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# **Productization of customer specific software in an IT company**

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Abstract  <p>Recent studies and surveys carried out in the area of productization have revealed a lack of knowledge of the productization process within software companies as the greatest obstacle in the path of transformation from producing customer-specific solutions to self-driven product-based business models. Software companies have recognized the advantages of developing product-based solutions that are reusable, scalable and market driven, but due to the lack of studies undertaken in the area and to the generic nature of the transformation process, they do not want to take the risks of a productization process.</p> <p>A software product-management reference framework was established as the main theoretical framework, and the key aspects of productization, such as its various levels, challenges and benefits as well as the definition of a software product were reviewed with the help of the existing literature. This was done in order to find the key success factors and their applications that could be utilized in a product transformation process. Due to the subjective nature of the study, the qualitative research approach was applied. In order to acquire in-depth information, the case study method was chosen, which comprised of an ongoing productization situation analysis of the case company and two semi-structured interviews conducted within the company's R&amp;D unit.</p> <p>The findings revealed that the maturity of four functions of the SPM framework (portfolio management, product road mapping, release management and requirements management) were the key success factors of the productization process in the case company. In addition, various improvements were identified and outlined in order to improve the maturity of the four functions. This was hoped to lead to higher levels of productization. The study also recommended similar future investigations into the productization processes of software companies of various sizes analyzed together in search of generic and widely applicable results.</p>		
Keywords/tags ( <a href="#">subjects</a> ) Productization, Software product management, Customer specific software		
Miscellaneous ( <a href="#">Confidential information</a> )		

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**LIST OF ABBREVIATIONS**

BSS	Business Support System
OECD	Organization for Economic Co-operation and Development
IT	Information Technology
ICT	Information and Communications Technology
ASP	Application Service Provider
COTS	Commercial off the shelf
ERP	Enterprise Resource Planning
CRM	Customer Relationship Management
NPD	New Product Development
SPM	Software Product Management
R&D	Research and Development
JIRA	Software tool provided by Atlassian

# 1 Introduction

This chapter outlines the importance of productized software along with research background, objectives and research questions tackled in this study. It also describes the structure that was followed in this thesis.

## 1.1 Importance of productization in software companies

In developing software in the current IT industry, basically two types of business models are most prevalent. The first one is the service business model in which software companies develop customized software for a specific customer need, and the second one is the software business model that caters for a variety of market needs by developing standardized software which is sold as products (Guvendiren, Brinkkemper & Jansen 2014).

Producing software as a product is receiving more and more attention from both academics and practitioners all over the world. With the huge success of companies like Microsoft and Apple, software companies are gradually recognizing the advantages and importance of delivering their software as a product. This has triggered software companies into a transition from developing customer-specific software (service based) to selling product-based solutions in order to improve their offerings (Artz 2010).

Product-based software also holds a substantial amount of market share in the global IT industry. The total market value of the product-based software industry was calculated to be around 196 billion USD in 2001. The overall spending on ICT industry was then 2.1 trillion USD worldwide. Hence product software makes up for 9% of economic activity, which was quite substantial (OECD 2001). However, the actual percentage of using product-based software varies from country to country, but the

trend in many businesses these days is that the make or buy decisions are made more and more in favour of using a standardized product-based software.

Definition of product software states, “a packaged configuration, which consists of software components or a software-based service, with auxiliary materials, which is released for and traded in a specific market” (Xu & Brinkkemper 2005). Actions related to service productization are often referred to as standardization and commercialization (Jaakkola, Orava & Varjonen 2009). The actual definition of the term productization is rather debatable. For the purpose of this study, productization of service-based software was defined as a method of developing, systemizing and defining software that can be reused with a minimum amount of customization. Productization helps in achieving dual goals of developing software service by maximizing customer benefits as well as company profitability by increasing quality and productivity (Jaakkola 2009; Sipilä 1996). Productization also helps in simplifying the service and makes the content and scope of service-based software more understandable. As a consequence, productized software becomes more concrete and matured to its prospective customers, which in turn eases the ability to sell, buy and understand.

Transitioning from service-based to product-based software can lead to significant improvements in the efficiency and success of a software company. It should be noted that a productization process does not automatically make the selling of the software successful. The overall success of a productization process is highly dependent upon the company’s ability to produce software that is in line with market needs. If there is no market for the productized software, then the entire transition from the service-based approach to a product-based approach has failed. Hence, it is important to clearly understand the market needs and ensure that the company is producing product-based software that caters to valid and existing customer requirements (Jaakkola 2009).



## 1.2 Research motivation

### **The Broader relevance**

According to Kadri, Sajaak & Slinger (2014), the productization process enables software companies to transform from a customer-specific service driven software business to a self-driven product business. The key finding in their study on the productization processes of software companies was that for most companies it was very difficult to achieve complete productization due to the lack of knowledge of the productization process in software companies.

Nowadays, more and more companies are recognizing the advantages of developing product-based solutions to improve their offerings, but there are very few studies undertaken in this area. Because of this, it is very difficult for organizations to undergo a product-based business transformation (Artz et al. 2010).

According to a national survey conducted by the Helsinki University of Technology on the challenges of software product companies, the area needing the most improvements was the level of productization (Hietala 2004). Hence, a systematic study in the area of productization would not only add to academic literature but also help many software companies that are planning to undergo a similar transformation.

### **The Relevance to case company**

The case company is a Nordic software company (name withheld to maintain confidentiality) that has been serving telecom operators in Europe for the last two decades. The company was founded in the 1990s and focused on delivering billing software for Nordic telecommunications providers.

In 2000, the company turned its focus to managing telecommunication providers' IT processes related to business support systems (BSS). In 2008, the case company merged with another upcoming software company in the same industry. The merger transformed the case company into an international telecom IT service provider with operation teams setup in Asia, in addition to Europe. Currently, the case company is a privately held company with over 1000 employees and offices across Europe, Latin America and Asia. The case company is also listed in London Stock Exchange's 1000 companies to inspire Europe 2017.

The case company's main business is to provide software services for the management of the business support systems (BSS) of telecom operators. New business opportunities are generated through selling its BSS offerings to telecom operators all over the world. The case company is also looking to increase its revenue from its existing customers by providing easily reusable software products and services that would improve the day-to-day efficiency and competitiveness of its customers. It is rather challenging for the company to productize its various versions of software used in different customer teams and then use the productized software for acquiring new customers.

As a result of this strategy, in the last few years, the company has seen rapid growth in both personnel rising from 400 to 1000 and in terms of revenue as well. Due to such rapid growth of the number of employees and new customer accounts, the company is trying to shift its software development style from the service-based to the product-based organization in order to better serve the increasing number of customers. Already a substantial amount of euros has been invested in trying to productize the company's current offerings. Hence, the company can benefit from academic research into ways of transitioning from the service-based model to a product-based method of managing its software.

## **The Personal Perspective**

The key motivation in choosing this research topic was personal interest as well as personal career aspirations of moving into the product management area. During my time with the case company, I have worked in such roles as a solution and project manager. A year ago, I was part of a newly formed product team so that there was an added motivation to help my team and company in understanding what exactly productization means and how we can successfully transition to delivering product-based software that could be packaged and sold to multiple customers with a minimum amount of customization. It would give me immense satisfaction if this study could be of use for the company in real-life business scenarios.

### **1.3 Research Questions**

The case company has been undergoing rapid growth in terms of the number of employees, annual revenue and addition of new customers during the last few years. In order to better serve the customers, the company has strategically decided to move from a service-based to a product-based model of software development and packing. This, however, is a major challenge because there are no industry standard programs or frameworks defined to facilitate this transition. Moreover, this process requires massive investments so that it is of utmost importance for the company to succeed in achieving its strategic target in order to facilitate continued growth.

The above-mentioned transition from a service-based approach of producing software to product-based deliverables has already been under way at the case company for a year now. Hence, one of the objectives of the study was to review the productization process available in academic literature within the context of case company. This study explains clearly what a service-based model is and what it means to have a product-based model of developing software. This, in turn, would help in improving the existing and ongoing process of productization.

For achieving the above-mentioned objectives, the study attempted to answer the following questions:

- What are the key success factors that should be taken into account during a productization process of a software company?
- How can these identified factors be utilized in the case company to improve the overall success of the productization process?

The answers to the above research questions were hoped to help the case company in gaining valuable information regarding the existing academic models and theories of the process of productization that could be incorporated in the present and future development efforts. In addition, the review and findings from this thesis could also serve as a practical guide for any IT company intending to productize its customer-specific software into the productized reusable software.

#### 1.4 Structure of the Thesis

The study was divided into following five chapters.

Chapter 1: This section introduced the subject of productization of services-based software into product-based software and its relevance to broader audiences, the case company and its personnel. This chapter also contains an introduction of the case company (name withheld to maintain confidentiality).

Chapter 2: This chapter contains a literature review providing a detailed explanation of most important terms related to software productization and stage by stage review of productization process for software companies. It concludes with the establishment of a theoretical framework.

Chapter 3: This section outlines the research approach followed in this study. Due to subjective nature of the study, a qualitative analysis method was adopted. Expert

interviews were conducted to review productization process of case company and gather relevant data. Finally, it presented the trustworthiness of implemented research approach.

Chapter 4: This chapter documented the findings obtained by carrying out the research methodology of chapter 3. It provided the results that would answer the research questions of this study.

Chapter 5: In this chapter, author aimed to provide an understanding of the most important findings and conclusions of the research. The answers to research questions of the study are also provided in this section.

## **2 Literature Review**

This chapter presents a review of a variety of academic literature focused on the concepts of the productization of service-based software. It also discusses in detail the definition of software products and differences between producing software products and offering customer-specific software as a service.

The chapters begin by explaining key concepts of this research and they are followed by in-depth explanations of productization stages and the path of successful productization. Subsequently, a theoretical framework is also established for research purpose.

### **2.1 The Key Concepts**

Important terms related to productization such as Service, Productization and a Software product are discussed in the chapter.

### 2.1.1 Service

There are multiple ways in which a service can be defined. Most of the definitions vary according to the context of a service company and the industry where it is operating. However, the following selection of definitions is the simplest and the most straightforward: "Services are separately definable intangible acts that, when marketed to consumer or company, fulfill needs which are not necessarily related to sales of a product or another service" (Gröönroos 1991, 49). "A service is a process consisting of a series of more or less intangible activities that normally, but not necessarily always, takes place in interactions between the customer and service provider, which are provided as solutions to customer problems" (Gröönroos 2007, 54). In a similar tone, Payne (1993, 6) describes service as an activity that has an element of intangibility and involves interaction between the service provider and the customer, with the property belonging to the customer.

Even though there is a lack of a single consensual definition of service, the following themes seemed to be fundamentally common (Gröönroos 2000, 48) across all definitions:

- Services are at least to some extent produced and consumed simultaneously.
- The customer usually participates in the service production process.

Another theme, which is evident across all service definitions, is the acknowledgement of the fact that services and products have very distinctive characteristics that differentiate them from one another. This is rather important for this study as it lays the foundations for the discussion on productization of services in the next sections.

### 2.1.2 Productization

Once again, there is lack of a single commonly accepted definition of the term productization of services within academic literature. However, it is usually referred

to as making an existing service offering into a product which consists of defining the core processes of the service in order to make it more stable, reusable and visible. For the context of this research, the following definition resonates the most, "Productization is one possible tool to systemize both the development and the production of services so that continues innovation, cost efficiency and customer orientation become a part of everyday life" (Jaakola 2007).

Productization in its essence modifies a tangible service offered to a customer into a well-defined outcome. At times, productization can consist of a merely better definition of a company's existing services. Hence, service-based software companies should take utmost care of clearly defining their service offerings because often buyers hesitate to purchase services that they cannot evaluate prior to their purchase (Levitt 1972).

The main reasons for software companies to transition their service-based software to productized software are to improve competitiveness and performance. It also helps in establishing the price of the service. As a result of productization, the seller understands his service offerings better, and the buyer as well is more aware of what he is buying. All in all, this explicitness transforms the service into a more tempting and easier-to-buy commodity (Edvardsson et al. 1997).

Table 1 below highlights some of the key differences between productized and non-productized services.

<b>Productized Services</b>	<b>Non-productized Services</b>
Fixed prices	Frequent changes in pricing
Implementation remains the same	Implementation changes
Easy to buy	Difficult to sell
Reusing previous tasks	Repetition of tasks

Knowledge is spread between a group	Knowledge is person-dependent
-------------------------------------	-------------------------------

Table 1. Productized services vs Non-productized services (Parantainen 2007; Moiso 2005)

### 2.1.3 Software Product

When it comes to defining software as a product various terms such shrink-wrapped, COTS, packaged software and commercial software are thrown around. In this section we review the meaning of those terms in order to improve our understanding of software product.

Figure 1 shows the relationship between these various types of software categories. It also shows frequently used terms such as open source software and software-based services like ASPs into consideration.

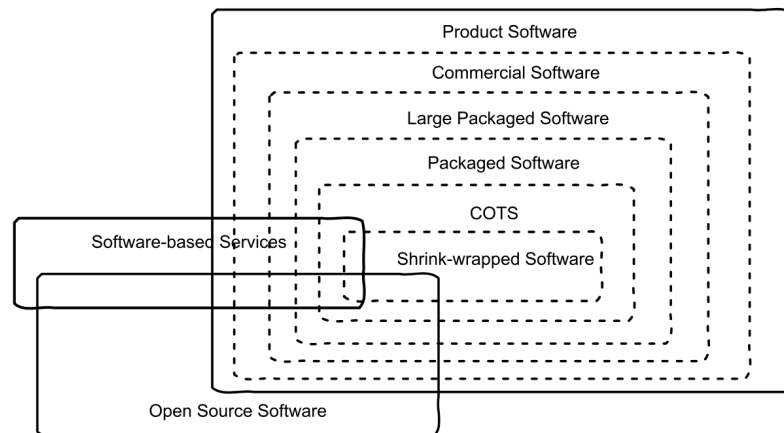


Figure 1. Product software Categories (Xu & Brinkkemper 2005)

Shrink-wrapped software is software sold on CDROMs or any other boxed medium in stores. This kind of software usually means widely supported standard platform.



COTS software ready made products that are available for sale to general public. E.g. Microsoft office is COTS product that is a packaged software solution that can be bought by any individual or a company. COTS software is usually highly specialized software designed to cater to a specific solution and its users can use them with little to no modification. Its source code is not available to the customers for any type of modification and in most cases is supported and further developed by its owner who holds the intellectual property rights sold in copies.

Packaged software products are set of software applications that can be easily obtained from software vendors. They require small amounts of modification and customization in order to get them up and running. In present days these are mainly marketed to enterprises needing to enhance systems like ERP or CRM. Large packaged software usually requires a significant amount of time (could be weeks or months depending upon the scale and complexity) for development and deployment. They focus on specific needs of their customers separately.

Commercial software is the type of software that is developed by a commercial entity serving a commercial purpose and sold typically with a licensed fee to a user or company. It also falls under the domain of proprietary software meaning it's not allowed to be copied or shared further without explicit authorization from the proprietary holder. More often than not its developed to solve niche problems and is then either sold or licensed to users or companies needing them. Adobe Photoshop, Mac OS, Microsoft Windows are few examples of commercial software.

Open source software is software where its source code is freely available for anyone interested in learning how the software's code works or even to modify the source code in order to change the behavior of software to suit one's needs. This is completely different from other software categories where the source code of the software is very closely guarded secret.

ASP offers their software applications to be accessed via web browsers by running them on web servers that are hosted either by themselves or by some hosting service. Email service providers such as Gmail & Yahoo are examples of ASP providing their software for free but generating revenue by running advertising on these remote applications.

## 2.2 Facets of productization

In this section of the study, 3 important aspects of Productization process will be discussed in more detail. First, the extent of production followed by compiling researched benefits of productization process and finally concluding with various types of challenges that come with transitioning from service-based model to product-based model.

### 2.2.1 Extent of Productization

The extent of productization needed hugely varies depending upon the individual situations. In some cases, productization of service might require minor changes related to styling or formatting whereas in some other cases it might be a major change where a company needs to standardize its various version service into one consolidated service which would be marketed and sold as a product.

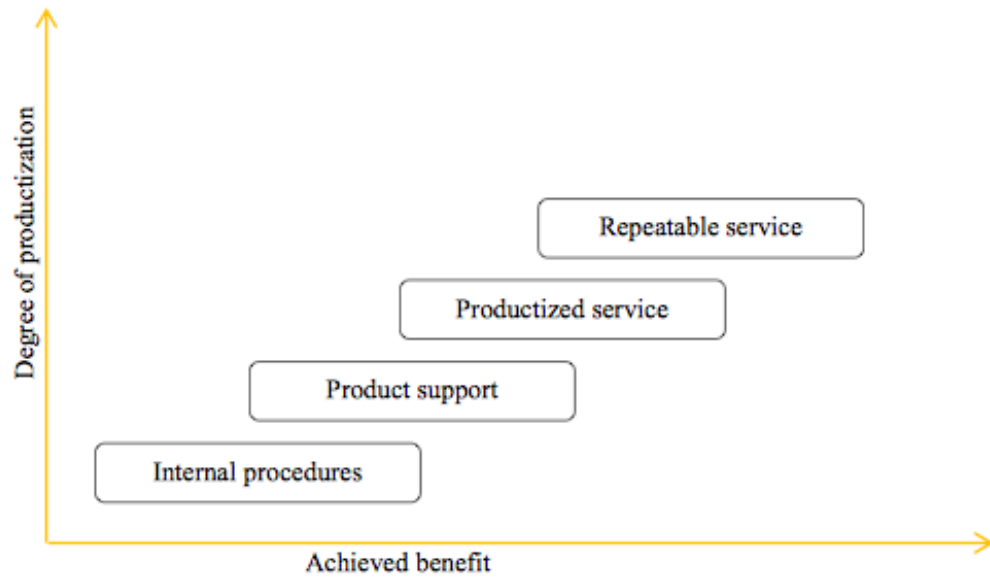


Figure 2. Levels of service productization (Sipilä 1996)

At the very beginning, we have productization of a company's internal methods of working. This includes harmonizing different kinds of methodologies of working that might be followed by different teams/units within a company with the end goal being systematic documentation of service. Adding product support for services undergoing productization is the next level. These are usually software programs that provide aid in service delivery. The third level aims for a complete definition of structures, processes, tools and methods that are part of the service being productized. At the final level, the productized service has been systemized to an extent that it can be duplicated or be reused for another customer with simple repetition.

Applying the above concepts of extent of productization especially to software companies developing software that is fulfilling a certain specific customer need and would like to transition is a more product-based style of developing and delivering it is important to differentiate between software as a product and software project business. Below Figure 3 highlights the spectrum and also shows how software products are positioned in the spectrum.

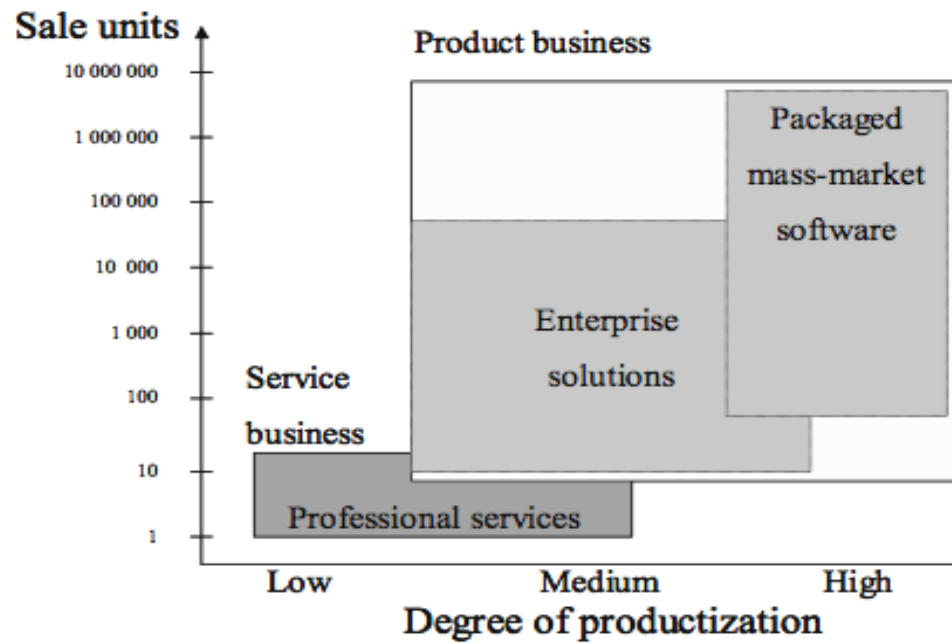


Figure 3. Software product and Services Business (Hoch 1999)

Hence it is highly crucial for the case company and any other software company that is planning to undergo the productization process to exactly know their position on this spectrum before undergoing productization process.

### 2.2.2 Inbound and outbound productization

Figure 4 shows a conceptual representation of productization. The key message of below figure is to show how NPD and marketing relate to each other in productization process, as both of them are common functions across all software companies. In order to make productization a common factor covering both marketing aspects and NPD, productization has been divided into two separate entities called inbound and outbound.

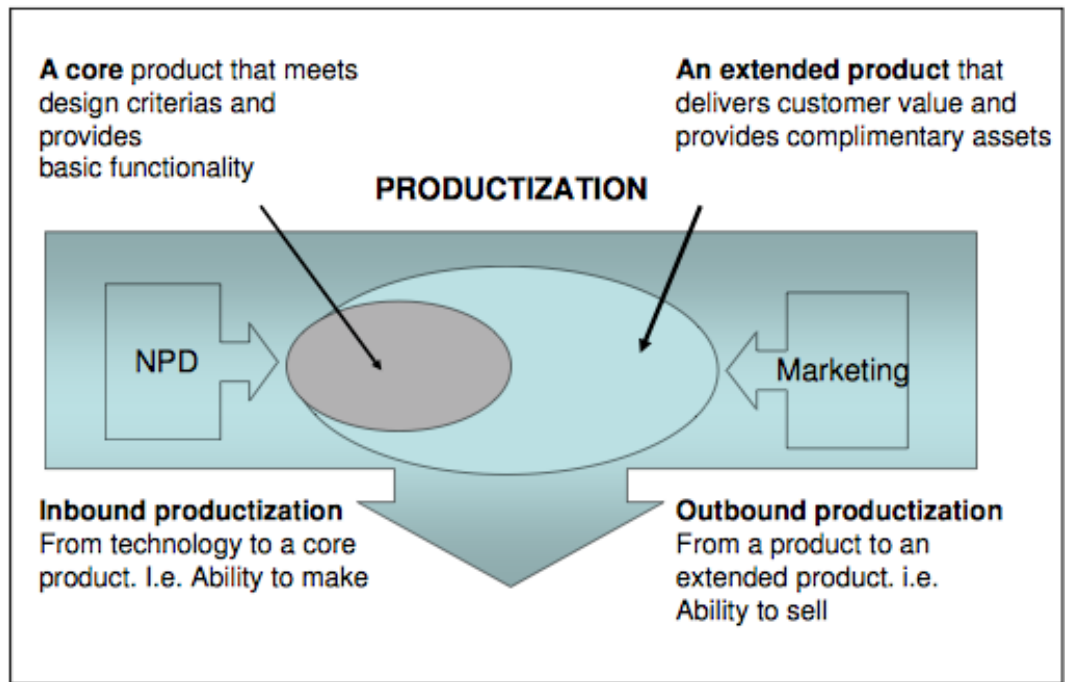


Figure 4. Inbound and Outbound productization illustration (Simula 2008).

Inbound Productization is the internal ability of a company to design and deliver software, which forms the core product. The main idea over here is to systemize as well harmonize the internal processes of the company via which it delivers its software. The goal of inbound productization is to create a core product that a company can reproduce with a reasonable amount of cost and effort. However, this does not imply that customer specific services should be left out. The objective of productization is come up with as many as possible innovative products that have a market demand and in turn, would enhance a company's product portfolio (Sipilä 1996).

Outbound productization is the ability of an organization as to how well they can market the outcomes of inbound production and sell them. One of the pre-requisites for this to happen is to make sure all the major activities or functions comprising inbound productization have been standardized. Another purpose is to increase the visibility of a company's offerings towards its prospective customers, which in turn leads to an increased value of how the product is perceived by the customer. Outbound activities such as branding, designing, training and after sales support and

service can hugely lead to adding value to the core product. All of these outcomes can influence the purchasing decision of customer in a positive way (Simula 2008)

The main point to be noted after studying details of inbound and outbound productization is that for software companies to achieve positive results from the process of productization, they should be to strike a balance between their ability to make and their ability to sell.

### 2.2.3 Benefits of Productization

In introduction (1.1) section of this study, I had briefly mentioned some of the reasons such as improving performance and competitiveness along with clarity in service offering as some of the main reasons why companies undergo productization. There are a number of other gains that software companies can benefit from a successful productization process that I will discuss in this section.

Standardization of service processes allows companies to deliver same services over and over again with fewer resources. This leads to a spike in efficiency levels of the resources as well since they get used to delivering a defined service for multiple customers leading to the reduction of costs and better management (Lehtinen and Niinimäki 2005). It also enables software companies to achieve a unified service delivery, which leads to faster production readiness and reusability. All in all, as services get productized they get much easier to manage which in turn enables software companies to have much better control over their portfolios and clienteles (De Bretani 1991).

As a result of service processes getting more organized and manageable leading to greater efficiency, productization of services also leads to significant increase in the quality of the delivered software that translates into greater customer satisfaction.

Inconsistent quality of services has been highlighted as one of the pain points of services sector for years now (Edvardsson & Olsson 1996). Hence, we can conclude that productization facilitates meeting customer expectations consistently leading more business from existing customers.

Last but not the least customers also reap benefits from productized service offerings, as they are able to compare the service promised to them by analyzing the outcome. They can easily compare prices of different services see which service provides more value for their money. Basically, productization allows customers to evaluate service offerings and this increase concreteness and tangibility of a service. According to Edvardsson (1997), this explicitness – transforms the service into a more compelling and easier buy.

#### 2.2.4 Challenges of Productization

In the previous section we discussed various benefits that productized companies can take advantage off, there are however certain challenges as well when transitioning from service based offerings to product based software. Some of the key challenges identified during productization process such as human resistance towards changes, understanding and maintaining customer perspective & time and resource constraints will be discussed in detail in this section.

Human resistance towards change is most likely to emerge during the process of productization as various internal methods and procedures will be changed in order to standardize company's way of working across all units/teams. Experts in certain areas or functions may not see any benefit in proving more documentation of existing features or changing his/her ways of working from their perspective and might consider this as unwanted and unnecessary work (Sipilä 1995). Hence before undergoing Productization Company should make sure that everyone in the organization understands benefits of productization and understands the overall impact of modifications in ways of working.

Understanding and delivering products that adhere to customer perspective is another challenge likely to be faced during productization process. In order to make sure the productized service is relevant and not useless, continuous customer feedback should be taken else it defeats the whole purpose of productization. Productization often leads to loss of customer perspective (Suddaby & Greenwood 2001) therefore it is important to align the output of productization caters to real customer needs of the targeted market segment.

Finding time and resources require significant investments to be made towards productization process. Productization is complex and requires certain of time to be allocated for completion of the process (Congram & Epelman 1995). Running out of time and resources during an ongoing productization process can lead to failure and catastrophic losses hence companies to should analyze beforehand which level of productization (section 2.2.1) can be achieved with the time and resources in hand.

### 2.3 Process of productization

Coming up with a generic, one fit for all kind of productization process model is not possible because every productization is unique in its own way depending upon the aims and strategy of a software company. One of the recommended process to follow for productization is suggested by Jaakola et al. (2009, 6). This model suggests that overall productization process can be divided into seven stages.

1. Preparation; validating the outcome of productization is aligned with market demand
2. Definition of service; Giving service and its contents/processes enough structure
3. Degree of productization; discussed in section 2.2.1
4. Finalizing the service; proving documentation, user guides & brochures



5. Selecting principles for pricing
6. Follow ups to check quality of service and success
7. Identifying elements for continuous development

Marketing and Piloting have been suggested as an additional step that should also be executed to conclude above productization process (Valminen & Toivonen 2007).

However, for the purpose of this study and especially keeping case company's service offerings and strategic goals in mind this study will focus on the productization process model suggested by Artz et al. (2010). One of the main reasons for selecting this model was that it is specifically tailored towards software companies developing customer specific software and would like to transform into developing more standardized software. This transformation from developing custom customer-based software to a product like software offerings is termed as productization process (Guvendiren et al. 2009). The ongoing productization process in case company is completely in line with this model. Below Figure 5 illustrates the six identified stages of productization.

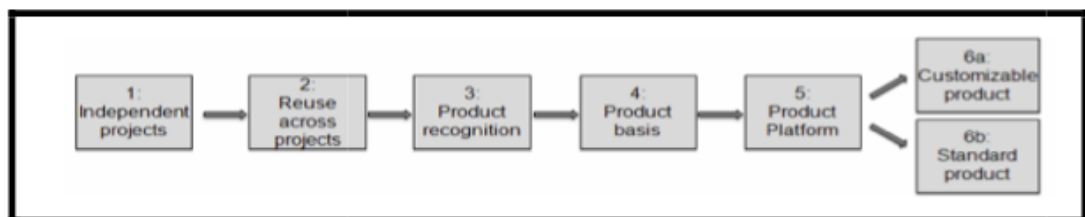


Figure 5. Productization process (Artz et al. 2010)

Subsequent sub sections will cover each of above identified stages of productization in further detail. Customer specific parts(non-productized) are highlighted in red color whereas share parts are represented in blue.

### 2.3.1 Step 1 - Independent projects

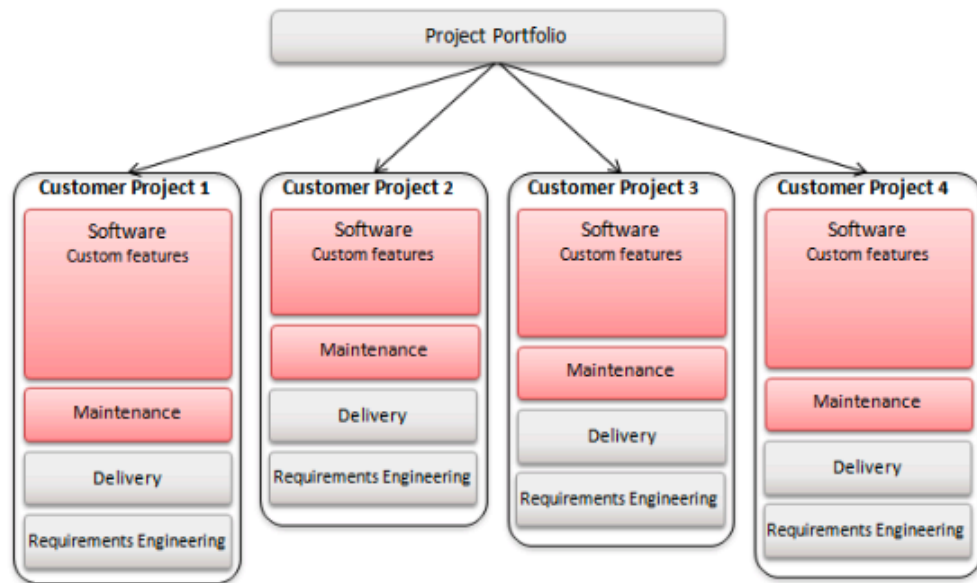


Figure 6. Independent Projects (Artz et al. 2010)

Figure 6 depicts the scenario where a software company implements and delivers multiple customer specific solutions for each customer on a separate project basis. These independent projects are handled by completely different teams that do not share budget, technology or ways of working. These customer specific projects do not share much standardized features or functions.

Most of these individual projects are driven by the active involvement of the customer who acts as the main stakeholders. Key to the success of such kind of projects is highly dependent on the level of customer satisfaction and therefore it is quite common to have small physical distance between customers and implementation team (Kiel et al. 1995). Engaging the customer in delivery projects to ensure the outcome matches their needs and expectations is quite essential at this stage. Gathered requirements are analyzed to determine the delivery date and resources needed for the success of an independent project (Carlshamre 2002). User

acceptance and validation is conducted in collaboration with the customer once implementation is done.

### 2.3.2 Step 2 - Reusable projects

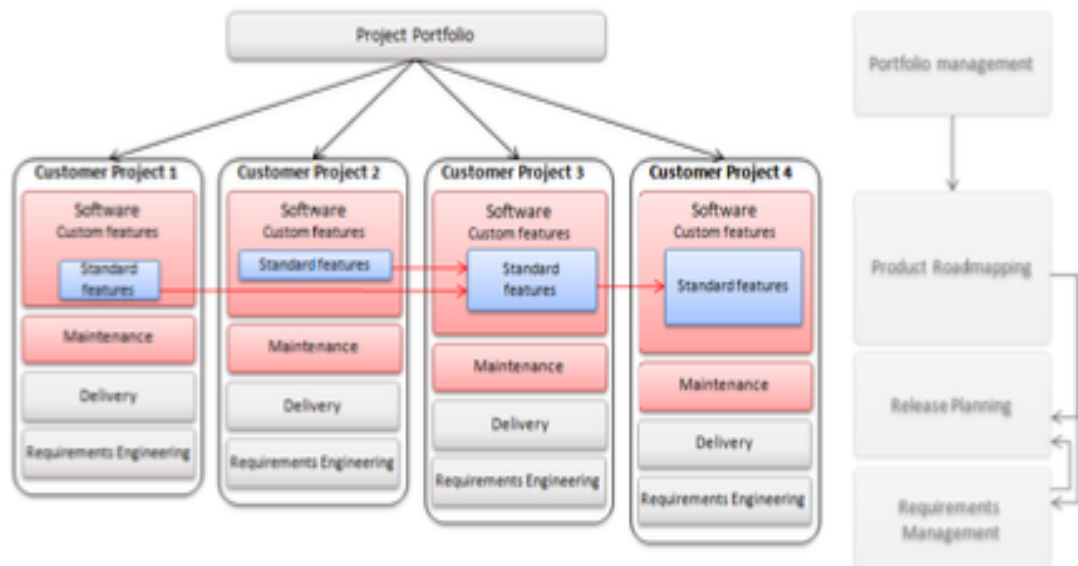


Figure 7. Reuse across projects (Artz et al. 2010)

Figure 7 illustrates the second stage of productization which is also termed as Project feature reuse. At this stage even though projects differ from one another in execution, some of the features are reused across different projects. Key difference from earlier stage being, now company starts reusing already developed features from one project in another. One of the benefits of reusing artifacts from previous projects is that new projects get to utilize features or functionalities that have already been tested in earlier projects leading to significant increase in quality and reliability of the deliverables. As shown in Figure 7, the percentage of customized components is still significantly lower than that of standardized component (ibid., 5).

### 2.3.3 Step 3 - Product recognition

Figure 8 represents the stage at which a software company begins to actively identify overlapping similarities between different customer demands and establishes a product scope.

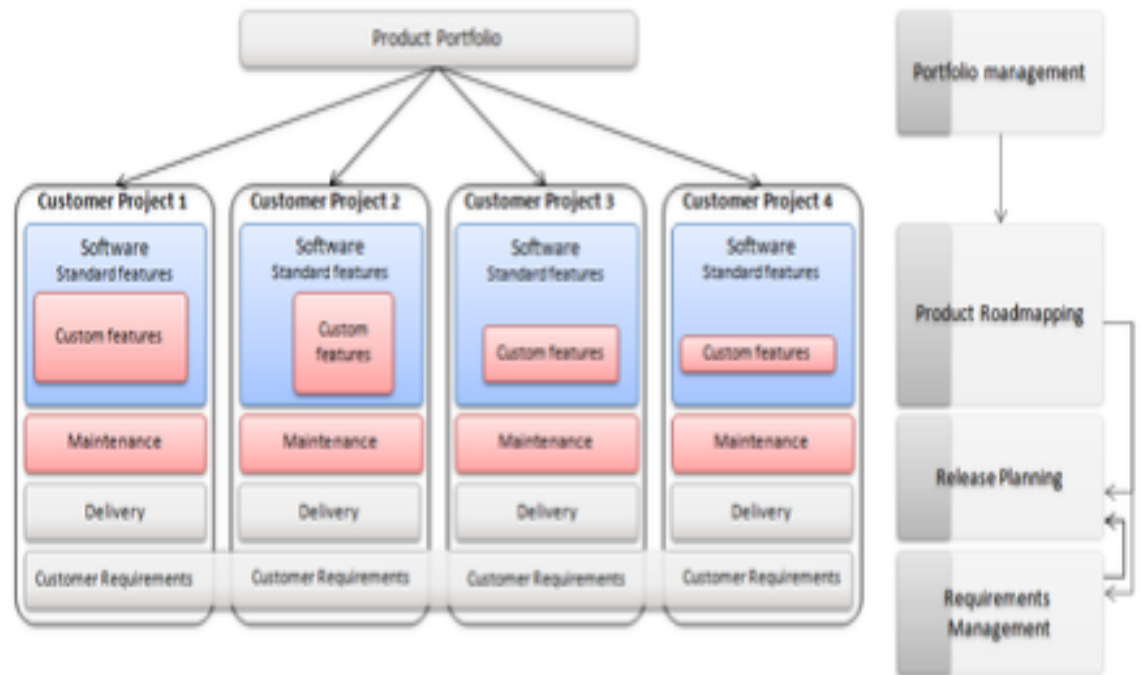


Figure 8. Product Recognition (Artz et al. 2010)

In contrast to step 1 & 2, the percentage of standardized features of project is much higher than customized ones. At this stage, the company starts the actual transitioning into a product driven style and hence it's advisable to design products for specific markets demands rather specific customers. A key aspect of this stage is the requirements management function. There should be dedicated unit/team which should focus on collecting new customer requirements from all ongoing or upcoming customer projects. In order to maintain customer satisfaction, requirements across customers need to be managed and ensure they are either part of the recognized product or then implemented via the custom features within a customer project (ibid., 6).

In subsequent stages, the maturity of product management areas increases as higher stages of productization are achieved. A higher percentage of dark segments of different software product management (SPM) blocks will represent higher product management maturity implying more maturity of the productization process.

#### 2.3.4 Step 4 - Product Platform

During this phase, a software company starts analyzing market requirements in order to plan contents of future releases. As a consequence, companies should prepare long term plans for their products.

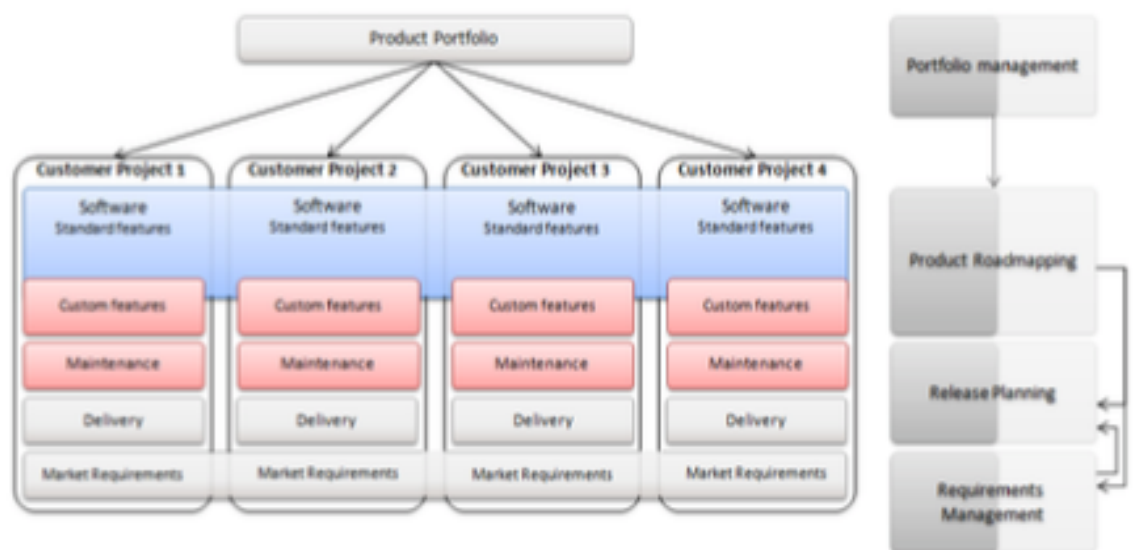


Figure 9. Product Platform (Artz et al. 2010)

As shown in above Figure 9. shows greater maturity in SPM functions (Portfolio management, Product road mapping, Release planning and Requirements management) implying there is more focus now on increasing market share whereas focus on satisfying customer specific demands decreases. It is crucial at this stage for requirements management function to gather market requirements in addition to customer requirements in order to ensure future software releases contain a higher

percentage of standardized software (derived from market requirements) and smaller contents of customized software (derived from customer requirements).

### 2.3.5 Step 5 - Standardized product platform

As shown in Figure 10 (blue colored blocks), there is marked an increase in standardized components and features due to the establishment of a Standardized product platform. At this stage, the focus of the software company shift towards market orientation from customer orientation in order to launch the standardized product platform in the market. There are still some customer specific features developed in order to manage customer satisfaction but most of them are positioned on top of the standardized features.

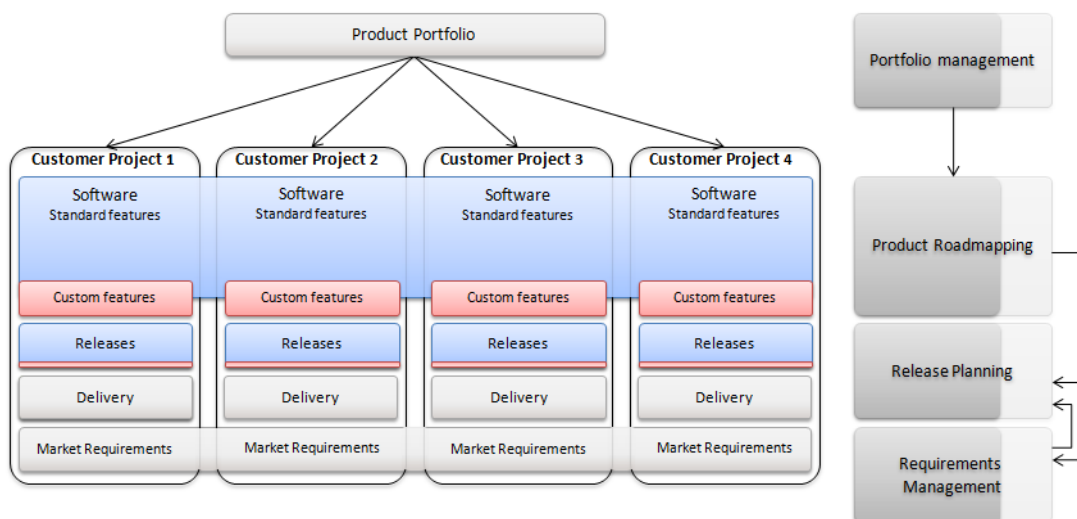


Figure 10. Standardizing Product Platform (Artz et al. 2010)

Event based release cycles also start to appear during this stage. These releases contain features that are part of the standardized main product plus customer specific needs which in turn increases the lifecycle of the product. Portfolio management becomes a key function in order to facilitate effective lifecycle management of the standardized product. At this stage, the company needs to make

an important decision, whether it wants to focus on selling only standardized product or if it intends on selling an additional customer layer on top of the standardized product. Depending upon which option is chosen by the company, final stages of productization are determined (ibid., 38).

### 2.3.6 Step 6 - Customizable product

Depending on the type of software product being developed, certain products might still need a layer of customization in order to integrate it with specific solutions. This type of software cannot be sold as 'ready to use' because of its complexity and need for custom integrations or customizations for it to work (Cusumano 2004). Hence there is always a need for customization layer. This can also be turned into an advantage as possessing a customizable layer enables the product to be applied to different kinds of scenarios (Codenie et al. 1997). These types of products usually cater towards large enterprises rather for individuals and are termed as 'enterprise solutions systems' (Hoch et al. 1999).

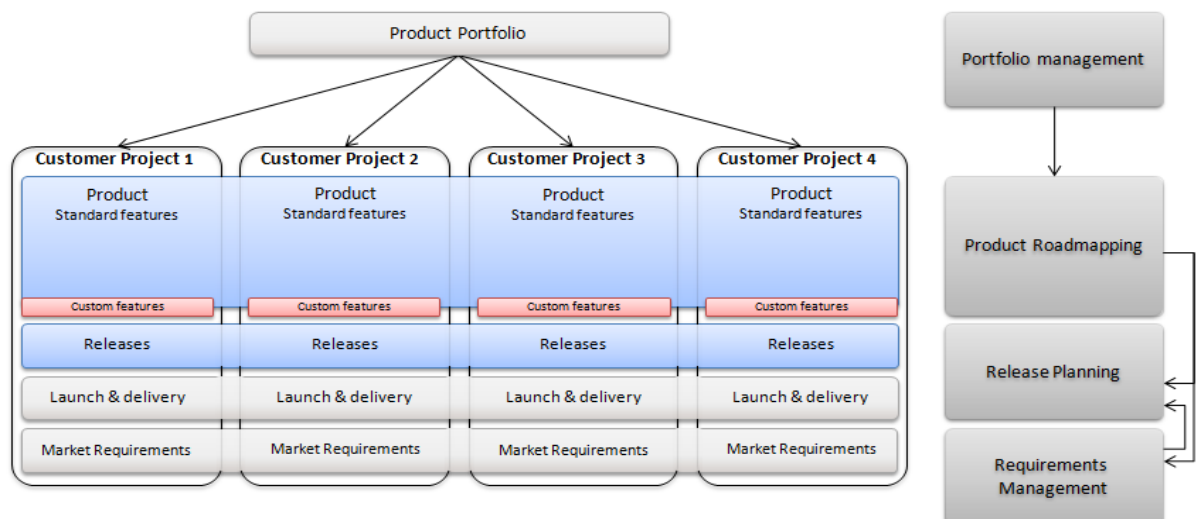


Figure 11. Customized software product (Artz et al. 2010)

### 2.3.7 Step 7 - Standard product

As previously stated in section 2.3.5, the final step of productization process can be one of either described in section 2.3.6 or then the standard software product which can be defined as “a packaged configuration of software components, which is released for and traded in a specific market” (Xu & Brinkkemper 2005).

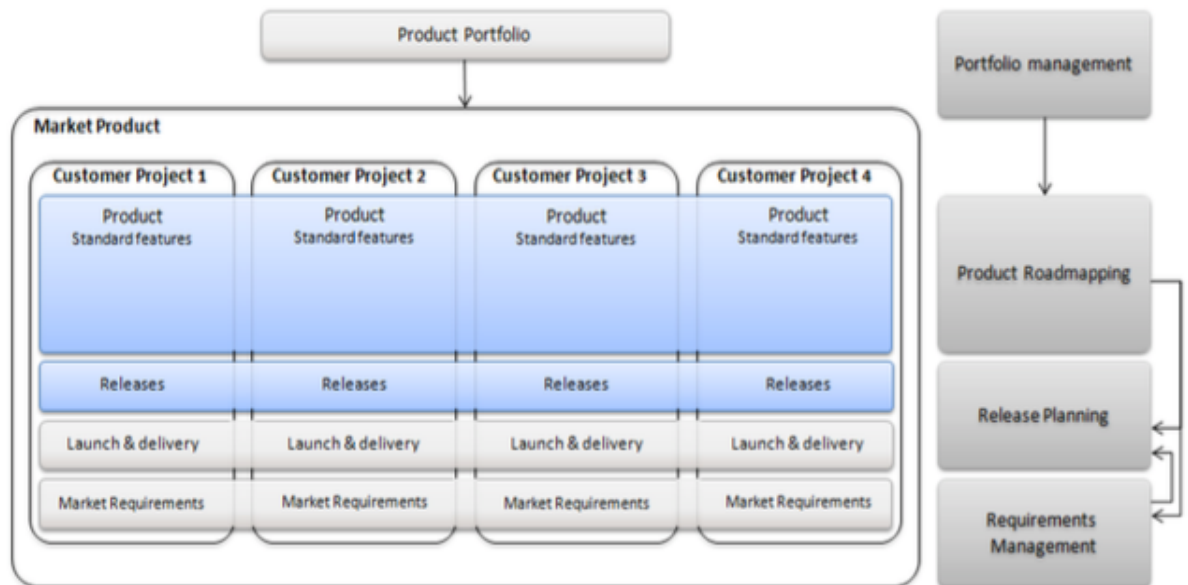


Figure 12. Standard software product (Artz et al. 2010)

At this stage, software company is primarily focusing on meeting market demands rather than customer demands. Through marketing and sales activities, the company starts selling towards mass-market and considers market wishes as an input for the next set of releases or product versions. The product should be completely configurable at this stage without any customer specific features in order to sell to the masses. The main criteria for determining success is solely dependent on gaining bigger market share and shorter interval to market. The biggest advantage of selling this type of product is that there is no need for additional customization to be done before selling it to new customers (Hietala et al. 2004).



## 2.4 Theoretical Framework

In the previous sections, detailed explanation for various stages of productizing customer specific software has been covered. There are few other processes available to follow in the literature but the usage of SPM functions in the productization process suggested by Artz et al. (2010) is the most appropriate framework to be followed keeping case company in mind. Following sections will clarify why SPM framework has been chosen for the purpose of this research and why it makes the most sense.

### 2.4.1 Why software product management framework

SPM provides guidance on how to deliver software that caters to anonymous market demands instead of delivering customer specific solutions. Functions that mostly differ from customer specific projects are requirements management, release planning and sales and marketing (Helfferich et al. 2006). The success of the product depends on various factors and stakeholders. An optimal combination of meeting customer demands together with putting out the product in the market on time and within budget is required (Ebert 2009).

In such scenario, SPM plays a crucial guiding role for companies who base their entire business on developing and selling one or two standardized products (Kilpi 1998). The SPM framework is based upon verified results of literature and field studies conducted along with product managers. Hence, keeping case company in mind where productization process has been ongoing for a year and key SPM process areas are already taking shape, selection of SPM reference framework is most appropriate.

## 2.4.2 SPM reference framework

SPM reference framework comprises of stakeholders, key process area and the relationship between them. These relationships can be seen below in Figure 13.

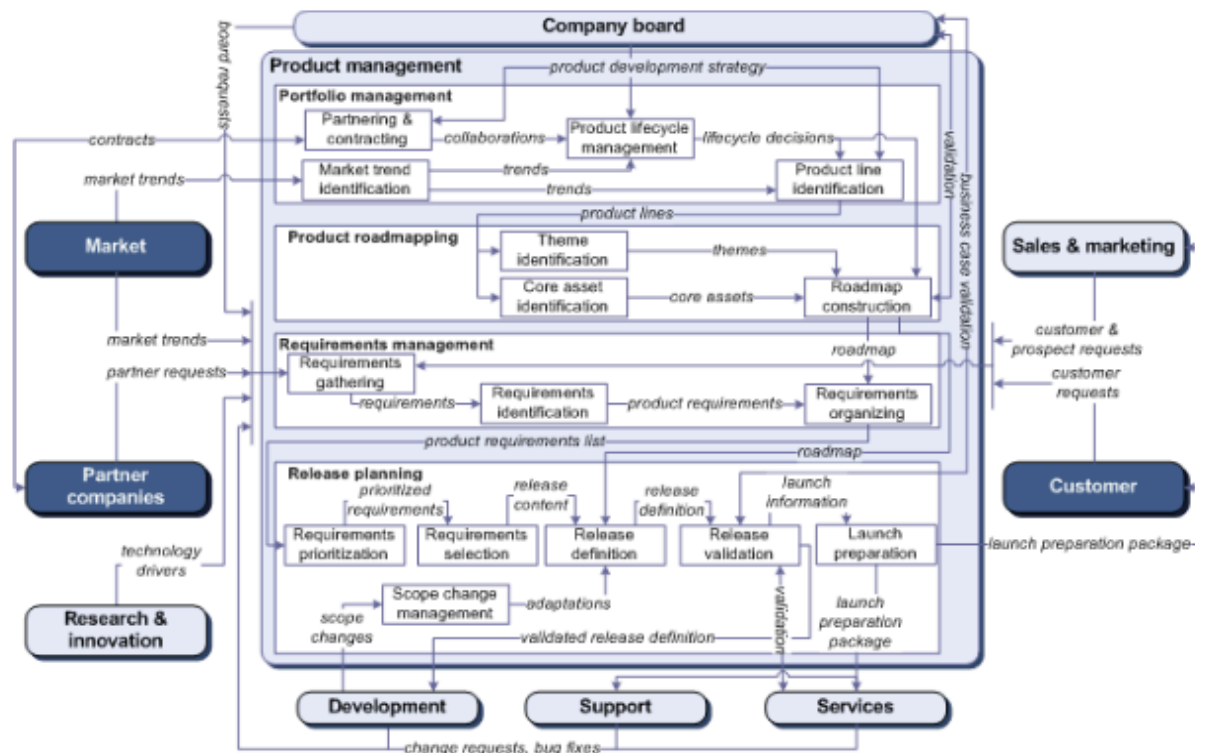


Figure 13. SPM reference framework (Weerd et al. 2006)

Marketing and delivering of the software are not directly related in this framework as it focuses to show the relationships between key process area of managing products, releases and requirements. It also shows the involvement of stakeholders and their relationship with product management. Product managers have a key role in this framework and they are the ones interacting and collaborating with stakeholders. Also, looking at the research activities of in SPM area, there are a noticeable active improvement and further research efforts ongoing. E.g. Weerd et. al (2009) proposed a method (SPM maturity matrix) that can be used to calculate maturity of each of the key processes within SPM reference framework.

The core of SPM framework is based on the productized software and represented in a hierarchal way in Figure 14.

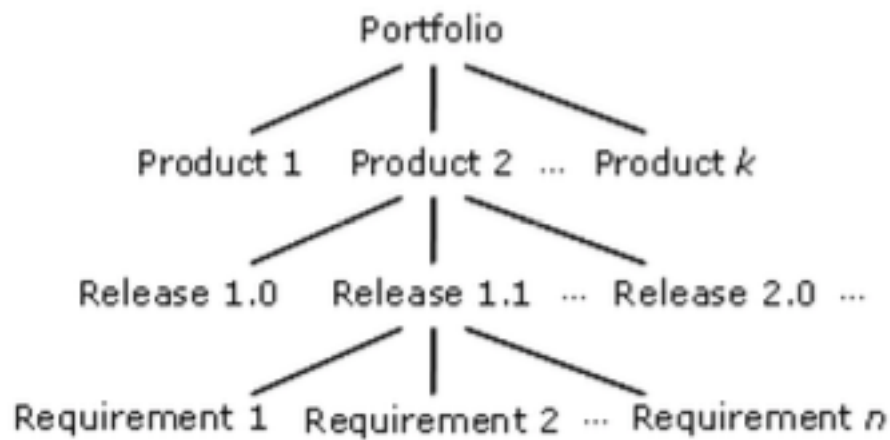


Figure 14. Product management hierarchy (Weerd et. al 2006)

Figure 14 highlights product portfolio containing a set of all productized software in a company, sitting at the top of this core. Each product has its own releases and in turn each release has its own set of requirements. A requirement in this framework can be a technical functional feature or a non-functional feature. Figure 14 also identifies four key functional area of product management namely, 'Portfolio Management', Product Road mapping, 'Requirements management' and 'Release planning'. Following sections will cover each of these functional areas of SPM reference framework in detail.

- Portfolio Management

The main responsibility of reference area is to make decisions about defining a set of existing products. These decisions are taken by monitoring marketing needs, selecting product development process, defining product lifecycle and managing various partners (Weerd et. al 2006). It also includes controlling and planning processes that manage data, documents and resources in a product lifecycle (Abramovici & Sieg 2002). Adoption of product lifecycle management enables companies in achieving higher operational efficiency. Identification of product line is also part of portfolio management.

- Product Road mapping

Product road mapping with SPM framework relates to theme identification and core asset identification. Theme identification means forecasting relevant technological and marketing trends. Core asset identification leads to knowledge of which components can be shared across product portfolio (Weerd et al. 2006). Identification of marketing trends and technology via portfolio management function serves as input for designing the product roadmap. As result, there is an expectation created for the contact of future releases.

- Release Planning

Release planning becomes an important aspect in order to achieve market driven software product development (Carlshamre 2002). Selecting which set of requirements will become part of the next product release needs to be a collaborated effort between all stakeholders as they have their personal interests dictating their preferences (Akker et al. 2005). Release planning consequently becomes another aspect of SPM framework. Stakeholders need to prioritize and select product requirements with mutual agreements which results in the formation of next release definition. Release definition also needs to be validated by all relevant stakeholders once it is written and is then sent to for final approval to the company board (Weerd et al. 2006).

- Requirements Management

According to Höst et al. 2001, in order to satisfy market demands effectively, management of software requirements is crucial. Analysis and elicitation of requirements often lead to poorly understood customer requirements which in turn result in inaccurate assumptions. Therefore, it is utmost important to devote sufficient time and resources towards the effective execution of requirement management activities. Regnell and Brinkkemper (2005) recognized the following core requirements engineering activities: eliciting requirements, modeling and analyzing requirements, communicating requirements, agreeing requirements, and evolving requirements.

The maturity of above-mentioned key process functions (Portfolio Planning, Product Road mapping, release planning and Requirement management) of SPM reference framework was identified as the most important factors governing the success of productization of customer specific solutions. Thus, providing an answer to the first research questions of this study, *what are the key success factors that should be taken into account during productization process of a software company?* These key factors and SPM framework will be utilized to in subsequent sections to answer the second research question, *how can these identified factors be utilized in case company to improve the overall success of the process of productization?*

### **3 Methodology**

The purpose of this section is to outline the methods and data used in the examination of the key factors influencing the productization process in the context of the case company. As concluded in the previous section, the aim of the subsequent sections of the study is to seek answers to our second research questions, introduced in section 1.3. *How can these identified factors be utilized in case company to improve the overall success of the productization process?* This section of the study describes the chosen research approach, procedures to collect the empirical data and its justification and the technique used for analyzing the data. The study was conducted through various systematic iterations of developing the idea influenced by the outcome of the earlier literature review.

#### **3.1 Research approach**

A qualitative research approach was utilized for the purpose of this study. The qualitative approach is suitable for this kind of research as most of the relevant information needed is in qualitative forms, for example, guidelines, specifications and documents. Qualitative analysis of the relevant literature on the productization

process along with the ongoing product development process in the case company lead to newer opportunities that can be beneficial for the case company or any other software company in a similar situation.

The qualitative research methodology facilitates outlining processes in identifiable contexts, and the sequential flow of the events and activities can be presented. It uses a naturalistic approach towards seeking an interpretation of complex situations wherein the actual researcher does not manipulate findings from analyzed situations (Golafshani 2003). Questions asking what and how are typical in qualitative research (Myer 2013).

A qualitative research method is also considered more flexible as it facilitates more interaction between the participants and the researcher (Mack et al. 2005). It also served the author's personal interests due to career aspirations in a very closely related topic of product management. In the context of this research, finding answers to the research questions via statistical and quantitative analysis would have been rather difficult, and hence, the qualitative research approach was chosen.

The study was implemented by selecting the R&D (research & development) unit of the case company and conducting semi-structured interviews with the senior managers in the areas of product and portfolio management. The author has been an employee of the case company for the last decade in various roles related to management activities, which has led to an in-depth understanding of the case company's strategy and practices. Familiarity with the case company's strategy over the years and existing process documentation enabled the author to focus the interview questions on information that was critical for the purpose of this research.

The answers to the interview questions were classified and then categorized keeping in mind the SPM framework chosen as the theoretical framework in section 2.4.2. After applying the organized data into the SPM framework, approximate answers to

the second research questions started to appear. Figure 15 illustrates the overall research approach adopted in the process of seeking answers to the research questions of this study.

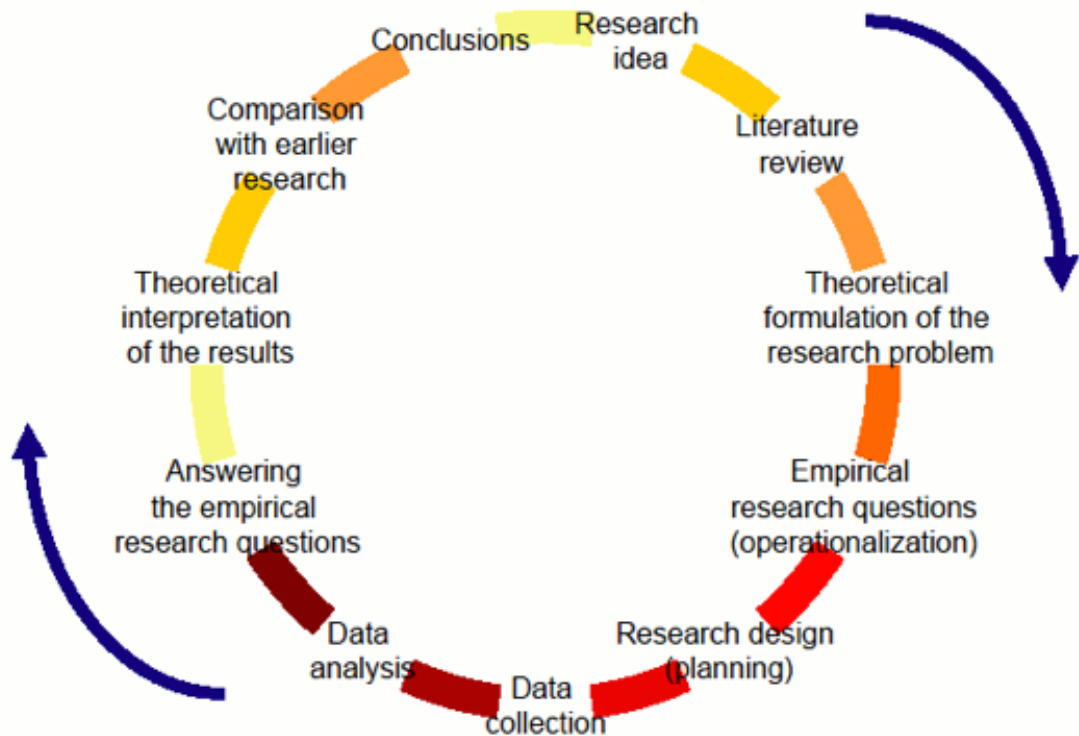


Figure 15. Research approach (Creswell J.W. 2007)

### 3.2 Data collection

The empirical data was collected through observation as the case company's employee and by analyzing verbal communication and written documentation pertaining to the process of productization. Most of the case company's specific material was not available to this thesis due to confidentiality issues. Methods, such as observations and interviews facilitating qualitative analysis are both dominant and supplementary in the naturalistic and positive paradigm respectively. On the other hand, utilization of surveys is more relevant in quantitative analysis (Golafshani 2003).

One of the most important sources for studying a case company is interviews (Yin 2003), and they formed the basis for the qualitative research process in this particular study. Interviews can be classified into three different categories:

- Structured & standardized: All interviewees are given the same set of questions.
- Semi-structured: Themes are defined but wordings and the order of questions can be different.
- Unstructured: Some guiding concepts or themes are provided for the interviewees to facilitate discussion.

For the purpose of this research, semi-structured interviews were conducted with senior business managers who were the key decision makers in the product management unit of the case company. The interviewed managers had a variety of information relevant to this study as well as inside information about the entire productization process within the company. In total two semi-structured interviews were conducted. These interviews were carried out between the 1<sup>st</sup> May and 11<sup>th</sup> May 2018. The first interview lasted approximately for 30 minutes whereas the second interview lasted 40 minutes. English was the chosen language for both of these interviews.

The interview themes revolved around the research questions and the literature related to productization reviewed in Chapter 2. Those interview themes are listed below, but more detailed questions are available in Appendix 1:

1. Theme A: Meaning of productization
2. Theme B: Goals & reason for an ongoing productization process
3. Theme C: Challenges and benefits of productization
4. Theme D: Concrete Results
5. Theme E: Maturity measurements

Below are the job profile details of the two interviewees selected for this research:



1. Senior Product Manager:

The interviewee's name was omitted from this study in order to maintain confidentiality for the case company. The manager had fifteen years of telecom and financial domain experience of leading international software businesses and development organizations. He had proven expertise in leading and developing product teams and organizations in his long IT career. He had a direct line of communication with the head of product management and key stakeholders in the case company.

2. Portfolio Manager:

The interviewee's name was omitted from this study in order to maintain confidentiality for the case company. In addition to portfolio management experience, this interviewee had a strong background in international research and development projects primarily focusing on cross-disciplinary collaboration projects between industry and academia. The interviewee was an obvious candidate due to his/her past research experience of working with universities and research organizations and due to an important role in the productization process of the case company.

### 3.3 Data Analysis

Accurate interpretation and analysis is the most difficult step of qualitative research (Ghauri 2004). Qualitative data analysis is best executed when it's done along with data collection enabling researchers to generate an understanding of research objectives. The iterative process of data analysis and collection finally reaches a point where no new categories or themes are discovered in data collection process. This stage is known as saturation and it signals that data collection is incomplete (Kuzel 1995). This technique was used in conducting semi-structured interviews along with the basic qualitative analysis of coding text fragments.

Qualitative data analysis using coding text fragments in an inductive approach and starts with the collection of data in form of text. Collected texts can be the following:

- Transcripts of structured or semi-structured interviews
- Field notes
- Documents, diaries or real-life stories (Bloom & Crabtree 2006).

For the purpose of this research, initial stage (after interviews were conducted and transcribed) comprised of entire reading of the transcript from semi-structured interviews. Original quotations from transcribed interviews were grouped into similar themes and codes using the established theoretical framework. Analytical strategies and their theoretical application were stimulated upon various iterations of reading the transcripts and without the use of any specific software. The selection of texts was performed based on their level of relevance to the chosen SPM framework established as the theoretical framework of this study which started to provide the first big picture of collected data. Thereafter, criteria for selection of text fragments became clearer and was checked for consistency in the selection process.

The last step of analyzing was to group the identified coded fragments into four relevant categories of SPM framework, namely:

- Portfolio management
- Product road mapping
- Release management
- Requirements management

Above categories were utilized as qualitative variables or the categorical variable (Rourke 2008) for further analysis of this qualitative study.

Below shown Figure 16 summarizes the above explained data analysis methodology employed in the data analysis of this research.

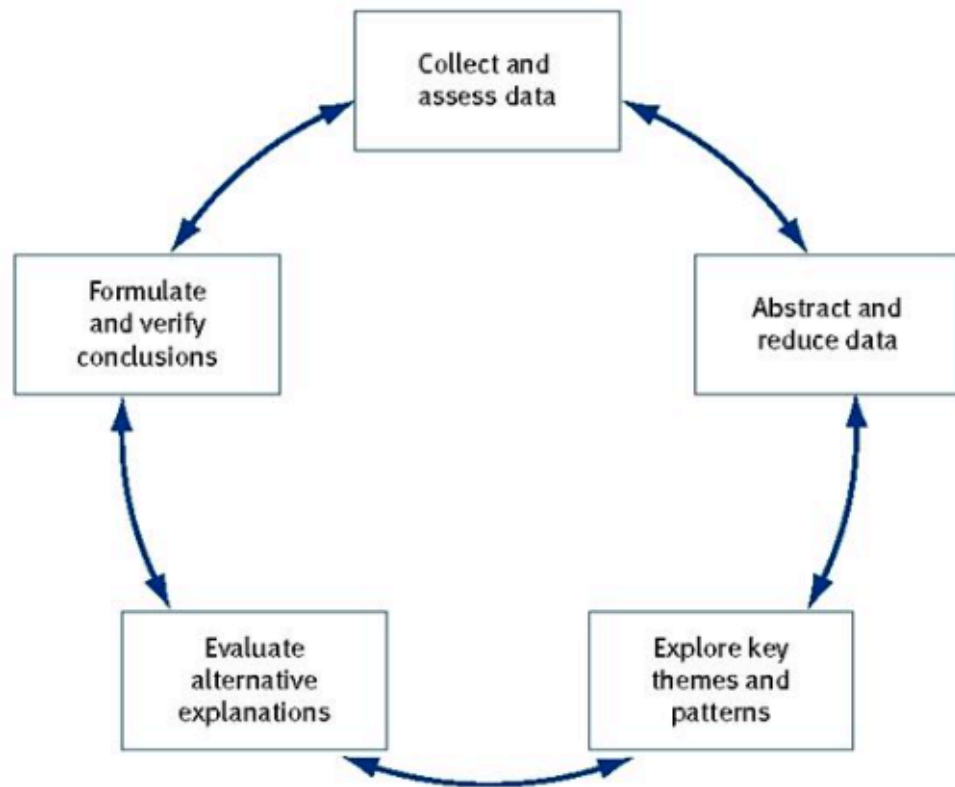


Figure 16. Data analysis methodology (Wilkinson 2016)

### 3.4 Verification of results

Qualitative research methods are often questioned due to concerns regarding their trustworthiness (validity & reliability) as it's argued that qualitative analysis adds subjectivity to the research. Subjectivity stems from lack of statistical and numerical analysis (Brink 1993). Therefore, it's crucial for researchers adopting the qualitative method for analysis to address issues concerning validity and reliability of the research. Trustworthiness of the research should be addressed throughout the entire research process (Hirsjärvi & Hurme 2010). Qualitative research aims towards providing insights into participants perceptions and experiences related to the research questions. The key aspect for researchers adopting qualitative approach is to stay objective and ensure researcher's own perceptions have no bearing on research results.

The researcher of this study is a current employee of the case company, therefore, it's important to ensure that the researcher's own personal ideas and perceptions did

not affect the outcome of the research process. Therefore, researcher ensured activities of research methodology such as data collection, verification, analysis and derivation of results were strictly adhered to the reviewed literature concepts and theoretical framework established earlier in the study. The researcher also ensured not to share his/her own opinions during the process of interviewing participants. In order to maintain objectivity researcher ensured careful documentation was carried out during the entire research process which can be easily repeated in any similar future studies. Interview questions are present in Appendix 1.

In addition, empirical data was collected in the English language itself so there was no need for any kind of translations. Due to the absence of any sort of translation, the risk of misinterpreting the meaning of interviewee's responses was significantly minimum. According to Brink (1993), the researcher should maintain sensitivity and carefulness in order to eliminate the possibility of errors during the process of research, for this reason researchers remained sensitive and careful thought the entire research process of this study to maintain its validity and reliability to derive bias free results.

However, it should be noted that this study was carried out for a single case company and specifically within the R&D unit. Customer teams were not directly involved in the research process as the focus of the research was on productization. Therefore, findings and results from this research should not be applied or generalized for any other similar settings. This research's results and recommendations are tailored completely towards the ongoing productization process of case company but in some specific cases might also serve as food for thought for software companies intending to productize their customer specific software.

## 4 Results

This section will present main findings derived from carrying out the research approach as explained in section 3.1. The purpose of this research activity was to find answers to following research questions:

- *what are the key success factors that should be taken into account during productization process of a software company?*
- *how can these identified factors be utilized in case company to improve the overall success of the process of productization?*

As this study was focused on finding answers relevant to case company, the findings are reported in four subsections in accordance with the SPM framework established as the reference framework for this study in section 2.4.2.

### 4.1 Portfolio Management

#### **Current Situation**

Both of the interviewees as mentioned in section 3.2 stated that case company is developing and maintaining two different products in its current portfolio, one which is based on latest technology and offers a wide range of productized features across the entire solution stack and the other one which is much older and contains lot of customer specific features and customizations. Senior product manager mentioned, the newer product line is not at a very matured stage and lacks a lot of basic features and functionalities that are needed by the customers in order to go live with the product stack. On the other hand, the older product line has much more variety of end to end working features and functionalities but drawback being it requires heavy customization effort in order to align it along with business processes of a new customer. So, depending upon the negotiations with prospective customers, the product line is chosen. If a customer has set aside longer time frame for its business transformation process, then the newer product line is sold to them whereas if they are in need of quick and dirty solution then the older product line is chosen which

requires a huge effort in customization and integration. Portfolio manager also mentioned the formation of new third product line being established in very near future which will be a hybrid of two existing product lines in order to reduce the time to market and heavy customization effort. Senior product manager pointed out lack of market trend identification activities leading to opening or maintaining multiple product lines in order to acquire newer customers. Portfolio Manager was of the opinion that case company's partnering, and contracting abilities were quite matured as they have been able to establish relations with multiple consultancies in order to acquire to additional talent and resources needed for delivering new customer cases.

### **Recommendations**

1. A specific business goal should be defined within the portfolio for each product:

This is the first action that case company should take by defining specific goals or targets for all product lines in its portfolio. Companywide focus should be applied on full control across the product lifecycle. Encourage cross functional projects with specific tactical goals such as the introduction of new lifecycle processes which would enrich the overall portfolio. Introduce plans for implementing precise improvements that would be targeted to enhance operational areas with lower efficiency or performance.

2. Active identification and documentation of current marketing and technological trends: As discussed in the literature review of this study, one of the key reasons for companies to undergo productization process is to become market driven instead of specific customer demand driven. To achieve that goal, it's important for case company to identify future trends and make sure they are documented. This will directly lead to better management, monitoring and documentation of different product lines and product lifecycles. Case company should invest more in R&D projects with specific goals of identifying new, existing and upcoming market trends. Once these trends are identified & documented, they should then be passed onto product road mapping to ensure their inclusion in the product roadmap.

3. Determining strategic direction for each product to improve product lifecycle: Case company also needs to revisit its strategic choices to ensure its existing products are well positioned to take advantage of upcoming market trends. E.g. maintaining and developing legacy product line might get some business for the company in short term but in long term it does more harm by taking away resources that could increase the maturity of the newer advanced product. The company should side with reason than being over ambitious while defining directions for product management. In order to make directions clear, it would be advisable to define business strategy for each product lifecycle.

## 4.2 Product Road mapping

### **Current Situation**

Both of the interviewees had a different opinion regarding the current product road-mapping situation in case company. Product manager was of the opinion that since they are continuously identifying features for the roadmap and then ensuring they are maintained on a component level roadmap hence product road mapping function of the company is quite matured. Product manager mentioned that product road mapping was in good shape for the newer product line but for the old legacy stack there is lack of road mapping due to those projects being entirely driven by customer demands. However, portfolio manager had a different opinion. Lack of identification of themes and core assets within product management unit leads to lack of long-term roadmaps. This results in uncertain future of the products and fewer releases being planned in advance. It was also pointed out that there is lack of balance between fulfilling market demands and adopting latest technologies. Portfolio manager was however happy regarding existing roadmaps being utilized for communication with stakeholders and being designed with active collaboration between both internal and external stakeholders.

### **Recommendations**

1. Defining policies to identify and store relevant themes and assets information:

As pointed out by the portfolio manager, it's an obvious area needing improvement. Case company should try wrapping similar ideas and requirements into certain themes (either new or existing) that provide certain functionality enhancing the product. Common functionalities should be grouped under a core asset which supports reusability. Upon identification of themes and core asset the roadmap becomes clearer and is also able to plan long term releases. It is advisable that product roadmaps are stored in a centralized location which is accessible across all functions in the company.

2. Defining the policy for storage and procedure for communicating roadmaps: Roadmaps should be developed and maintained as a continuous process and at no point should be outdated. Case company should create standardized methods which will ensure roadmaps being updated at all times. Communication with stakeholders can be further improved by creating procedures which will keep stakeholders updated with upcoming and future product releases. It is also advisable to create a standardized template which will be used to share regular roadmaps updates with stakeholders.

### 4.3 Release Planning

#### **Current Situation**

Both interviewees were in agreement that release planning was currently the most mature function in case company of the four key functions in SPM framework. Both interviewees also agreed that post release actions were more matured than planning and validating activities that take place before the actual release is deployed in customer environments. Product manager pointed out that even though the release-planning process was quite good, main focus while selecting requirements for next releases was still leaning more towards customer satisfaction rather than towards increasing market share suggesting an attitude block in mindset across the company. The reason for this, customer first before market demand attitude is mainly because



of the historical service-based model prevalent for last twenty years in the case company that is now being transitioned into a product-based approach.

### **Recommendations**

1. Implementing requirement prioritization procedure:

Case company should implement a requirement prioritization procedure for release planning, which is either based on requirement urgency or value. If urgency is the chosen criteria, the requirements should be prioritized that can fulfill market or customer needs in a shorter time-to-market. However, if value is the chosen criteria then prioritization should be done keeping business benefit vs cost of implementation comparison in mind for each requirement. As pointed out by one of the interviewees there is still customer first attitude prevalent in the company when it comes to prioritizing requirements, this means the software is developed for the paying customer & not for the potential market which would lead to the development of a standardized product. Case company needs to act in this area and change its attitude when it comes to prioritization of requirements. Literature suggests various ways to accomplish this change but the best suitable approach for case company is suggested in below Figure 17. Modifying existing requirements prioritization procedure in a short time span is rather difficult, hence the suggestion of adopting another approach which can act as a trade-off between all concerned stakeholders. In this approach, the customer still plays a role in requirement prioritization but is no more the main driver.

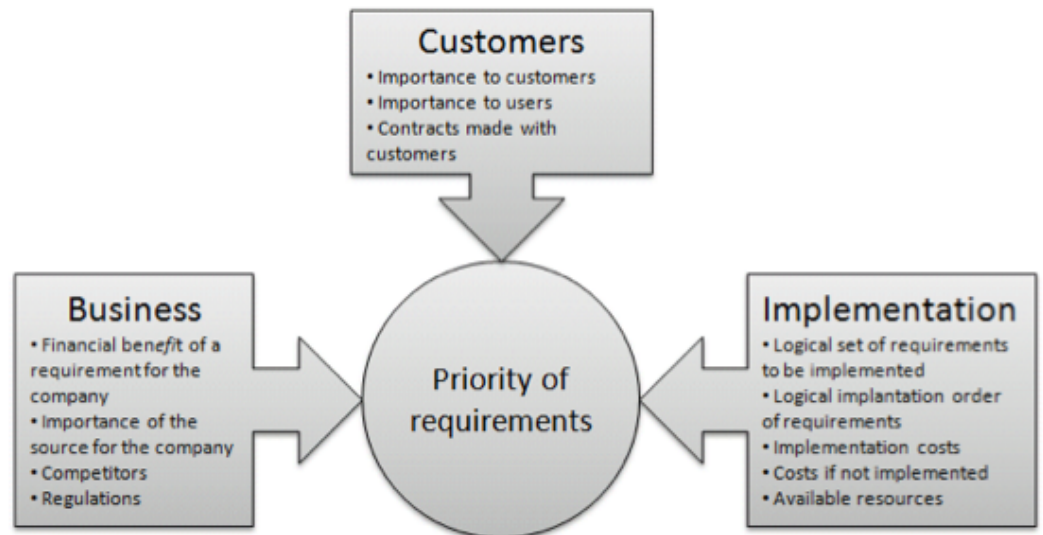


Figure 17. Three points view (Artz et al. 2010)

## 2. Implement requirement selection procedure:

After case company has modified its processes towards more efficient requirement prioritization, they need to select an optimal set of candidates for the release. Increase in market share should be the prime focus and customer specific satisfaction being the secondary focus while selecting release candidates. Selection method should be able to manage constraints such as quality, schedule, time to market & budget. Unstable or complex requirements should be identified in order to ensure scope changes are minimal.

## 4.4 Requirements Management

### Current situation

Both interviewees had a varying opinion about requirements management process in case company. Product manager was quick to highlight the fact that there was no process implemented yet in order to differentiate between marketing and customer requirements. Product requirements were decided based on the feasibility of converting customer requirements into a standardized feature. Requirements

elicitation process was still quite customer specific. Portfolio manager on the other hand was quite content as case company was focusing on gathering and identifying requirements as a continuous process and that there was a centralized database tool available which was being used to store all gathered requirements. This provided requirements management process maintainability and traceability. However, both interviewees highlighted high customer involvement when it came to the determination of which requirements should be part of the product.

### **Recommendations**

1. Implement a process for gathering wishes from all stakeholders:

Case company should ensure the current requirement gathering process is collecting requirements not only from internal stakeholders but from external stakeholders as well. This will ensure in capturing the complete set of market and customer requirements. Stakeholders should be responsible for specifying the priority for their specific requirements. In order to be market driven which is the ultimate goal of a productization process, case company also needs to start collecting market requirements which will be prioritized along with customer requirements. As processes mature and the company becomes more market driven, customer involvement in requirement prioritization will decrease leading to matured productization.

2. Implement a process to transform customer requirements into product requirements:

Case company also needs to translate gathered market requirements into identifiable product requirements. Product requirements should be documented in a manner that is understandable by both marketing and product development teams. In addition, market requirements should be explicitly connected to its corresponding product requirement to support bidirectional traceability. Since the case company is already using JIRA (database management tool developed by a company called Atlassian), they can utilize below shown mapping in Figure 18 for linking marketing and product requirements. Another advantage of this linking is that it supports identification and maintenance of themes and core asset across requirements

and release functions. These connections require effort, but they are achievable.

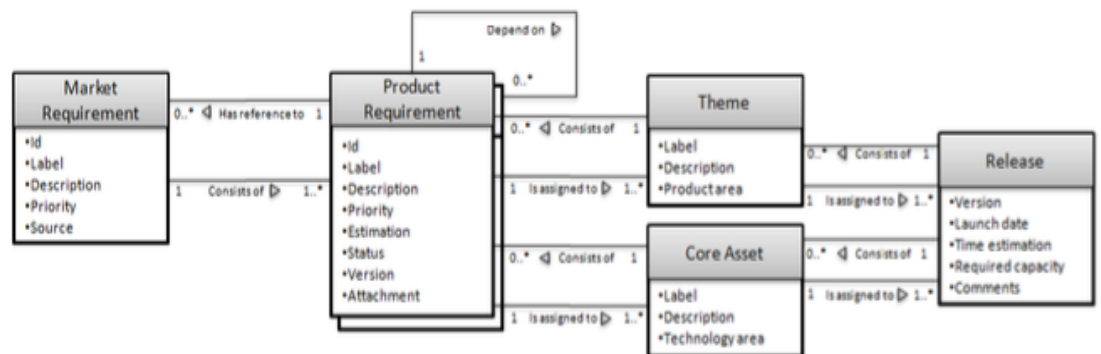


Figure 18. Market and product requirement linking (Artz et al. 2010)

## 5 Discussion

This research aimed to provide a detailed review of the productization process of customer specific software for the case company from academic literature, which in turn would help in improving the existing ongoing process of productization. In order to achieve that objective, relevant academic literature was reviewed in section 2.3 and presented seven sequential steps that should be carried out to achieve goals of productization in case company. Section 2.4 describes the SPM reference framework that should be adopted for the implementation of productization stages discussed in section 2.3.

The purpose of this study was to find answers to following research questions within case company's context:

- *What are the key success factors that should be taken into account during productization process of a software company?*
- *How can these identified factors be utilized in case company to improve the overall success of the process of productization*

In order to find answers to above research questions, this study focused on detailing the selected model of productization in section 2.3 and establishing a theoretical

reference framework in section 2.4. Through the established SPM reference framework, four key success factors were identified. The study then proceeded onto conducting a qualitative analysis of findings gathered from two semi-structured interviews with key business managers of case company and researcher's own observations from being an employee in case company in sections 3 & 4. The following section 5.1 summarizes those findings and attempts to answer the two research questions of this study.

## 5.1 Answering the research questions

Table 2 summarizes the improvements suggested for case company in previous sections 4.1, 4.2, 4.3 & 4.4 for the four key success factors Portfolio management, Product Road mapping, Release Planning & Requirements Management of the SPM framework which was chosen as the theoretical framework in section 2.4.

Table 2. Key success factors in productization process and their improvements

Key Success Factors	Improvements
Portfolio Management	<ul style="list-style-type: none"> <li>• A specific business goal should be defined within the portfolio for each product</li> <li>• Active identification and documentation of current marketing and technological trends</li> <li>• Determining strategic direction for each product to improve product lifecycle</li> </ul>
Product Road mapping	<ul style="list-style-type: none"> <li>• Defining a policy for storage and procedure for communicating roadmaps</li> <li>• Defining a policy for storage and procedure for communicating roadmaps</li> </ul>
Release Planning	<ul style="list-style-type: none"> <li>• Implement requirement selection procedure</li> <li>• Implement requirement prioritization procedure</li> </ul>

Requirements Management	<ul style="list-style-type: none"> <li>• Implement a process to transform customer requirements into product requirement</li> <li>• Implement a process for gathering requirements from all involved stakeholders</li> </ul>
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Using Table 2, research questions of this study can be answered:

- *What are the key success factors that should be taken into account during productization process of a software company? (Refer to **key success factors** column in Table 2)*
- *How can these identified factors be utilized in case company to improve the overall success of the process of productization? (Refer to **Improvements** column in Table 2)*

In addition to the identified key success factors of productization process and their improvements for case company within the SPM framework, there are some other general recommendations related to product management activities found during literature review which can be utilized by case company for further improvement of their current product management function. The basis for suggesting these recommendations is researcher's own observations being an employee at case company for several years and in different managerial roles as mentioned in section 1.2.

### **Product Management (recommendations)**

Case company should ensure that following activities are included in the existing product manager's responsibilities and thing to do list:

- A product manager should be aware regarding the target market and marketing trends of his product. Product's applicability to other solutions should be known and tracked.

- Managing complete lifecycle of product including strategical and tactical decisions along with specifying market requirements for current and future products (Dver 2003).
- A product manager should be responsible for managing product requirements, product release lifecycles, and release definitions along with the responsibility to prepare and implement a new business case in his/her product (Ebert 2007).

## 5.2 Implications

In the previous section, answers to the research questions of the study were presented. This section will outline practical implications of those findings. The following listed steps will describe the approach case company should adopt for incorporating the findings in section 5.1:

### 1. Determining the initial position:

The process should begin by trying to determine the current level of productization in the case company as it already has varying maturity levels of core SPM functions (Portfolio management, Product Road mapping, Release planning & Requirements management) existing in the organization. In order to determine the initial levels, case company should conduct a software product management assessment. This procedure involves three steps:

- Check if there are any situational factors to be considered (Appendix 2)
- Determine current maturity level of core SPM functions using SPM maturity matrix (Appendix 3).
- Using above two, derive the current position within ongoing productization process in the company.

### 2. Performing gap analysis:

The purpose of this activity is to determine the gap between the calculated initial position of productization process in step 1 and the targeted level of productization in case company (section 2.3 explained the various levels of productization). Based on the information gathered from initial maturity

levels and gap analysis, case company should determine the functions that should be improved.

### 3. Applying recommendations:

The final step is to apply the improvements determined in step 2 in order to further mature case company's productization process and complete the transformation from being customer driven to market driven.

A benefit of following above-mentioned approach is that, it is quite possible that case company will identify additional improvements to be made to their existing processes that might not have been captured in Table 2.

## 5.3 Comparisons with earlier literature

During the course of this study, a literature review was performed covering key aspects of productization, different stages of productization and software product development framework to be used as a framework to implement the reviewed productization process.

In relation to key aspects of productization (service, product and software product), it was found that these aspects of productization exist in the case company in varying levels in different project teams. The older customer teams are more service based whereas the newly established customer's teams are delivering less of customer specific features and more of product based features implemented by the core development team. The results from interviews confirmed the knowledge within product organization of difference between software as a service and as a product. The understanding of these key aspects can be found quite similar in Software product conceptualizations by Hyrynsalmi & Hurme(2011).

In the literature review of productization process for a software company, this study mainly adopted guidance from Artz et al. (2010), which breaks down the productization process in a software company into seven different stages. The stages



suggested within this process provide in-depth explanations for each of the stages starting from zero productization to the highest level of productization. Chosen process for productization made sense to the interviewees of this research study as well validating the choice of productization process suggested for the case company. There are some other processes of productization available for software companies within the academic literature, the most common of them being 'productization of services' by Jakkola et al.(2007). The reasons for choosing Artz et al. (2010) was due to the focus of their process in transforming software companies delivering customer specific software into delivering more standardized product based software where as Jakkola et al. (2007) focuses on productization of services which is not in line with strategic choices of case company.

Due to the choice of productization process adopted in this study, it made sense in establishing the SPM reference framework as the theoretical framework since it already incorporated the key aspects (portfolio management, product road mapping, release management & requirements management) of productization process. Furthermore, there are ongoing active improvements and further researches being conducted such as further development of SPM maturity matrix within the SPM framework (Weerd et al. 2009). However, there is also software product management process model formulated by Kilpi (1998) that can be adopted but there have not been any further recent improvements or relevant researchers using it in the area of product management.

#### 5.4 Limitations

This section outlines the limitations of this research that need to be kept in mind while considering the results and practical implications highlighted in this study. The research was carried to analyze productization process of a single case company in order to identify the key success factors and their potential improvements also for the case company. Therefore, the findings and implications discussed in the previous sections cannot be generalized to other contexts. Each productization process is

unique depending upon a variety of variables such as market segment, company size, existing processes in the company, strategic goals and attitudes of employees towards productization, hence it is important to highlight that there was no intention to provide a generic approach for other software companies in a similar situation. The findings and implications discussed in the research can be utilized as part of research material rather than a set of generic guidelines.

## 5.5 Recommendations for future research

This research provided an overview of productization process that could be utilized at case company in order to transform from delivering customer specific software to selling productized software. The study also included practical implications of implementing chosen productization process using SPM framework at the case company. However, it should be noted that productization is a subject that has been recently reviewed by various organizations, universities and individual researchers in collaboration with software companies that are keen on adopting the product based methodology over services or customer specific business model. Software companies are majorly undergoing this transformation in order to gain more scalability, effectiveness and revenues to increase shareholder value.

For future researches, the area of software productization offers an array of possibilities to continue further. The findings and implications of this research are specific to a single case company as explained in the previous section. A logical way to build on this research could be an analysis of combinations of multiple software case companies of varying sizes (by market size, headcount) in ICT industry. It would be interesting to investigate if the production process and its findings and implications could be generalized to other case companies in a similar situation as case company of this research.

Another area of future research could be an investigation of productization in software companies from the customer perspective. The current literature on productization is focused on company's perspective of becoming market driven instead of being customer driven. Since the customer is not directly involved in these transformations, it would be interesting to gather customer insight and how a company's clientele would view productization process. Researchers could invest if existing clients of companies could be involved in the process of productization in order to maintain high customer satisfaction levels.

Furthermore, the current academic literature on productization process focuses on transforming into a product based company by being completely market driven. There could be unforeseen future situations in the industry that might compel a transformed product software company to undo the transformation. Therefore, there could be researches conducted in future that could determine how to perform the reverse transformation.

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## Appendices

### Appendix 1. Interview Questions

- What does productization means to you?
- What are the goals and reasons for productization in case company?
- Do you think current productization process is aligned with case company's business strategy?
- What do you think should be taken into consideration before starting productization?
- What are some of the key challenges facing case company in productization of its offerings?
- Any noticeable benefits so far from the productization process?
- What do you think are concrete results of our productization process?
- Do we measure the stage or success of our productization process? if not then what's your personal opinion about it.
- What do you think is the maturity of functionalg function areas in case company? Are there are any obvious flaws, which could be improved?
  1. Portfolio management
  2. Product management
  3. Release planning
  4. Requirements management



Appendix 2.                    Situational factors

For complete list of situational factors and their application refer to Bekkers et al. (2008).

Appendix 3.                    SPM Maturity Matrix

For in-depth understanding of SPM maturity matrix and its application refer to Bekkers & Weerd (2010).