

# CHALMERS



## Strategic Product Planning – The Enlightenment

An explorative mapping of formal processes within Nordic-based industrial companies

*Master of Science Thesis*

*in the Master's Degree Programs Management and Economics of Innovation,  
and Supply Chain Management*

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Gothenburg, June 2012

Kristoffer Claesson and Daniel Lovenbäck



*Note 1: The initiator of this master's thesis was Triathlon Consulting Group, hereafter referred to as Triathlon. Triathlon is a management consultancy firm serving large, multinational, industrial clients based in the Nordic region. The firm focuses on management issues within the areas strategy, operations, and finance. (Triathlon, 2012)*

*Note 2: Input and feedback on this master's thesis has also been provided by ISEA, Industry Senior Advisors, an organization consisting of a large number of executives and experts in the late stage of their careers. ISEA has direct access to senior expertise in many areas through its partners and through individual associate memberships. (ISEA, 2012)*

*Note 3: The investigated companies in this master's thesis include: ABB, Alfa Laval, Arkivator, Astra Tech, AstraZeneca, Atlas Copco, Atlet, Electrolux, Ericsson, ESAB, Fläkt Woods, Gambro, Getinge, Geveko, GGP Sweden, Höganäs, Kemira kemi, Mölnlycke Health Care, Plastal, Saab Group, SCA, Scania, SKF, Sony, Swegon, Thule, Volvo Aero, Volvo Buses, Volvo Cars, Volvo Construction Equipment, and Volvo Trucks. In addition to the mentioned companies a number of companies have chosen to be anonymous in this study.*





## Abstract

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Strategic product planning (SPP) consists of the continuous planning process of deciding which products should be offered to the market in order to reach future business goals, while considering the alignment of market demand and R&D capabilities. This master's thesis analyses how SPP is conducted in Nordic-based large to medium sized industrial companies by focusing on three aspects; how companies organize their SPP process, how the companies align the market demand with their R&D capability, and how companies evaluate their product portfolio. In addition to this a set of eight contextual factors has also been evaluated in order to explain the differences in the way companies conduct SPP and their SPP performance.

Data was collected from 36 reference points acquired through structured/semi-structured telephone interviews. Before conducting the interviews an explorative study was made, where literature was studied, industry experts were consulted, and interviews with representative companies were held.

The study shows that companies tend to have a product management function responsible for the planning, with a marketing or sales function included together with a R&D function. The frequency of conducting the planning is often annually, with a planning horizon of approximately five years. When companies evaluate their SPP performance typical measures are success and accuracy of products and projects. Companies tend to have a departmental responsibility in place in order to ensure the alignment between market demand and R&D capabilities. Companies also tend to evaluate their portfolio based on financial parameters, strategic fit, and customer or market oriented parameters. When balancing the portfolio between different types of products there are usually no formal processes in place. Companies tend to focus on individual projects rather than the whole product portfolio. They also focus on adding new products rather than evaluate existing products.

The contextual factors evaluated in the study influence the SPP process in different ways, where turnover is the most significant influencer. Time-to-market, product complexity, and portfolio complexity also show high degree of signification.

Conclusions from the study are that company turnover is often correlated with how the company is organized. Companies showing a higher turnover also rank themselves higher on their overall SPP performance. This is argued to stem from higher degree of formal processes in companies with higher turnover.



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# 1 Introduction

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*This chapter gives a background to the area of strategic product planning. The chapter aims at creating a general understanding of the phenomena of strategic product planning and the reason why this is considered to be an important area of research. It also highlights how and why this is an important issue for any larger company to focus on. The chapter begins with a discussion about general needs for planning within companies, before focusing entirely on strategic product planning.*

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## 1.1 Background

The planning for future products is an essential function within any industry company. Industries are often aware of the fact that competing companies will continuously present new products and services that changes the competition on the market. Firms operate with the knowledge that competitors will inevitably present a product or service to the market that significantly changes the basis of competition (Trott, 2008). Because of this it is important for companies to have a competitive product portfolio, and successfully introduce new products to their offerings. According to Crawford and Di Benedetto (2000, p. 5) “...new products hold the answer to most organization’s biggest problems”. The authors base this statement on the fact that competitors do the most damage when there is little product differentiation so that the price decreases and takes away the profit margin for all involved manufacturers or when a competitor has a new, desirable product that the own company does not have.

Companies can be said to represent themselves in the marketplace by the products, services and ideas they offer. The objectives of providing such offerings can be strictly profitability, or a combination of profitability and other objectives, such as customer satisfaction, company awareness, and market share. What is evident is that in order to reach long-term competitiveness through offerings there are strategic implications for companies to deal with (Kahn, 2001). The offerings must be aligned with the overall strategy of the company, hence product planning and strategic planning must be aligned in order to have successful products. Strategic planning can be defined as being about how the company should position themselves in a market, how they should compete successfully, satisfy customers and achieve business performance (Olsen, Olsen, Olsen, 2004). One can say that strategic planning concerns overall company strategy, at the highest level of a company. Product planning on the other hand can be defined as “the process of envisioning, conceptualizing, developing, producing, testing, commercializing, sustaining, and disposing of organizational offerings to satisfy customer needs and achieve organizational objectives” (Kahn, 2011, p. 3). Even though many definitions exist on both strategic planning and product planning one can argue that the offerings are means to reach the overall business goals.

Product planning within companies is a complex task because of the uncertainty of future market demand as well as the uncertainty of the companies’ capability to develop and manufacture products. It is a multifunctional process (Kahn, 2001) and, because of the involvement of multiple functions, the process becomes complicated. There are many separated functions within companies that all have separated planning processes, e.g. the marketing and business function within companies often have separated planning from the technology and R&D functions. The departments are often responsible for developing their own plans, using the competencies and knowledge that the individuals in those departments possess (Karlsson, 2004). Wheelwright and Clark (1992) argue

that great products and processes are achieved when all major functional activities within a firm fit well together. In order to get a competitive future product portfolio there is a need to take both market demands and technical capabilities into consideration, hence aligning market strategies with R&D strategies.

Based on the above discussion strategic product planning (SPP) is the planning process adjacent between strategic planning and product planning in order to decide how the future product portfolio should look, and while doing this taking into consideration both the market requirements (including customer preferences) and the company's technical capability. SPP in its corporate context is illustrated in Figure 1, and defined as:

*Strategic product planning is the continuous planning process of deciding which products should be offered to the market in order to reach future business goals, by considering the alignment of market demand and R&D capabilities.*

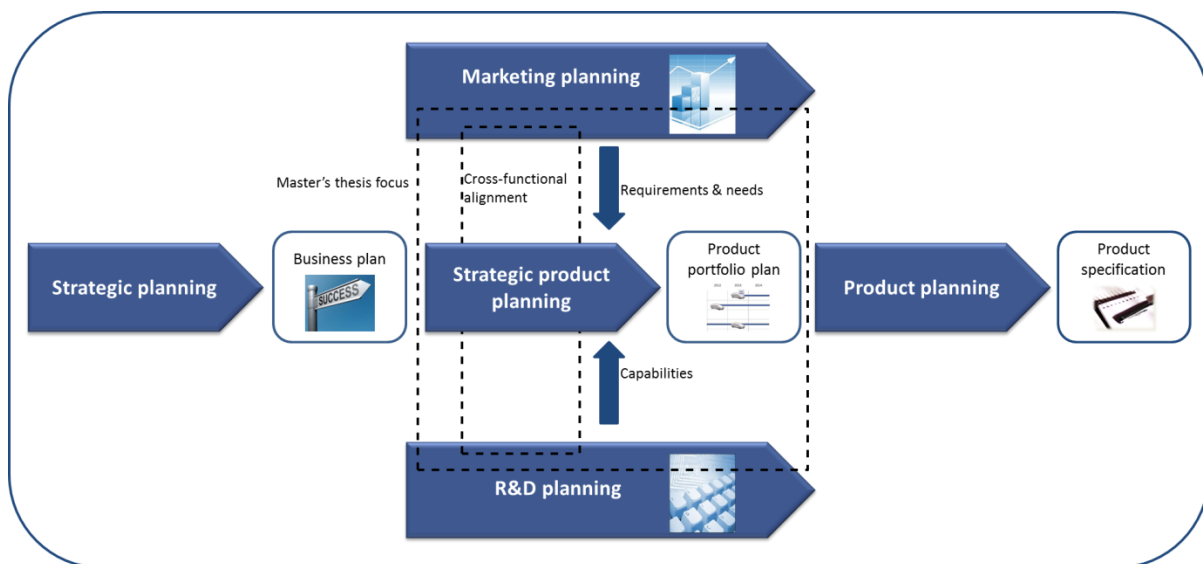


Figure 1: Strategic product planning in its corporate context

In order to get a clear picture of what SPP is it is important to clarify what the difference is between strategic planning, product planning, and SPP. Strategic planning is, as previously mentioned for instance how the company should position itself in a market, i.e. planning of overall strategic direction of a company. This can be said to be already stated before the SPP process. SPP is then, on the level of the product portfolio, to match these strategic directions with different products to form a product portfolio that can realize the strategic goals that have been set. This can for instance include specifying which product that should be available to different markets, what types of products that should be developed in the future (on a portfolio level), and when different products should be introduced and phased out in different markets in order to reach the strategic goals. Product planning is more about specifying the exact features for a specific product.

In the same way it is important to highlight the difference between marketing planning, R&D planning, and SPP. In this master's thesis marketing planning concerns mapping which market will be profitable in the future, which business opportunities will be most attractive, etc. while R&D planning is about the planning for what R&D capabilities will be attractive and needed by the company in the future. SPP is then in-between these two and much more focused on the products. In SPP both

marketing planning and R&D planning need to be taken into consideration and create products that should fulfill the market demand and opportunities using the R&D capability within the company.

Even though literature and research exist on many adjacent topics to SPP there seems to be a lack of an overall description of the phenomena; how companies work in order to decide upon their product portfolio. One part of this is the organization of the planning, which in this thesis are aspects as process steps, involved persons/functions, process output etc. These aspects are not explicitly mentioned in theory today. Portfolio management (e.g. Kahn, 2005; Cooper, Edgett, and Kleinschmidt, 2001) covers one part of SPP and is well-established in literature. This literature however fails to include the organizational aspects previously mentioned and also the focus on alignment between marketing and R&D functions which was stated as a critical element of SPP. This alignment is however also treated in literature today but is most often focused on the alignment between these two functions in the settings such as product development.

In other words, some aspects are covered in today's literature however it still lacks an overall description of the SPP phenomena. This thesis therefore aims to generate an overall understanding of the SPP process within companies. The focus will be Nordic-based large to medium-sized industrial companies, due to the interest of the initiator, Triathlon.

## **1.2 Purpose**

The purpose of this master's thesis is to investigate how Nordic-based large to medium sized industrial companies work with strategic product planning.

## **1.3 Structure of the thesis**

Chapter two consists of a literature review in order to explore and present what is already known about SPP. Chapter three presents the research method used throughout this thesis. In chapter four the results from the empirical study can be seen as a basis for the mapping of how the investigated companies work with SPP. Chapter five is an analysis of the match between the theory and the empirical results as well as an analysis of what differs between companies in SPP. Finally conclusions are drawn and a discussion regarding the thesis and further research is held.

## 2 Theoretical framework

*This section defines concepts and models that will be used throughout this thesis. The framework is intended to both put concepts and phenomena in its context, but also set the foundation for the analysis of the findings.*

As stated in the background; SPP is the continuous planning process of deciding which products should be offered to the market in order to reach future business goals, by considering the alignment of market requirements and R&D capabilities.

As a result of the explorative study, three main areas will be studied in order to investigate SPP, as will be further explained in chapter 3, namely organization of the SPP process, alignment between market demand and R&D capabilities, and portfolio evaluation. Firstly, in order to examine how companies work with SPP the organization of the process must be studied. Secondly, the portfolio evaluation area serves to investigate which parameters and how companies evaluate their product portfolio, which is critical when deciding which products the portfolio should consist of. Thirdly, the definition of SPP states that alignment market demand and R&D capabilities is a crucial part of SPP, which means that this will also constitute one of the three main areas of investigation.

In addition to the three main areas, contextual factors that can influence the SPP process will be examined in this chapter in order to create an understanding of how the situation and the context are affecting the SPP process within companies. Also, a set of performance measurements that can indicate how companies perform in the SPP process will be presented. The contextual factors and the performance measurements will mainly serve as input to the analysis where they should be linked to how companies organize the process, what the output is, how they evaluate their portfolio, and how they align themselves in order to fulfill the market demand with their R&D capabilities. Figure 2 illustrates the sections included in this theoretical framework.

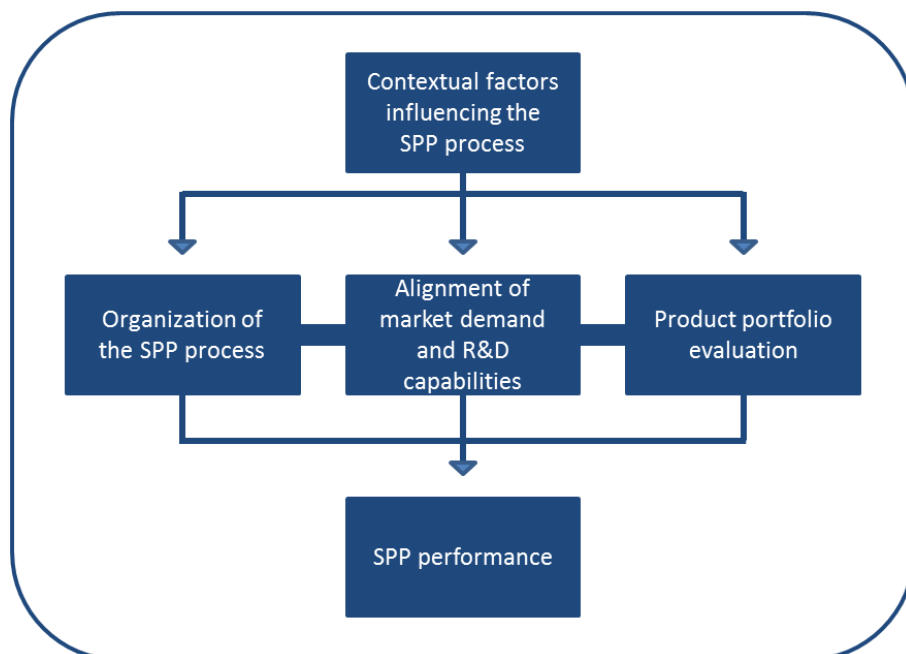


Figure 2: The theoretical framework used in this master's thesis

## **2.1 Organization of the strategic product planning process**

This section covers which company functions are involved in the planning, which factors determine the planning horizon of the process, and finally roadmaps, which in addition to the organization of the planning function in companies is discussed since these are seen as the output from the planning process.

### **2.1.1 Functions included in the planning and planning responsibility**

Kahn (2001) argues that product planning activities can be carried out in many different company functions or departments and that integration of different functions and departments is needed in order to achieve successful product planning. This is something supported by the authors, and it is argued to be interesting to see how the organization related to SPP is set up within the companies in this study in order to be the basis for the mapping.

As described in the definition of SPP one main concern is to align the market demand with technology and R&D capabilities within companies. Kahn (2001) states that the technical side of the company often focuses on discovering new technology etc. while the marketing side of the company serves a demand management role, consisting of identifying, understanding, stimulating, servicing market demand. The product development can be under the responsibility of both the technical and the marketing side of the company but very often it is a stand-alone department. Examples of departments that can have the responsibility of the marketing side are marketing, sales, and market research. Kahn (2001) further states that product planning activities most often are carried out by teams, for instance a cross-functional team. He argues that these teams constitute a temporary organizational structure with a specific objective.

### **2.1.2 Planning horizon**

According to Bradford (2011) the length of the strategic planning horizon is a question that depends on different settings. He argues that mainly three aspects impact how long planning horizon it is possible to have. These three aspects are:

1. How much information is available in the environment.
2. How quickly the environment change.
3. How well the company gathers and understands information about the future of the environment.

The first aspect can vary depending on for instance the size of the industry, regulation in the industry etc. The second can depend on technology advancement, regulation changes, economic development etc. The third aspect simply concerns how well and how much effort the company puts into the forecasting. Also, some companies have to work harder for their information while other can have the possibility to access information from trade associations etc.

Steiner (1979) states that the typical strategic planning horizon within most companies is five years. For technically advanced companies the planning horizon tends to be longer, approximately seven to ten years. However, he also argues, in accordance with Bradford (2011), that in environments that are particularly turbulent the planning horizon is often reduced, being somewhat three or four years.

### 2.1.3 Roadmapping

As stated before, the SPP process results in a company deciding which products and when these products should be offered to the market. These decisions might be visualized in some sort of plan. One type of plan is the roadmap. The concept of roadmapping is widely used in academia today with several different notions such as technology roadmapping and product roadmapping. Today roadmapping and roadmaps are widely used but can often mean different things and have different purposes (Phaal, Simonse & Ouden, 2008).

Muller (2011) argues that a roadmap is a visualization of the future integrating all relevant business units at the level of a portfolio and often comprises several generations. He states that a typical roadmap describes the relevant developments of the dimensions market, product, technology, people, and process. Albright and Kappel (2002, p. 31) argue that product-technology roadmaps are *“used to define the plan for the evaluations of a product, linking business strategy to the evaluation of the product features and costs to the technologies needed to achieve the strategic objective”*. They divide the product-technology roadmaps into three sections, namely market, product, and technology. The market section includes competitive assessment, market segmentation and trends. The product section includes product drivers, experience curve price forecast, product evolution plan, and product roadmap. The technology section includes technology roadmap and forward costing. It is also common that a summary or an action plan is used with a strategic summary and a risk roadmap. According to Muller (2011) the product dimension concerns technologies that should be packaged into products in order to fulfill market needs. Albright and Kappel (2003) argue that product drivers should be included in this product section where these drivers (product attributes) should be linked to what is valued by the customers. Moreover, they include an experience curve price forecast that shows the decrease in price level against the total quantity sold up to that time. They also include a product evolution plan that includes key features for each product launch and linkage between the key feature and product drivers. The final aspect they include is the product roadmap which is a view of the product family over time and shows the entire platform of relationships between products in the platform. The authors of this thesis argue that since the focus of this study is to get a general understanding in order to create a mapping the same level of detail as Albright and Kappel (2003) describe will not be examined. The findings will more be in line with Muller (2011) mapping how the companies’ product plans or product roadmaps are built up, and which aspects they consists of in relation to dimensions such as market, product, technology, people, and processes. Figure 3 illustrates a simple product roadmap.

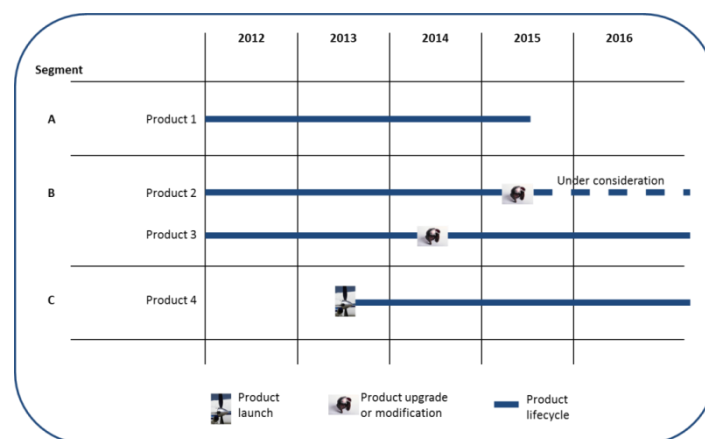


Figure 3: An example of a product roadmap

## 2.2 Alignment of market demand and R&D capabilities

An important aspect of SPP is to take both the market demand and the company's R&D capability into consideration. This means that the company needs to align these two aspects in order to fulfill the market demand using the company's R&D capability in the best way possible, hence creating highest possible profit. Alignment is argued to be the communication and information exchange that takes place throughout both the planning phase and the operational phase of businesses. This communication and alignment can consist of varied information and the exchange can be conducted in many ways. The essentials are however that work needs to take place in order to minimize the contradictions and gaps between different functions and departments in the company. There are many separated functions within companies that all have individual planning processes, e.g. the marketing and business function within companies often have separated planning from the technology and R&D functions. The departments are often responsible for developing their own plans, using the competencies and knowledge that the individuals in those departments possess (Karlsson, 2004). All the different departments and functions however need to be aligned and exchange information in order to create appropriate plans and be successful in the marketplace (Griffin & Hauser, 1996). For example, marketing and business need information about what possibilities the company has to develop certain products and services that can be offered to the market. In a similar way technology and R&D functions require information about future market demand predictions in order to develop the appropriate technologies, products and resources. Wheelwright and Clark (1992) argue that great products and processes are achieved when all major functional activities within a firm fit well together. In short, outstanding processes in a company require integration across functions. All involved functions need to be aligned and support each other in order to reach future business goals through planning and development processes. Wheelwright and Clark (1992) also argue that if the new products and processes should be developed rapidly and effectively, the company must develop the capability to achieve integration across the functions in an effective and timely way.

According to Acur, Kandemir and Boer (2012) strategy can be seen as the process of aligning functional strategies to each other and to corporate strategy, as well as aligning corporate strategy to the demands, opportunities, and risks created by a company's external environment. Acur, Kandemir and Boer (2012) also argue that strategic alignment related to NPD performance can be viewed to consist of market alignment, technological alignment, and NPD-marketing alignment, see Figure 4.

Market and technological alignment are argued to be important in order to formulate a company's NPD strategy in accordance with its external environment, while the NPD-marketing alignment is necessary to effectively implement the strategy. By technological alignment Acur, Kandemir and Boer (2012) consider a company's ability to monitor technological developments and to integrate new technologies into new products. Market alignment is argued to be a company's ability to identify and analyze current and future needs of its target markets and to integrate market information into its

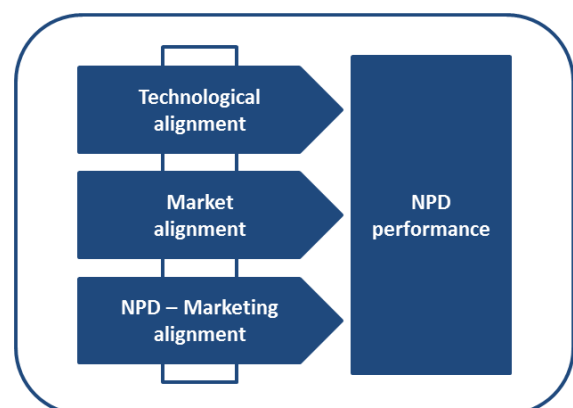


Figure 4: NPD performance is influenced by different types of alignment



NPD activities in order to continuously create greater customer value. Alignment between NPD and marketing facilitates the degree of communication, interaction, and collaboration between the NPD and marketing functions. As NPD-marketing alignment allows for communicating and exchanging information about technological and market developments, it enables technological and market alignment to work jointly and thus enhances the strategic alignment (Acur, Kandemir & Boer, 2012). Based on the discussion of Acur, Kandemir and Boer (2012), in this thesis alignment includes all three aspects; market alignment, technological alignment, and NPD-marketing alignment. The alignment is argued to be the phenomena of aligning the current and future needs of the markets with the development of new technologies that can be incorporated into a company's products by the company's planning team. All this is done in order to develop and offer products that fulfill the future customer needs.

### 2.2.1 Alignment of marketing and R&D functions within firms

One can argue that the mindsets and prerequisites of business and marketing departments differ from the ones of technology and R&D departments. Marketing prefers the short time horizon of incremental projects. It tends to focus on the market, accepts a high degree of uncertainty and bureaucracy, and feels loyalty to the firm. By contrast, R&D prefers the long time horizon of advanced projects. It focuses on scientific development with a loyalty to their scientific profession and has low tolerance for uncertainty and bureaucracy. Of course these generalities should only be considered to indicate trends rather than being applicable to all marketing and R&D departments (Griffin & Hauser, 1996). Based on these differences, one can easily understand that there is a need for alignment between departments in the SPP process in order to have a successful product planning, which both meet market requirements and utilizes the capabilities within the firm in a productive manner. Table 1 summarizes some common differences between marketing and R&D departments within firms.

Dimension	Functional position	
	Marketing	R&D
Time orientation	Short	Long
Projects preferred	Incremental	Advanced
Ambiguity tolerance	High	Low
Departmental structure	Medium	Low
Bureaucratic orientation	More	Less
Orientation to others	Permissive	Permissive
Professional orientation	Marketing	Science
Professional orientation	Less	More

Table 1: Differences between marketing and R&D departments (After Griffin & Hauser, 1996, p. 196)

It has frequently been shown that the alignment between marketing and R&D functions within companies is an important success factor to consider in all process steps from product idea to product launch when developing new products (Cooper & Kleinschmidt, 1995; Ernst, 2002; Ernst & Soll, 2003; Souder, Buisson & Garrett, 1997). In order to have a well-functioning alignment, and plan for and develop the right products, there is a need to integrate market requirements and technological capabilities on all management levels of firms. On a project or process level there is a need for measures to overcome interface problems and to foster interdepartmental communication,



e.g. establishing cross-functional team, in order to avoid one department being dominant, which could result in either incremental updates lacking long-term returns to the firm or in high-tech products that are not accepted by the market (Ernst & Soll, 2003; Griffin & Hauser, 1992; Holland, Gaston & Gomes, 2000). A cross-functional team can be defined as (Kahn, 2005, p.582): *“A team consisting of representatives from the various functions involved in product development, usually including members from all key functions required in order to delivering a successful product... The team is empowered by the departments to represent each function’s perspective in the development process”*. At the same time as aligning the project or process level in a company the alignment must also be done on a strategic level, i.e. the marketing and R&D strategy need to be aligned (Ernst & Soll, 2003). Several studies have indicated that a strategy with balance between market requirements and technological capabilities gives greater new product success (Cooper, 1984; Ernst & Soll, 2003; Griffin & Hauser, 1996).

Griffin and Hauser (1996) distinguish six types of integration mechanisms that can increase the integration between marketing and R&D; relocation and physical facilities design, personnel movement across functions, informal social systems, organizational structure, incentives and rewards, and formal integrative management processes. In addition to these six factors Leenders and Wierenga (2002) also evaluate how information and communication technology (ICT) effects the integration between departments in relation to new product performance (NPP), and concludes that ICT facilitates communication between departments.

Although one can argue that there is a need of alignment between departments in order to be able to perform the trade-off between the market requirements and the technological capabilities within a firm it is not always positive with cross-functional teams. An extensive cross-functional integration does not necessarily lead to more effective and efficient results under all circumstances, and it can be argued that there are costs associated with such integration, for example, through an increased number of meetings to make it possible to exchange information and making joint decisions. (Brettel et al., 2011) Wheelwright and Clark (1992) also add to this argument by stating that not all product development projects need deep cross-functional integration. Where product design is fairly stable, customer requirements are well-known, the interfaces between functions are clear, and product lifecycles and lead times are long it might not be needed a high degree of coordination between departments. However, where the technology and the market are dynamic and time is an important element of competition a more intensive cross-functional integration is needed.

The authors of this thesis argue that most existing literature related to the alignment suggested to take place in order to fulfill the market demand using the companies’ R&D capabilities, to some extent also including the literature presented in this thesis, is very normative. The general trends in the literature found have been that authors encourage alignment in order to get the marketing or sales functions within companies to work closely together with the R&D or technology functions. A large portion of the alignment within companies is related to accessing and sharing accurate and appropriate information. However the impression is that there seems to be a much smaller focus on concrete actions of how this alignment actually should take place, and even what benefits are to be gained from such an alignment. Based on this, in this thesis the authors attempt to map how the companies in the study consider and ensure taking prerequisites from the market as well as from the R&D function in when planning for their future product portfolio. Because even if there is a lack in

the literature regarding how this should be done the authors still consider the process of matching the two somewhat opposite sides of companies to be essential for SPP.

### **2.3 Product portfolio evaluation**

Since the product portfolio often constitutes the most essential part of a company's revenue it must be managed in order to maximize companies' profitability. The authors of this thesis argue that when it comes to SPP, and when companies decide upon future product offerings, the decisions originate from the current product portfolio. It is important to have an understanding and an overview of the current situation before planning for the future. Cooper, Edgett, Kleinschmidt (2001) argue that reasons for evaluating the portfolio are for instance to communicate vertically, create visibility, communicate horizontally, increase objectivity, increase sales and market share, and achieve focus.

The product portfolio can be evaluated according to many different parameters. For instance, Roussel, Saad and Erickson (1991) argue that what determine the attractiveness of a product is the fit with business and corporate strategy, inventive merit and strategic importance to the firm, durability of competitive advantage, reward, competitive impact of technologies, uncertainty (probability of technical success, commercial success and overall success), and exposure (R&D costs, time-to-completion and capital and marketing investment to exploit technical success).

In academia product portfolio evaluation is well-documented. Different notions for this are used, such as product portfolio management and product portfolio analysis. Patterson (2005) distinguishes between portfolio planning and portfolio management and argues that portfolio planning is the strategic process with purpose to create a strategic plan and that portfolio management consists of the more tactical tasks such as portfolio assessment, resource management, and portfolio review. The authors argue that different authors and researchers equalize portfolio planning and portfolio management, as well as using several other notions, as mentioned above. In this thesis the authors further argue that when discussing SPP there is an overlap between portfolio planning and portfolio management. The more tactical tasks must be taken into consideration when deciding about how the future product portfolio should be set up, and even though the overall aim with SPP is to create a strategic plan consisting of the products that should be offered to the market in the future, very much in line with the concept of portfolio planning, these aspects cannot be neglected. However, in order to have a clearer structure the authors will utilize Patterson's (2005) division of portfolio planning and portfolio management in order to keep a structure of this section of the theoretical framework and complement with additional literature connected to these two sections.

#### **2.3.1 Portfolio planning**

Srivastava and Prakash (2011) argue that analysis tools such as growth-share matrices are included in portfolio planning in order to evaluate different products or ideas. These types of matrices are often divided into market portfolios and technology portfolios. The market portfolio matrix typically has the two dimensions competitive position and market attractiveness while the technology portfolio matrix typically has the two dimensions technology attractiveness and relative technological position.

The most commonly used tool for this type of portfolio evaluation and analysis is the Boston Consulting Group's market growth-share matrix and can be seen as a market portfolio matrix (Ernst & Soll, 2003). It gives strategic directions for what products that should be offered. It puts products in relation to each other and hence products are not analyzed in isolation which is important since a

company has traditionally limited amount of resources that should be allocated to the products that give best return of investment. In the market growth-share matrix products are mapped according to degree of market growth and relative market share, see Figure 5. According to Friend and Zehle (2009) it can be used to understand how resources should be allocated in order to be able to change the company's strategic position or to decide what products that should be divested. Different products do not contribute equally.

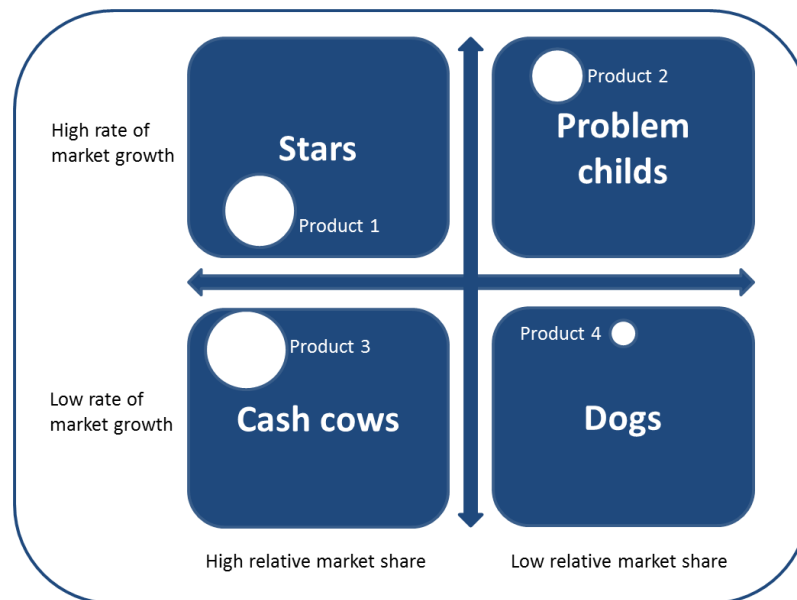


Figure 5: An example of a growth-share matrix

There exist several other market portfolio evaluation and analysis tools as well. One of these is the directional policy matrix. This tool tries to include many more factors that a company should consider when evaluating the product portfolio. The first dimension concerns business sector prospects which include market factors, competitive environment, technology factors, financial and economic factors, political factors. The other dimension is the business position dimension which includes marketing factors, technology factors, production, organizational factors and financial factors. The company then quantifies the importance and strength of the different factors along these two dimensions (Friend & Zehle, 2009). Another example of a market portfolio tool is the Hofer matrix which maps the competitive position of different products together with the product lifecycle.

In addition to the market portfolio firms have often developed technology portfolios in order to cope with the competitive dynamics of technological change (Brockhoff, 1999; Wolfrum, 1991; in Ernst & Soll, 2003). Ernst and Soll (2003) argue that these portfolios often have two multivariate dimensions. Typically, as previously stated, these two dimensions are the external factor technology attractiveness and the internal construct relative technological position. Moreover, they argue that in order to get a more objectively analysis one can use patent data for the technological portfolio, this has sometimes then been called a patent portfolio. But traditionally, a patent portfolio and a traditional technology portfolio aim to map the same thing.

As described, both market and technological matrices exist and since SPP is about aligning business and market with R&D and technology the mix of products must be analyzed from both the market perspective and the technology perspective. Ernst and Soll (2003) argue that the technology and

market portfolio need to be integrated because new technologies need to fulfill market needs in order to be successful. Several integrated portfolios have been developed in the past. Ernst and Soll (2003) present one approach, see Figure 6, which takes both of these aspects into consideration. This portfolio is a combination of the growth-share matrix and a patent portfolio. The circles represent products in the market position dimension and technologies in the technological dimension respectively. The length of the diameter corresponds with the importance of the object (can for instance be sales or profitability for the market position and R&D emphasis for the technology position) while the arrow shows interdependencies between products and technologies.

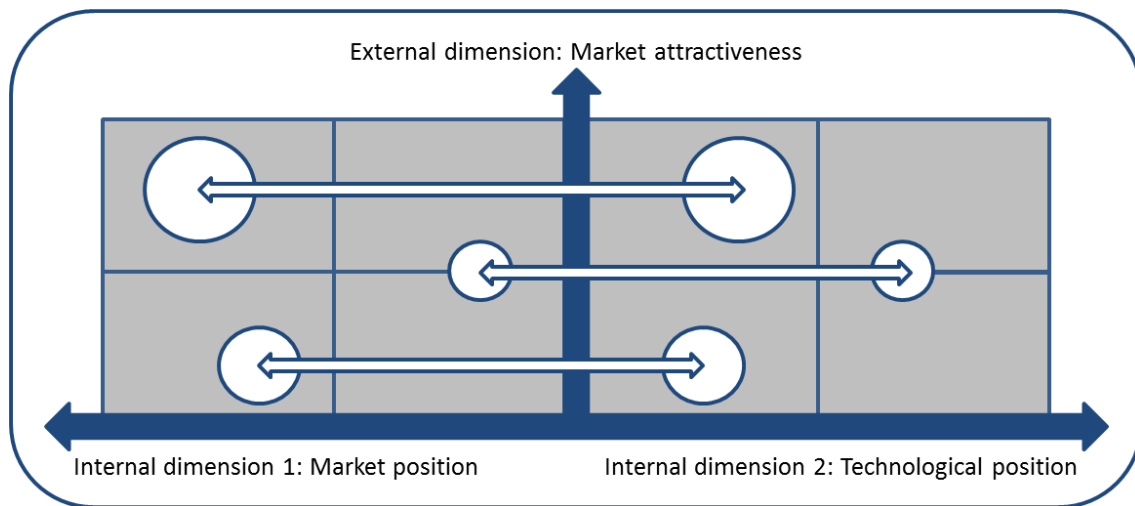


Figure 6: An integrated portfolio approach (After Ernst and Soll, 2003, p. 550)

Based on the literature presented above in this section it is clear that many different types of matrices can be used in order to evaluate and analyze a product portfolio. In this thesis however the main focus is not to evaluate which specific tool companies are using, but rather to get an overview of which type of tools are commonly used. Hence, even though many different portfolio evaluation matrices are to be found in literature in order to map how companies evaluate their product portfolios in SPP it is argued to be sufficient to only evaluate if and how this type of evaluation tool is used.

### 2.3.2 Portfolio Management

Patterson (2005) argues that portfolio management includes portfolio assessment, resource management, and portfolio review. Portfolio assessment ensures that the current portfolio provides anticipated returns, is aligned with strategic directions, and reflects the best possible use of resources. The purpose of resource management is to ensure that resources are effectively applied to achieve portfolio goals. The portfolio review, on the other hand, concerns for instance that new product investments meet expectations, enforce a sense of urgency and accountability amongst project personnel, midcourse correction of projects.

As stated before, a vast amount of literature exists relating to portfolio evaluation and portfolio management. One of the most quoted and referred to literature is the work of Cooper, Edgett, and Kleinschmidt (2001), hence the authors want to give additional attention to their findings. They identify three main goals with portfolio management. The first is to maximize the value of the portfolio against different business objectives such as profitability, strategy and acceptable risk.

Cooper, Edgett, and Kleinschmidt (2001) state that it is hard to find a method for doing this but commonly used methods include:

- Net Present Value (NPV) – financial model where products are ranked according to NPV and resource constraint are taken into consideration.
- Expected Commercial Value (ECV) – financial method based on decision tree with probabilities and resource constraints.
- Scoring models – ranking technique with several weighted criteria to get a project score.
- Productivity index – financial ranking approach using ECV, technical risks, and R&D expenditures.
- Options pricing theory – financial method to review risk and risk reducing.
- Dynamic rank-order list – ranking technique that includes NPV, IRR etc. as criteria.

They argue that these methods all come with different weaknesses but the main disadvantage is that they fail to ensure that the portfolio is strategically aligned or that the portfolio is balanced with different types of products or projects. Cooper, Edgett and Kleinschmidt, (2001) state that companies with most enviable portfolio rely less on financial methods than others. In addition, the use of financial methods can, according to Christensen, Kaufman, and Shih (2008), hinder innovation since these types of methods often underestimate the value of the investment. This is because most companies compare cash flows from innovation against doing nothing and assume that the cash flows will be the same in the future even if no investments are done. However, these types of calculations are still important since projects must be profitable, have high likelihood of success etc. in order to be attractive.

The second goal is to find a balance between different types of products and projects. Most companies have a mixed portfolio of new products. In order to find the right balance of different types of products the overall strategic directions must be taken into account. There are many different factors that should be taken into consideration to find the right balance between different types of products, for instance short-term or long-term, high risk or low risk, different markets, product categories and project types (Cooper 2005).

According to Cooper, Edgett, and Kleinschmidt (2001) the most commonly used tool for balancing the portfolio is bubble diagrams. In these bubble diagrams, bubbles are plotted on a two-dimensional grid with for instance risk and reward (NPV versus probability of technical success). They also argue that pie charts are used in order to show breakdown of spending and by project type, market etc. These tools are most often used as information display and discussion material rather than like a decision model. Drawbacks with the bubble diagrams are that it is often unclear how it should be used, many diagrams rely on financial data that is hard to get or even unavailable, and it is hard for managers to know what “right balance” means.

The third goal that Cooper, Edgett, and Kleinschmidt (2001) identify is that the portfolio should be strategically aligned. They argue that strategic priorities must be reflected in the portfolio and that commonly used tools for this is the top down approaches strategic bucket (break down the business strategy and product innovation strategy into for instance project types, market. In each of these strategic buckets projects should be ranked in order to get a portfolio that reflects the strategy) and product roadmap (the product roadmap should show how strategic objectives (broken down product innovation strategy into for instance product types or markets) should be reached). Cooper and

Edgett (2007) also include a bottom-up approach by including a number of strategic questions in a scoring model. However, by using this approach the spending splits between different markets is not assured.

In addition to the three goals Cooper and Edgett (2007) highlight the importance of picking the right number of projects. The major constraint when deciding upon which projects should be developed and when these should be developed is most often the availability of resources. Cooper (2005) suggests that companies should rank their projects in order to find which projects that contribute most to the portfolio value and in that way decide when a project should start, in order to ensure that the most important projects get the resources needed. Methods for resource evaluation are, according to Cooper and Edgett (2007), for instance resource capacity analysis and resource limits. In resource capacity analysis the projects should be prioritized with the one assessed as the best first. Then the resources needed by departments for all active projects should be determined. Finally you need to decide how much resources are available and compare the results.

Cooper, Edgett and Kleinschmidt, (2001) also present some key success factors in order to get a balanced, strategically aligned, high value portfolio, with the right amount of projects, and good time-to-market for portfolio management. These include:

- To have an explicit and established method for portfolio planning
- That management buys into methods that are used
- The methods have clear rules and procedures
- That projects are treated as portfolio, not as single projects
- That methods are consistency applied across all appropriate projects

However, it is not easy to do this and Cooper, Edgett and Kleinschmidt (2001) state that common challenges with establish methods and make them work are;

- Creating a positive climate, culture and buy-in for our portfolio method
- Better allocation of resources, selection of projects & balancing of projects
- Finding the right balance between short term & long term projects
- Obtaining better input data & forecasting estimates: markets, volumes, costs, etc.
- Better linkages of our strategy to the portfolio of projects
- Better balance & resource allocation) across SBUs, divisions & technologies
- Better balancing across functions and level of involvement
- Having more credible financial metrics & tools

## **2.4 Contextual factors influencing strategic product planning**

Eight factors have been identified (see section 3.1.1 for more information regarding how these factors were identified) that are believed to influence the SPP process. These contextual factors are presented in Figure 7. In order to create an understanding of the factors and to set a basis for the analysis this section gives a description of what the corresponding literature states related to the eight factors respectively.

The development cycle time is often referred to as time-to-market (Alam 2005). Time-to-market can be defined as time between product definition and product availability (Vesey, 1992). However, time-to-market is often measured in different ways and confusion exists regarding where

measurements should start and stop (Smith 2005). Therefore it is crucial to be specific when talking about time-to-market in order to actually know what is meant. In this thesis time-to-market is identified to be measured from project development start to product launch, not including pre-research. The time-to-market is often critical since being able to develop product fast can be a source of competitive advantage (Wheelwright & Clark, 1992).

The level of complexity of the environment is critical for the process of aligning business with technology (Karlsson, 2004). For instance, with a

low level of complexity it might be possible that one person can represent a business unit while the number of participant will increase with the level of complexity of the environment. In this thesis complexity is divided into complexity of products and complexity of the product portfolio. Product complexity is argued to be determined in terms of product technology and number of components while portfolio complexity is determined in terms of number of products and how diverse these products are.

Product life cycle and product life cycle management are broad concepts covering a wide range of theory. Stark (2011) states that the product lifecycle consists of five phases namely imagine, define, realize, use, and retire. In this master's thesis the length of the product life cycle is considered to be the essential aspect, and this is argued to be measured from product launch to the end of production, including smaller face-lifts but excluding aftermarket and support. Kahn (2001) argues that life cycle management can be seen as a tool for developing strategy and as a managerial planning tool.

Swann (2009) separates two different types of innovations which are incremental and radical innovations. An incremental improvement to an existing product is an update of the product where the fundamental characteristics of the old version are the same (Wheelwright & Clark, 1992). Kahn (2001) states that these type of innovations most often do not require any change in customers' behavior. A major, or radical, innovation results in a product that differs from other products within a field and can sometimes create entirely new markets. According to Rogers (1995) discontinuous products implies two major difficulties for companies; problem with selection of respondents and user understanding.

Markets are complex due to for instance that it include different customers that value different product attributes (Wheelwright & Clark, 1992). This means that it can be difficult to predict how the market will react to different products or change its behavior over time. For instance, Kahn (2001) argues that product planning is difficult due to the uncertainty whether or not the market will accept a new product.

Two types of approaches to innovation is technology push and market pull. Technology push characterizes by first developing, manufacture it and then find a market space for the product or

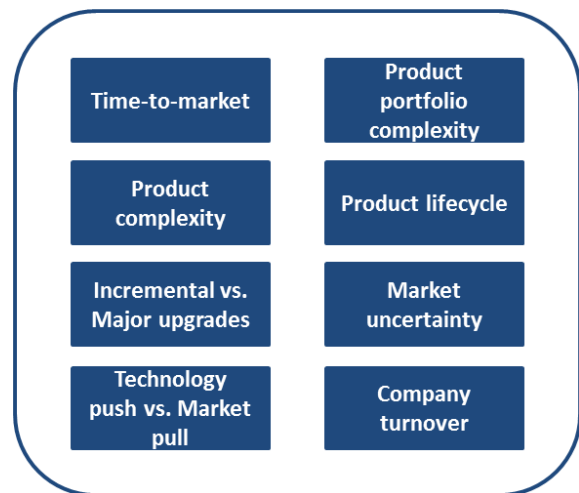


Figure 7: Contextual factors used in this master's thesis

technology. Market pull is the opposite focusing on first identifying a market potential and then trying to develop and manufacture the product (Trott 2002). Kahn (2001) argues that no firms have a perfect merge between technology push and market pull and therefore always favors either the development department or the marketing department.

Finally, company turnover can often be linked to what type of processes the company has. A large company often has totally different needs than a minor and this is reflected in the process that is in place. For instance, to align different functions in a large company where the functions can be spread in different parts of the world differs from a smaller company that can have all functions geographically close which is connected to what Griffin and Hauser (1996) means arguing that the relocation and physical facilities design influence the alignment possibilities.

## **2.5 Strategic product planning performance**

Since this thesis aims to evaluate how companies perform within SPP it is of interest to investigate how the mapped companies evaluate their performance.

### **2.5.1 Performance measures**

Performance measurements can be defined to be the process of quantifying action, where measurement is the process of quantification and action leads to performance (Neely, Gregory & Platts, 2005). Kotler (1984) states that organizations perform successfully, and achieve their goals, when they satisfy customers with greater effectiveness and efficiency than their competitors do. Referring to both effectiveness and efficiency shows not only that these are two critical dimensions of performance, but also highlights the fact that there might be both external and internal reasons for pursuing specific actions (Slack, 1991).

One problematic issue occurs when discussing measurements of a firm's planning process. The issue concerns the fact that it is in general difficult to quantify the efforts and actions taking place during the planning process, and the impact these actions have on the result of the developed product. The result can depend on several parameters, where the planning effort is one such parameter while the product itself is another. Many argue that formal strategic planning is not at all related to firms' economic performances (Shrader, Taylor & Dalton, 1984; Scott, Mitchell & Birnbaum, 1981).

Griffin and Page (1996) argue that even with a lot of research done on the subject product development success it is still difficult for firms to define whether new products are successful or not. Many different measures exist with little consensus of what measures are the most useful. In addition to this it can be argued to be even more difficult due to the fact that it is possible to measure product development success on different levels. Either it is possible to measure on the overall development program level or for individual projects making up the portfolio. Also adding to the discussion is the fact that different projects can have different focus. Even though the most common measure on the highest portfolio level is financial success, it is not necessary that financial outcome is the primary focus for individual projects in the portfolio. One can argue that because outcome goals differ between projects every project will have separate success objectives, and hence saying that the most useful success objectives vary by project strategy (Griffin & Page, 1996).

As stated, a large portion of SPP concerns development of new products. This development gives projects that are conducted by the companies. Kerzner (2009) defines project success as the



completion of projects with certain criteria. Included in these criteria are that projects should be completed:

- At the proper performance or specification level
- Within the allocated time period
- Within the budgeted cost
- With minimal or mutually agreed upon scope changes

Kerzner (2009) argues that very few projects are completed within the original scope of the project. However the changes within projects should be held to a minimum in order not to jeopardize the project success. Since SPP takes place before the product development projects are initiated it is of more relevance to evaluate to what extent companies change the plans. Changed plans can generate large costs associated with changes that need to be made. This argument can be compared to what Verganti (1999) states saying that the cost and time of corrective actions in the product development process is lowest in the planning phase, see Figure 8.

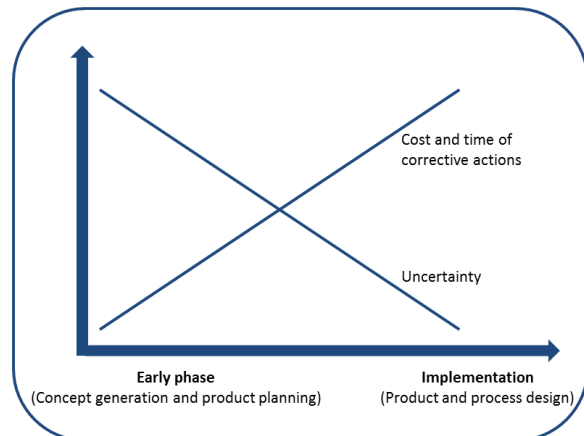


Figure 8: The effects of corrective actions in product development projects (After Verganti, 1999, p.364)

Many different performance metrics exist, and many metrics are defined in different ways. However, in this thesis, based on the above mentioned criteria for project success together with the aim of this thesis being to get an overall indication of the companies' performance related to SPP, the measures that have been used are shown in Figure 9 (see section 3.1.1 for more information regarding how these metrics were identified). These measures are, except from profit margin, not objective measures based on numbers etc. Instead companies have been asked to rank themselves compared to other companies in these measures.

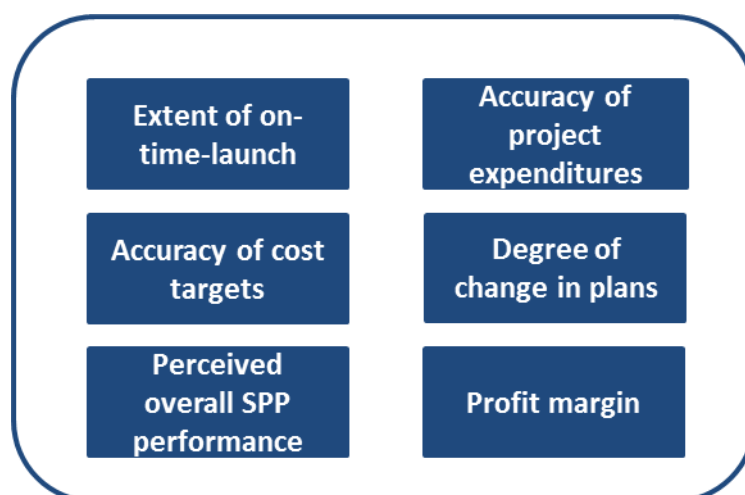


Figure 9: The performance measures used in this master's thesis

### 3 Methodology

This chapter aims to describe the process that the authors have gone through in order to fulfill the purpose of the thesis. The chapter describes research process and method, research questions, research strategy, research design. Also, some quality criteria related to the data will be discussed at the end of the chapter.

#### 3.1 Research process and method

The main steps in the research process are summarized in Figure 10.

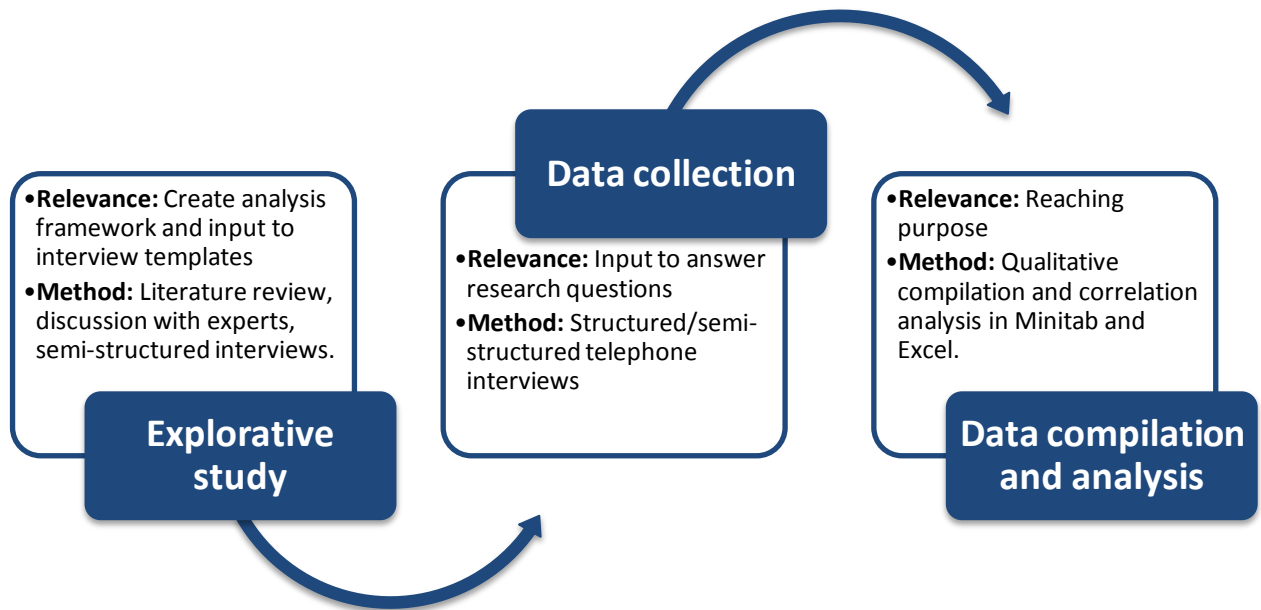


Figure 10: The main process steps in the master's thesis

##### 3.1.1 Explorative study

The first step in the research process was an explorative study in order for the authors to understand the SPP phenomena, and also in order to give input for the creation of interview template that was to be used in the next step of the research process. This initial part of the study consisted of secondary data collection through a literature review. This literature review resulted in the identification of three main areas, which became a framework for the rest of the study. These areas were:

- Organization of the SPP process within companies and its resulted output
- Alignment of the market demand and the R&D capabilities
- Evaluation of the product portfolio

In addition to these three areas two more aspects were identified as needed in order to being able to map the companies in respect to SPP. These aspects were:

- The companies' planning performance
- Contextual factors influencing the industries and companies

These last two aspects were identified in order to being able to map the performance of the companies in the study, as well as being able to compare the companies in the study with each other, with different prerequisites. This was identified as interesting in order for the authors to be able to draw some conclusion about how the most successful companies manage their SPP process. The contextual factors were included during the explorative study, which indicated that industry and company characteristics play an important part within SPP and therefore impact how companies manage this process. Therefore, after discussions with Triathlon as well as ISEA Sweden, eight industry and company characteristics and six performance measures were chosen to be included in the study, which were shown in section 2.4.

Included in the explorative study were also three semi-structured face-to-face interviews with targeted companies. The three chosen companies were from different type of industries since this might have impact of how they manage the SPP process. The three targeted companies were also among the largest of the targeted companies since initial discussion with Triathlon and ISEA pointed towards that larger companies often have more developed and structured SPP processes. The semi-structured interviews had several purposes. First, it served to give more information about which questions and topics that are most interesting and relevant for this study. They were also used to pre-test coming interview questions for the data collection phase in order to ensure that the questions are understandable and relevant.

The explorative study was the foundation of the creation of research questions, which are presented and discussed more in-depth in section 3.2.

### **3.1.2 Data collection**

The data was collected from 36 interviews, see appendix 8.1 in order to see how the companies have classified themselves in relation to the contextual factors studied in this thesis. This number was resulted from the combination of the maximum amount of data that was possible to collect within the time frame of this master's thesis and the estimated minimum amount needed to be able to draw some more general conclusions about the target population.

The process of selecting companies was done together with Triathlon who provided a list of companies which were Nordic-based large and medium sized industrial companies. After a review of the list six main subgroups/industries were identified. These industries were Automotive, Heavy industry equipment, High-tech, Med-tech, Raw material and chemistry, and Machinery and equipment. Quota sampling (Bryman & Bell, 2007) was then used in order to get companies from all six industries. The initial list of companies for future interviews contained five to eight companies in each industry, which adds up to more than the interviewed companies in total. The reason for this is that a number of the targeted companies chose to not participate in the study, which also was predicted on beforehand and therefore some back-up companies were identified already from the start.

The interviewees that were targeted had different positions since every company is built up and organized in different ways. However, the people that were contacted had responsibility or overview of the SPP process. Examples of interviewees' positions are product manager, product planner, and R&D manager.

With the purpose as a basis and the input from the explorative study an interview template was created. This template was pre-tested with people from ISEA Sweden since they have experience from the industry and have had similar positions in different companies as the persons that were interviewed. The template was also pre-tested at one company before the data collection started. From the pre-tests it became evident that some minor changes were needed. For instance the templates contained too many questions for managers to answer since they often are very busy. Some questions were also unclear and therefore changed in order to minimize the risk of misunderstandings. See appendix 8.2 for the interview template.

The main empirical data collection process consisted of telephone interviews which were more structured than the semi-structured interview but still gave opportunity to qualitative answers to some questions. The answers to these interviews served as the main data for the analysis. Telephone interviews were used since it would have been too time consuming to conduct face-to-face interviews. Another option was to send out questionnaires and let the respondents fill in the questionnaire by themselves. However, since the concept of SPP can be quite broad and is not well defined and established in the industry telephone interviews were preferable instead of self-completion questionnaire since this gave the possibility to explain ambiguities.

During the interviews both authors participated, one asking questions and one taking notes. This approach also ensured that both authors explain ambiguities in the same way and by that received answers that were comparable.

### **3.1.3 Data compilation and analysis**

Finally, the data from all of the interviews was used in the analysis in order to reach the purpose. In this phase the answer from each question from the interview template were summarized. Some of the questions from the interviews were not used in the result and analysis since it became clear in this stage of the study that the questions were not as relevant as it was believed from the beginning or since the answers to the questions were unclear, even though pre-tests had been made.

The answers regarding how they work with SPP were then mapped against both the influencing contextual factors in order to be able to answer why SPP is different in companies and also against the performance measures in order to map how companies that can be seen as successful within SPP work with this. This was done in Microsoft Excel and in Minitab statistical software. Since an important part of the study is built upon finding correlations between how companies are working with SPP and influencing factors and performance measurements the way of finding these correlations were a critical part of the study. To put it simply the most clear and evident correlations were selected. However, in order to find the most evident correlations two different methods were used. Firstly, the data was plotted in Minitab to be illustrated graphically, see appendix 8.3. The curves with the steepest slope were chosen. Secondly, a correlation identified in Minitab was then checked in Excel where the data regarding how companies tend to do their SPP was mapped against the influencing factors and the performance measurements. Since both the influencing factors and the performance measurements were divided from one to six, such as from low complexity to high complexity shown in appendix 8.3, the average of a factor or a performance measurement was calculated for different ways of working. As an example the planning horizon were mapped against the product complexity in order to identify the average product complexity for companies where the planning horizon was short or long. Than it was possible to see that companies with a planning

horizon between one and two years had an average product complexity of for instance four out of six. The reason for using both Minitab and Excel was that Minitab gave a good overview of the most evident correlations while Excel provided necessary validation of the correlations found in Minitab. For instance, as Minitab was used it did not show if the results fluctuated, this was better visualized in Excel.

In some cases where not both constructs were quantitative only Excel was used since Minitab cannot handle qualitative constructs. In Excel it was possible to for instance calculate the average product complexity of companies having a planning process owned by R&D and compare the product complexity with companies having a planning process owned by marketing. This was the case many times when the performance measures were compared with the way companies work. An average of the different performance measures were calculated for different way of working and the approaches with the highest scores were compared with the approaches with lower scores in order to find what was distinguish the best performers.

### 3.2 Research questions

This study is based on five research questions, which are formulated in order to reach the purpose of this master's thesis.

In order to understand how companies work with SPP it is of interest to understand which company functions are involved in the process and which steps these go through in order to decide upon a plan of how the product portfolio should be built up. Also, the result of the process needs to be investigated as well as how the process is evaluated. This resulted in the first research question:

1. *How is the SPP process within companies organized?*
  - a. *Which are the process steps?*
  - b. *Which company functions are involved in the process?*
  - c. *What is the output of the process?*
  - d. *How is the planning performance evaluated?*

From the explorative study it became evident that in order to secure that market requirements are met by products based on the technological capabilities within a firm there is a need to align these different functions within firms. The alignment needs to be done early in the planning process in order to coordinate the capability for the future because there are often large investments associated with development projects, both in terms of time and money. This formulated the second research question:

2. *How do companies align their business and marketing function with their technology and R&D function?*

Since SPP is about deciding what the product portfolio should consist of, it is interesting to see how companies evaluate their portfolio in different aspects. The portfolio can be evaluated according to many different aspects. For most companies the product portfolio needs to be the main revenue generator and therefore the commercial value of the products in the portfolio must be ensured. Also, the explorative study showed that the balance between different products must be ensured,

resource need must be considered, and the portfolio must be strategically aligned. This formulated the third research question:

3. *How do companies evaluate their product portfolio?*
  - a. *How is the commercial value of the product portfolio evaluated?*
  - b. *How is a balance of different types of products ensured?*
  - c. *How is it ensured that the product portfolio is strategically aligned?*

The authors believed that contextual factors would have an influence on how SPP is being conducted within different companies. Therefore eight contextual factors were identified and studied in order to be able to explain the patterns found in the result and to identifying how company and industry characteristics influence SPP within companies. The factors include length of product lifecycle, time-to-market, product portfolio complexity, product complexity, market pull or technology push orientation, predictability of market demand, types of product upgrades, and company turnover. In addition to this the authors initially also had the hypothesis that there would be differences in the way companies work with SPP in different industries. This formulated the fourth research question:

4. *How and why does SPP differ between companies?*

In addition to the above mentioned research questions the authors also believed it was important to get an understanding of how the studied companies perform on a number of areas in order to assess their overall performance of SPP. These are studied in order for the authors to draw some conclusion about how certain methods, work procedures, and processes can influence the performance of a company. The studied parameters include degree of change in plans, accuracy of estimated product launch dates, accuracy of estimated product costs, and accuracy of estimated development project costs, overall SPP performance, and profit margin. All of the measures are based on what companies perceive themselves and not based on objective numbers except from profit margin. This formulated the fifth and last research question:

5. *What characterize companies that perceive themselves as high performing in SPP related measures?*

### **3.3 Quality criteria**

In order to secure the quality of the results it is crucial to consider some quality criteria. Two main types of quality criteria are considered to be extra important in this study, namely validity and reliability.

#### **3.3.1 Validity**

The validity of a research concerns the integrity of the conclusion (Cepeda & Martin, 2005). There exist different kinds of validity. Below the four most relevant and important types of validity for this study are discussed.

The internal validity concerns causality, whether or not true cause-and-effects are drawn during the research (Scandura & Williams, 2000). During the study analysis and conclusions were drawn regarding how companies work and connect to company and industry characteristics as well as different performance indicators. During this type of analysis the internal validity is a key concern

since for instance many more elements can have an impact on the how companies work than just the company and industry characteristics that have been measured. However, since the sample size was relatively large the risk of drawing false conclusions was mitigated since the authors looked for patterns of associations that were true for a significant part of the sample. Therefore the internal validity is considered medium to high in this research.

External validity concerns whether or not it is possible to generalize results from the research to a whole population or other populations (Scandura & Williams, 2000). The targeted population, Nordic-based large to medium sized industrial companies, was given by Triathlon and can be seen as a large heterogeneous group which would make it hard to draw some general conclusions. Hence, in the beginning of the study an analysis was done in order to distinguish which type of company was to be included in the population. From this analysis it became evident that the population consisted of mainly six subgroups. As previously described quota sampling was used in order to get representatives from all of the six subgroups and in that way get a representative picture of the populations. This will increase the possibility to draw general conclusions about the populations consisted of these six subgroup. However, since the difference between industry and company characteristics and prerequisites can vary very much the authors do not think that the results from this study can be generalized to other populations. Therefore, the external validity is seen to be medium, high for Nordic-based large to medium sized industrial companies but lower for other types of companies.

Construct validity concerns how well different measures used in the research actually represent your ideas and theories (Scandura & Williams, 2000). In order to increase the construct validity discussions with industry experts regarding the relevance of the interview questions and what type of answers the questions were going to result in were held. These discussions made it clear that what were asked about really reflected the ideas and theories the authors of the master's thesis had.

Content validity concerns if the measures are both relevant and representative for the targeted construct (Haynes, Richard & Kubany, 1995). It deals with the exhaustiveness of the research, for instance if all aspects are taken into consideration. Since the definition of SPP does not exist in theory today it is not totally clear which aspects to investigate during the research. Therefore literature from many different related fields and concepts will be used in order to make sure that all important aspects related to the concept are considered. In addition semi-structured interviews with industry representatives were held during the explorative study in order to increase the content validity as well as discussion with ISEA Sweden. In Table 2 a summary of how the purpose of the study was broken down into research questions, how these research questions relate to literature concepts, which interview questions were asked in order to get useable information, and also the validity issues identified related to each research question.

### **3.3.2 Reliability**

Reliability concerns if the research is stable, i.e. if the same results is produced more than once (Cepeda & Martin, 2005). In order to increase the reliability pre-tests of the questions were performed in order to decrease the risk that the interviewees would misunderstand and misinterpret the questions. Pre-tests were done with both a company from the population sample but also with representatives from ISEA Sweden. Clear and understandable questions will increase the likelihood to get the same answer if the research was performed again.



Since only one person at each company was interviewed it is possible that other answers would have been collected if the study would have been repeated and another person in the company was targeted. The reason for only interviewing one person at each company was time limitation. A large sample was preferable in order to be able to draw some more general conclusions prior to interviewing more than one person at each company. Some questions were really subjective where for instance the interviewee ranked their company's performance in SPP etc. and some were more objective where they for instance describe their SPP process. The subjectivity were considered during the analysis and handled with care.

Research question	Literature concepts	Interview template questions	Validity
How is the strategic product planning process within companies organized? →	Strategic planning, product planning, product management, organizational theory, planning performance, technology and product roadmapping	Do you have a formal planning process? If yes, which steps are included and how frequent is the process iterated? What is the planning horizon of the process? Which business function owns the planning process? Which company functions are involved in the planning? Does the process result in a visual plan? If yes, what is included in the plan? If no, what is the output of the planning process? How is the output from the planning process transferred to product realization and used by different departments?	Internal validity - Argued to not be as important related to these research questions, since these are not aiming to identify any correlations, but rather just map a current situation.  Construct validity - Argued to be difficult to fully ensure since SPP is a somewhat unknown concept, but has been considered and addressed by a thorough explorative study.
How do companies align their business and marketing function with their technology and R&D function? →	Alignment between marketing and R&D, IT/communication tools	How does the planning team ensure that they have access to correct and enough information from marketing and R&D functions? Do you use any IT tools (databases, excel charts, etc.) for information exchange between marketing and R&D? If yes, which tools? What is the geographical distance between marketing and R&D functions?	
How do companies evaluate their product portfolio? →	Portfolio management, portfolio planning, portfolio matrix, commercial value, strategic fit, resource management, balance of products	According to what parameters do you make decisions about your product portfolio? Do you evaluate products based on the potential of the single product or on the potential of the product portfolio? Do you have an explicit and established method for portfolio optimization? How do you ensure to maximize the commercial value of your product portfolio? E.g. what type of methods or tools are used? How do you ensure to find the right balance of different types (e.g. risk, time horizon) of products in your portfolio? How do you evaluate the resource need for products in the portfolio? E.g. what type of methods or tools are used? How do you ensure that the portfolio is aligned with overall business strategy? E.g. what type of methods or tools are used?	





<p>How does strategic product planning differ between companies and why?</p> 	<p>Contextual factors, product lifecycle, time-to-market, product complexity, portfolio complexity, market push, technology pull or market prediction, incremental or major upgrades</p>	<p>Approximately, what is the length of the lifecycle of your products (from launch to end of production, including smaller face-lifts, excluding aftermarket and support)?</p>	<p>Internal validity - Argued to be important since these research questions are aiming to find the correct correlations, and has been considered and addressed through a thorough correlation analysis using both Minitab and Excel.</p> <p>External validity - Argued to be possible to generalize for the target sample of Nordic-based large to medium sized industrial companies, but not possible for generalizations outside this target group.</p>
		<p>Approximately, what is the time-to-market for your products (from product development project start to market launch, not including pre-research)?</p>	
		<p>Compared to other industry companies, how complex is your product portfolio in terms of number of products and amount of shared components between products?</p>	
		<p>Compared to other industry companies, how complex are your products in terms of product technology and number of components?</p>	
		<p>Do you regard your company as market pull oriented or technology push oriented?</p>	
		<p>To what extent is it possible to predict the market demand in your industry five years from now?</p>	
		<p>Are your company's new products mostly incremental upgrades or major upgrades?</p>	
<p>What distinguish companies seen as high performing in strategic product planning?</p> 	<p>Planning performance, change of plans, product cost, project accuracy</p>	<p>How do you measure the results and the efficiency of your planning process?</p>	<p>Content validity - Argued to be difficult to ensure relevant measures since the task of measuring the planning process itself has been identified as difficult. The measurements used in this study are being used as indications of performance.</p>
		<p>From one year to another, to what extent do you change your plans?</p>	
		<p>To what extent are products delivered in accordance with estimate launch dates?</p>	
		<p>To what extent are products delivered in accordance with estimated cost targets (e.g. production, material and overhead costs)?</p>	
		<p>To what extent are development projects keeping given expenditure frame?</p>	
		<p>How would you rate your company's performance in strategic product planning?</p>	

Table 2: Illustration of the process from research questions to interview questions, including validity concerns

### 3.4 Research strategy

Bryman and Bell (2007) distinguish between two different research strategies, namely qualitative and quantitative approaches. These two can often beneficially be combined; this is called multi strategy approach. However, both approaches come with different characteristics and are suitable to use in different situations.

The qualitative approach is characterized by being more explorative in its nature, and can initially give deeper understanding than the quantitative approach (Björklund & Paulsson, 2007). It is preferable in situations where the research is inductive, which means that the research is theory building rather than theory testing. (Bryman & Bell, 2007)

The quantitative approach is characterized by being more about numbers and is particularly useful in cases where a hypothesis should be tested and validated. In other words, a quantitative approach is

often used when the research is deductive in its nature (Bryman & Bell, 2007). According to Denscombe (2009) a quantitative approach increases the possibility to generalize the findings compared to if a qualitative approach is used.

Based on the discussion above this master's thesis can be argued to be a combination of a qualitative and a quantitative approach. The first part of the research, which was the explorative study, aimed to increase the understanding of how companies work with SPP. This part is more qualitative in its nature since this helped the authors to get a better understanding of the situation in order to be able to ask right questions in next step of the research. The second part of the study is more quantitative and aimed at retrieving as much data possible in order to be able to draw some more general conclusions. However, the second part of the study contains qualitative data as well.

### **3.5 Research design**

The purpose with the research design is to guide the data collection and analysis during the research process. It also helps researcher to express casual relations between different variables, make generalizations and understanding behavior. Mainly five different research designs are used today in research. Which one that is most appropriate depends on the situation since they come with different pros and cons (Bryman & Bell, 2007). In this master's thesis the research design can be argued to be a cross-sectional design. A cross-sectional design means that data is collected on more than one case at a single point of time. Then the data should be connected to two or more variables in order to identify patterns of association (Bryman & Bell, 2007). This is the case in this study where data was collected at 36 companies at a single point of time. In next step this data was then analyzed in order to detect patterns of associations.

## 4 Results

This chapter aims to outline the answers from the structured/semi-structured telephone interviews. The chapter consists of four main sections; organization of SPP, portfolio evaluation, alignment of market and business with R&D and technology, and performance measures.

Generally in this section, the diagrams show the percentage of the investigated companies that use a certain approach. Since it has been possible for the interviewees to give open answers in many cases, some companies have state that they use more than one approach. This means that the total percentage in one diagram can exceed 100 percent in some cases.

### 4.1 Organization of strategic product planning

This section will cover the process steps in SPP, planning horizon of the process, included functions in the SPP, owner of the planning, which type of plan that is used, and how the companies measure the result of the planning process.

#### 4.1.1 The process of strategic product planning

Regarding the different steps that the SPP process consists of the answers from the responding companies were diversified to a high extent. However, some general trends at the highest level were identified. More or less all companies collect relevant information from the market and match that information with the R&D capabilities of the firm. The information gathering process is different between different firms but two common approaches are that the marketing and R&D function are involved in the planning and provide the planning team with relevant information. Another approach is that a product management function or a product planning function is responsible for the planning and ask marketing and R&D functions for the information needed for the planning.

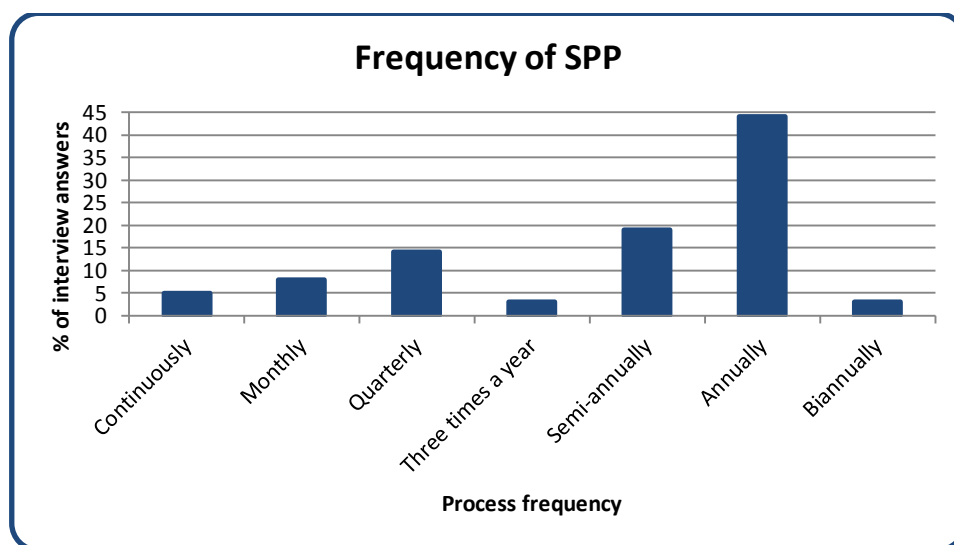


Figure 11: Distribution of how often the SPP process is iterated

Most respondents also described that the process ends up in a meeting with top management, a steering group, product council or similar. This is often a group that is cross-functional in order to ensure that different views are taken into consideration. Some companies use the meeting in order to both create the plan and decide upon it. In other companies one function, which was often product management or the product planning function, prepare a plan before the meeting and

during the meeting the plan is only presented and decided upon. In other words, it varies between if the meeting only is an approval board or if it more or less constitutes the planning process. Figure 11 shows how often this process in the responding companies is iterated. As can be seen in the figure, 44 % of the companies state that the process is iterated annually.

The planning horizon for the responding companies is illustrated in Figure 12. The most common planning horizon is between four and six years which more than 40 % of the companies have answered.

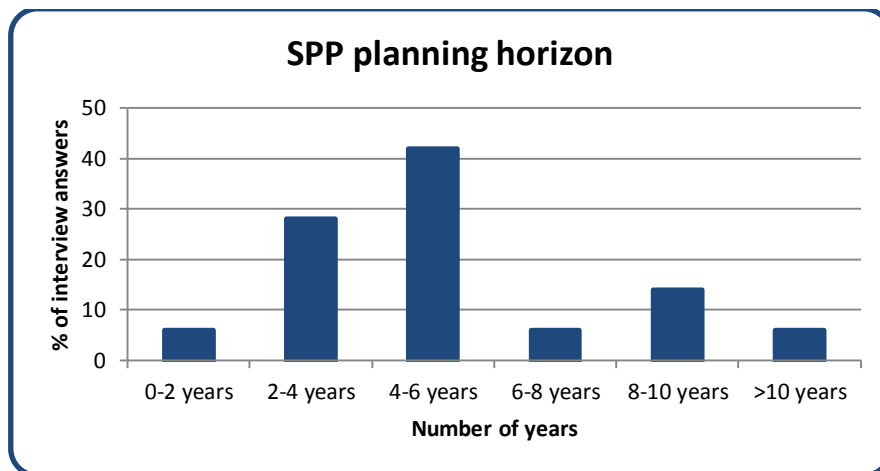


Figure 12: Distribution of the planning horizons used in SPP

#### 4.1.2 Involved function in strategic product planning

The interviewees answered which business functions are normally involved in their own planning. Here it was up to the respondents themselves to prioritize which business functions to include in the answer, why it has also been identified why there are differences in the number of functions that companies have. Another remark is that since many companies are organized differently they would be expected to have a spread of the involved functions. The result should not be seen as a comparison as much as an indication of the type of functions that can be involved in the planning.

What can be seen is that R&D most often is identified as a component of the planning team. In 89 % of the interviews R&D has been stated to be included in the planning effort. Marketing and sales are identified in 69 % and 53 % respectively to be involved. However another remark here is that depending on the company organization marketing and sales sometimes can be referred to as basically the same function, namely the business and customer side of a company. In 50 % of the cases a product management function has been identified to be involved in the SPP process, while top management has been identified in approximately one third of the answers. Some other identified functions are also illustrated in Figure 13 as for example Product planning. The difference between Product management and product planning can vary between companies. However, generally the difference is that product planning is, as the name states, more of a planning function while product management often has overall responsibility of a product or a product family. Apart from the identified functions in Figure 13, there were also some less frequent functions identified, such as aftersales, law and regulatory, customer service and brand management.

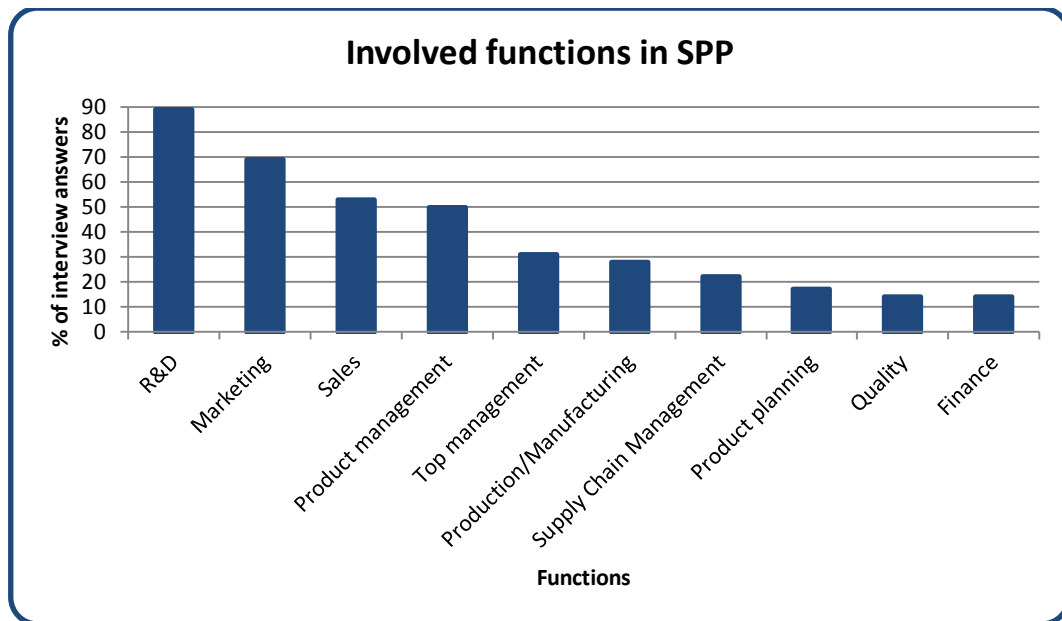


Figure 13: Distribution of involved functions in SPP

#### 4.1.3 Owner of strategic product planning process

Regarding which business function that owns the SPP process the most common answer is a product management function. Approximately 47 % of the interviewees have identified a separate product management function as the owner of the process. After Product management it is equally common for companies that the marketing function and the R&D functions is the owner of the process. Both these functions were identified as the owner in 8 % of the interviews. In some of the companies both R&D and marketing were identified as co-owner of the process. This cross-functional ownership was in place in 14 % of the companies. Another 14 % of the companies have a separate product planning function as process owner. See Figure 14 for the distribution of the owners of SPP.

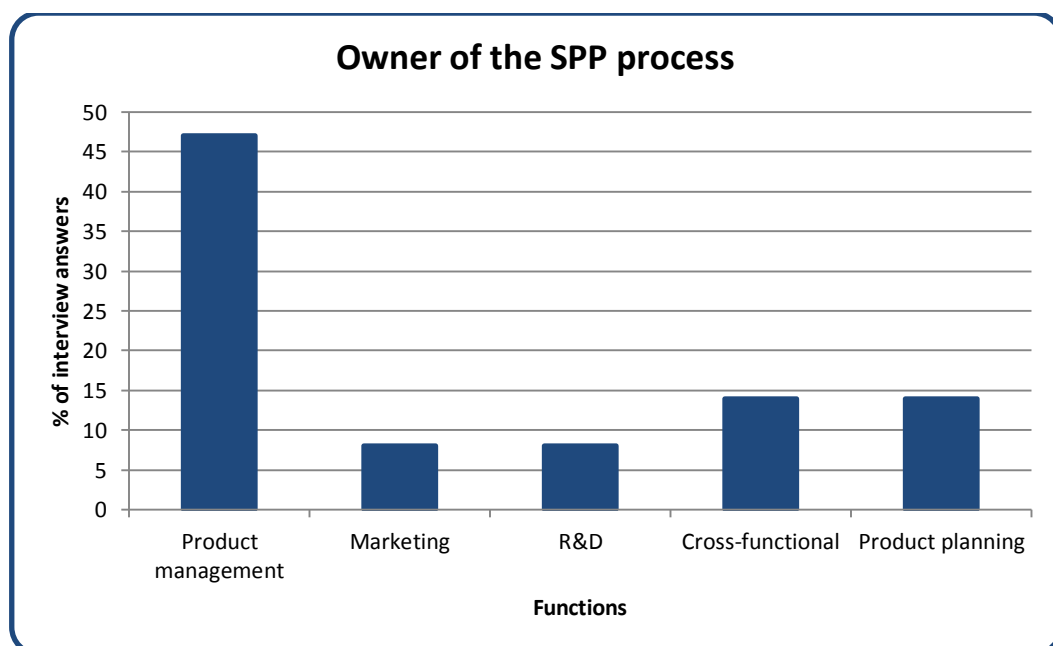


Figure 14: Distribution of owners of the SPP

Apart from the above mentioned other functions and setups were identified to some extent. In some cases a Product portfolio management function was responsible for the planning. Some answers also indicated that different segments or categories of companies were responsible (VP for segments, or category manager).

#### 4.1.4 Type of plan

Mainly three different types of plans are used by the responding companies. First, a simple product roadmap in the form of a time plan with launches, phase outs, and face-lifts. Second, a product roadmap with additional information (here called an extended product roadmap) such as project data, market information, trends, development costs, customer groups, regulation- and law requirements, and product performance. Third, a project roadmap in the shape of a time line showing the prioritization and which development projects that should be carried out in the coming years. 17 % of all companies use both one type of product roadmap and a project roadmap, while 11 % use only a project roadmap. See Figure 15 for the types of outputs identified by companies.

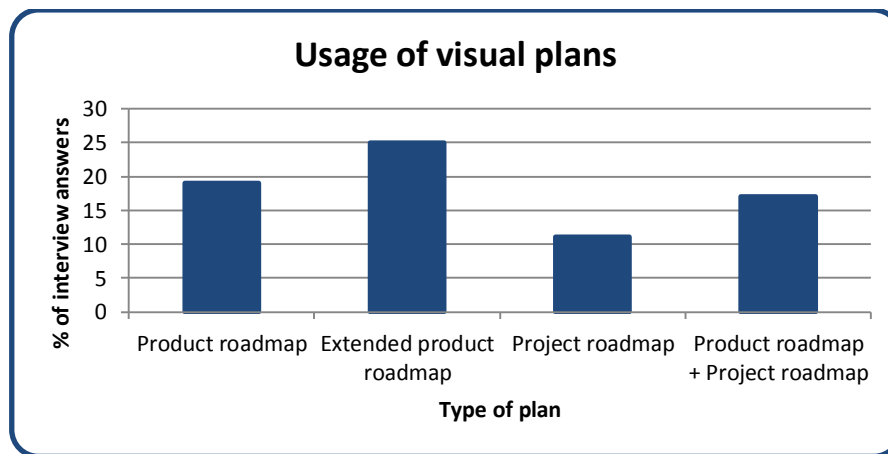


Figure 15: Distribution of different outputs from the SPP process

Additional answers included action plan for the portfolio, a table saying which product it is and which product it will replace together with something about the development project, a product plan in form of a list of products with information about launches etc. Moreover, one company answered that the SPP process resulted in a portfolio framework including when product launches should take place, target markets, price levels, service offers connected to the products, main customers, business assumptions. Finally, 6 % of the respondents answered that the SPP process does not result in any visual plan.

#### 4.1.5 Measure the performance of the strategic product planning process

Many respondents stated that it is difficult to measure the result and efficiency of the SPP process per-se and therefore use measurements related to product and project success instead. Four main approaches are used throughout the investigated companies.

- **Product success** – This approach means that the company measures the success of the products in order to indicate how the company performs in the SPP process. Typical answers in this category are product sales results, product profitability, product costs, new product sales etc.

- **Accuracy of product achievement** – The difference with this approach compared to only measure product success is that the product success or achievement is measured and compared to the estimations that have been made beforehand. Typical answers from the companies in this category include follow up business cases, follow up sales targets, and follow up quality and user experience.
- **Project success** – This approach focuses on the success of development projects. Some standard measurements in this category include profitability of projects and success rate of R&D projects.
- **Project accuracy** – The project accuracy approach focuses on measuring the accuracy of project estimations. The most common way of using this approach is to measure the accuracy of time and cost estimations for individual projects.

Figure 16 shows the distribution of how companies use different approaches.

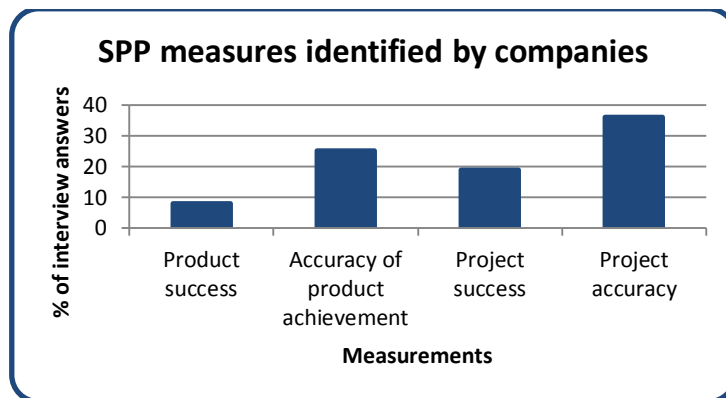


Figure 16: Usage of different measurements related to SPP performance

In addition to the above mentioned ways of measuring the performance of the SPP process single responses of other approaches were obtained. These were for instance that one company used KPIs, such as frequency/changes of plans and alignment with overall strategy, which are measured and followed up. Another company used a numerical value of how many business opportunities they have exploited during the year together with questionnaires regarding how well the SPP process is managed that is sent out to the stakeholders of the process. Finally, one company answered that it uses portfolio targets (e.g. profit and market position) which are followed up monthly.

## 4.2 Alignment of market demand and R&D capabilities

This section presents the result of how the interviewed companies align their market side with their technology side of the company.

### 4.2.1 Ensuring enough information from marketing and R&D

During the interviews four main trends were identified concerning how companies ensure enough and correct information from the business side and the technology side of the company in order to plan for the appropriate products. The first trend is that companies tend to have a separate product/portfolio management/planning function responsible for product planning, and it is the responsibility of this function to collect the information needed in order to make the appropriate decision. Of the interviewees 58 % answered that it is the responsibility of the separate department

to secure the information needed. The function is often responsible in the sense that they have to ask questions to the involved functions and receive answers and information back to use.

The second trend is that companies have a cross-functional planning where the functions are involved and responsible for providing correct information themselves. In 42 % of the interviews there is a cross-functional planning done by the concerned functions. Another trend is that even though there might be a separate planning function responsible for the planning all concerned functions are involved and integrated in this planning to a very large extent.

Thirdly it has been identified that companies have answered that there is a cross-sectional approval board in place in order to ensuring that enough information is exchanged. Often this cross-functional approval board can also be seen as a check-point in order to have all functions aligned. Sometimes there are check-points where information must be provided, even without an approval board. Approximately 28 % of the companies in the study have a cross-functional approval board as a way to ensure that enough information is provided from involved functions. As previously mentioned, this cross-sectional approval board can often be seen as a check-point. Other types of check-points can also be identified, such as check-points or toll-gates in projects where parameters or certain information needs to be provided in order to get an approval to continue the process.

The fourth and last general trend that has been identified is that some companies do not have a clear process for how and when information exchange takes place. Sometimes it is more ad-hoc based on the specific situation rather than a structured and stated process that looks the same over time. Approximately 17 % have answered that they do not have a clear or structured process in place in order to ensure that enough information is collected in order to plan for the right products. Some answers have stated that it is more of a continuous information exchange taking place rather than an established process.

Figure 17 shows the percentage of companies ensuring information in the different ways.

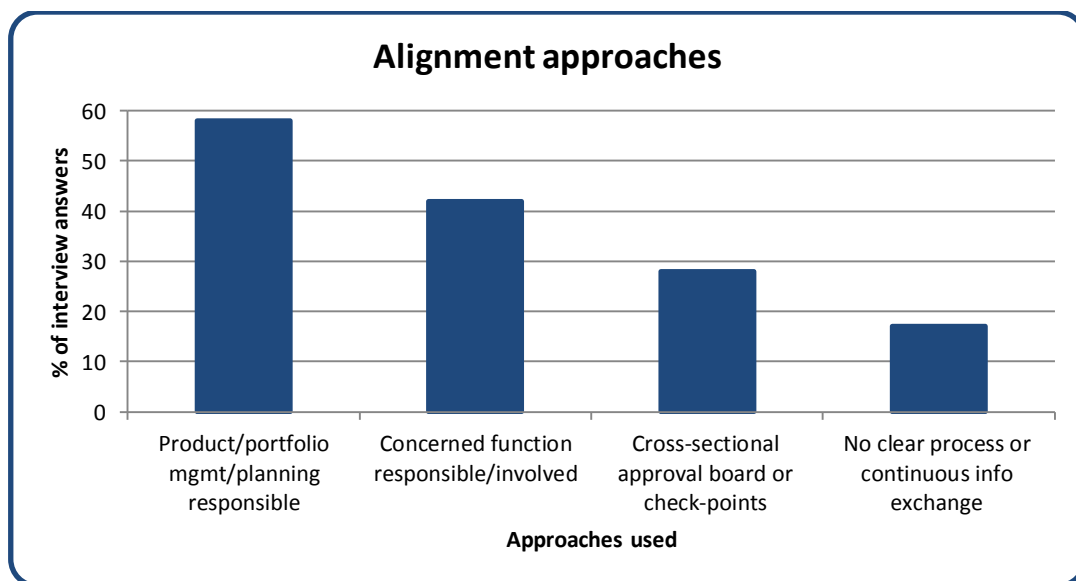


Figure 17: Usage of different approaches to ensure collection of enough information from marketing and R&D



#### 4.2.2 IT tools used for information exchange

Several tools or methods have been identified to be used by companies. The priority has been on the mostly used IT tools. Mainly five categories have been identified, see Figure 18.

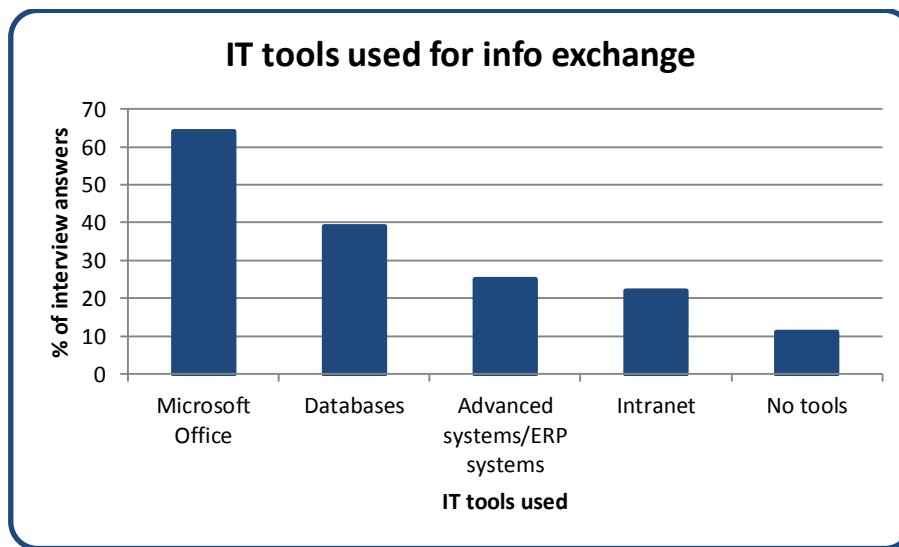


Figure 18: Usage of different IT tools for information exchange between marketing and R&D

Companies tend to rely on Microsoft Office to a large extent in order to exchange information. 64 % of the companies have addressed Microsoft Office as a main tool for information exchange between functions.

Databases have also been identified as an important factor for ensuring that information is stored and exchanged between functions. It is 39 % of the interviewees that have stated databases as a main tool. The extent to which it is clear or stated exactly what should be put into and stored in the database however varies among companies.

Approximately 25 % of the interviewed companies have answered that advanced systems, such as ERP systems (Product/Project Portfolio Management, PDM, CRM, ERP systems, etc.) are used in order to assist the information exchange. The systems are not necessarily for the sole purpose of information exchange for SPP, but are in use for this process.

In 22 % of the interviewed companies intranet solutions are used within the company in order to store and access information by involved functions and people.

Approximately 11 % of the companies have answered that no specific tools are used for information exchange in the planning process. Noteworthy here is that the interpretation of what corresponds as IT tools may be questioned and it can be questioned if these companies do not use simple solutions, such as Microsoft Office, for information exchange to some extent.

#### 4.3 Product portfolio evaluation

This section contains the results that concern how companies evaluate their portfolio.

#### 4.3.1 Product portfolio decision parameters

Three main categories of answers were mentioned during the interviews when asking about what parameters that the companies use when taking decisions regarding their product portfolio. These three were:

- Financial parameters (e.g. profitability, turnover, return on investment, payback time, Net present value, and sales volume)
- Strategic fit or strategic value (e.g. company strategy, emerging market trends, brand management, and growth potential)
- Market or customer parameters (e.g. market/customer demand, market/customer need, and customer/market feedback)

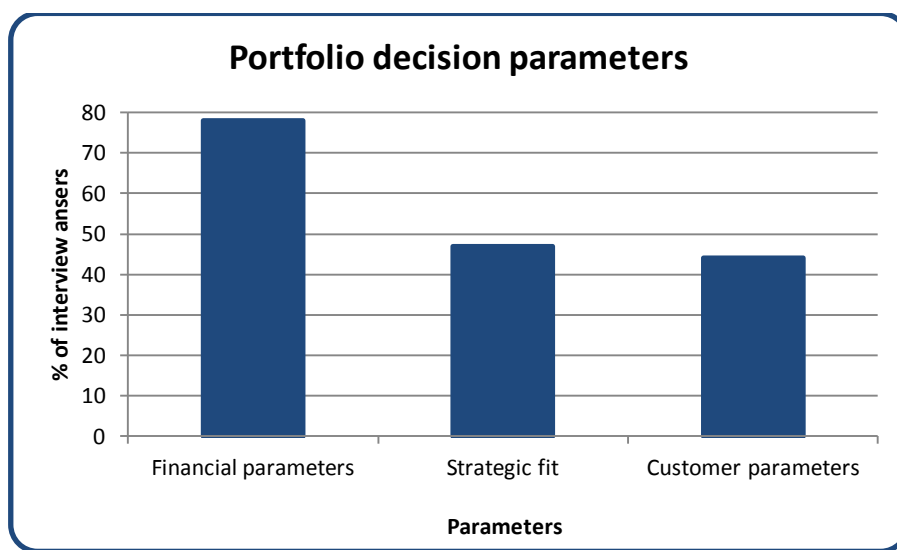


Figure 19: Distribution of different portfolio decision parameters used

As stated before, companies were allowed to answer more than one parameter and Figure 19 shows the percentage of the responding companies that use the three main parameters.

It is evident that the most common parameter is financial. In addition to the three main categories of answers other parameters that were mentioned were quality, competitive strength, manufacturing fit, regulations/law requirements, intellectual property rights, and time since last update.

#### 4.3.2 Method for portfolio optimization

Regarding the questions if the company has an established method for portfolio optimization 61 % of the responding companies answered that they do not have any established method for this. 17 % however answered that they are about to develop and implement a method for this. 19 % of the respondents answered that they have a method, these companies used different methods. Only two respondents had a method for evaluating single products/projects (e.g. total contribution of individual products/projects, business cases for single products/projects) in order to optimize the portfolio. Additional single answers included to use stage-gate process for projects, use a life-cycle management process, use a financial method, calculate profitability and sales margin, and to evaluate ability to capture, market attractiveness and strategic fit for single products. Finally, one respondent had a process established for this, with instructions, check-lists, and optimization tools.

In this process all products in the portfolio and all the potential new products are evaluated according to a set of variables related to the three parameters profitability, brand, and growth potential.

#### 4.3.3 Ensure to maximize commercial value of product portfolio

The responding companies mainly gave three types of answers regarding how they ensure high commercial value of their portfolio. The three different categories were:

- Financial calculations for specific projects (e.g. costs, sales volume, return on investment, income calculations, gross profit margin, ABC-calculations)
- Ensure customer insight through market research
- Financial calculations for portfolio (e.g. profitability calculated on product group level or portfolio level, and potential products and projects are ranked based on a set of parameters and then the most profitable ones are chosen)

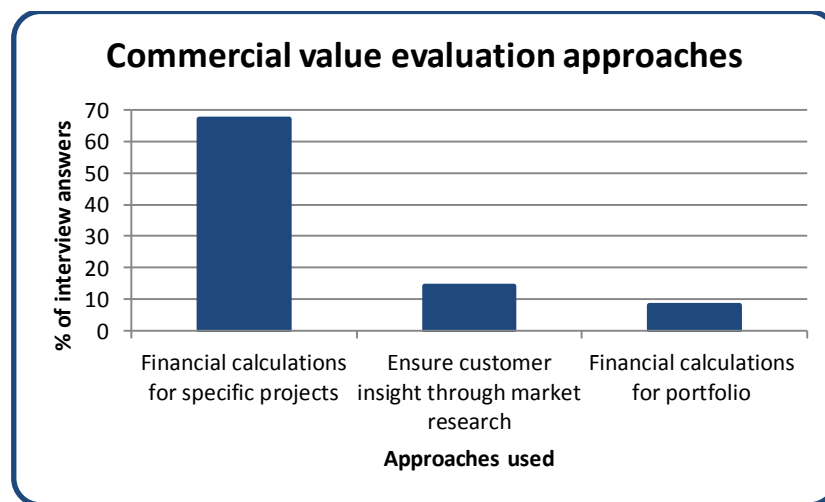


Figure 20: Usage of different approaches in order to ensure the commercial value of the product portfolio

Figure 20 shows how many of the responding companies that use different approaches. Most companies only answered one approach. Other approaches that were less common were cross-benefit analysis, lifecycle analysis, qualitative evaluations, and portfolio fit.

#### 4.3.4 Ensure balance between different types of product in the portfolio

In order to ensure that the product portfolio has balance between different types of products the main trend was that companies consider it but do not have any method for doing it. Some companies meant that the product mix is market driven (e.g. mix of customers decides product mix or the market demand decides the mix). Two other approaches that several companies used were bubble diagrams (e.g. Boston matrix, bubble diagrams with e.g. Risk versus reward or ability to capture versus reward), and to divide products/projects into different categories (e.g. low and high margin products, long-term, medium-term, and short-term projects, core-products, tactical products, customer feedback-based). Figure 21 shows how many of the responding companies that use the different approaches mentioned.

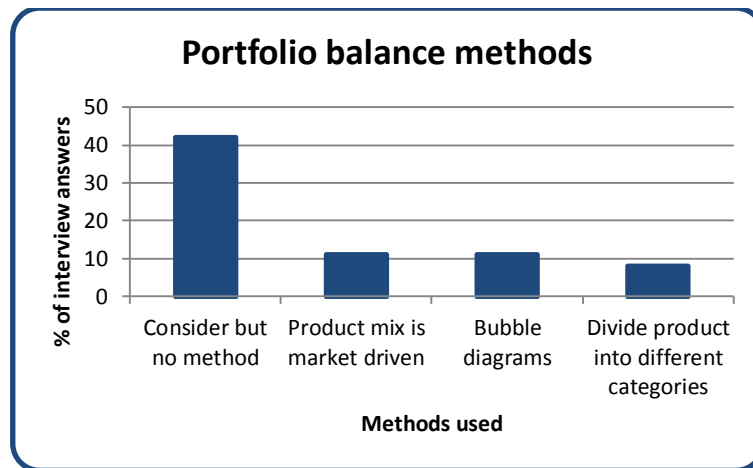


Figure 21: Usage of different methods in order to ensure balance between different types of products in the portfolio

Moreover, the answers in this subject were diversified and other approaches that were mentioned by single respondents or by two companies were SWOT-analysis, evaluate what they should develop internally and what they should outsource, qualitative evaluations in cross-functional global steering group, conjoint analysis to compare different products, lifecycle analysis, prioritize the projects based on strategic areas, focus on profitability for the whole platform and not for single products, and calculation of risk or probability of success for different projects.

#### 4.3.5 Ensure that the product portfolio is aligned with business strategy

In order to ensure that the portfolio is aligned with the overall business strategy the answers were much diversified. However, two main approaches were mentioned. The first is to use some sort of steering group, most often cross-functional, to take decisions about the product portfolio and foremost new products. The second is to use a top-down approach in the SPP process and the creation of the plan using the business strategy as a base for the planning. Figure 22 shows how many of the responding companies that use different approaches.

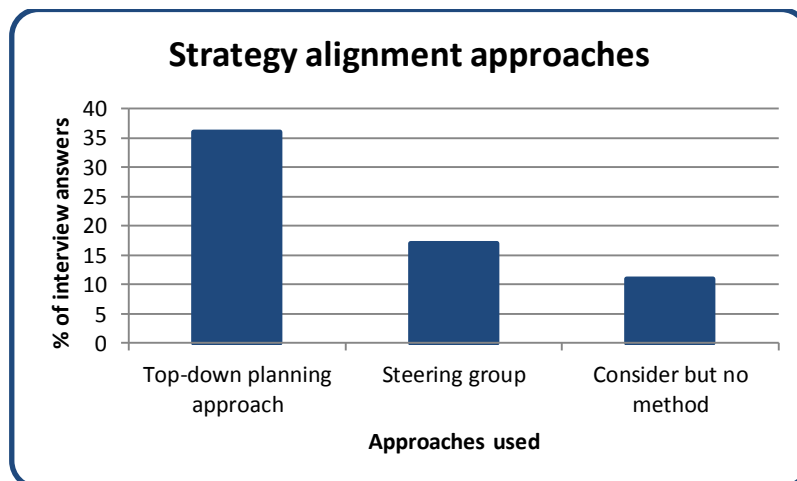


Figure 22: Usage of different approaches to ensure that the product portfolio is aligned with overall business strategy

Many companies had other ways of ensuring that the portfolio is aligned with the business strategy. Additional answers included; usage of templates in the product decision process about that new products are in line with the strategy, product portfolio manager should ensure this, ensured by

brand management, continuous meetings with top management, use the strategic bucket approach, break down the business strategy to portfolio level, strategic dimension is included in business cases, new innovations are classified in opportunity platforms which are based on the business strategy, involvement of the strategic function during planning, continuous follow up of what the purpose with projects is and that they are in line with the strategy, and that the strategy available to everyone.

#### 4.4 Strategic product planning performance measurements

The companies were asked about how they perceived themselves to perform in five different SPP related issues. The first measure concerns how much companies change in their planning from one year to another which can indicate either how accurate the performed planning is or how uncertain the industry is. The second is about to what extent products are delivered in accordance with estimated launch dates. The third measure concerns to what extent products are delivered in accordance with estimated cost targets (e.g. production, material and overhead costs). The fourth measure is to what extent development projects are keeping given expenditure frames. The fifth measure concerns how companies perceive their overall performance in SPP. The overall performance focuses on the processes in place to perform SPP and not the how good the output from the planning process actually is. In addition to these five measurements profit margin have been studied but due to large difference the investigated companies' profit margin the result is not displayed in the figure. The profit margin will however be considered in the analysis as the other five performance measures.

The main trend is that most companies rank themselves somewhere between two and five on the scale. For accuracy of estimated launch dates, accuracy of project cost, and overall SPP performance the most common answer is to rank themselves as a 4 out of 6. For degree of change in plans the most common answer is a 2 which means that companies do not change very much in the plans from one year to another. For accuracy of estimated product cost the most frequent answer is a 5 which means that companies think that they are better in estimating product cost than launch time and project cost.

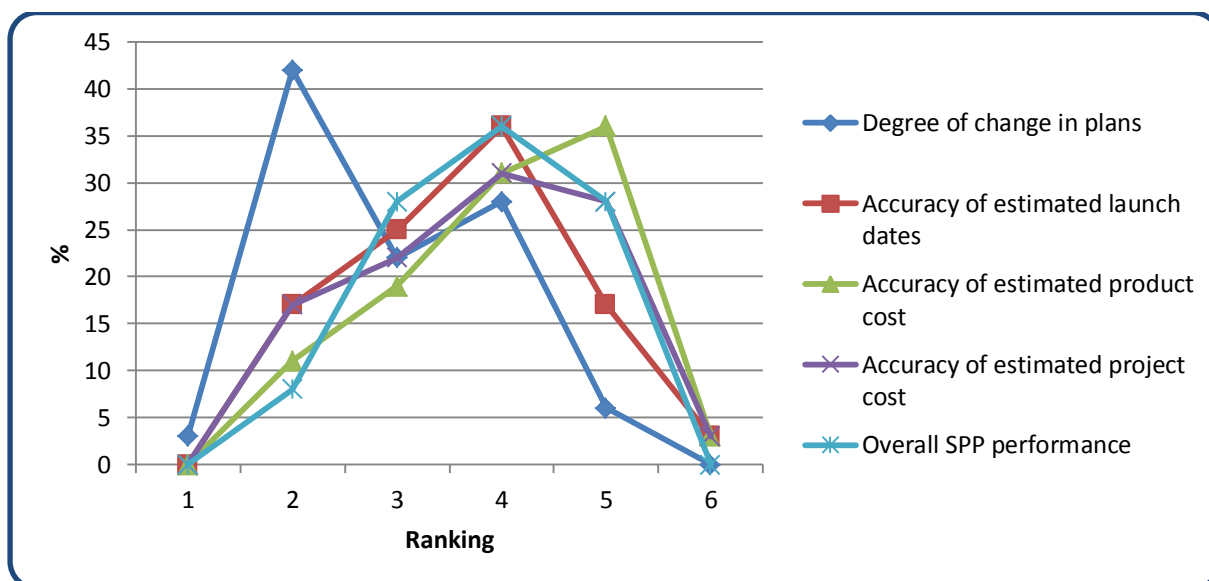


Figure 23: The companies' performance in five SPP related measures

The result is displayed below in Figure 23. For the degree of change in plans 1 is equal to a low degree of change while 6 is equal to a high degree of change. For the accuracy of estimated launch dates, product cost, and project cost 1 corresponds to low accuracy and 6 corresponds to high accuracy. For the overall SPP performance 1 equals poor performance while 6 equals very good performance. The Y-axis shows the percentage of the responding companies that have answered different alternatives.

## 5 Analysis

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This chapter presents an analysis of the findings in the empirical study aiming at taking the mapping one step further and answer research questions four and five. The chapter starts with a general analysis of the main findings from the result in relation to existing theory. Secondly, an analysis of how and why SPP differs between companies is performed based on the identified contextual factors and the division of companies into different industries. Finally, an analysis of the difference between companies that have answered that they perceive themselves as high performing in SPP related issues compared to companies that perceived themselves as not as high performing is performed.

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### 5.1 Main findings in relation to existing literature

This section aims to analyze the findings from the interviews in relation to existing academic literature. This is done divided into the three main areas of organization of the SPP process, alignment of market demand and R&D capabilities, and portfolio evaluation.

#### 5.1.1 Organization of the strategic product planning process

When it comes to the organization of the planning process and the output from the planning process the information from the literature is limited and therefore the result from the study is not comparable to the theory to a high extent. For instance, it is unclear what planning horizon for the SPP can be used in different cases since this is not stated in theory, and more just being compared to planning horizon of strategic planning. Despite this, some of the findings will be discussed in relation to existing theory below.

Almost all companies answered that both R&D and marketing or sales were included in the process. This was expected since the integration of these two functions is a critical part of SPP. However, neither of these functions were the most common owner of the process which instead was product management. This can also be seen as reasonable since product management is often seen to lie between these two functions. The implication of this will be discussed further in section 5.1.2. Moreover, according to Kahn (2001) the planning is often carried out in a temporary cross-functional team. This was also often the case in the study even though the process most often had a specific function owning the planning responsibility.

Regarding the output from the planning process most companies described different types of roadmaps which can be categorized as either product or project roadmap. Some companies had a product roadmap which more or less only stated which products that should be offered to the market in coming years. Others had more extensive roadmaps which, according to Albright and Kappel (2003), are preferable. They state that a roadmap should include for instance how product drivers (product attributes) should be linked to what is valuable for the customers. Moreover, since some companies answered that the output from their SPP process is a project roadmap it is believed that these companies risk ignoring some issues of SPP in the visual plan. SPP is about new development projects but also about existing products and the phase out of old products which might be ignored in a project roadmap. One can argue that the usage of a project roadmap or a product roadmap does not decide if the company focuses on the phase out of old product or not. However, the most reasonable approach must be to use a roadmap which reflects as much of the planning as possible in order to be illustrative and useful for the company.

It became evident from the literature review that it is often hard to measure the performance of a planning process. The impression from the study was that the companies also experience this problem. Some companies stated that it is really hard to measure the performance of their planning process and that they do not have any method in place for this. However, companies that do measure this tend to measure product success, product accuracy, project success or project accuracy. Both product and project success is mentioned in theory as useful approaches even if these types of measurements depend on many more factors than just the planning. As argued above, SPP is about more than just development projects why it can be more logic to measure product success or product accuracy than project success or project accuracy. However, it is somewhat unclear what companies include in their measures relating to project success or project accuracy, and it is believed likely that in order for a project to be seen as successful the product needs to be successful in the market as well. This means that the distinction between the product and project related measures are somewhat fuzzy. Regarding if companies should measure accuracy or success one can argue that success is most appropriate since this is what counts in the end. Accuracy can, however give a better indication of how well the estimation during the planning is working which is important both in cases if the product performs better or worse than expected. Hence, a combination of accuracy and success can be reasonable to use. Table 3 summarizes the findings from the studies in relation to the literature.

Findings from study	In line with theory and authors' believes?
Product management most common owner of process	Yes. Natural since this function can be seen to be between marketing and R&D.
Product roadmaps, project roadmaps, and extended product roadmaps are used	More focus on extended product roadmap can be preferable in order to include more aspects of the planning work in the visual plan
Measure the performance of the planning process by focusing on product success, product accuracy, project success, and project accuracy	A combination of these approaches can be preferable

Table 3: Comparison between interview findings with literature regarding organization of the SPP process

### 5.1.2 Alignment of market demand and R&D capabilities

The main finding regarding the alignment of market demand and R&D capabilities is that the most common approach for ensuring that enough information is gathered from both functions is that one function, often the function responsible for the whole SPP process, has the responsibility. From the literature review it is evident that it is really important to ensure the alignment between these functions. Hence, the question is if the approach of having one function, e.g. product management, responsible for collecting information from marketing and R&D is a preferable way to reach alignment. From one point-of-view, this approach can be seen as not being a cross-functional approach since only one function collects the information from the other functions. A more cross-functional approach would instead be that the concerned function is involved and responsible for providing relevant information itself. If only thinking about aligning marketing and R&D functions the latter approach, being more cross-functional in its nature, is preferable. However, since cross-functional teams can lead to decreased efficiency with through increased number of meetings and harder to reach consensus (Brettel et al., 2011) as well as that alignment through cross-functional teams not always is necessary one can argue that the former approach can be a good alternative. In other words a company has to evaluate what degree of cross-functional integration that is needed in



order to match market demand with R&D capabilities. Table 4 summarizes the findings in relation to the literature.

Findings from study	In line with theory and authors' beliefs?
The selection of approach depends on the need for alignment.	Yes. Alignment needs to take place in order to ensure the two views of R&D and marketing. However, an increased amount of alignment is not necessarily value-adding.

Table 4: Comparison between interview findings with literature regarding alignment between marketing and R&D

### 5.1.3 Product portfolio evaluation

One main finding regarding how companies evaluate their portfolio is that they lack established methods for conducting this evaluation. Cooper, Edgett and Kleinschmidt (2001) argue that key success factors to get a balanced, strategically aligned, high value portfolio, with the right amount of projects, and good time-to-market is to have an explicit and established method for portfolio planning. These methods should have clear rules and procedures, and also being consistently applied across all appropriate projects. This was however not the case in the investigated companies where often no methods or no established methods were used. One question is why the investigated companies do not have this in place, even though the literature states that it is important. It can either depend on that the benefits stated in literature are not as great as it seems. Cooper, Edgett and Kleinschmidt, (2001) on the other hand state that it can be challenging to establish methods for portfolio management and that the most common challenges is to create a positive climate, culture, and buy-in for the methods used. Hence, senior executive support is important in order to establish a specific method.

Companies also tended to focus on financial methods. This is in line with theory since Cooper, Edgett and Kleinschmidt (2001) state that this is the most common approach used in companies. They also argue that even if the financial methods have advantages the top performers that have enviable portfolios do not focus much on financial methods. This is since the financial methods most often fail to ensure that the portfolio is aligned with the overall business strategy and that the portfolio has the right balance between different types of products. In addition, companies can, according to Christensen, Kaufman, and Shih (2008), hinder innovation if relying too much on financial methods. However, the financial methods are still important in order to secure profitability of project etc. Hence, a good approach can be to combine the financial methods with other methods, such as strategic buckets and bubble diagrams, discussed in chapter 2, in order to ensure that the portfolio is aligned with the business strategy and have balance between different types of products.

A majority of the companies in the study answered that they evaluate products based on the potential of the product portfolio and not the single product. This is in line with what Cooper, Edgett and Kleinschmidt (2001) argue is the best approach. However, the companies have also answered that the methods used to evaluate their portfolio tend to focus on single projects, which can be argued to not be an evaluation of the overall portfolio. For instance, the most common approach to ensure the commercial value of the portfolio was financial calculation for specific projects. It is unclear whether or not these methods are used to benchmark projects and put them in relation to the portfolio. However, it seems that most of the targeted companies do not have an established method for evaluating projects in relation to the product portfolio. Only a couple of the targeted

companies answered that they perform financial calculation for the portfolio in order to ensure the commercial value of the portfolio. Table 5 summarizes the findings in relation to literature.

Findings from study	In line with theory and authors' beliefs?
Not common to have a specific and established method for portfolio evaluation.	Theory suggests having an explicit method for portfolio evaluation.
Focus on financial methods.	In line with what the theory states is the most common approach but the use of it have drawbacks and these methods need to be combined with other methods.
Many companies lack methods for evaluating the whole portfolio and product in relation the portfolio.	Theory suggests having methods that focus on the portfolio rather than specific products/projects.

Table 5: Comparison between interview findings with literature regarding portfolio evaluation

## 5.2 How and why strategic product planning differs between companies

This second section of the analysis is a comparison of how SPP is carried out between different companies, as well as identifying the reasons for why such differences exist. Firstly the section presents how different contextual factors influence the three main areas of the SPP process. In addition, after the comparison of companies using these contextual factors an analysis of the differences between industries participating in the study will be done in order to visualize and give a better view of how the contextual factors can influence and how SPP can be carried out among different types of industries.

### 5.2.1 Organization of the strategic product planning process

Figure 24 shows which contextual factors affect the organization and the output of the planning process. It is shown that time-to-market, length of product lifecycle, ability to predict market demand, product complexity, and whether the company focuses on incremental upgrades or major upgrades influence the SPP process in different ways. In coming sub-sections these correlations will be elaborated upon in order to explain the results.

#### 5.2.1.1 SPP process steps

As stated in the results in chapter 4 companies tend to have very different approaches concerning what steps that the SPP process consists of. This makes it hard to analyze and draw some general conclusions about what the difference between companies really is and explain the differences. However, when analyzing the answers one trend that it evident is that turnover seem to influence how structured and established the SPP process is. In terms of turnover, when comparing the largest with the smallest, it is evident that the smaller companies to a higher extent lack clear and established methods. Even if there exist exceptions this is a general trend that have been identified during the study.



Figure 24: How the contextual factors influence the organization of the SPP process

### 5.2.1.2 Frequency

Regarding how frequent the planning process is iterated the main trend evident from the data analysis was that the frequency was depending on if the company's new products were mostly incremental or major upgrades. Companies focusing on incremental upgrades had a more frequent process than companies focusing on major upgrades. The reason for this can be that if the company focuses on incremental upgrades this will probably also be reflected in the planning. Since major upgrades most likely have longer development time it is possible that the process is iterated less frequent in these companies than in companies focusing on incremental upgrades.

### 5.2.1.3 Planning horizon

A clear tendency looking at companies' planning horizons was that this was connected to companies' time-to-market, length of product lifecycle, and product complexity. Firstly, companies with short planning horizons had substantially shorter time-to-market for their products. In addition the planning horizon increases with the time-to-market. For instance, companies who had a planning horizon between 0-2 years had an average time-to-market of one year while companies with a planning horizon over ten years had an average time-to-market of 4.5 years. This relation seems realistic and was expected on beforehand since a longer time-to-market requires longer forward planning.

In the same way as time-to-market, the lengths of the lifecycle of the companies' products impact the planning horizon. However, the relation between product lifecycle and planning horizon was not

as clear as in the case of time-to-market. From the study it became evident that many companies focused more on the development of new products when working with SPP than planning for existing product and when these should be phased out from the market. This might be the reason for why time-to-market influence the planning horizon more than product lifecycle length since the whole lifecycle analysis was not always included by companies in the SPP.

It also became evident that the product complexity impacted the planning horizon. Companies with more complex products tended to have longer planning horizon than companies with less complex products. Since complexity was defined in terms of product technology and number of components it is believed to impact the time-to-market of the products. In other words, it might not be the product complexity in itself that impact the planning horizon but instead that the complexity impacts the time-to-market. However, the product complexity might also impact the time before time-to-market since time-to-market was defined from product development project start. This means that pre-research is not included. If a company's products are complex one can argue that the pre-research period will increase and that this also will increase the planning horizon.

According to Bradford (2011) the planning horizon is dependent on how quickly the environment is changing. This was partly validated in the study since companies that thought it was easy to predict the demand in their industry five years from now in average had a longer planning horizon than companies that thought it was hard to predict the market demand five years ahead.

In addition Bradford (2011) argues that if a company can gather and understand information about the future in a good manner they are likely to be able to have a longer planning horizon. It became evident that companies with shorter planning horizon had no clear process to ensure enough and correct information from marketing and R&D functions. Hence, one can argue that this indicate that a no clear process to ensure enough information can result in worse information and in turn impact the ability to have longer planning horizons.

#### **5.2.1.4 Owner of process**

One hypothesis made beforehand was that the ownership of the planning process would be connected to if the company regarded themselves as market pull oriented or technology push oriented. This was however not the case in the studied companies where there were more or less no difference in market pull or technology push orientation between companies where the planning process was owned by the marketing or the R&D function. There might be several reasons for this. Firstly, several companies stated that they have moved towards market pull and might not have changed the ownership of the process since then. Secondly, many companies perceived themselves in the middle of market pull and technology push which means that the choice of owner of the SPP might not be obvious.

Companies with a planning process owned by the marketing function also answered that it is easier to predict the market demand in five years from now compared the companies with a process owned by another department. This might seem strange since one can argue that marketing should own the process if the market is uncertain and in that way compensate for that. On the other hand, if it is really hard to predict the market demand it may be no benefit in that marketing owns the planning process but instead gathers and provides as much information available to the owners.

#### 5.2.1.5 Type of plan

Mainly three different types of plans were used by the companies. These have been outlined as product roadmaps, extended product roadmaps, and project roadmaps. What is clear is that companies using a project roadmap have substantially longer time-to-market, with an average time-to-market of approximately five years compared to around two years for companies that use a type of product roadmap. This seems reasonable since if the time-to-market is longer the project often can be more comprehensive and constitute a larger part of the planning and hence also a larger part of the plan.

#### 5.2.1.6 Measure the performance of the SPP process

What became evident from the data gathering was that companies which said to measure the performance of the SPP process by measuring project success had higher product complexity than the rest. The reason for this might be that with more complex product, which was defined as having a higher number of components and more advanced product technology, the project success might be seen as the most critical issue and therefore this is what is measured. In comparison, if a company has less complex products the actual product development project is not the most critical issue; instead the most critical issue might be to get enough sales. This does not mean that companies with more complex product do not think that measures related to product success in the market are not a critical issue but it seems like the product complexity impacts the approach when measure the performance of the SPP process.

#### 5.2.2 Alignment of market demand and R&D capabilities

The alignment of market demand with R&D capabilities is influenced by the factors portfolio complexity, market pull and technology push, and product complexity. In addition to the identified contextual factors it is shown that company size also influence the alignment between these functions. Figure 25 shows all the correlations that have been identified in the study and these correlations will be explained in coming sub-sections.



Figure 25: How the contextual factors influence the alignment between marketing and R&D functions

#### **5.2.2.1 Ensuring enough information**

One clear finding when evaluating how companies organize themselves in order to ensure that the planning function has enough and correct information from both the business side and the technology side concerns the companies that have answered that there is no clear process in place. The information rather tends to be collected more informally and by a continuous information exchange rather than by a structured process in these cases. The most evident correlation that has been found is that the companies with no clear process tend to have a lower level of portfolio complexity and also tend to consider their company as market pull oriented. The complexity of product portfolio related to the alignment of information between company functions is discussed more in the next section, dealing with the usage of IT tools.

The fact that companies not having a clear process also tend to be more market pull oriented might be explained in relation to the companies that actually have a process in place. The companies that have identified a process for ensuring information exchange have also classified themselves to equally prioritize a market pull and technology push approach. One can argue that when companies tend to focus equally much on fulfilling the market demand as on developing and offer new products and technology there is a larger need of alignment. A company characterized by either market pull or technology push orientation might have a smaller focus on the alignment due to the fact that the demand is either stated clearly by the marketing or the R&D side of the company. The demand is coming from one direction and can be argued to be more clear than if a trade-off is needed to a larger extent.

One additional finding related to how companies ensure information is that the companies stating that they do not have clear processes are in general substantially smaller in size when comparing annual turnover. It can be argued that it is the size of the company that sets the need of having a structured way of dealing with information rather than the portfolio complexity and market pull or technology push orientation. A smaller company which is more geographically limited can manage with a more informal and unstructured information sharing process than a large multinational company.

#### **5.2.2.2 IT tools for info exchange**

In similar manner to how companies ensure information to the planning team it also became clear that the companies that state to not use any IT tools for information exchange between marketing and R&D functions tend to be companies with a low degree of complexity of products as well as of the product portfolio. They have also been identified to be more market pull oriented as a company.

If having a lower degree of complexity both of products and of product portfolio then the need for information exchange might not be the same as for advanced, complex products and portfolios. The more complex products and product portfolios are there is a larger need to have information exchanged between business functions in order to understand all aspects of the product and the portfolio. The benefit of using IT tools can be larger when the need for information exchange is larger, which is in line with the study by Leenders and Wierenga (2002).

### 5.2.3 Product portfolio evaluation

Figure 26 shows which contextual factors affect the organization and the output of the planning process. It is shown that ability to predict market demand, product complexity, portfolio complexity, market pull or technology push orientation, and if the company focuses on incremental upgrades or major upgrades influence the SPP process in different ways. In coming sub-sections these correlations will be elaborated.



Figure 26: How the contextual factors influence the portfolio evaluation

#### 5.2.3.1 Decision parameters

When mapping which decision parameters companies tend to rely on financial calculations, strategic fit, and customer and market evaluation have been compared. The clearest trends that have been identified in relation to the influencing contextual factors is that companies that focus on customer and market oriented parameters in order to evaluate their product portfolio tend to have less complex products, being more market pull oriented, and stating that they can predict the future market demand to a large extent.

One can argue that complexity correlate to the companies that focus on customer and market oriented parameters indirectly. It might be possible for companies to rely more on customer input and feedback to a larger extent if the customers are able to understand the products they are buying. A complex product with high number of components or advanced technology can in cases be more difficult for the market to evaluate. It might be no surprise that companies that are more market pull oriented rely more on customer and market oriented parameters when they evaluate their portfolio. Based on that these companies are more market driven it is logical that the decision parameter should also be customer or market oriented. If it is possible to predict the future market demand to a larger extent it can be more accurate to rely on customer and market oriented parameters to evaluate the portfolio. If the market demand is very dynamic it might be considered to be less



accurate to use customer input as evaluation parameters since this input will undergo considerable change coming years.

#### **5.2.3.2 Balance of products**

The two strongest correlations of contextual factors and the way companies consider the balance of different products in their portfolio is with the complexity of the portfolio and the market pull orientation. Companies answering that they are using bubble diagrams for evaluating the balance of different types of products in general have answered that they also consider their portfolio to be very complex. Companies using other methods have ranked their products not having the same level of complexity. Cooper, Edgett, and Kleinschmidt (2001) argued that bubble diagrams was one of the most frequently used tools for this purpose and based on this one can argue that the companies with complex portfolios have a larger need of balance in their portfolio than a simpler portfolio would need.

The other correlation can be argued to be rather straight-forward, that the companies stating they do not really consider to evaluate a balance of product but instead focus on developing the products demanded by the market are to a much larger extent market pull oriented than the other companies.

#### **5.2.3.3 Alignment with overall business strategy**

The clearest trends for how companies work with aligning their products with the overall business strategy has to do with the type of new products that the company develops. Companies that tend to develop more incremental upgrades to a much larger extent do not consider aligning the products with the overall business strategy, while companies developing major upgrades have a more structured and clear process of making sure that the products are in line with the overall direction of the company. This alignment can either be done by a strategic board or a management team with cross-functional responsibility or by a top-down approach where the overall business strategy is the basis for the initial product planning. One can argue that for companies that tend to do more incremental upgrades the overall direction of the company is somewhat clearer, and the incremental upgrades do not create substantial changes to the existing offering. However, if developing a major, radical new product there might be a possibility that this product can create a somewhat larger change of focus in comparison to the existing offerings, and hence needs a larger amount of alignment with the overall business strategy.

#### **5.2.4 Difference between industries in contextual factors and strategic product planning**

As stated related to the fourth research question in this thesis it can be interesting to compare different industries in order to give a better picture of how the influencing factors can impact an industry and how these factors can influence the way of working. The authors believe that this can give a good visualization by putting it in a context. Figure 27 summarizes how the companies within the six identified industries have positioned themselves in relation to the influencing contextual factors that are evaluated in this study. Turnover is left out in the figures in this section due to the large difference between the investigated companies but is still considered in the analysis. The contextual factors can be parameters that are significant for different industries, and industries have different settings of these factors. One can argue that the companies in this study in general are similar in their characteristics, which can be expected due to the fact that this thesis is focused on large to medium-sized industry companies, excluding for instance start-ups and smaller companies which might have resulted in a larger spread.



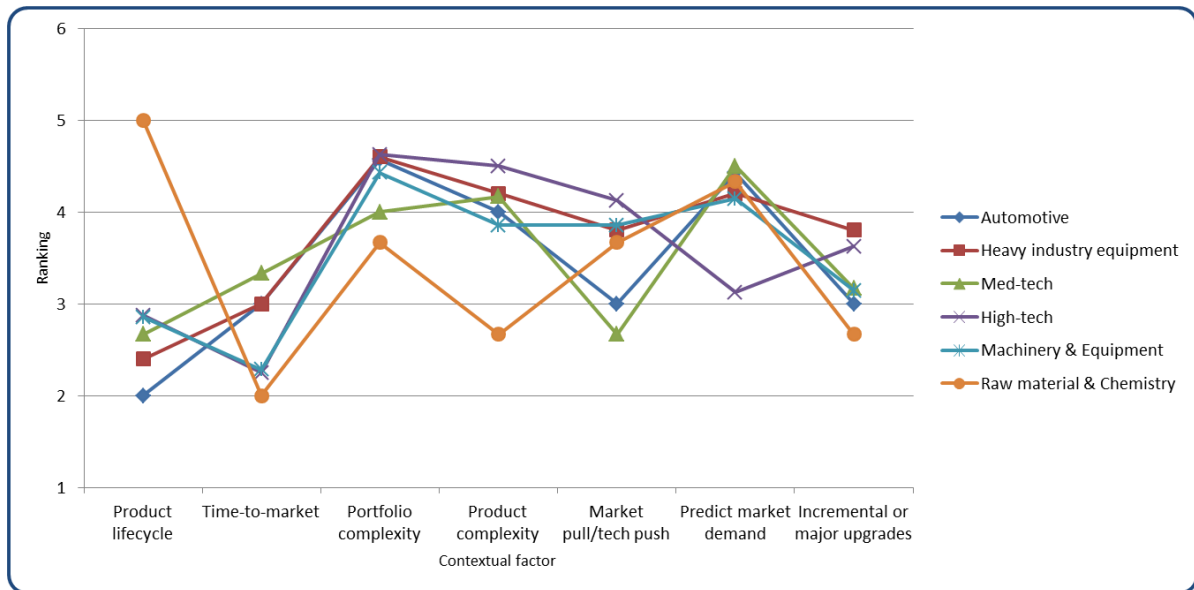


Figure 27: Differences between investigated industries in terms of the contextual factors used in this master's thesis

#### 5.2.4.1 Automotive

When comparing how companies within the automotive industry work with SPP to companies in other industries one can find that the companies within the automotive industry have in general longer planning horizon. As stated in section 5.2.1.3, a company's planning horizon tended to correlate with the length of the product lifecycle, time-to-market of the product, the product complexity, and the possibility to which it was possible to predict future market demand. If focusing only on the companies within the automotive industry the length of the product lifecycle do not seem to correlate to the same extent as when comparing all industries together. In this study the automotive industry actually has been identified to have the shortest product lifecycle on average. However the time-to-market, which is argued to have larger influence on the planning horizon, is the second longest for the automotive industry, only longer for companies in the med-tech industry and hence in line with the argument in previous section. The results are similar for the product complexity and the possibility to predict future market demand within the automotive industry, where the companies have ranked themselves of being in the high end of the range when comparing to other industries.

#### 5.2.4.2 Heavy industry equipment

Not many clear findings have been identified within the heavy industry equipment segment. This might be due to the fact that the companies within this industry do not create a homogeneous enough industry or it can just be that the companies within this industry tend to work in different ways from each other. What can be said though is that in general these companies tend to measure the result of their process by focusing on project related metrics rather than product oriented metrics.

On the contextual factors the industry is showing the highest degree of focusing on major upgrades when developing new products. It is also shown that it is possible to a high extent predict the future market demand. This can be said to be, together with some of the other industries in the study, an inert industry. In an inert industry, especially if the company is technology push oriented, it can be

argued that it has been possible to get a good result based on good engineering skills. This can be the reason for why companies tend to focus on project rather than product in many cases.

#### **5.2.4.3 Med-tech**

Companies within med-tech industry have been identified to have long planning horizons and ensuring the maximizations of commercial value of the product portfolio through financial calculations for specific projects. They are also identified to conducting the SPP process more frequent than other industries which in the case cannot fully be explained by the contextual factors used in this thesis. This because it was previously argued that the frequency were mostly influenced by if the company focus on incremental upgrades or major upgrades and the med-tech industry does not focus more on incremental upgrades than the other industries. This indicates that more than the contextual factors included in this thesis influence. This seems reasonable since not all factors that were identified actually were included in the study and maybe some factors that influence the SPP were not identified at all. The long planning horizon can be argued to relate to the long time-to-market that the companies within the med-tech industry are experiencing in comparison to other industries. It can be a valid finding since companies developing medicines in particular often have a thorough development process with substantial amount of testing taking place, together with governmental approvals that are often needed in order to get medicines onto the market. Apart from the long time-to-market the companies within med-tech industry have also given answers indicating a high amount of market pull orientation and to a high degree being able to predict the market demand in the near future.

#### **5.2.4.4 High-tech**

Within the high-tech industry it is, just like in the med-tech industry, most common to try to maximize the commercial value of the portfolio through financial calculations of specific projects. When evaluating the contextual factors for the companies in the high-tech industry it shows that these companies have ranked both their products and their product portfolio as the most complex out of all industries in the study. They have also to the largest extent considered themselves being technology push oriented, and having the lowest possibility to predict the future market demand out of the industries.

Another finding related to the high-tech industry which was identified through the interviews was the fact that the ROI of projects in many cases in this industry are generated over a relative short time period after product launch to a larger extent than within other industries. Because of this it is important to launch new products on time as well as conducting a successful project in order to have the product fully ready for delivery when launched.

#### **5.2.4.5 Machinery & Equipment**

Companies within the machinery and equipment industry have together with the raw material and chemistry industry shown the lowest frequency of their SPP process. The frequency was in section 5.2.1.2 shown to be related to if the companies' new products are mostly incremental upgrades or major upgrades. When evaluating the machinery and equipment industry however there is not the same correlation found. As previously mentioned this might be the case since the some factors have been excluded in the study. One can also argue that this might be due to a randomization due to limited sample size or merely that the same correlation cannot be found in this industry. However, since it was the frequency did not correspond with previous findings in the med-tech industry as well

one can suspect that the frequency is depending on another contextual factor not included in this study.

Within the machinery and equipment industry two other clear findings were identified, namely that a product management function is present and is the owner of the SPP process and that the companies within this industry tend to evaluate their portfolio based on the total portfolio rather than on individual products. To some extent these findings correlate to that in this industry segment there are, based on indications resulted from the interviews in this study, to a larger extent than within other industries in this study often large amount of complementary products and there is a need to coordinate the overall portfolio rather than evaluating the individual product. Companies consider developing and selling complementary products or system solutions to a larger extent, which results in that products need to be compatible with each other.

#### **5.2.4.6 Raw material & Chemistry**

As stated above, the raw material and chemistry industry has together with the companies in the machinery and equipment industry indicated the lowest frequency of their SPP process. The companies within this industry have also answered that they use the shortest planning horizon of the different industries and also tend to focus on evaluating individual products rather than the overall portfolio when evaluating the portfolio value. It is possible to argue that this industry to a larger extent than others is somewhat more focused on one major technology or product and do not need to align as much between different products. It might be the same raw material component used in different ways in order to develop variants of products. This can be enhanced by evaluating the contextual factors influencing the raw material and chemistry industry the most. This industry is characterized by having the highest degree of incremental upgrades compared to other industries, and also the lowest amount of complexity both in relation to the products and the product portfolio. In addition to this the industry has also identified the longest product lifecycles and the shortest time-to-market. The short time-to-market can be used as partially explain the short planning horizon that is experienced in the raw material and chemistry industry. If it is possible to quickly deliver a new product to the market the need for a long planning horizon is smaller.

### **5.3 Characteristics of high performing companies in strategic product planning**

This third section of the analysis includes an analysis of the findings from a performance based point-of-view. This is done by comparing the findings in relation to the six measures indicating companies' SPP performance which have been studied during the interviews, presented in section 2.5.1.

#### **5.3.1 Degree of change in plans from one year to another**

Contextual factors found to influence how much companies change their plans from one year to another are; possibility to predict market demand, portfolio complexity, time-to-market, and length of product lifecycle. Firstly, companies that have difficulties predicting the market demand five years into the future tend to change their plans more than those who can predict the market demand to a higher extent. This seems reasonable since the availability of accurate information is critical for making right assumptions about the future and hence set plans that do not have to be changed.

Secondly, companies with more complex product portfolios also tend to change their plans more from one year to another than other companies. The reason for this can be that it is believed that the more complex the portfolio is the harder and more complex the SPP work will be. Hence, with a

complex portfolio the likelihood of changes will increase since it is harder to plan and since more things can change.

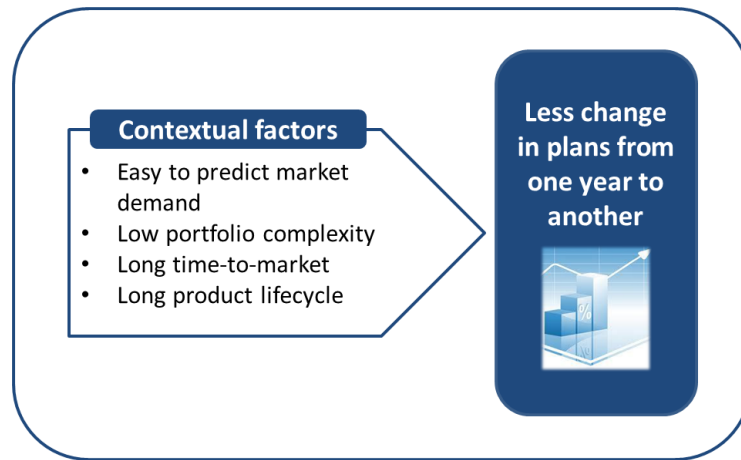


Figure 28: How contextual factors influence the degree of change in plans from one year to another

Thirdly, both time-to-market and length of product lifecycle influence how much companies change their plans in the way that shorter product lifecycle and time-to-market give more changes in the portfolio. With a shorter product lifecycle the likelihood that something will change to next year probably will increase and if the time-to-market is long, for instance three to four years as in the companies that have answered that they change quite little from year to year, it is reasonable that they do not change that much from one year to another.

In Figure 28 the contextual factors that according to this study influence to what degree companies change their plans from one year to another are highlighted.

When evaluating this measure no clear correlations between the degree of change in the plans and the companies' way of working were found. The authors believe that there might be correlations to be found and it might be a methodological issue concerning no such findings in this study. However, it is still argued that the indications are that the contextual factors may be influencing to a higher extent.

### 5.3.2 Accuracy of estimated launch dates

The most apparent correlation looking at to what extent different companies can keep given launch dates was that this was connected to if the company is market pull or technology push oriented. Companies with technology push orientation considered themselves to be better keeping given launch dates than companies with more market orientation. One reason for this can be that with market pull orientation the market requires a product and probably want it as soon as possible which can result in a need of fast delivery. However, it is not clear whether the R&D function actually can deliver what the market want in this stage. In the other case, in a company with more technology push orientation they start with what the R&D function actually can deliver and squeeze it into the market. With the latter approach it seems more likely that one can keep given launch dates. In addition, with market pull orientation the company becomes sensitive for changes in the market which can result in changes in products that are under development which can influence the delivery date.

The main finding trying to explain what distinguish companies in their way of working with SPP that are keeping launch dates to high extent from those who cannot is that companies that have a planning process owned by the R&D department is much worse in this matter than others. This might seem strange at the first glance thinking that R&D should keep its own deadlines. However, companies where R&D owns the SPP process are believed to have a somewhat more ad-hoc approach to SPP and in that way also lack cross-functional thinking. Hence, if the cross-functional thinking is not there it is likely that one function, for instance the R&D department, underestimate the effort needed by other departments which result in delays.

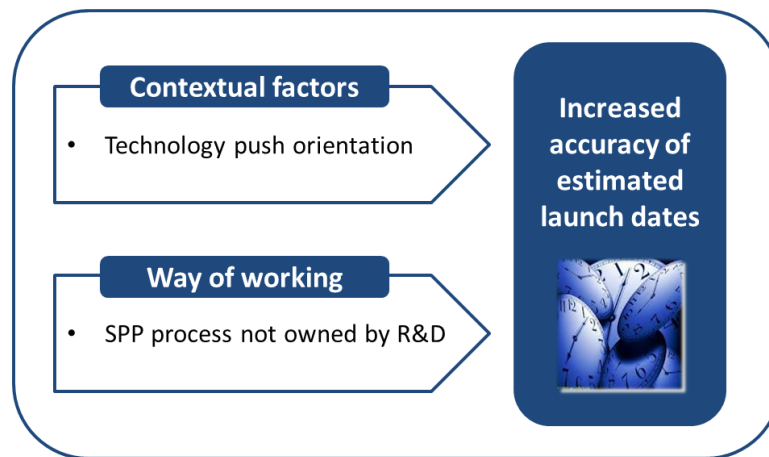


Figure 29: How contextual factors and way of working can increase the accuracy of estimated launch dates

The reason for why companies where R&D owns the process is believed to have a more ad-hoc approach to SPP is based on that these companies have scored lowest on estimation of product launch date, product cost, and perceived overall SPP performance. In addition, these companies also had almost lowest scores in estimation of project cost. Together this indicates that these companies lack cross-functional thinking and have less established methods and procedures.

Figure 29 is a summary of which contextual factors that influence the accuracy of estimated launch dates and how the way of working with SPP also can influence this.

### 5.3.3 Accuracy of estimated product cost

Looking at which contextual factors that influence the accuracy of estimated product cost it was found that companies with more technology push orientation perceived that they keep estimated cost targets for product to a higher extent than companies with market pull orientation. This can be explained in the same way as in the case of accuracy of estimated launch date described above.

Moreover, companies with no clear process for ensuring enough information from marketing and R&D also keep estimated product cost targets to lower extent than others. These companies also do not use any IT tools for information exchange. According to Leenders and Wierenga (2002) the use of IT tools can improve the alignment between functions. Supposing that companies with no clear process and no IT tools cannot ensure enough information as good as others this means that it seems reasonable that these companies cannot estimate product cost as good as others. This since unclear information in the process from different functions can influence the estimations since the product cost it set by many aspects covering different company functions.

It was shown in the study that companies with longer geographical distance perceived that they hold estimated cost to lower extent than companies with short geographical distance between marketing and R&D functions. According to Griffin and Hauser (1996) relocation and physical facilities design impact the alignment potential in organizations, i.e. with a longer geographical distance it is less likely that the alignment will be successful. As previously stated, the estimation of the product cost is a cross-functional activity which makes the alignment aspect important. Hence, this can be one reason for why companies with longer geographical distance not perform as high as other in estimation of product success.

Figure 30 is a summary of the above mentioned factor and ways of working that influence the accuracy of estimated product cost.

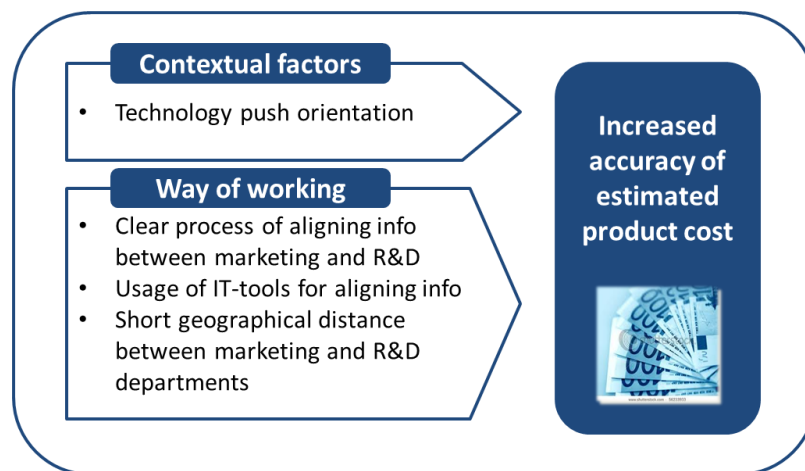


Figure 30: How contextual factors and way of working can increase the accuracy of estimated product costs

#### 5.3.4 Accuracy of estimated project cost

It became evident that companies with no clear process of aligning information between marketing and R&D functions in the SPP process keep project expenditure frames to a lower extent than other. This is in line with previous findings that better alignment between marketing and R&D functions can improve estimations of product cost and launch time. In the same way the project cost is a cross-functional issue including alignment with different departments. A development project does not only concern the R&D function, instead many functions have to be included, such as marketing and production. With a better alignment between the concerned functions the likelihood of making correct cost estimations for projects will increase. See Figure 31 for an illustration of the relation between way of working and estimation of project costs.

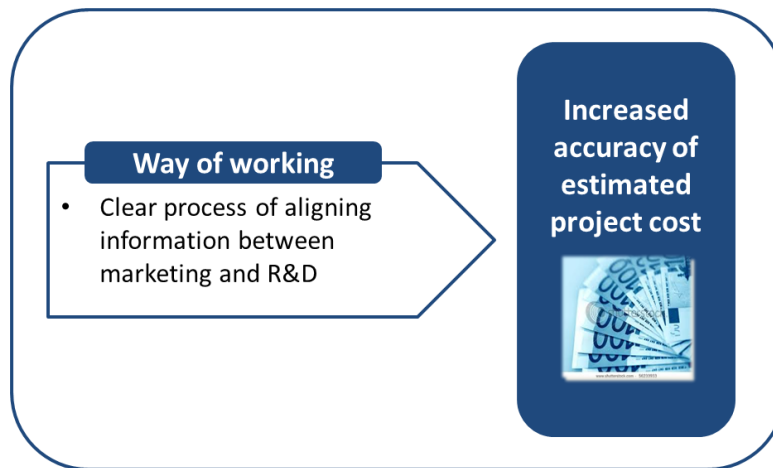


Figure 31: How contextual factors and way of working can increase the accuracy of estimated project costs

### 5.3.5 Perceived overall strategic product planning performance

Companies acting in an industry where the market demand is easy to predict five years from now had lower score on overall SPP performance than companies that thought it was hard to predict the market demand five years ahead. Also, companies with a more complex product portfolio also scored higher than those with less complex portfolio on overall SPP performance. Both these results can at the first glance seem strange since both these factors were believed to obstruct the SPP process. However, the companies scored their overall performance by thinking of the processes in place and not how good the actual output from the process is. This since the output is really hard to measure. Therefore having good processes in this study means having a high overall performance in SPP. Thinking of this the correlation with market demand and product portfolio complexity seems more accurate. This because these contextual factors make it harder to work with SPP and therefore companies with problem predicting the market demand and a complex portfolio have been forced to implement processes in order to be able to handle these challenges.

Another clear trend is that company turnover corresponds with perceived overall SPP performance. Companies with high turnover perceive themselves performing better than companies with low turnover. This is probably connected to that the respondents have answered this question with the processes and methods that are in place in the company and not the performance of the output of the planning process. This means that companies with higher turnover perceive themselves as better since they have more structures and established methods in place as also where previously discussed in the analysis.

The authors have identified that companies who perceived themselves as high performing in SPP in general have more structured and clear processes than others. In order to illustrate this, examples of the SPP process steps from two companies with high score on overall SPP performance is described below. One company started with information and knowledge gathering, where the company has a separate market intelligence department that collects information and forecasts about the market, customers, trends etc. Next step in this process is a brainstorming phase where all potential products and projects are presented. Then a cross-functional team performs a screening where the potential products and projects are evaluated and prioritized by the planning team with input from other functions in order to take away the least profitable ones. This step is repeated a number of times until the number of products and projects are limited. Finally, the new products are mapped against



the existing product portfolio in order to add or subtract products from the portfolio. This process takes six-seven months and is continuously aligned with top management. Figure 32 illustrates this example.

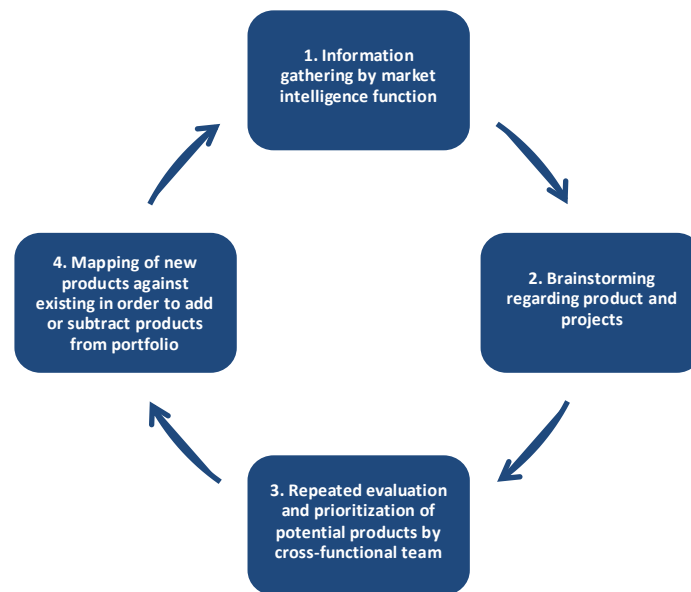


Figure 32: An example from the industry of how the SPP process can look like

Another company's process is structured in such a way that it starts 6-9 month before the plan should be ready. The first step is to contact all sales offices in different regions. The regions create a list with the most important requirements from the customers, and on the largest trends etc. Then these requests are consolidated. A formal request is sent to the regions and which prioritize issues regarding the product portfolio. Then discussions are held and different business units prioritize their projects and products. R&D supports this process by giving information about if this is possible to develop and how much resources are needed. The final decision is taken by top management.

Companies with lower scores on overall SPP performance answered that they do not have any clear process in place. For instance, one company answered that no process is in place for the portfolio, only for separate new product development projects.

Moreover, companies with a planning process owned by the function product planning had the highest score on overall SPP performance. This seems logic since, as discussed before, the SPP performance concerns the processes that is in place. It is reasonable that companies with a separate functions handling only product planning also have proper and well established methods for SPP. However, this does not mean that the output from the planning process is better than the output from others which is shown when comparing the other performance measures studied in this thesis. Companies with a product planning function only have average scores in how well they estimate launch dates, product costs, and projects costs.

Companies with the highest scores on overall SPP performance also use an extended product roadmap, which is the most comprehensive plan identified in the study. In the same way as in previous paragraph one can argue that this is because if you have a more comprehensive plan you take more aspects into consideration in a structure manner and in that way perceive that you are better than if you do not have this.



Moreover, in the work of aligning marketing and R&D functions companies with that have no clear process and do not use any IT tools for information exchange have a lower score of overall SPP performance than others. As stated before, the use of IT tools can improve the alignment between functions (Leenders & Wierenga, 2002). Since alignment is a critical issue in SPP it is logic that companies that do not use this have a lower overall performance in SPP.

Another characteristic of companies that perceived themselves as high performing in SPP was that they have a more distinct approach to how they ensure that their product portfolio is aligned with the overall business strategy. These companies scored higher on overall SPP performance than companies that answered that they just consider this but do not have any specific method to ensure the alignment with business strategy. Companies that use a top-down approach when creating the plan where they start with the business strategy had the highest scores on overall SPP performance.

Finally, companies that tend to focus on products and not projects when measuring the performance and efficiency of the SPP process scored higher on overall SPP performance. Companies that measure the success and accuracy of products scored higher than companies measure the success and accuracy of projects. This also seems reasonable since SPP is about more than just specific projects. Looking at how successful and accurate the products are instead of the projects is a wider approach that can cover more aspects of SPP since SPP is more about how well the products perform and not how a single projects perform.

In total one can say that companies that perceived themselves as high performing in SPP seem to have more established methods and focus more on SPP than companies with low performance. However, it is unknown whether or not the established methods and investments in SPP really pay off. One can argue that companies tend to think that “more is merrier”. An example of this the case of companies having a separate function only focusing on product planning not score higher on measures such as accuracy of launch dates, product cost, and project cost. However, as have been seen these aspects are not only depending on methods and how the companies work but also on contextual factors that the companies have limited possibility to influence.

Figure 33 summaries which contextual factors that influence and what ways of working of working that is preferable to increase the perceived overall SPP performance.

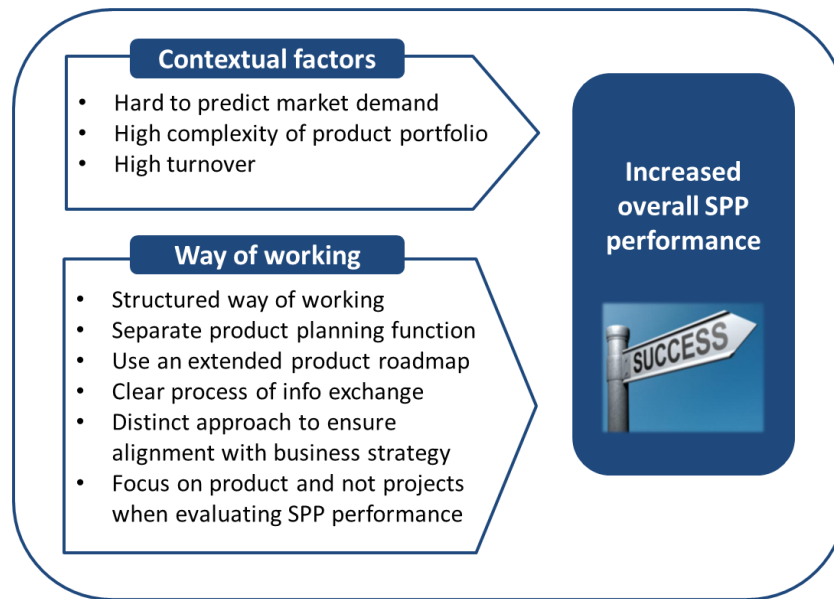


Figure 33: Contextual factors and way of working can influence the perceived overall performance of SPP

### 5.3.6 Profit margin

No clear trends have been identified looking at how contextual factors and way of working with SPP influence the profit margin. The reason for this might be that there are too many other aspects that influence the profit margin in addition to SPP issues. In addition, the large differences of the investigated companies' profit margin have made it hard for the authors to find true correlations. One can argue that outliers could have been removed in order to get around this problem but then the sample size would have been too small to draw any conclusions. Since the profit margin can be seen as an overall performance measure the other SPP related performance metrics were checked against the profit margin as well. However, this did not result in any clear trends either.

## 6 Conclusions and discussion

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*This chapter aims to outline the conclusions from the study. First the research questions will be answered and some additional conclusions will be specified. The chapter also includes a discussion regarding limitations and further research.*

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### 6.1 Conclusions based on the findings related to the research questions

In this master's thesis an initial mapping of how Nordic-based large to medium sized companies work with SPP has been carried out. It has been shown that this phenomenon consists of mainly three areas; organizations of the SPP process, alignment between marketing and R&D functions, and product portfolio evaluation. The authors of the master's thesis argue that SPP must exist in companies, meaning that all companies have to come up with what their product portfolio should consist of. Based on the results it is evident that SPP vary between companies but the results also show that all of the three main areas included in this study are relevant and that these constitute the foundation of SPP. It is possible that SPP also constitutes of other areas than the three evaluated in this study and that the SPP will be different if studying other types of companies, such as start-ups with a strong customer orientation. The process might then start with the market planning and the SPP and R&D planning is carried out based on the result from the market planning. This means that the alignment between marketing and R&D functions will be different from the companies that have been investigated in this study. The organization of the SPP process might also in this case be different where marketing has a higher degree of power. The portfolio evaluation can also be carried out based on different parameters in this type of company.

#### 6.1.1 Research question 1

What has been evident is that one can divide the comparison of the SPP process carried out by companies into two different levels. It is shown that on the highest level the companies are somewhat similar in the sense that they all tend to conduct the essentials of SPP, being to plan for the future product portfolio. Some companies have very well-defined processes while others have less defined processes. In both these cases the planning still takes place. However on a lower, more detailed level the conclusion is that the processes taking place in companies are structured and carried out very differently. There are, as stated, companies who have very structured and documented guidelines and processes for how the planning should take place, while other companies tend to carry out the planning somewhat more ad-hoc, based on the individuals within the organization. These different ways of working show that there are many possible ways of setting up an organization while still being profitable.

If trying to come up with the general conclusion about how companies conduct SPP it is done using an annual planning cycle, and R&D are almost without exceptions involved in the planning while a marketing or sales function represents the market/business side of the company. A product management function is often also present within companies and this function is generally the owner of the process, which was expected since this function can be seen to lie between R&D and marketing function. The planning process often results in a visual product roadmap, which is only a schematic view of future product launches or a complete business case summarizing all business aspects of the product portfolio. In addition, it can be concluded that, in general it is difficult to evaluate the planning performance since this cannot be seen as an isolated process. However, the companies that evaluated their planning performance tend to either rely on measurements

connected to project performance or product performance, and it is argued that a combination of these approaches can be appropriate to use.

### **6.1.2 Research question 2**

The part of SPP concerning how companies align themselves in order to fulfill the market demand, while using the R&D capabilities, concludes that it is most often the responsibility of a separate function within companies, such as product management or product planning, to ensure that both of these somewhat contradicting aspects are taken into consideration. Quite frequently all company functions are involved in a cross-functional planning team responsible for ensuring the functions' best interests. It can be argued that the choice of alignment approach depends upon the alignment needed and the companies need to evaluate how much alignment is preferable since additional alignment does not always add value but can instead in some cases decrease the efficiency. The IT tools that are used for communication are often simple tools, with Microsoft Office being the most frequent IT tool.

### **6.1.3 Research question 3**

When examining how companies evaluate their product portfolio the conclusion is that the companies tend not to necessarily have a clear process for portfolio optimization, but to evaluate the product portfolio based on financial parameters, strategic fit, and customer or market oriented parameters. The companies tend to ensure the commercial value of their portfolios based on financial calculations for individual projects, while the balancing of different types of products in the overall portfolio is considered but there is no formal process or method. Finally companies make sure that the portfolio is aligned with the company's business strategy using a steering group or a top-down planning approach, where the overall strategy and business plan is the basis for the SPP. The different approaches used by companies regarding portfolio evaluation differs from what the literature argues is preferable, this theory states that the large focus on financial parameters is sometimes dangerous and that companies should focus on the portfolio rather than on individual projects or products. It is also evident that companies tend to focus on adding new products in the evaluation of the product portfolio and sometimes forget to include existing products in this analysis.

### **6.1.4 Research question 4**

When comparing the differences in way-of-working of the companies in this study this has been done using the eight contextual factors. Based on these factors, the most evident conclusions to be drawn are: the way companies organize their SPP process is much depending on the time-to-market of its products, the company turnover, the product complexity, and the degree to which it is possible to predict the future market demand. How the companies align their customer demand with their R&D capabilities mostly relates to the complexity of the products and the product portfolio, the company turnover, and whether the company is market pull or technology push oriented. How companies tend to perform an evaluation of the product portfolio relates to the complexity of the product portfolio, and what type of products the portfolio consists of. What type of products the portfolio consists of is decided by product complexity and if the upgrades are incremental or major. In addition to this, the portfolio evaluation is also decided based on if the company is market pull or technology push oriented.

### **6.1.5 Research question 5**

There are three, distinguished main measures when concluding characteristics that companies possess demonstrating a SPP high performance. The first one studied in this thesis is the degree to

which companies tend to change their plans over time. This is concluded to mostly relate to the contextual factors rather than the way in which companies are working. Not surprisingly the companies who are characterized by the ability to predict the future market demand, and a lower level of portfolio complexity, together with a longer time-to-market and product lifecycle state that they to a lower extent change their set plans.

The second measure is actually a set of measures relating to the accuracy of product and project estimations set in the plans. Companies that to a larger extent are keeping given launch dates, product costs, and project costs are characterized by the contextual factor of being technology push oriented. However the accuracy of the estimates seem to be somewhat lowered when R&D is the owner of the planning process. Regarding the way in which companies are working, the clearest correlation with the accuracy of estimations is related to having a clear way of aligning marketing and R&D functions. In addition to having this clear alignment process is also the usage of IT tools for communication which is higher within companies keeping estimates.

The third and final measure is the ranking that the companies have done of their own perceived overall SPP performance. The companies that stated to have a higher overall SPP performance were all influenced by the contextual factors high turnover, high complexity of product portfolios, and the fact that it is difficult to predict future market demand. The companies tend to have structured and clear processes, with a standardized way of ensuring information. They also often have an extended product roadmap stating the future product portfolio. The overall conclusion related to this measure is that the companies which have a higher overall SPP performance are the ones that have a set of contextual factors which creates a need for a higher degree of planning and formalization. High turnover, complexity and uncertainty are all argued to be prerequisites which make the planning essential to a higher extent. This is reflected in the processes in place, which are structured and formal to a higher extent.

## **6.2 Concluding discussion**

In addition to the fore mentioned conclusions, which answer the research questions in this thesis, some further conclusions have been made throughout the study. The following conclusions are argued to be more connected to the analysis of the result rather than the empirical result.

It became very clear throughout the interviews that the topic SPP is much highlighted within companies today. More emphasis and resources are put into improving the strategic planning process for future products than what has been done historically. Many interviewees have indicated that they are currently re-organizing and improving their SPP process. The type of companies involved in this study, large to medium-size industry companies can be argued to historically have been somewhat inert, and it has been possible to rely upon engineering skills rather than a well-functioning SPP. However, this is changing when moving towards a more dynamic, faster changing industry set-up where companies need to plan future scenarios to a much larger extent. Due to this there is also an opportunity for interesting further research to take place regarding SPP, which is more discussed in section 6.5 in this thesis.

One can ask if it is essential to have a well-structured and clear SPP process in place, or if it is not necessary to put more effort into than needed. In this thesis the performance related to SPP that the companies have indicated has been mapped against the average profitability of the companies during the past years. This has however not shown any clear correlation. Neither has any correlations

to profitability been found with the way companies work. Therefore it is needed to ask if the SPP has no impact on the companies' profitability. One can argue that so many more factors than SPP are involved in the creation of profit for a company and it is difficult to evaluate the isolated SPP process and its impact. Manufacturing and all other operations taking place play such a significant role that they are adding up with the initial strategy creation and SPP process in order to determine the success of a firm. However the other financial measurement evaluated in this study, namely turnover, tends to strongly correlate with how companies organize their SPP process. Larger companies with higher turnover have in general a higher degree of formal processes and methods in place. The correlation with turnover is also reflected when comparing how the companies have ranked their own performance in SPP. There is a strong correlation showing that companies with higher turnover rank their own performance higher than companies with lower turnover. The conclusion related to this is that the larger the companies are the larger the need is for a well-defined and formal process. This is argued to be valid for processes other than SPP also.

Another conclusion that can be drawn from the study is that it is in general difficult to measure the performance of the SPP process. Many argue that if it is not possible to measure the performance it is not possible to control it. At the same time many of the companies argue that they do not really have sufficient measures of their own performance. Many companies have stated that they have identified a more structured and measured process as one of the main improvement potential in their own organizations.

### 6.3 Use cases of strategic product planning

The authors of this master's thesis argue that in order to describe how SPP is carried out in Nordic-based large to medium sized industrial companies, based on the findings in this study, this should be done based on the degree of formality in companies' SPP processes. Therefore three use cases have been identified, see Figure 34, built upon the level of formality of processes:

- **Case one:** High degree of formal processes that reflects the actions and activities in the company.
- **Case two:** Formal process in place with somewhat ad-hoc activities around the formal processes.
- **Case three:** Informal processes that are carried out on a day-to-day basis.

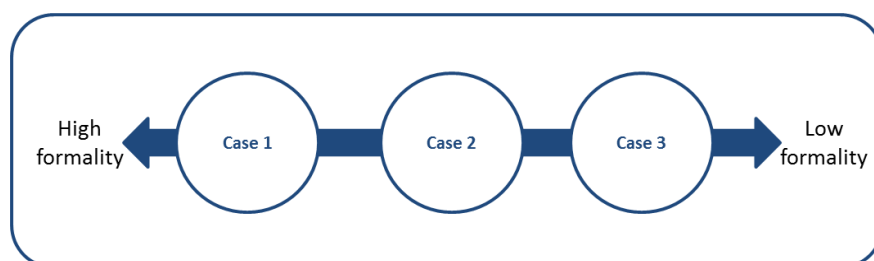


Figure 34: Three identified use cases from this study

The first use case includes companies that have many stated processes in place which is also reflected in their day-to-day work. The stated processes work as a framework for how the daily activities should be carried out during for instance one year. In general these companies also use

more tools and methods for different processes, both tools and methods that the company has established themselves but also tools and methods which are treated in the literature. The level of formality in these companies is high, and processes and responsibilities are clearly stated. In several cases these companies have a separate product planning functions dedicated to this type of planning. Two examples of processes from use case 1 companies were presented in 5.3.5.

The second use case includes companies that have basic formal processes in place but the activities around these formal processes are much more ad-hoc than in the first case. Typically, these companies have a meeting, often once a year, that is the basis for the planning and many times also constitutes the planning. The rest of the year a more ad-hoc approach is used in order to collect the relevant information needed for the yearly meeting. These companies also use tools and established methods for different issues to a lower extent than in case one, but still have some tools in place. Since the formal processes are not reflected in the daily work the actions that are carried out during the year is dependent on the initiative of individual employees. Hence these actions can be impacted by the individual employees' time, engagement, and knowledge in the field.

The third use case consists of companies that do not have any formal processes in place and handle the SPP related issues on a day-to-day basis. These companies often indirectly consider aspects of SPP but do not have any formal processes stated for this and also use limited amount of methods and tools to support the planning. The overall level of formality concerning the SPP process within these companies is argued to be low. Hence these companies are totally dependent on individual employees' ability to take own initiatives and evaluated critical issues. At the end of the day, these companies also work in some way or another with SPP since all companies have to decide what their product portfolio should consist of. However, the decision meetings regarding the portfolio is not stated and these issues might instead be treated at other meetings or in the office corridor.

It is of interest to see what characterizes the companies that are included in the different cases. The most evident trend that the authors have identified is as the size of a company increases, as does the formality of SPP processes. This seems logical since larger companies often need more structured processes in order to be able to coordinate people, products, projects etc. An additional finding here is that companies that are very customer driven have a lower degree of formality. These companies have often answered that the customers almost decide how their product portfolio should look and in this way the companies have argued that they do not necessarily have the need for extensive SPP processes. The most common approach in this study is use case 2 where approximately 50 % of the companies lie. The reason for this is that the most common approach is not totally clear from the study. However, the authors believe that companies that fit under case two have in some way tried to move from low formality to high. This has not resulted in many differences in how they actually work with SPP on a daily basis since the work around the formal processes is still treated more ad-hoc. These companies might not have realized the real benefit of SPP and how it can be used to improve the performance of the company and therefore not have been able to take it one step further.

It is difficult to state which approach is best suitable between the three use cases since the relation between these three cases and SPP performance have not been fully straightened out. However, the authors think that even if the correlation between the different cases and the performance would exist it would be hard to draw any general recommendations since most companies are very

different from each other. For instance, moving towards high formality can give one company a necessary structure for how they should work with SPP and in that way help them to carry out important tasks, yet for another company this movement can result in unnecessary formality and bureaucracy.

#### **6.4 Research limitations**

One major question is how applicable the results in this study really are to other companies than the ones that have been included in the study. In relation to this important issue is that the results are not statistically certain. This was not the purpose of the study since it would have required a larger sample size, as well as not being possible to have as comprehensive interviews that were used in this study due to the time constraints. The aim was instead to give indications of how the targeted companies work with SPP and which contextual factors influence the planning in order to give both companies and academia guidance in SPP. For companies these indications can give ideas of how other companies are working and also explain why other companies might conduct SPP differently. For academia this study can give indications of what can be studied in the future regarding SPP, see more about this in section 6.5. This also means that it should not be used in order to state how companies work with SPP, even if the study gives trustworthy indications of how Nordic-based large to medium sized industrial companies work with SPP today.

Another issue that is both connected to the result and method concerns that companies have mainly been asked about their usage of formal processes. The use of a formal process does not necessary mean that more activities are carried out. This can be seen as a limitation of the research and an aspect that lower the value of the result from this thesis. However, the authors believe that it can be much more complicated to investigate activities in a master's thesis rather than asking about formal processes. In order to investigate activities more time is needed at every company to find what activities that are really carried out. To just ask about a specific activity can be perceived as more unclear and the authors believe that more subjective answers might follow from such question. Asking about which formal processes the company has in place makes it harder for the respondent to build subjectivity into the answers.

#### **6.5 Further research on strategic product planning**

This master's thesis has given academia new knowledge mainly in two new areas. Firstly, how the organization of SPP can be carried out in companies. This is not described in theory today. The other main area concerns the alignment between marketing and R&D where the literature today to some extent fails to really described how this can be done at the level of SPP. In addition to these two areas this master's thesis has given a comparison of how much of the knowledge from the existing literature regarding product portfolio evaluation that is used in Nordic-based large to medium sized companies today. However, the field of SPP is broad and more research is needed and a discussion regarding further research will be provided below.

First of all, portfolio evaluation is comprehensively covered today with different concepts such as portfolio management, portfolio planning, and portfolio matrices with authors such as Cooper R., Patterson M., and Kahn K.

For the alignment of market demand and R&D capabilities literature also exist with authors as Ernst H., Soll J.H., Griffin A., Hauser J. R., Wheelwright S. C., and Clark K. B. among many others. However,



the literature regarding the alignment between marketing and R&D could be more focused on SPP, i.e. the alignment between these functions in an earlier stage of the product generations process and on a more strategic level than is often the case in the literature today. The literature today tends to focus on this alignment in the product development process, but lack focus in the strategic planning process. Also, the existing literature that have been studied tends to focus more on highlighting that this issue is important, and argues around this, rather than covering more concrete actions and different approaches of how companies can actually do this in different situations as well as pros and cons with different alignment approaches.

However, the main area that is argued to not be covered in the literature today is what has been referred to as the organization of the SPP process, which in this thesis covers more or less how the planning is done, with the exception of the portfolio evaluation and alignment between marketing and R&D. This means, as described earlier, process steps, process output, planning horizon, and which functions that are included in the planning. These areas are not clear in today's literature. The authors of this thesis have in the literature review studied adjacent concepts and topics in these cases, such as what planning horizon that can be used in strategic planning. In some cases, as for the different process step in SPP the authors have not found any relevant literature to be studied.

The authors believe that companies can benefit from having literature that can give guidance regarding how SPP can be done. It is of course impossible to find any right or wrong approaches since companies have different needs. However, if it would be possible to map alternatives and approaches, such as what different process steps can be as well as pros and cons with different planning horizons, this is believed to have been useful for many companies.

Another important issue when building this theory will be to study how to measure the performance of the SPP process. The authors have understood during the thesis that this is a difficult task and needs to be exploited more. This is important since the performance can be a critical part when evaluating different approaches to SPP and map the pros and cons with different ways of working.

Moreover, the authors have not found much literature regarding which contextual factors influence SPP, how they influence SPP and why they influence SPP. Other contextual factors need to be studied as well since not all of them could be included in this research. It is also important to map why these contextual factors really influence the planning, and not only how this influences.

Finally, other industries and regions of the world need to be studied. This thesis only covers some industries in the Nordic region. Even if different industries have been studied, the authors have argued that they have quite similar characteristics if comparing with start-up companies or fast moving IT-companies. This study mainly covers Swedish companies and it is possible that companies from other parts of the world have totally different SPP processes.

The thesis is a first step towards building new theory that explains how SPP can work in companies and which factors influence the planning. However, it has only given indications and therefore more research is needed in order to more comprehensively map how SPP works in companies today. For instance statistical investigations need to be done in order to be certain that the findings/indications from this master's thesis really are valid. Based on the above discussion the authors think that academia needs to focus on four aspects in order to improve the literature on SPP:

1. More research mainly on the organization of SPP but also on how alignment between marketing and R&D can be done at the level of SPP.
2. Mapping of how the performance of the SPP process can be measured in order to be able to conclude if different approaches work or not.
3. Investigation of more contextual factors that can influence the planning and also describe how and why these contextual factors influence SPP.
4. Expand the research to include other industries and regions of the world as well in order to fully map the situation.

## List of references

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### Literature references

- Acur, N., Kandemir, D., Boer, H. (2012) Strategic Alignment and New Product Development: Drivers and Performance Effects., *Journal of Product Innovation Management*, Vol. 29, pp. 304–318.
- Alam, I. (2005) Interacting with customer in the new product development process. In: Kahn, K. (red.), *PDMA handbook of new product development* (2<sup>nd</sup> edition) (p. 46-58). New Jersey: John Wiley & sons.
- Albright, R., Kappel, T. (2003) Roadmapping in the corporation, *Research technology management*, 46, 2, 31-40.
- Björklund, M. & Paulsson, U. (2003) *Seminarieboken – att skriva presentera och opponera*. Lund: Studentlitteratur.
- Brettel, M., Heinemann, F., Engelen, A. & Neubauer, S. (2011) Cross-Functional Integration of R&D, Marketing, and Manufacturing in Radical and Incremental Product Innovations and Its Effects on Project Effectiveness and Efficiency. *Journal of Product Innovation Management*, 28, 251-269.
- Bryman, A. and Bell, E. (2007) *Business research methods* (2<sup>nd</sup> edition). Oxford: Oxford University Press.
- Cepeda G., and Martin, D. (2005) *A Review of Case Studies Publishing in Management Decision 2003-2004: Guides and Criteria for Achieving Quality in Qualitative Research*. *Management Decision*, Vol. 43, No. 6, 851-876.
- Christensen, C., Kaufman, S., and Shih, W. (2008) Innovation killers – How financial tools destroy your capacity to do new things, *Harvard Business Review* , 86(1): 98-105.
- Cooper, R.G. and Kleinschmidt, E.J. (1995) Benchmarking the firm's critical success factors in new product development., *Journal of Product Innovation Management*, Vol. 12, pp. 374-391.
- Cooper, R., Edgett, S. (2007) *Portfolio management for new products-picking the winners*, reference paper No. 11, Product development institute Inc.
- Cooper, R. G. (2005) *Product leadership: pathways to profitable innovation* (2<sup>nd</sup> edition). New York: Basic Books
- Cooper, R., Edgett, S., Kleinschmidt, E. (2001) Portfolio management for new product development: results of an industry practices study. *R&D management* Vol. 31, No. 4, 361-380.
- Cooper, R.G., Edgett, S.J. & Kleinschmidt, E.J. (2001) *Portfolio Management for New Products* (2<sup>nd</sup> edition). Cambridge, Mass: Perseus Books.
- Cooper, R.G. (1984) .The strategy-performance link in product innovation., *R&D Management*, Vol. 14, pp. 247-259.

Crawford, C. M. & Di Benedetto, C. A. (2000) *New products management* (6<sup>th</sup> edition). United States of America: McGraw-Hill Higher Education.

Denscombe, M. (2009) *Forskningshandboken* (2<sup>nd</sup> edition). Lund: Studentlitteratur.

Ernst, H. (2002) Success factors of new product development: a review of the empirical literature., *International Journal of Management Reviews*, Vol. 4, pp. 1-40.

Ernst, H. and Soll, J.H. (2003) An integrated portfolio approach to support market-oriented R&D planning., *Int. J. Technology Management*, Vol. 26, Nos. 5/6, pp. 540-560.

Friend, G., Zehle, S. (2009) *Business planning: guide to business planning*. London: Profile books.

Griffin, A. & Hauser, J. R. (1996) Integrating R&D and Marketing: A Review and Analysis of the Literature. *Journal of Product Innovation Management*, 13, 191-215.

Griffin, A. and Hauser, J.R. (1992) Patterns of communication among marketing, engineering, and manufacturing. A comparison between two product teams., *Management Science*, Vol. 38, pp. 360-373.

Haynes, S., Richard, D., & Kubany, E. (1995) *Content Validity in Psychological Assessment: A Functional Approach to Concepts and Methods*. American Psychological Association, Vol. 7, No. 3, 238-247.

Holland, S., Gaston, K. and Gomes, J. (2000) Critical success factors for cross-functional teamwork in new product development., *International Journal of Management Reviews*, Vol. 2, pp. 231-260.

Kahn, K., B. (2001) *Product planning essentials*. Thousand Oaks: Sage Publications, Inc.

Kahn, K., (2011) *Product planning essentials* (2<sup>nd</sup> edition). New York: M.E. Sharpe.

Kahn, K. B. (editor) (2005) *The PDMA handbook of new product development* (2<sup>nd</sup> ed.). Hoboken, New Jersey: John Wiley & Sons.

Karlsson, M. (2004) *Organizing Technology Planning – A contingent approach*. Gothenburg: Department of Operations Management and Work Organization, Chalmers University of Technology.

Kotler, P. (1984) *Marketing Management Analysis, Planning and Control*. Englewood Cliffs: Prentice Hall.

Leenders, M. A. A. M. & Wierenga, B. (2002) The effectiveness of different mechanisms for integrating marketing and R&D. *The Journal of Product Innovation Management*, 19, 305-317.

Muller, G. (2011) Roadmapping, Buskerud University College, Eindhoven.

Neely, A., Gregory, M. & Platts, K. (2005) Performance measurement system design: A literature review and research agenda. *International Journal of Operations & Production Management*, 25, 12, 1228-1263.

- Olsen, N., Olsen, E., Olsen, H. (2004) *Strategic Planning Made Easy—A Practical Guide to Growth and Profitability*. M3 planning, Reno.
- Patterson, M. (2005) New product portfolio planning and management. In: Kahn, K. (red.), *PDMA handbook of new product development* (2<sup>nd</sup> edition) (p. 46-58). New Jersey: John Wiley & sons.
- Phaal, R., Simonse, L., Ouden, E. (2008), Next generation roadmapping for innovation planning, *Int. J. Technology Intelligence and Planning*, 4, 2, 135-152.
- Rogers, E. (1995) *The diffusion of innovation*. New York: Free press.
- Roussel, P., Saad, K., Erickson, T. (1991) *Third generation R&D: managing the link to corporate strategy*. Arthur D. Little Inc.
- Scandura, T. A. and Williams, E. A. (2000) Research Methodology in Management: Current Trends, Practices and Implications for Future Research. *The Academy of Management Journal*, 43, 6, 1248-1264.
- Scott, W. G., Mitchell, T. R. & Birnbaum, P. H. (1981) *Organizational theory: A structural and behavioral analysis*. Homewood, IL: Irwin.
- Shrader, C. B., Taylor, L. & Dalton, D. R. (1984) Strategic planning and organizational performance: A critical appraisal. *Journal of Management*, 10, 2, 149-171.
- Slack, N. (1991) *The Manufacturing Advantage: Achieving Competitive Manufacturing Operations*. London: Mercury.
- Smith, P. (2005) Accelerate product development: techniques and traps. In: Kahn, K. (red.), *PDMA handbook of new product development* (2<sup>nd</sup> edition) (p. 46-58). New Jersey: John Wiley & sons
- Souder, W.E., Buisson, D. and Garrett, T. (1997) Success through customer-driven new product development: a comparison of US and New Zealand small entrepreneurial high technology firms., *Journal of Product Innovation Management*, Vol. 14, pp. 459-472.
- Srivastava, R., Prakash, A. 2011, *Growth-Share Matrix as a Tool for Portfolio Planning: Evidence from the Indian Telecommunication Services Industry*, *IUP Journal of business strategy*, 8, 2, 22-33.
- Stark, J. (2011) *Product lifecycle management – 21<sup>st</sup> century paradigm for realization* (2<sup>nd</sup> edition). London: Springer.
- Steiner, G., 1979 *Strategic planning: what every manager must know*. New York: The free press.
- Swann, P. (2009) *The economics of innovation: An introduction*. Edward Elgar publishing ltd,
- Trott, P. (2002) *Innovation management and new product development* (2<sup>nd</sup> edition). Harlow: Pearson Education Limited.
- Trott, P. (2008) *Innovation management and new product development* (4<sup>th</sup> edition). Harlow: Pearson Education Limited.

Verganti, R. (1999) Planned Flexibility: Linking Anticipation and Reaction in Product Development Projects. *Journal of Product Innovation Management*, 16, 363-376.

Vesey, J. (1992). Time-to-market: Put speed in product development. *Industrial marketing management*, 21, 151-158.

Wheelwright, S. C. & Clark, K. B. (1992) *Revolutionizing product development: quantum leaps in speed, efficiency, and quality*. New York: The Free Press.

### **Internet references**

Bradford, R., (2011) Strategic planning horizon: How far should you plan? Center for simplified strategic planning. Available at Internet: <http://www.cssp.com/strategicplanning/blog/?p=900>, [2011-05-02]

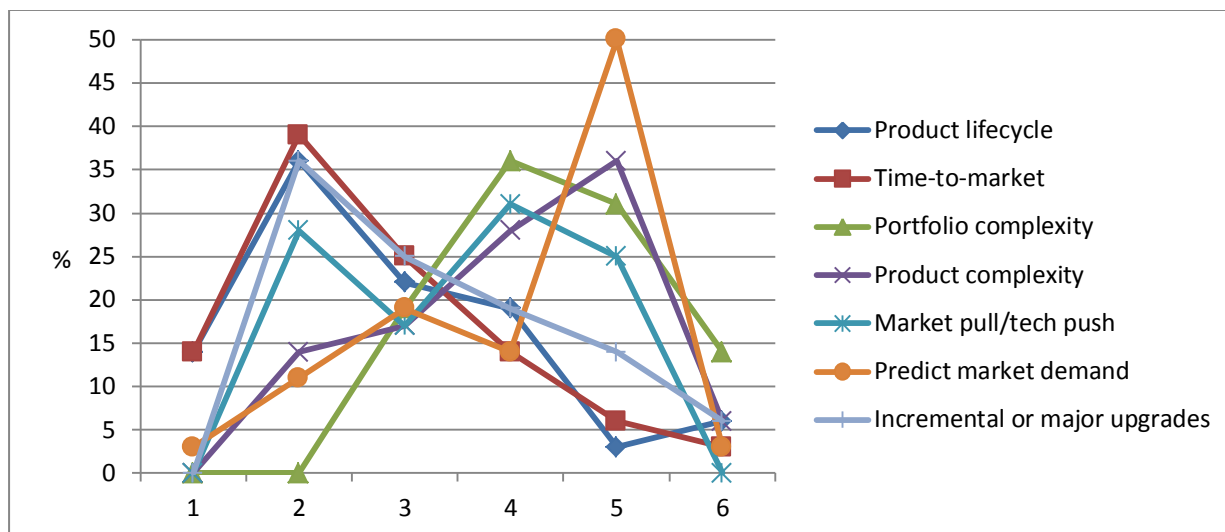
ISEA (2012) Available at Internet: <http://www.iseasweden.com/>, [2012-05-01]

Triathlon (2012) Available at Internet: <http://www.triathlon.se/>, [2012-02-20]

## Appendix

### Appendix 1: Contextual factors influencing strategic product planning

The chart below shows how the companies have responded and classified themselves in perspective of seven different factors which are believed to influence the planning process.



## Appendix 2: Interview template for semi-structured telephone interviews

Company	Business unit	Interviewee	Interviewee's position	Answer representation

### Industry and company characteristics influencing strategic product planning

This section aims at evaluating how contextual factors affect the strategic product planning in companies. The aim is to map where your company is positioned in terms of these factors.

Q 1	Approximately, what is the length of the lifecycle of your products (from launch to end of production, including smaller face-lifts, excluding aftermarket and support)?

Q 2	Approximately, what is the time-to-market for your products (from product development project start to market launch, not including pre-research)?

Q 3	Compared to other industry companies, how complex is your product portfolio in terms of number of products and amount of shared components between products?						
Very simple	1	2	3	4	5	6	Very complex

Q 4	Compared to other industry companies, how complex are your products in terms of product technology and number of components?						
Very simple	1	2	3	4	5	6	Very complex

Q 5	Do you regard your company as market pull oriented or technology push oriented?						
Market pull	1	2	3	4	5	6	Technology push

Q 6	To what extent is it possible to predict the market demand in your industry five years from now?						
Low extent	1	2	3	4	5	6	High extent

Q 7	Are your company's new products mostly incremental upgrades or major upgrades?						
Incremental	1	2	3	4	5	6	Major



## Organization of the strategic product planning process

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This section aims at mapping the strategic product planning process in your company.

Q 8	Do you have a formal planning process? If yes, which steps are included and how frequent is the process iterated?	
Yes	No	Comment

Q 9	What is the planning horizon of the process?

Q 10	Which business function owns the planning process?

Q 11	Which company functions are involved in the planning?

Q 12	Does the process result in a visual plan? If yes, what is included in the plan? If no, what is the output of the planning process?	
Yes	No	Comment

Q 13	How is the output from the planning process transferred to product realization and used by different departments?

## Alignment of business and marketing with technology and R&D functions

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This section aims at identifying how business and market requirements are aligned with the technology and R&D capabilities when planning for the products in your portfolio.

Q 14	How does the planning team ensure that they have access to correct and enough information from marketing and R&D functions?

Q 15	Do you use any IT tools (databases, excel charts, etc.) for information exchange between marketing and R&D? If yes, which tools?	
Yes	No	Comment

Q 16	What is the geographical distance between marketing and R&D functions?					
Short distance	1	2	3	4	5	6
						Long distance

## Product portfolio evaluation

This section aims at mapping how you evaluate and optimize your product portfolio.

Q 17	According to what parameters do you make decisions about your product portfolio?

Q 18	Do you evaluate products based on the potential of the single product or on the potential of the product portfolio?					
Single product	1	2	3	4	5	6
						Product portfolio

Q 19		Do you have an explicit and established method for portfolio optimization?		
Yes	No	Do not know	Comment	

Q 20	How do you ensure to maximize the commercial value of your product portfolio? E.g. what type of methods or tools are used?

Q 21	How do you ensure to find the right balance of different types (e.g. risk, time horizon) of products in your portfolio? E.g. what type of methods or tools are used?

Q 22	How do you evaluate the resource need for products in the portfolio? E.g. what type of methods or tools are used?

Q 23	How do you ensure that the portfolio is aligned with overall business strategy? E.g. what type of methods or tools are used?

## Planning performance

This section aims at mapping how you evaluate and perceive your planning performance.

Q 24	How do you measure the results and the efficiency of your planning process?

Q 25	From one year to another, to what extent do you change your plans?						
Low extent	1	2	3	4	5	6	High extent

Q 26	To what extent are products delivered in accordance with estimate launch dates?						
Low extent	1	2	3	4	5	6	High extent

Q 27	To what extent are products delivered in accordance with estimated cost targets (e.g. production, material and overhead costs)?						
Low extent	1	2	3	4	5	6	High extent

Q 28	To what extent are development projects keeping given expenditure frame?						
Low extent	1	2	3	4	5	6	High extent

Q 29	How would you rate your company's performance in strategic product planning?						
Very poor	1	2	3	4	5	6	Very good

### Appendix 3: Correlation analysis in Minitab

