates are partially standardised. For instance, the cost calculation template leaves space for a certain level of customisation, such as local labour cost. Product managers will revise the templates and other product files every time after one case. Updates will be documented if changes happen. According to one product manager, they started to standardise the documentation one year ago. Half the ideas of productisation documents came from previous experience and half of them came afterwards. It is argued that standardisation may take more time and cost in one case in the beginning, however, in the long run, it makes things easier and cheaper.

The other recognised practice is the standardisation of the project delivery process. An improved model for process flow of material, people and information was developed in the case BA since last year. In this model, certain sub-processes are standardised, several checking points with standard checking lists are established. It saves time, makes the flow of information and material smoother, and helps to recognise mistakes in the early phase. Moreover, a new phase is designed, which is the post-mortem meeting. This is the time to collect and review all the information from a project. Failures can be analysed, and

learnings can be shared to improve the process for the future. Figure 9 summarises the above mentioned two best practices.

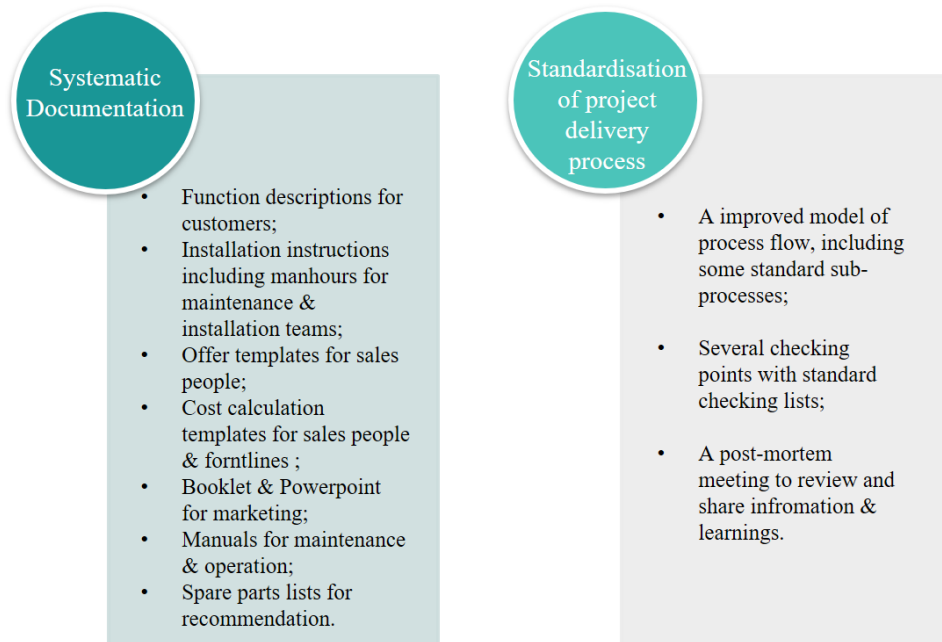


Figure 9. The best practices of SP recognised in the case BA.

3.3.4 Challenges in daily routines and in service productisation

Firstly, interviewees talk about the challenges they are facing in their daily work. Some challenges exist even in different job positions. Summaries of challenges and corresponding interviewees are presented in Table 6.

Table 6. Challenges faced by the interviewees in daily work.

Challenges in daily work	No. of interviewees	Interviewee code
1) Lack of human resources	5	B, C, D, F, G
2) Internal communication	4	A, B, C, F
3) Time management	3	B, D, F

1) Lack of human resources

Most of the interviewees identify lack of human resources as the biggest challenge in their daily routine. Here human resources mainly refer to engineering specialists, such as electrical engineers and software engineers. Qualified engineers with hands-on

experience in specific areas are scarce resources in the market, which makes it hard and expensive to find the right person. Engineering is the critical activity in service production and delivery. It is time-consuming, and it is required by every single project. All these reasons make engineering becomes the bottleneck. According to one interviewee, indeed, the market need is larger than current capacity. It is also argued that engineering is one competence of case BA as it has the capability and know-how which competitors may not have. Another interviewee points out that lack of resources is sort of the evidence of the history which the case BA has not been sufficient with product portfolio management. Too much variance of original products and poor documentation in old times turn out to increase the workload for today.

2) Internal communication

Internal communication in daily work is seen challenging for over half of the interviewees. One reason is the inefficiency of communication due to the time difference. The case BA offers services globally and has employees and frontlines all over the world. As a result, there is a time delay for communication among people located in different time zones. It is not easy to make progress of communication comparing to regional business.

Moreover, the organisational working difference influences internal communication. Service business is living quite close to customers and their experience. Customer satisfaction is always the topic. On the other hand, product development of equipment side has more passion for optimisation, high-performance, and cost-effectiveness. Those two parties are quite apart from each other. Different perspectives make it not easy for each party to recognise the truth that a slight change in one's way of work may ease the other one's workload a lot. Communication can be more effective if experiences and opinions are exchanged frequently.

Last but not least, knowledge asymmetry makes communication difficult. One product manager points out that finding the right questions to ask engineers is a critical task. As mentioned earlier, product managers need to translate customer needs into technical requirements, then inquire engineers about technique feasibility and time duration. Here knowledge asymmetry exists. Engineering specialists have solid knowledge and experience on certain topics and they are expecting other people have them as well. However, if others don't know the topic that well, then wrong questions are asked which

leads to a misunderstanding of the technical requirements. This situation may be recognised afterwards, then a certain amount of time and efforts are wasted. If it is not recognised until the service product is delivered to the customers, bigger problems such as poor reputation, are aroused.

3) Time management

Three interviewees find it challenging for time management. In practical, each product manager or project manager may have several projects undergoing at the same time. There may be conflicts in the deadline or some critical resources. How to make prioritisation and stick to the delivery schedule for each project is a tough thing. One product manager also mentions that preparation of all the documents is time-consuming.

In summary, interviewees identify lack of human resources, internal communication and time management as the most critical challenges. These can be seen as the places where they are looking for solutions or improvements through service productisation as well. In other word, effective communication, increased efficiency and decreased delivery time are the overall objectives of service productisation in case BA.

Then interviewees share their opinions on potential challenges the service productisation may face during implementation. Four types of challenges are identified. Table 7 lists the categories of challenges with corresponding interviewees.

Table 7. Potential challenges to service productisation in case BA.

Challenges in service productisation	No. of interviewees	Interviewee code
1) Motivation	4	C, D, E, G
2) Customer understanding	3	C, E, F
3) Balance between standardisation and customisation	2	C, F
4) Resources needed	2	B, G

1) Motivation

Over half of the interviewees believe motivation will be a big challenge to service productisation. It is common to receive resistance when it comes to changes. Service productisation may change the way people work, which they are used to. In some cases, changes may even happen at the organisational level. Responsibilities and relationships vary as a consequence. Getting familiar with new work increases workload. Even though nothing changes, the workload can still become heavier due to extra tasks related to service productisation, such as preparation of new materials and documentation.

Resistance can come from other places as well. If employees cannot see the benefits of service productisation, they may not be willing to be part of it. It may also take time to see the outcome of service productisation, during which people may lose their patience and passion. Some may even feel their authorities are threatened if their experience and expertise are shared through service productisation. How to get people motivated to service productisation is a big question. Nothing can be well-productised without people, as people are the very basic carriers of every implementation.

2) Customer understanding

Three interviewees identify customer understanding as a challenge to service productisation. It is argued that customers should be engaged as early as possible to better fulfil their requirements. However, figuring out what are the actual customer needs is not easy. In some cases, customers may not be able to explain precisely what they are looking for, and salespeople cannot understand correctly. Key information can be lost or interpreted wrong or misunderstood throughout the whole communication chain. In each step, there is a risk of missing information. Therefore, it is necessary and challenging to make sure that customer requests are understood comprehensively.

Moreover, one interviewee points out that the content of some services is not defined clearly enough for customers, and it is too abstract from a high level. Customers are interested in the added value through service productisation not the service productisation per se. The competence of understanding the value-added rather than engineering content is critical.

3) Balance between standardisation and customisation

Two interviewees mention that the balance between standardisation and customisation is challenging to achieve. Customisation favours customers with flexibility and adaptivity. However, on the other hand, it is not beneficial for the business if you have to tailor every time and no repetition exists as cost and time increase dramatically. Real-life should be somewhere between fully customised and standard packages with rigid offerings.

One interview also points out that trade-off among different departments is not easy to handle. Traditionally, different departments have their own targets and strategies, which are even conflicting to some extent. In some cases, for the whole corporation, it is more beneficial if increasing the cost of certain parts to get it multiplied profits out of other parts. People should keep in mind that service productisation must be aligned with the corporation's business requirements.

4) Resources needed

Resources are identified by interviewees as another challenge to service productisation as well. Resources needed include time, manpower, budgeting, knowledge, etc. It may take a long time to implement service productisation. People who are involved in this journey also have other daily works to deal with. And priorities differ among people. How to utilise the existing resource and design a time frame which suits most of the people are definitely not easy. Knowledge of service productisation is also a critical resource in the case BA. It has a direct impact on how well the productisation can achieve.

3.4 Analysis of the case service

3.4.1 Introduction of the case service

The case service is a digital service with condition monitoring techniques. It consists of two elements: hardware and software. Here hardware means data collection and communication hardware which needs to be installed on the equipment. The hardware can be also offered as a default part of the newly delivered equipment even though the case service itself is not sold to customers yet, depending on the equipment and market area. The software, in this case, is the website and application where the collected data is listed and visualised. Reporting and notification functions are provided as well in the

software. Subscription must be sold and activated to get access to the data. The other business area also has a similar service product as the case service. The core technical concept is the same, which is condition monitoring. However, the availabilities as well as the content of the service, and the user interface of software are different.

Service contents related to offering hardware components, design and installation have some overlaps with other service products in the case BA. To simplify the case, in section 3.4, the case service to be analysed refers specifically to software part and the information it offers. The hardware part is excluded in the following case study.

3.4.2 Selection of the case service

The case service is selected based on three reasons. First, the case service belongs to the digital path, which is the fourth product family involved in the developing service product portfolio in the case BA. It is an essential part and to some extent the foundation of new service product portfolio development. The monitoring data collected by the case service can support other services such as maintenance, by revealing the real-time condition. The case BA expects to gain more insights from the case service and to create extra value internally.

Secondly, as a digital service, it is highly aligned with the business strategy of the case BA and the whole group. In the era of Industry 4.0, developing digital technologies such as data mining, IoT, are the leading trends in the market. To thoroughly understand what competences it has right now, and how they are going to bring new opportunities, is beneficial for the case BA to succeed in the competition.

Lastly, the case service product has been developed for years, during which many investments are spent. A huge volume of usage data is collected after year and year. The case BA wants to utilise these data and experience to gain knowledge about its own equipment as well as customer operation condition. As a result, more value can be created both internally and externally.

In summary, the case service is an important product for new service portfolio development and the development of the service itself has a great alignment with company strategy. The case BA aims to get deep insights from the data collected by the case service and to look for new business opportunities or any improvement for current

service products. Taking these into consideration, the case service is selected to be analysed and productised. The main goal is to develop a process from data to well-structured reports and to define a proactive sales process for the case service.

3.4.3 Current state of the case service

The cornerstones of service productisation (Rekola and Haapio, 2009, p.96) are used as a checklist to quickly review the case service. A basic picture of its current state is generated. Table 8 summarises the corresponding results of this review.

Table 8. Current state review of the case service in the context of service productisation cornerstones.

Cornerstones of service productisation (Rekola and Haapio, 2009, p.96)	Current state of the case service
The name	The name is uniform internally and externally. It is protected by registering as a trade mark.
The price	The price model is stable, consisting of hardware cost and a subscription fee to software.
The configuration and packaging	Lack of service packaging as well as the clear availability of configuration.
The quality standards	Lack of quality standards.
Intellectual property rights	It is owned by the group. The data transmission is secured.
The service description/specification	The description includes general information such as basic content and benefits.
Proactive service contracting	Partially proactive.

The case service has a short uniform name which describes the service simply. This name has been registered as a trademark. A stable price model is generated. Hardware cost differs from different equipment while subscription fee for the software is fixed. The core technology of the case service is developed by the corporation and intellectual property rights are owned by the corporation as well. There is an official description of the service which includes general information such as the content of the service, benefits, and requirements. Frontline salespeople communicate with customers frequently and service contracts are made based on the consensus of service agreement level. However, how

carefully and proactively the contract is designed is not clear yet. Some elements are missing in the case service. The availability and configuration are unclear. Questions like “to what equipment is the service applicable”, “what are the prerequisites of the hardware requirements for different equipment” cannot be answered. This makes it difficult for customers to understand the availability and for salespeople to sell. The service offers one uniform content in its software environment for each type of equipment. There are no quality standards for measuring the case service’s quality, at least not any in written form.

To further review the case service, several discussions with technical specialists, product managers, and senior managers are taken in the context of the case service. The customer usage data (e.g. reports) from the software and original data from the database is gathered. Analysis of these data is conducted to search for patterns and inter-correlations. After analysing all these information and materials, the case service is further demonstrated from three perspectives, which are: 1) the service contents; 2) the service delivery process; 3) the measurement.

1) The service contents

The core content of the case service is real-time condition monitoring data. As mentioned earlier, for the same type of equipment, the case service offers the same type of information. It mainly consists of two parts, operating statistic such as activity time, load distribution, and service life statistics such as faults and alarms. Some simple visualisation is provided when checking the data, such as bars and pie charts. Reports based on that can be generated and data can be exported into other formats as well.

When looking into the user interface, it is found that there are too many figures listed. This makes it hard to quick evaluate the data. Not all of them are useful for customers. Indeed, it is unknown which one is useful for customers. The content of listed information was defined a long time ago and no one knows who did that. It turns out that supposition about customer needs was made internally, not really from customers. The attempt to gather customer feedback regarding the content was made years ago by conducting meetings and interviews with customers. However, this was not followed up continuously due to a priority issue.

In addition, the end-users will receive notifications if a certain type of condition is diagnosed. There is a total of four diagnostics message classes. Following the sequence

of increasing critical level, they are Event, Bypass, Alarm, and Fault. Each class has sub-categories of different conditions. No critical difference is defined among sub-categories, even though some may be way much critical than others. Whenever users encounter Fault messages they should contact the maintenance and some functions may be not fully working during Fault. Users will also get notifications for Alarm, which does not require attention from maintenance personnel.

Here comes the second issue. There are over six hundred different faults and alarms. The reality is that in some cases customers are receiving notifications too frequently. If customers need to read through all the notifications right away, it is time-consuming and normal operation is interrupted. If reading is not required, then what is the point to keep sending notifications? How can customers figure out which message they should read and which not? This is also a question mark to the case BA. It is pointed out by employees that, the argument about how to define the severity of different messages within the same class has been existing in the case BA for a long time. There is no consensus achieved by managers, engineers and maintenance specialists. Though some incremental changes such as categorising code numbers of the diagnose have been taken place, the main challenge remains there. The excessive data and notifications result in the “explosion” of information. Figure 10 illustrates the causes of this situation.

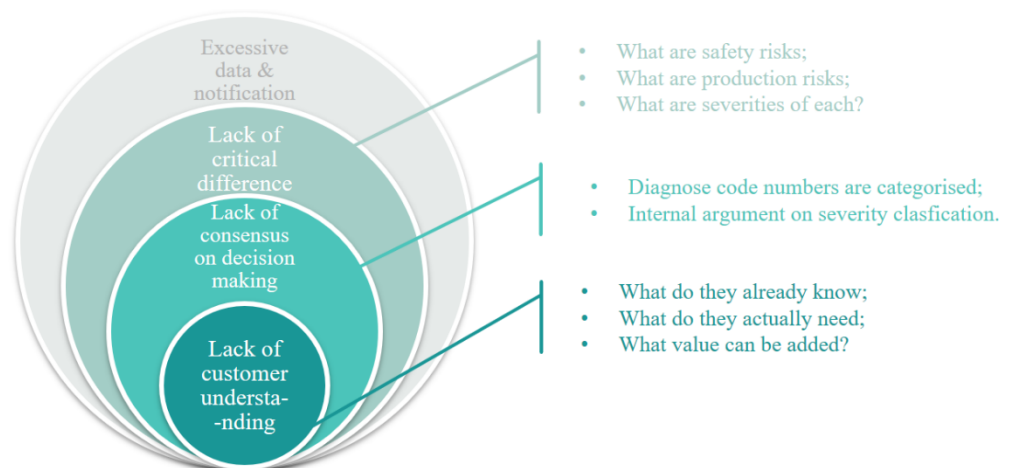


Figure 10. The Onion of information “explosion”.

Those two issues together reveal the truth that, customer understanding is missing or at least insufficient for defining the content of the case service. Too much “nice to know” data rather than valuable data is monitored and presented to customers. It is good that engineering is capable of offering more data, however, this does not mean value is added.

2) The service delivery

Customers can make requests for the case service. After the contract is mutually agreed and hardware is installed, a new user account will be created and activated for the customer. Contact information is needed from customers to set up notifications. After this initial engagement is done, once the modem/router is on, equipment is under monitoring and data is collected automatically. Customers can log into the website or the application to check the real-time data and historical data, as well as order a report for a certain period. If a condition is diagnosed as a Fault or Alarm, notifications will be triggered and sent to customers via emails or text messages. Usually, Fault requires the intervention of maintenance and Alarm does not. In the practical situation, customers sometimes cannot understand notifications and what is going on with their equipment. Then they turn to frontlines or even directly to engineers in the headquarter for technical support. Engineers have to check the data and do the troubleshooting remotely. Figure 11 describes the service delivery process by using the blueprinting tool.

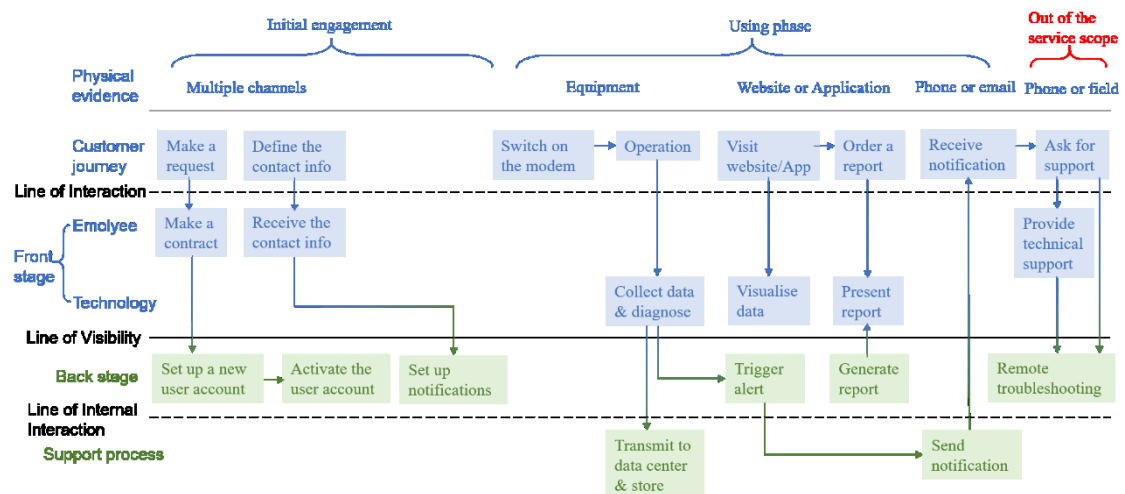


Figure 11. Service blueprint for the case service.

It should be noted that this remote troubleshooting thing is beyond the scope of the case service. The most usual case is that no invoices are sent to customers for this extra work. It seems like a good-will to customers which may benefit customer engagement. However, the truth is it does not. This is mainly because of the differences in standpoints between the case BA and customers (Figure 12).

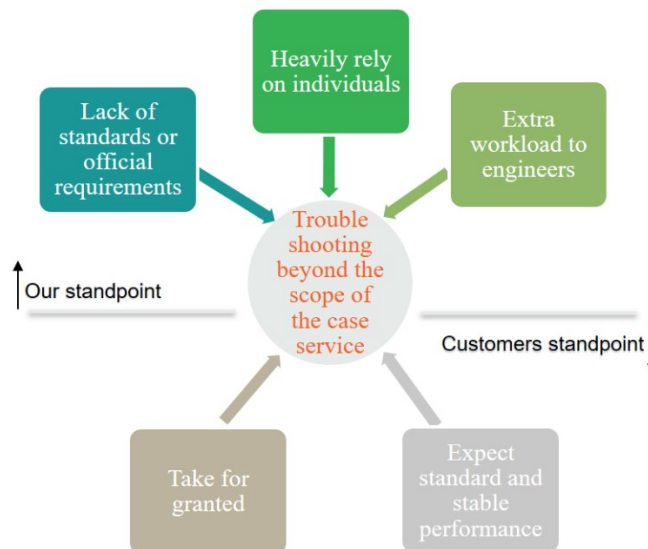


Figure 12. Differences in standpoints between the case BA and customers regarding the troubleshooting task.

Engineers see the troubleshooting as a favour to customers, which does not mean the work is done with poor quality though. There are no standards or official claims of how the troubleshooting task should be performed. No specifications of the service level neither. This may result in an unstable performance of the remote troubleshooting. Moreover, only a few engineers have the competence for this support. Those engineers with corresponding knowledge and experience are scarce resources in the case BA. Extra workload is added on those engineers' shoulders which may influence their routine tasks as well. On the other hand, from the customer point of view, the troubleshooting is taken for granted. Customers do not realise it is not included in the case service. They expect the remote support to be well delivered as other parts of the case service. Once the expectation is not reached, they may get disappointed about the case service.

3) The measurement

There are not any quality standards or key performance indicators designed for measuring the case service in the case BA. Though a monthly review and summary of all collected data are organised, no actual measurement or follow-up of missing or wrong reporting is conducted. Some techniques are developed to make sure data will remain the same during transmission. The data itself is not validated. This means that the correlation between the data and the real condition is not crystal clear and verified, although it may be clear from the theoretical perspective. Experienced engineers seem quite confident about the

performance of this monitoring technique, and most of the time, it runs well as no poor feedback is received by the case BA. However, the lack of measurement brings uncertainties. No one can tell if the wrong diagnose or reporting has never happened or just not been recognised. No actions are planned to mitigate the situation if a mistake happens.

Attention on data quality has been aroused earlier in the case BA. That is where the original objectives of service productisation come from. The case BA aims to validate the data content and find out the root causes of certain conditions. To achieve this, a reference is needed. In this case, the reference is the field data. It includes data of inspections and maintenance. Unfortunately, it turns out that the field data is incomplete. The main reason is that field service is not well-documented, which means the content, format, and ways of doing it are not systematically required or standardised. As a result, it is not able to define a measurement for the case service due to the lack of reference and validation.

Apart from the above three perspectives, during the analysis, it is realised that one more issue, which is a lack of responsible person dedicated to the case service. Unlike other service products which have dedicated product managers, the case service does not have a product owner. There is no one in charge of communication and collaboration related to the case service. This leads to the situation that certain information can only be gathered from different people and channels separately in order to have an overall picture of the case service. It can be imagined that daily work regarding the case service could be like this as well, to some extent. The fragmentation of information wastes time and decreases efficiency.

One thing needs to be noted is that, during the analysis, it is realised that the current state of the case service is not ready for achieving the original goal. Several workshops with the case BA were conducted to achieve an agreement on a new objective. It is to find obstacles which stop the case BA from better utilising the data and further developing the case service. The new target is met after a comprehensive current state analysis. Above described issues are exactly the obstacles and detailed situation where each issue is aroused from can be seen as the effects. Table 9 summarises the recognised obstacles and corresponding effects.

Table 9. Obstacles in the case service and corresponding effects.

Obstacles in the case service	From which perspective	Corresponding effects
Unclear availability	Service contents	Difficulty to understand and sell
Lack of customer understanding	Service contents	An excessive amount of data collected and presented Insufficient criticality rating of notifications
Unclear scope of the case service	Service delivery	Potential customer dissatisfaction
Lack of field service data	Measurement	Lack of measurements
Unclear responsibilities	---	Fragmentation of service information

After identifying the current obstacles, the goals of case service productisation are updated again. The new goal is to find solutions to overcome these obstacles via service productisation. Practical recommendations on the case service will be presented in the next chapter.

3.5 Summary of the case study

In this chapter, a case study regarding service productisation is conducted via interviews, observation, material reading, data analysis and discussions. As a part of the leading manufacturing group, the case BA has a large service product portfolio and is currently developing its digital path. Employees have different understandings of service productisation, which can be summarised as getting the service ready and sellable, packaging offerings, systematising the service, standardising the service, tangibilising and concretising the service. Systematic documentation and standardisation of project delivery process are the two best practices recognised related to service productisation in the case BA. Interviewees face similar challenges during their daily work in the case BA, which are lack of manpower, ineffective internal communication and time management. Potential challenges to service productisation are identified as follows: motivation, customer understanding, the balance between standardisation and customisation, resources needed.

As the main service product in the current digital portfolio, the case service contains hardware and software. Only the software part and corresponding offerings are analysed in this case study. The case service has a clearly defined name and price model, a general description and partially proactive way of contracting. Intellectual property rights regarding the case service belong to the whole group. Service packaging and configuration, quality standards are missing. Then the case service is further analysed from three perspectives: content, delivery process and measurement. Obstacles to better data utilisation and business performance are recognised, which can be summarised as unclear availability, scope, and responsibilities, lack of customer understanding, and lack of field service data.

4 RECOMMENDATIONS ON SERVICE PRODUCTISATION

4.1 Recommendations on the productisation of the case service

Based on the analysis of current state quo of the case service, recommendations on productising the case service are given to overcome the identified obstacles. As shown in the Figure 13, there are five practices designed for SP: 1) concretising the service; 2) specifying and standardising the service offering; 3) developing customer understanding; 4) systematising documentation of the service; 5) defining the responsibilities. Due to the limit of time, only first practice has started during the period of writing this thesis. Other practices may be conducted in the future.

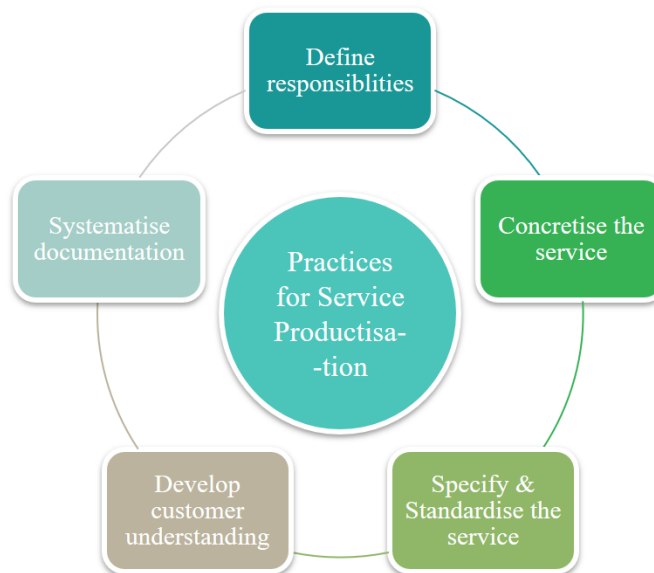


Figure 13. Recommended practices for the case service productisation.

1) Concretising the service

It is important to show customers a clear picture of what a firm can offer. In the context of the case service, information about the availability scope should be defined. Particularly, answers to questions such as “to what equipment is the case service applicable” should be provided to customers. Tables can be generated, listing all types of equipment which the case service support, along with available data and requirements of corresponding software. Table 10 and Table 11 give two examples of how to illustrate the information. They can be used as marketing materials for customers as well as training

materials for frontlines. In this way, the case service becomes more concrete and easier to understand from the customer point of view. Moreover, it is beneficial for further development of the case service as it offers a clear picture of what it is capable right now.

Table 10. Availability illustration example for the case service.

	The case service	Equipment A	Equipment B	Equipment C
Operating statistic	Activity time	X	X	X
	Load		X	X
Service life statistic	Fault description	X	X	X
	Alarm description	X	X	
	Text message alerts	X		X

Table 11. Hardware requirements illustration example for the case service.

Equipment	Control system	Modem type	Special requirements
Equipment A	System a	Modem a	
Equipment B	System b	Modem b	System b version updates to v2.0
Equipment C	System a+b	Modem a / b	

2) Specifying and standardising the service offering

As analysed earlier, the scope of the case service is not clearly defined. Whether extra activities such as the troubleshooting are included in the case service should be decided. It is obvious that there is a customer need for extra support related to the case service. Here come new service business opportunities. Remote support or consultancy based on the case service and the data it collects can be designed into a brand-new service, with a clear function and price model. Or, it can be made into a premium module apart from the regular function of the case service. In such a way, misunderstanding of the case service scope can be eliminated. Customers who haven't ask for supports can also be notified that

there is such a new service or function available. They can make purchases depending on their situations.

During the discussion, it is realised that the case BA has a product-oriented mindset rather than a service-oriented mindset. This means they have a preference for profits from products over profits from pure service. Comparing to the large number of turnovers from equipment selling, the monthly subscription fee for the case service seems like will not make any difference to the overall profits. Sometimes, it is seen as inappropriate to sell the case service separately, especially to those loyal customers who make a large order of the equipment. As a result, the case service is bundled with other bigger services or products as the bonus part. This mindset also has an impact on defining the scope of the case service. In this context, if the extra troubleshooting work cannot be charged, describing it as a new feature of the case service is recommended. Attach the task to the case service delivery, make clear descriptions of the process, update the benefits. The core is, no matter charge or not, to show customers clearly what is offered and what values are added. Figure 14 illustrates three recommendations on how to position the troubleshooting activity. Once the scope is defined, there should be a consensus established among customers, frontlines, and engineers.

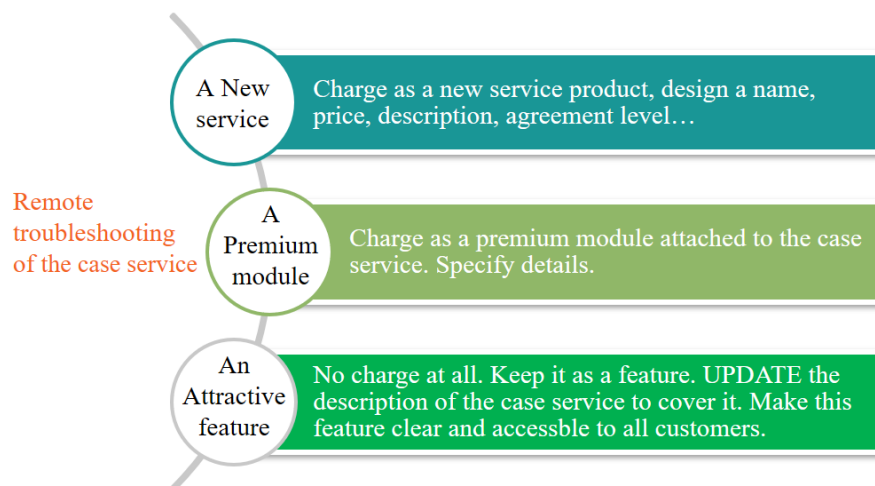


Figure 14. Recommendations on positioning of troubleshooting.

3) Developing customer understanding

It is suggested that customer understanding for the case service should be developed from three perspectives according to the customer-orientation approach (Valminen, 2011), which are knowledge about customers, knowledge from customers, and knowledge to

customers. Figure 15 demonstrates how to develop customer understanding from these three perspectives. In this case, knowledge about customers refers to customer segment. Who is the target group? Who are the end-users? What is the use case? Those questions should be answered carefully. Current customer segment analysis and market analysis can be conducted.

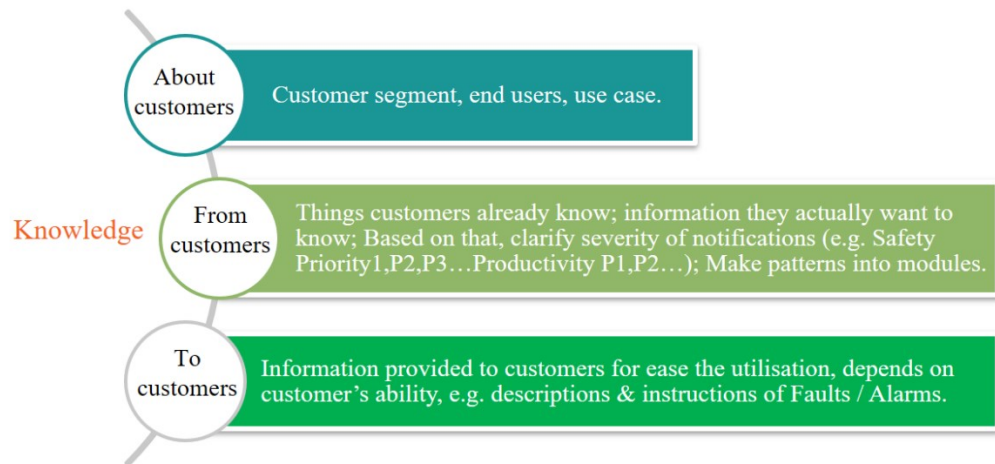


Figure 15. Developing customer understanding by the customer-orientation approach.

Knowledge from customers is what do they already know and what are their actual needs. According to the previous analysis, engineers remain deadlocked about the argument on what data should be presented to customers and how to define its criticality. However, customer needs are the actual drivers for this decision making. Because customers are the people who are actually operating the equipment every day. They may already have certain information which is not necessary to collect by the case service again. Customers should be engaged in defining the content and customer perspectives should be considered. Interviews and regular feedback can be conducted to gather this information. After careful analysis, modularisation can be applied in categorising customer requirements. The most popular information can be designed as the basic module. Others can be made into premium modules. Price model can be modified accordingly. This offers flexibility and a certain degree of customisation for customers to make choices based on their own needs.

Lastly, knowledge to customers means the information provided to customers for their better utilisation of the case service. The case BA should be clear about customers' abilities to use the service so that proper information is offered. It can conclude a clear

description of Fault and Alarm, detailed instructions to Fault and Alarm. Knowledge to customers smooth the service delivery and the using phase after delivery.

4) Systematising documentation of the service

Information is generated everywhere throughout the service production and service delivery. Which information should be documented? In which way? Who has the authority to change? How frequent should it be updated? Answers to these questions are needed. Above mentioned three practices all require proper documentation. Figure 16 summarises the suggested systematic documentation in four categories.

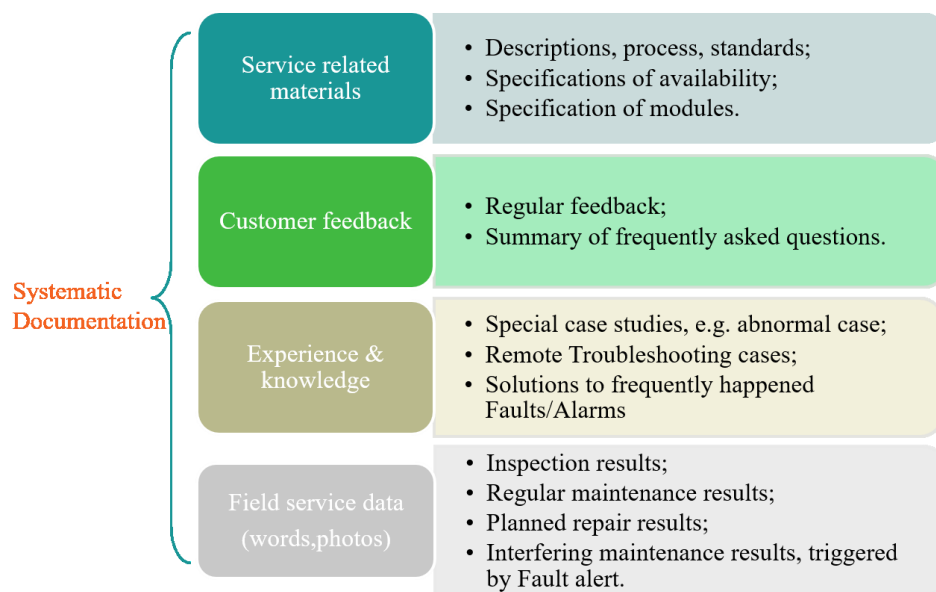


Figure 16. Recommendations on systematic documentation.

Availability, hardware requirements and service scope are basic service information which will approach to all existing and potential customers. They should be up-to-date. Customer understandings vary by the time so that continuous documentation is required. Tools such as software and templates can be utilised. A standard template helps to simplify the documenting process as well as reviewing process. The service delivery process should be standardised into a written form. It can work as a guideline for employees to follow as well as a standard for the check. Documentation is one way to diminish the misunderstandings occurring in the communication chain as key information is on the record.

In addition, if each service product has clear documentation, it is easier for communication and collaboration across different service products. In the context of the case service, if the field services such as inspections, corrective maintenance are well documented, a database of the real condition can be established. Correlations between real cases and monitoring conditions can be analysed. Not only validating the data quality, but it also creates new opportunities, e.g. potential for predictive maintenance.

Furthermore, the troubleshooting task should be documented as well. A template including time, customer, location, equipment type, Fault/Alarm, and cause can be applied. By documenting and collecting this information, a knowledge base is built. As mentioned in the previous section, certain knowledge related to the case service is grasped by only a few experienced engineers. The situation of heavily relying on certain personnel may be eased by the knowledge base. The documentation of troubleshooting cases is one way to share knowledge. With the accumulation of use cases, certain patterns will show up. For example, frequently asked questions can be identified. Then they can be restructured into instructions for internal learning purpose or external helpdesk purpose. Next time when certain Fault/Alarm is triggered, other employees can help to solve this problem or customers can find the solutions from the knowledge base by themselves. By this means, knowledge is shared and accumulated so that the average level of competence is raised. Time is saved so that engineers who are currently the scarce resources can focus on more important and unreplaceable tasks.

5) Defining the responsibilities

All these practices are accomplished by humans. Most likely, they are extra work apart from daily routine. How to handle it with regular tasks depends on individuals. However, there should be at least one person who is responsible for controlling the overall progress and making sure the path is aligned with company strategy. Based on the situation of the case BA, it is suggested forming a team with at least one member from sales, one member from engineering and one team leader. The team leader is dedicated to the case service and responsible for the service productisation. Despite regular work, two team members support the team leader with corresponding tasks. For instance, one member from sales assists the team leader to gather customer requirements and feedback, as well as offers necessary market information. One engineer helps with answering technical questions and building knowledge sharing. Top management commitment, as well as support from

the whole case BA, is necessary and important to push the process forward as service productisation is a cross-functional project.

4.2 Recommendations on service productisation in the case BA

Although different understandings of service productisation exist inside the case BA, two best practices have been undertaken already even without realising they are related to productisation. This implies that there is a good environment for implementing service productisation inside the case BA. Experience and learnings from the two best practices and the productisation of the case service can be applied to productising other service products when needed inside the case BA.

Reviewing the findings and processes of the case study, a hybrid service productisation framework is developed, as shown in Figure 17. This framework contains five sequential sub-processes, which are clarifying initial goals, defining responsibilities, defining the scope of SP, mapping the current situation and discovering best practices. Then three in-parallel sub-processes can be conducted simultaneously, which are concretising the service, developing the customer understanding, specifying and standardising the service. Two iterative sub-processes should be noted. First one should take place after mapping the current state. Reviewing the initial goals based on the current situation and updating when needed, are suggested. Similarly, keeping the situation up-to-date whenever there is any progress from the three in-parallel sub-processes is recommended. Lastly, systematic and standard documentation is a sub-process which is happening throughout the whole process.

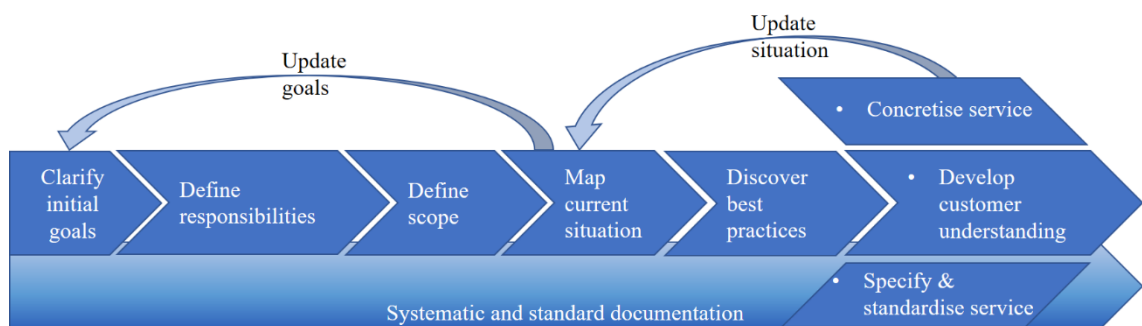


Figure 17. Service productisation framework for the case BA.

The framework illustrates how to apply service productisation in the case BA. Additionally, techniques used in the case service productisation can be utilised to other

services too. For instance, blueprinting can be used as a tool to map the current service delivery process as well as to develop new processes. The outcome of service blueprinting can act as internal training material and external promotion material. Customer-orientation approach can be applied to develop comprehensive customer understanding.

5 DISCUSSIONS

The existing literature on the topic of service productisation can be applied to the case BA well, from perspectives of definitions, processes, techniques, challenges and benefits. The findings of the case study have a high consistency with the previous literature, which will be discussed and compared with literature in details in this chapter.

5.1 Perception of service productisation

The results of the study show that there is not a common perception of service productisation shared in the case BA. Interviewees understand the topic differently. All five types of understandings perceived by interviewees can find references from previous literature. For instance, a popular understanding of service productisation in the case BA is to define and develop service products to be ready and sellable. Similarly, Ohvanainen et al. (2013) and Simula et al. (2008) label “productisation” the process to rationalise the ultimate formation of a service product before launching.

Additionally, in the literature synthesis, it is agreed with the argument that service productisation can be applied to both existing and new services. Results of this study support this understanding. Initially, the existing case service is the object of productisation. During the process, a new business opportunity is identified. Remote troubleshooting based on the data gathered from the case service can be developed as a new service in the future. This is consistent with previous literature. Productisation can be restricted to the more accurate definition of already existing services, but more commonly the term includes some renewal of the service as well (Chattopadhyay, 2012; Valminen and Toivonen, 2007). A broad view of service productisation which covers both existing and new services is widely used by different authors in their studies (Chattopadhyay, 2012; Lehto, 2013; Valminen and Toivonen, 2007; Ylitalo, 2011.).

Furthermore, it is quite interesting to see that the marketing manager is the only one who refers service productisation to tangibilising and concretising services among all the interviewees. This may be because the marketing manager is the only interviewee whose job responsibility is related to sell the service product. People usually observe and look for solutions based on their own experience. To some extent, standpoints determine what and how far a person can see. In this sense, service productisation is a great opportunity

for people to think out of the box. Different perspectives and opinions are shared and discussed throughout the productisation. This also reminds the author that, when motivating people and setting targets, differences among individual perspectives should be kept in mind and considered.

5.2 Process and practice of service productisation

There are nine phases regarding service productisation in total can be recognised throughout the case study. They are clarifying the objective of service productisation, defining the productisation scope of target service, mapping the current situation, discovering the best practice concretising the service, specifying and standardising the service offering, developing customer understanding, systematising service documentation, and defining the responsibilities. Except for the last one, the same patterns can be identified in the literature. Comparing to Table 2 from sub-section 2.2.2, Table 12 lists the process used in this study and literature support for each phase.

Table 12. Productisation process in the case study and corresponding literature support.

Productisation process in the case study	Literature support
Clarify the objective of service productisation	Tuominen et al. 2015
Define the productisation scope of target service	Toivonen 2012, Tuominen et al. 2015
Mapping the current situation	Tuominen et al. 2015
Discover the best practice	Parantainen 2011, Tuominen et al. 2015
Concretise the service	Jaakkola et al. 2009
Specify and standardise the service offering	Jaakkola et al. 2009, Toivonen 2012, Tuominen et al. 2015
Develop customer understand	Jaakkola et al. 2009, Toivonen 2012, Tuominen et al. 2015
Systematise service documentation	Parantainen 2011, Toivonen 2012, Tuominen et al. 2015
Define the responsibilities	---

It should be noted that the above process utilised in the case study is not a rigid sequence of steps. It is an iterative process as at some stages one can go back and restart again if necessary. For instance, customer understanding is constantly changing, and this may have an impact on the specification of the service offering which leads to changes as well. In this case study, the phase of clarification of the service productisation objectives has been gone through twice. Along with the productisation, the objectives have been modified and updated three times. This is consistent with the literature. It is argued that the iterative productisation process is important. No process model can assure first service productisation produces the perfect end result, thus updates and changes should be done as needed. (Tuominen et al., 2015, p.11)

Moreover, this argument is continued with an emphasis on the iteration of reviewing goals. Within the implementation of productisation, the situation changes, including resources and organisation environment. There is a possibility that, the original goal no longer suits the situation. In this case, the goal needs to be modified or updated. Or, someone in charge needs to have a good control of the productisation and to make sure if the undergoing direction is still aligned with the goal.

In addition, the practice of systematising service documentation supports basically every other phase and as a result, it is running throughout the productisation journey. Due to the limited resource such as time and manpower, several phases e.g. concretising the service and developing customer understanding, may take place in parallel in the case BA. During the time of waiting for response for one phase, another phase can be kept conducting. Similarly, Jaakkola et al. (2009, p.5) point out that service productisation is not necessarily a linear process and some steps can be performed simultaneously. Same as the results of Ahokas's (2012) study, not all the phases mentioned in the literature were used in this case study. All these support the findings of Jaakkola et al. (2009, p.1) that each company employs productisation in a slightly different process depending on the company's own goals and resources, and there is not only one right way or formula to put service productisation into practice.

Though the process varies among companies, the importance of defining the responsibilities should be highlighted. For those firms who have enough resources, building a new team dedicated to service productisation is not needed. Productisation tasks can be distributed to certain relevant people as part of their regular job

responsibilities. However, the procedure of responsibility distribution is worthy to talk about. Finding the right people to do the right thing, and doing it right is not easy. It is necessary to make sure that everyone is clear about their own task and there is no misunderstanding regarding the objectives. With the implementation of productisation, someone must take the responsibilities of controlling the budget, following the schedule, and keeping aligned with group strategy. When conflicts or iteration happens, decisions need to be done. Therefore, it's suggested that one phase particular for defining the responsibilities is needed. Similarly, Ylitalo (2011) argues that there is a need to assign a product manager as responsible for the whole productisation process because this is identified as the main challenge to service productisation in his case telecommunication company.

In previous literature, an inbound-outbound framework is developed by Simula et al. (2008), based on traditional product-based industries which the output being sold consists of both physical products and service elements. It is argued that this framework can be applied to the situation where the output consists of only service elements as well. This is because, a service offering with service elements only, should be able to provide functionalities and added-value to satisfy customer needs as well. To achieve this, it still requires a firm to have both the ability to produce and to sell. In this sense, the ability to make means to design, rationalise, produce and deliver a service offering in a repeatable and cost-efficient manner. The ability to sell remains the same, which means marketing related activities. Service productisation processes such as setting a name and a price, concretising the service, etc., can be the phases where outbound productisation activities take place.

Findings of this case study partially support the author's argument. The hardware part of the case service is excluded from the case study. The core offering of the case service is condition monitoring service, which is delivered in the software environment. However, the idea is not to sell the software itself but to sell the data. And troubleshooting task is pure service element. Thus, the output of the case service can be seen as somewhere between pure service elements and the combination of physical products and service elements. Service productisation practices developed in the case study can be divided into inbound activities and outbound activities according to this framework. Inbound activities are clarifying the objective of service productisation, defining the productisation scope of target service, discovering the best practice, specifying and standardising the service

offering, systematising service documentation related to the internal process, and defining the responsibilities. Outbound productisation activities are concretising the service, developing customer understanding, and systematising documentation related to marketing and user guides.

Several techniques mentioned in the literature were utilised in this present study. For instance, blueprinting tool (Fließ and Kleinaltenkamp, 2004; Shostack, 1982) was used in sub-section 3.4.3 to map the current service delivery process of the case service. Additionally, to attain an in-depth customer understanding, applying the customer-orientation approach (Valminen, 2011) is suggested in chapter 4.

5.3 Perceived benefits of service productisation

Although only one suggested SP practice is conducted during the time of writing the thesis, benefits of service productisation in the case BA, however, can be recognised. By concretising the service, clear availability and prerequisites of the service are offered not only to customers but also to internal stakeholders. It enables customers to evaluate the case service and increases internal understanding of own capabilities. This is consistent with the existing literature. Chattopadhyay (2012) and Sipilä (1996, p.19) argue that customers can benefit from service productisation as they can better understand the service and compare the service with the promise. Ahokas (2012) points out that SP helps to raise the awareness of the company's competence within the organisation.

Furthermore, it is worthy to note that, new business opportunities can be explored through the productisation of the existing service product. The finding of the case study is one of the examples. In the present case study, the remote troubleshooting was uncovered as an extra activity when analysing the current service delivery process. This activity is conducted by customer requests every now and then in a disorganised manner, as an unofficial feature of the case service. It is realised that this could be a new business opportunity as it can be made into a new service product to satisfy a specific customer need. In addition, during the process of developing customer understanding, it is recognised that there is a possibility to design basic and premium modules of the case service content to offer flexibility. New revenue model may be created accordingly.

These are just two examples of new business opportunities which are explored during the very beginning of service productisation in the case BA. It can be assumed more chances are going to be recognised along with the further implementation of service productisation. In general, the customer orientation helps to discover new customer needs or existing needs which are ignored before. When mapping the current situation, existing resources including competences, knowledge is recognised and reviewed, during which new capabilities may be discovered. Resource re-allocation also can stimulate this discovery. During the process, massive opinions from diverse perspectives are exchanged. These different ways of thinking boost the new idea generation. Service productisation facilitates evaluation of the service product in a systematic way and results in a great chance to explore new business opportunities. With new business opportunities, profitability may be improved in the end, which is identified as a benefit of SP in the literature as well (Jaakkola et al., 2009, p.1).

5.4 Potential challenges of service productisation

If service productisation is employed in the case BA, interviewees identify motivation, customer understanding, the balance between standardisation and customisation, and resources needed as potential challenges they may encounter. Similar challenges are found in the literature. How to motivate personnel to change is recognised as a big challenge during productisation process by several authors (Ahokas, 2012; Jaakkola et al., 2009, p.39; Wali, 2018; Ylitalo, 2011). According to Valtakoski and Järvi (2016), the lack of motivation is likely to hinder the implementation of the productised service. Tuominen et al. (2015, P.7) argue that the proper balance between standardisation and customisation is important and challenging to achieve during the service productisation. Lack of resources especially the time is found to be the main reason for productisation failures in Ylitalo's (2011) study. Particularly, Valminen and Toivonen (2009) conducted an empirical study of productisation in a manufacturing company. Their finding shows that scarce resources, understanding and keeping customer perspective are also considered challenging to service productisation in manufacturing firms. Table 13 lists the challenges of service productisation identified in the case BA and in the literature.

Table 13. Challenges of SP identified in the case BA and in the literature.

Identified in the case BA	Identified in the literature
Motivation	Resistance to change
Customer understanding	Find & maintain customer perspective
Balance between standardisation & customisation	Risks of replication & imitation
Resources needed	Requires a significant amount of resources

During the development of service productisation practices, it's realised that there is an unspoken rule in the case BA, which is that selling equipment is considered more profitable than selling services. This is consistent with the finding in the study of Valminen and Toivonen (2009). They argue that the prevailing culture in their case manufacturing company still promotes more selling trucks than selling services. This possibly is a common issue in manufacturing companies who provide services as well. Further validation is required.

5.5 Suggestions for further productisation of the case service

Service productisation practices for the case service are mainly developed from service content point of view. Systematising and rationalising the content can be seen as the first big step. Due to limited time, only one suggested practice has started. After all suggested practices are accomplished, the case service content will be well defined and rationalised based on comprehensive customer understanding.

The next step can be standardising the service delivery process. This means some replicable work can be modularised into a standard sub-process so that everyone can follow easily. Keeping this standard process description into a written form is highly recommended so that it can act as learning material. With such documents of standards, the service can be measured to some extent. In addition, a knowledge sharing and learning platform can be built, where relevant employees can share their cases and experience. Lastly, the hardware part of the case service, such as hardware installation, can be included in the scope of productisation in the future.

6 MAIN CONTRIBUTIONS OF THE STUDY

6.1 Theoretical implications

There are relatively not too much empirical studies regarding practical service productisation projects in the previous literature, especially in a manufacturing context. This case study contributes a detailed example of service productisation in a manufacturing company to the literature and enriches the diversity of references. The findings of this study have shown that service productisation methodology summarised from literature can apply to manufacturing organisations as well.

Moreover, this study complements previous literature from the perspective of productisation process, highlighting the importance of defining responsibilities for implementing service productisation smoothly. In addition, four sub-processes proposed in the literature are categorised by the author as the very basic ones, which are suggested being performed in every service productisation case. They are to clarify the objectives of service productisation, to define the scope of productisation, to discover the best practice if exists, and to document necessary materials throughout the productisation.

6.2 Practical implications

The findings of this thesis have several implications for practitioners as well. First, the SP framework (Figure 17) developed by the author provides a simplified illustration of the productisation process. It can be used as a guideline by practitioners to implement service productisation in real case more systematically. The iterative sub-processes in the framework reminds managers to continuously review the progress, update the goals and make sure the direction is aligned with the goals.

Additionally, the recognised challenges can help managers to take proactive actions on the preparation of service productisation accordingly. Productisation also reveals the individual differences in standpoints and benefits. Different perspectives may broaden the ways of thinking during the teamwork. Nevertheless, managers should consider this when distributing certain tasks, setting individual goals and motivating people for service productisation.

6.3 Limitations

When considering the findings and results of this study, there are limitations needed to be acknowledged, though, the limitations do not diminish the trustworthiness of this study. Firstly, this is a single case study. All interviews and discussions are conducted with employees from the case company. A deep understanding of service productisation within the context of the case company is achieved. However, generalisations of the findings into other companies or industries should be concerned.

Another limitation is that the whole service productisation process is not finalised in the case BA. As mentioned earlier, only one suggested practice is undertaken due to the time limit. Though literature regarding benefits and challenges are reviewed carefully, the actual outcomes and challenges of service productisation for the case service are not covered in this research, which to some extent compromise the integrity of the whole study.

Lastly, there is a limitation related to the language issue. There are several widely acknowledged papers and books written only in Finnish. For these Finnish materials, if the original publications are available, they are translated into English one by one and double-checked by reviewing references from other English materials. There is still a possibility that accuracy is depressed during the interpretation. If the original versions are within limited access, secondary sources are used as less as possible since the reference by secondary source is not validated. The original sources are cited though.

6.4 Suggestions for further research

Firstly, expanding research on other manufacturing companies is suggested as the present study only examines the service productisation on a single case company. It would be interesting to see if the same patterns, for example, same challenges can be found in other manufacturing service providers. Additionally, the service productisation framework developed in this study can be validated if it is applicable to other manufacturing firms.

Second direction for further research could be focusing on productising professional services within the context of manufacturing. There is a trend that more and more manufacturers are tempted to provide professional services to support customer's

operation and business. Considering the culture and mindset of manufacturing companies, it would be interesting to study how to better utilise the existing know-how. Experience from productising in KIBS (knowledge-intensive business service) can be learned from. However, how to apply this in to the context of manufacturing is challenging.

Lastly, how to engage customers into value co-creation could be another research direction for service productisation. Although developing customer understanding is highlighted and certain practices are mentioned in the present case study, it is not actually implemented in reality due to the time limit, and corresponding results are missing. More empirical study results are needed to discover potential obstacles and further examine how can new business opportunities be explored during service productisation.

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APPENDIX 1(1). Interview questionnaire for service productisation case study.

1. Introduction
 - 1.1. Introduction of the research and interview related issues (by interviewer)
 - 1.2. Introduction of interviewee (Name, position, responsibilities)
2. Service product portfolio
 - 2.1. What is the current service product portfolio?
 - 2.2. How is it categorized?
 - 2.2.1. Based on what criteria?
 - 2.2.2. Who is responsible for it? (or decision maker)
 - 2.3. How is the availability of each service? Location dependent or product dependent, etc?
 - 2.4. How is service delivered? (In general, or particularly related to interviewee's work)
 - 2.4.1. What is the process?
 - 2.4.2. What is your role in service delivery?
 - 2.4.3. What do you think is customers' role in service delivery?
 - 2.5. How is new service developed?
 - 2.5.1. What is the trigger and process?
 - 2.5.2. What is your role in new service development (NSD)?
 - 2.5.3. What do you think is customers' role in NSD?
3. Service productisation
 - 3.1. What is your understanding of service productisation?
 - 3.2. How familiar are you with service productisation? Any work experiences?
 - 3.2.1. If YES:
 - 3.2.1.1. What were drivers and goals of that?
 - 3.2.1.2. what was your role/responsibility?
 - 3.2.1.3. what was the outcome? Or how was it progressed?
 - 3.2.1.4. Facing any challenges?
 - 3.2.1.5. Any learning lessons? (in general, and applicable to current work)
 - 3.2.2. If NO, skip.
 - 3.3. What are the main challenges of your work, your company or even your industry?

APPENDIX 1(2). Interview questionnaire for service productisation case study.

- 3.4. Do you think there is a necessity of service productisation in your company?
Why? What are the goals?
- 3.5. What is your attitude/acceptance to service productisation?
- 3.6. What could be the practical challenges if service is going to be productised?
(Related to your work, and in company level.)
- 3.7. How would you improve your work in any other ways?