TAMPERE UNIVERSITY OF TECHNOLOGY
Degree Programme in Industrial Engineering and Management

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DEVELOPING A SYSTEMATIC MODEL FOR PRODUCT STRATEGY AND PRODUCT PORTFOLIO MANAGEMENT

Master of Science Thesis

ABSTRACT

TAMPERE UNIVERSITY OF TECHNOLOGY
Master's Degree Programme in Industrial Engineering and Management

HEINOLA, JAAKKO: Developing a systematic model for product strategy and product portfolio management
Master of Science Thesis, 70 pages, 10 appendices (37 pages)
March 2011
Major: Industrial management
Examiner: Professor Saku Mäkinen
Keywords: product strategy, product portfolio management, offering development, strategy tools.

This master's thesis discusses the processes and practices of product strategy development and product portfolio management. The goal of this research was to develop a systematic model consisting of tools and processes for the product management function of the case company. The theoretical background of this research is divided into three parts: strategy, product management, and management tools.

This research was conducted on an assignment for a case company. The research process resembled an action research process and the researcher was an employee of the case company for approximately five months. The research material was gathered mostly by semi-structured interviews, informal discussions, benchmarking two other companies, and with a survey. The material was mostly qualitative but also a quantitative survey was used which makes this thesis a mixed-method research.

As a result of this research a systematic process model was developed. The model is divided into three layers which are: daily, quarterly, and as needed -tasks. Five sets of templates were also developed to help the product management function in the product offering development. These templates are called preliminary investigation, business case, current state analysis, product strategy, and product group strategy. The standardized form of performing the tasks will benefit the case company by assuring that all the essential elements are taken into consideration when performing the needed tasks. The standardized way of illustrating makes the results easier and faster for others to understand and it also makes the results more reliable. For academics this research provides a summary of the scattered publications about product strategy and product portfolio management and provides detailed information about the research process conducted in the case organization of this research.

TIIVISTELMÄ

TAMPEREEN TEKNILLINEN YLIOPISTO
Tuotantotalouden koulutusohjelma

HEINOLA JAAKKO: Systemaattisen tuotestratagia- ja tuoteportfoliomallin kehittäminen
Diplomityö, 70 sivua, 10 liitettä (37 sivua)
Maaliskuu 2011
Pääaine: Teollisuustalous
Tarkastaja: professori Saku Mäkinen
Avainsanat: tuotestrategia, tuoteportfolion hallinta, tuotetarjonta, strategiatyökalut

Tämä diplomityö käsittelee tuotestrategian ja tuoteportfolion hallinnan prosesseja ja käytäntöjä. Tutkimuksen tavoitteena oli kehittää kohdeyrityksen tuotehallinnalle systemaattinen malli, joka koostuu prosesseista ja työkaluista. Tämän diplomityön teoreettinen tausta on jakautunut kolmeen osaan, jotka ovat strategia, tuotehallinta ja johdon strategiatyökalut.

Tämä tutkimus tehtiin kohdeyrityksen toimeksiantamana. Tutkimusprosessissa on käytetty action research –menetelmää, ja tutkija työskenteli kohdeyrityksen työntekijänä noin viisi kuukautta. Tutkimusmateriaali kerättiin enimmäkseen puolistrukturoiduilla haastatteluilla, epävirallisemmilla keskusteluilla, arvioimalla kahden muun yrityksen toimintatapoja, ja kyselyllä. Tutkimusmateriaali oli enimmäkseen laadullista, mutta myös määrällistä kyselyä käytettiin avuksi.

Tutkimuksen tuloksena kehitettiin systemaattinen prosessimalli. Malli on jaettu kolmeen eri kerrokseen, jotka ovat: päivittäiset, neljännesvuosittaiset ja tarvittaessa suoritettavat tehtävät. Tutkimuksen tuloksena syntyi myös viisi valmista tiedostopohjaa, jotka tukevat tuotehallintaa tarjoaman hallinnassa. Näiden tiedostopohjien nimet ovat: esitutkimus, liiketoimintatutkimus, nykytilan analyysi, tuotestrategia ja tuoteryhmän strategia. Standardoitujen toimintamallien käytöllä voidaan varmistaa, että kaikki tarpeelliseksi nähty tulee otettua huomioon suoritettaessa tarvittavia askareita. Standardoitu esitystapa tekee tuloksista helpommin ja nopeammin tulkittavia ja lisää myös tulosten luotettavuutta. Akateemiselle yhteisölle tämä diplomityö tarjoaa yhteenvedon hajautuneesta tuotestrategian ja tuoteportfolion hallinnan kirjallisuudesta ja kuvailee tarkasti tutkimuksen kohdeyrityksessä suoritettua tutkimusprosessia.

PREFACE

Tampere, April 8th 2011

Jaakko Heinola

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ABBREVIATIONS AND NOTATION

R&D   Research and development

NPD   New product development

PPD   Present product development

ECM   Engineering change management

STP model   Segmentation, targeting, and positioning model

SWOT analysis   Strengths, weaknesses, opportunities, and threat analysis

PLC   Product life cycle

ETO   Engineering to order

PPT   Portfolio performance team

PAT   Product approval team

EBIT   Earnings before interests and taxes

1. INTRODUCTION

Delivering well performing products to market is a process that involves innovation and technology but also proper market sensing. Due to globalization and more intense competitive environment, companies have to pay more attention to being market driven if they want to succeed. Many companies' product strategies are strongly in the hands of engineering departments which can lead to products that are technologically superior but do not fit the customers' needs. Being market driven requires well planned methods and tools from product management function.

This master's thesis has been made on an assignment for a case company, Glaston Oyj. As a producer of investment goods, Glaston is highly exposed to the global economic trends. The recent global financial crisis has hit Glaston hard causing the management to rethink the current ways of working. There have earlier been challenges with the product management function and therefore new, more systematic, ways of working were needed. A global strategy development project relating to development of product management capabilities was launched and this thesis was written as a part of the project. The thesis researcher was responsible for a work stream aiming at building a model for product strategy and creating a model for business intelligence database. However, the creation of business intelligence database was excluded from this master's thesis.

1.1. Objectives of the study

The objective of this research is to create tools and processes for the case company. Glaston Oyj operates internationally and has machines manufacturing facilities in four different countries on three different continents and software development in one country. Common systematic processes for product management function are needed as well as a standardized way of creating and presenting the product strategies. The model and tools have to be universal in order to fit all the different business units of the case company. The long term objective of establishing stronger product management practices is to ensure the long term competitiveness of the product portfolio.

The main research question shaped during the thesis process, as it is characteristic for action research, and finally took the following form: What elements are included in the product strategy creation and product portfolio management? Elements can broadly be defined as things to consider when managing the portfolio and creating product strategies. The main research question has two sub-questions. The first one is what kind of processes should be established in order to systematically manage the product

portfolio of the case company. The synthesis of theory (chapter 3.4) answers the first sub-question and at the same time provides outlines for the research. The second sub-question is: What kind of tools should be used in the case company to create and illustrate product strategies? The research questions of this study are shown in the figure 1.1 below. The second sub-question was originally the main research question for the whole research.

What elements are included in the product strategy creation and product portfolio management?

What kind of annual processes should be established in order to manage the product portfolio of the case company?

What kind of tools should be used in the case company to create and illustrate product strategies?
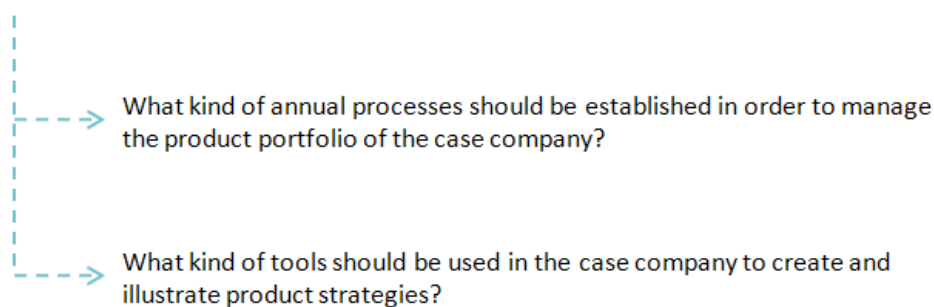
Figure 1.1 The main research question and the two sub-questions.

Of course a common objective for all master's theses is to create knowledge for the academic community. However, as this thesis has been made as a case research the top priority is to fill the needs of the case company.

1.2. Research approaches and methodology

As this thesis is carried out as an assignment for the case company Glaston Oyj, the researcher worked as a member of the organization for five months. Due to the topic of this thesis a lot of literature research was needed but it was also important to constantly work closely together with the personnel of the case company in order to adjust the theories to the individual needs of the case company. The researcher worked in a project team of three members and constantly received feedback from the other members of the project team as well as from the supervisor of the thesis in the case company. The research approach in this thesis is inductive i.e. the researcher is building a theory by analyzing the research material (Saunders et al. 2009, p.1   26).

The research methodology described above closely resembles an action research. In action research the involvement of practitioners and the collaboration of practitioners and the researcher are considered to be important (Saunders et al. 2009, p.147). In action research the researcher is a part of the organization in which the research and the change process are taking place (Reason & Bradbury 2001). It is also typical of action research to be an iterative process. One of the strengths in action research is that the results are often easier to implement when the employees of an organization have taken part in creating the results (Saunders et al. 2009, p.148).

The theories used in this research were chosen with the help of an iterative method which is typical of action research (Herr & Anderson 2005). The iterative circle begins with the researcher orientating to the case organizations business, which meant studying the current practices and learning about the business environment and the products of the case company. The second phase of the circle is literature research and benchmarking. In practice this means that the researcher searched for material and new methods that could fit the needs of the case company by browsing through a large amount of literature and also by benchmarking other companies' practices. In the third phase of the iterative circle, the researcher proposed the materials to the project team he worked in and received feedback from the researcher's supervisor in the case company. In this way the theory section of a relatively broad topic could be outlined to suit the measures of a master's thesis. Figure 1.2.1 below illustrates the iterative circle used in this research.
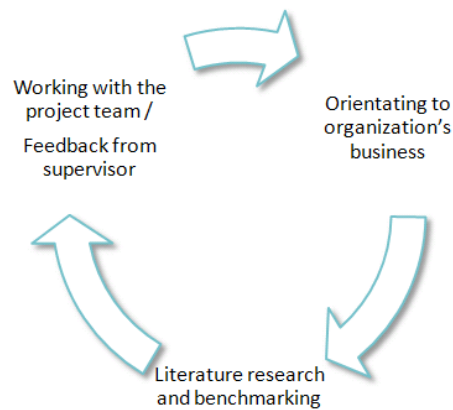
Figure 1.2.1 *The iterative process of selecting the theories to use*

Due to the relatively broad topic of the thesis, the researcher had to browse through many fields of literature and publications. There are very few fundamental books to cover the topic of product strategy and the definitions for product strategy are not that well-established in publications and literature. The concept of product strategy is often defined in a really universal and abstract way with links to almost every function of a company. In this research however, some of the key themes in literature were strategic management, product management, product development, and the organizational operations and processes relating to those. Figure 1.2.2 clarifies the key literature themes used in this research and the interrelationships between them. In chapter 2.1.3 some of the definitions for product strategy are introduced and summed up.
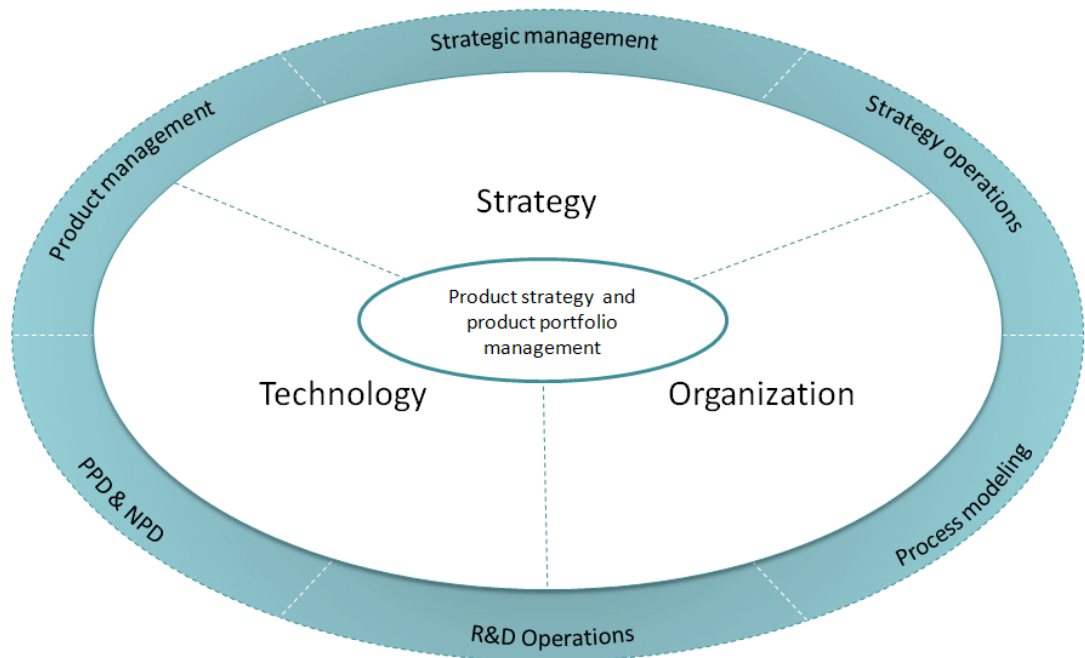
Figure 1.2.2 *Literature themes in this research*

After the theory part of this research had been constructed, a series of semi-structured interviews and a quantitative survey were carried out to acquire research material. These research strategies are discussed more precisely in the research method and material chapter.

1.3.   Reseach process

The planned schedule for the research process was five months and the research process started in the beginning of October, 2010. During the first two months a big amount of the time was spent on literature research, learning about the company and getting to know the people working in it. The thesis was written down mostly in January and February of 2011. Two companies were benchmarked as a part of the thesis project. The first benchmark was in November 2010 and the second was in February 2011. Both of the benchmarks were held with globally operating companies that have facilities in the Tampere region.

The researcher's supervisor in the case company and the other members of the project team the researcher worked in were the biggest influencers to the researcher's work. However, a series of interviews were held in the beginning of the research process to get research material and to get to know the organization and the employees of the case company.

All of the employees that took part in the research project are listed in figure 1.3.
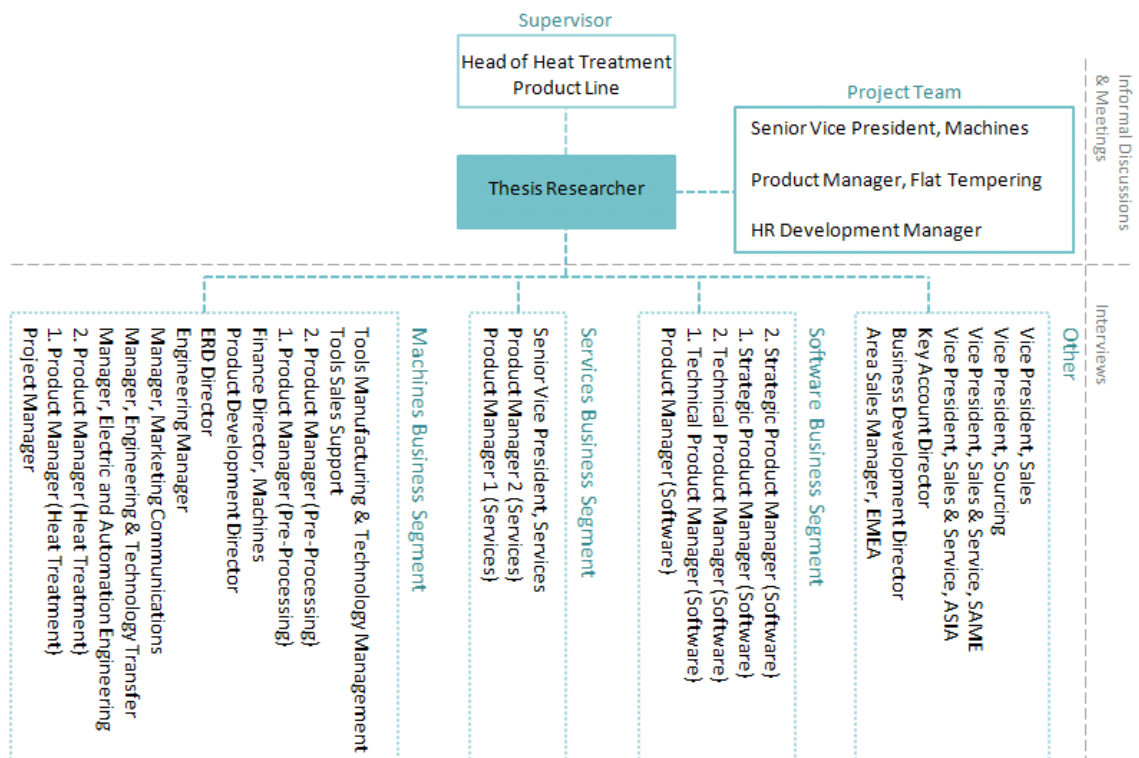
Figure 1.3 *List of employees related to the research project.*

The supervisor of the master's thesis took the initiative to the whole thesis project and defined the original research question with the researcher. The project team and the supervisor of the thesis were constantly co-operating with the researcher especially in the beginning of the thesis project. The discussions between the researcher and the project team and the supervisor of the thesis were mostly informal discussions and meetings. However, the project team had a more formal documented meeting approximately once a month. The interviews and surveys that took place as parts of the thesis project were all documented and used as research material later. In total 29 employees of different business segments took part in the research project through interviews or participating in the quantitative survey. The research methods used in this research are discussed more in the chapter four (research method and material).

1.4.   Structure of the study

The structure of this thesis is pretty similar to the commonly accepted version suggested by Robson (Robson 2002; Saunders et al. 2009). However, since the research resembles an action research as discussed earlier, a synthesis of the theory is introduced early in the second chapter. The synthesis of theory chapter pulls up all the theories discussed and creates outlines for the rest of the research. The synthesis of theory chapter exists so

that the storyline and the flow of this thesis would be logical and easy to follow. In addition, as this research is a case study, the case company is also introduced in the introduction chapter. Otherwise the thesis has a typical structure for a research report. The structure of this particular thesis is illustrated in figure 1.4 below.

1. Introduction to the research			
Background and objectives of the study	Research approaches and methodology	Research process and structure of the study	Overview of the case company

2. Literature review		
Strategy	Product management	Management tools
Synthesis of the theory		

3. Research method and material		
Research methods	Interviews and survey	Research material

4. Results			
Results of the interviews	Results of the survey	Templates	Discussion

5. Conclusions	
Summary of the results	Recommendations for the future

Figure 1.4 *The structure of the thesis.*

The last part of the introduction chapter is a brief overview of the case company. The organizational structure and some key figures of the case company are discussed in this chapter so that the reader would have a better understanding of the research question and the objectives of this research. Next chapter is the theory chapter of this research. The literature that was chosen to be suitable for supporting the goals of this research is discussed in the chapter three. This chapter is divided into four parts: strategy literature, product management literature, literature about management tools, and finally a synthesis of the theory.

Once the theoretical background to this research is discussed the next chapter is the introduction of the research method and material used in this research. First, the research methods and strategies used in this research are discussed. After that the held interviews and survey are discussed on a more detailed level. Lastly, the different kinds of research material used in this research are discussed. After the methods and material has been introduced the results of this research are presented. The results of the

interviews are presented in a narrative form and the results of the survey are presented with the help of graphs. After these, the contents of the templates constructed as an outcome of this research are introduced for the reader. Last part of the results chapter is the discussion about the results. Here the importance of the results is discussed as well as the reliability and validity of the research. The last chapter in this thesis presents the conclusions of this research. The conclusions chapter sums up the most important results of this study and some advises for the implementation phase of the results of this research are also presented in the conclusions chapter.

In general, this thesis has been written keeping in mind that it would be pleasant to read. The researcher tried to keep the structure and the flow of this thesis simple, although the research process took quite a complex form. The text in this thesis is typed in a compact form, and graphs and figures were used as much as possible to clarify the discussed matters for the reader in a simplified way.

1.5. Overview of the case company

This research was conducted on an assignment for Glaston Oyj. Glaston is an internationally operating glass technology company which provides glass processing technology and services for glass processing industry. Glaston's service network covers more than 20 locations worldwide and Glaston has machines manufacturing in four countries on three different continents. At the end of 2009 Glaston employed approximately 1200 employees globally. Net sales on the year 2009 were 152 million euros which had come rapidly down from last year's net sales of 273 million euros. (Glaston 2010.) Glaston's head office is located in Tampere and Glaston's share is listed on the NASDAQ OMX Helsinki Small Cap List. The researcher worked at the head office in Tampere.

Glaston has divided its business into three major segments: Machines, Services and Software Solutions. The markets are divided into four regions which are EMEA (Europe, Middle-East, Africa), South America, North America and Asia.

The business segments and regions are illustrated below in figure 1.5.1.
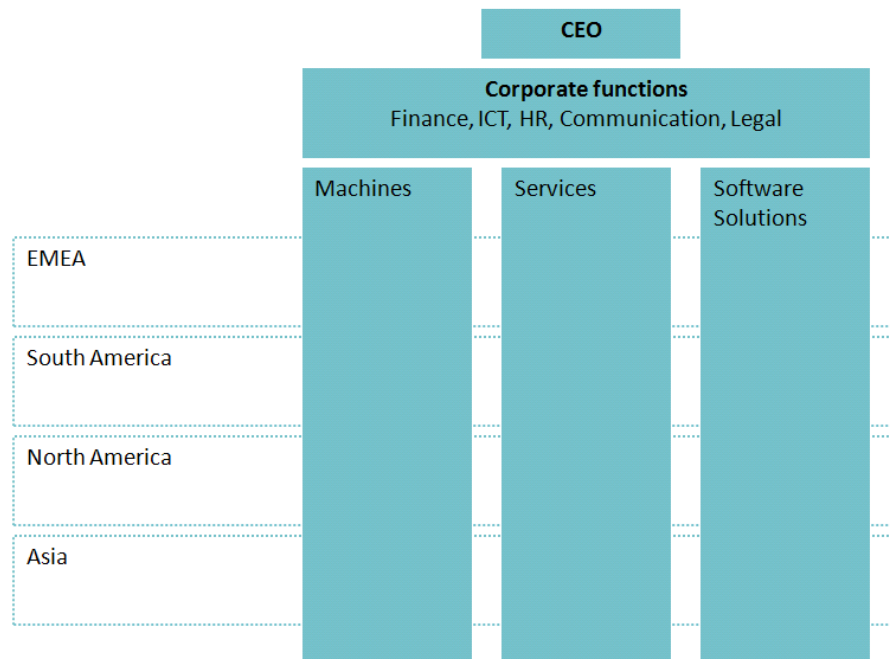
Figure 1.5.1 Glaston organization chart

The Machines segment can be divided into two different product lines which are Heat Treatment and Pre-Processing. The Heat Treatment product line includes tempering, bending, bending and tempering, and laminating machines sold under the brands Tamglass and Uniglass. The Pre-Processing product line produces CNC machinery, cutting tables, drilling machines and edging machines for glass to name a few products. The Pre-Processing products are sold under the Bavelloni brand. The net sales of the Machines segment was 82 million euros in 2009 (169 million euros in 2008). (Glaston 2010.)

The Services segment consists of maintenance services of glass processing machines and sales of tools as well as spare parts for the machinery. The maintenance services of Glaston also cover the machinery of other manufacturers. The most extensive service network in the glass processing business is a fundamental competitive asset for Glaston. The net sales of Services segment totaled 48 million euros in 2009 (76 million euros in 2008) (Glaston 2010).

The Software Solutions segment develops and supplies software for the glass industry. The products include enterprise resource planning and reporting systems which are sold under the Albat+Wirsam brand and other software for the needs of window and glass door manufacturers sold under the Cantor brand. The total net sales of Software

Solutions segment were 24 million euros in 2009 (28 million euros in 2008) (Glaston 2010).

Figure 1.5.2 illustrates the ratio between the revenues of different business segments.

Net Sales in 2009

■ Machines ■ Services □ Software solutions

16 %

31 %

53 %
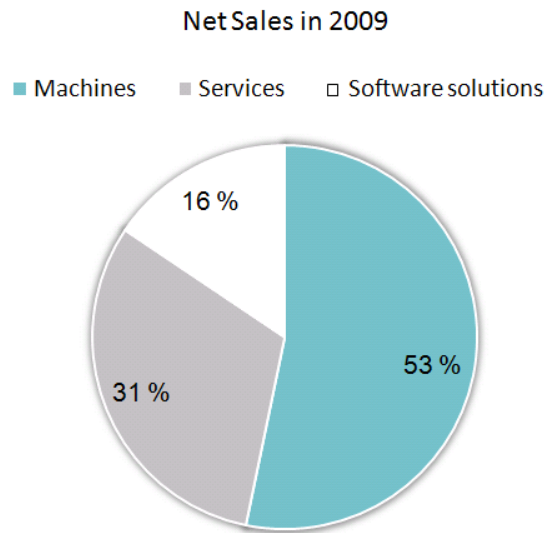
Figure 1.5.2 *Revenues by business segments*

Glaston's customers can be divided into four major customer segments: architectural glass technology, appliances and furniture, automotive glass technology, and solar energy. Architectural glass is used a lot in residential and commercial buildings. Different sizes of for example flat, bent, tempered, laminated glass is used all around the world. Safety regulations and architectural trends have a huge influence in what kind of needs the customers have. Different kind of coatings are used for the protection of the glass, energy saving or to make the glass the self-cleaning for example. Appliances and furniture often need to be built out of safety glass due to safety regulations. The use of safety glass as a design element has also increased in the past. Automotive glass technology industry produces glass for example cars, trains, buses, tractors, boats and other vehicles in which safety glass is used. The glass used in automotive industry is often bent or bent and tempered. The solar energy industry uses glass in applications like photovoltaic panels, solar thermal panels and as mirrors in concentrated solar power systems.

2. THEORETICAL BACKGROUND OF THE RESEARCH

The theories selected to back this research up are discussed in this chapter. The theoretical background of this research can be divided into three segments. First part of the theory chapter concentrates on strategy and product strategy, the second part discusses product management and the third part introduces the management tools that are used in this research. After the three parts of theory are discussed, a synthesis of theory pulls the theories together and builds a framework for the further research process.

2.1. Strategy and product strategy

2.1.1. Strategic perspective

This thesis applies the competitive dynamics perspective to strategy. The idea behind the competitive dynamics perspective is that a company's success is based on the actions performed by the company and the behavior of the company in a competitive environment (Chen 1992). Smith et al. (2001) describe competitive dynamics as sequences of competitive moves and counter-actions that companies make in order to enhance their profits. The competitive dynamics perspective emphasizes a company's awareness of competitors' strengths and weaknesses when searching for opportunities and threats in the environment (Williams 2007).

 According to Chen (1996), the competitive dynamics process should begin with a competitor analysis. The competitive environment can be analyzed by two variables which are market commonality and resource similarity. Market commonality describes how much two competing companies act on the same markets. This is analyzed by a company's product portfolio, geographical location, customer segmentation, the size of a company, marketing, and the priority of the market to the company. The more commonality exists in the markets of two companies, the harder the competition is between them. By resource similarity Chen means all the resources that a company possesses. The more similar resources two companies have, the harder the competition. After the analysis has been carried out it can be decided who and how do we want to compete. (Chen 1996.) Porter (1983) comments that in industries where two or more companies consider each other as enemies it is common to have a price war between similar products.

Chen concentrates on the individual competitors in his studies (Chen 1992; Chen 1996), whereas Jacobson (1992) concentrates more on the dynamics of the markets and the importance of market sensing and innovation in his article "The Austrian School of Strategy". According to Jacobson's theory of competitive dynamics, when a company launches a new product innovation it gets a competitive advantage. However, after a while the other competitors on the market imitate the innovation and the competitive advantage disappears. Now a new innovation or a product update has to be created in order to get a competitive advantage. Lee et al. (2000) also agrees with Jacobson's (1992) theory and states that the best returns are often gained by the first movers and the imitation by later movers erode the first movers' competitive advantage and profits.

In this study a combined perspective of the earlier is used. The market is seen as a dynamic field where the top priorities are forecasting the customers' needs and finding innovative ways to serve them, and at the same time following and predicting the moves of the biggest competitors. The main reasons why the competitive dynamics approach to strategic thinking were adopted in this thesis are described in the next paragraph.

Firstly, ever since the first interviews inside the case company it has been made clear that one of the key thoughts behind this case study is to change the organization's practices towards a more market and competitor driven way of thinking. Also, the competitive situation in the case company's industry has become significantly more intense due to globalization and the competitors have gained more market share especially in the growing markets. Proper market and competitor analysis is needed in order to define the basis for product strategy. Being a producer of capital goods in business to business markets, the case company is highly volatile to economic trends, which also strengthens the importance of environment analysis.

2.1.2. Five elements of strategy

Before product strategy can be discussed, it is important that a clear framework for strategy is defined. Strategy as a whole is a larger concept than product strategy in which we concentrate later in this study, but still most parts of strategy can be adapted to the product strategy thinking. In this chapter a framework for strategy by Donald Hambrick and James Fredrickson (2001) is introduced.

First of all, strategy must be outlined and it must be understood that all the important choices of a company are not actually parts of strategy itself. The company's mission and objectives for example are really important decisions that have to be made but they are not parts of the strategy. If every important decision was included in the concept of strategy, it would easily lose its meaning.

Figure 2.1.1 illustrates the relationship between strategy and other important choices and actions in a company.
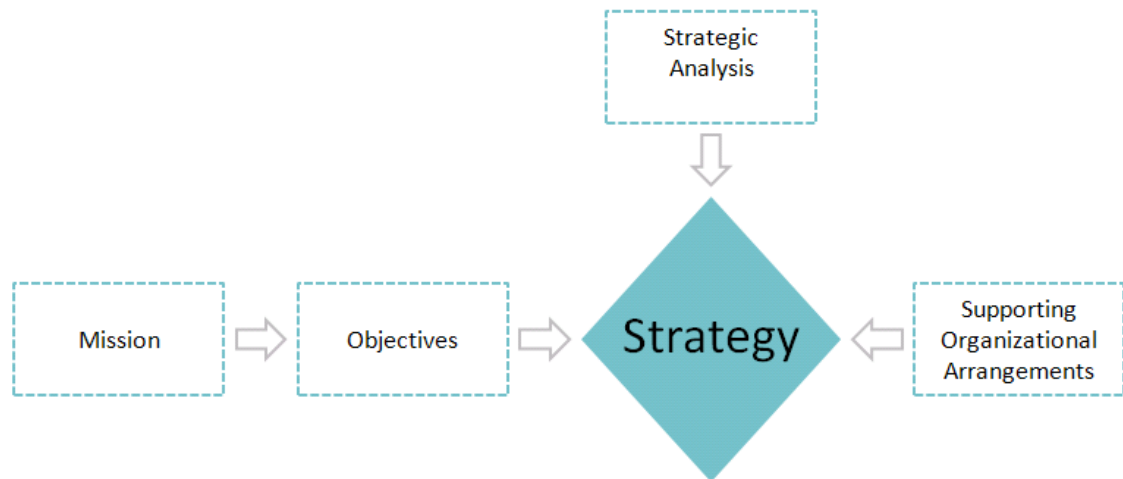
Figure 2.1.1 *Putting strategy in its place (Adapted from Hambrick & Fredrickson 2001, p.52)*

A company's mission, objectives, strategic analysis and other supporting organizational arrangements like organizations' processes and policies are all very important components in the strategy making process. However, they are not parts of the strategy itself. Even though they are excluded from the strategy definition framework, they will be taken into consideration when planning the strategy making process.

Hambrick & Fredrickson have divided strategy into five major parts i.e. the elements of strategy. They concentrate especially on how important it is that the elements form a unified whole. The five elements of strategy provide answers to five questions: Where will we be active? How will we get there? How will we win in the market place? What will be our speed and sequence of moves? How will we obtain our returns? (Hambrick & Fredrickson 2001.) Figure 2.1.2 illustrates the five questions and their relationships with each other. This illustration is often referred to as the strategy diamond.
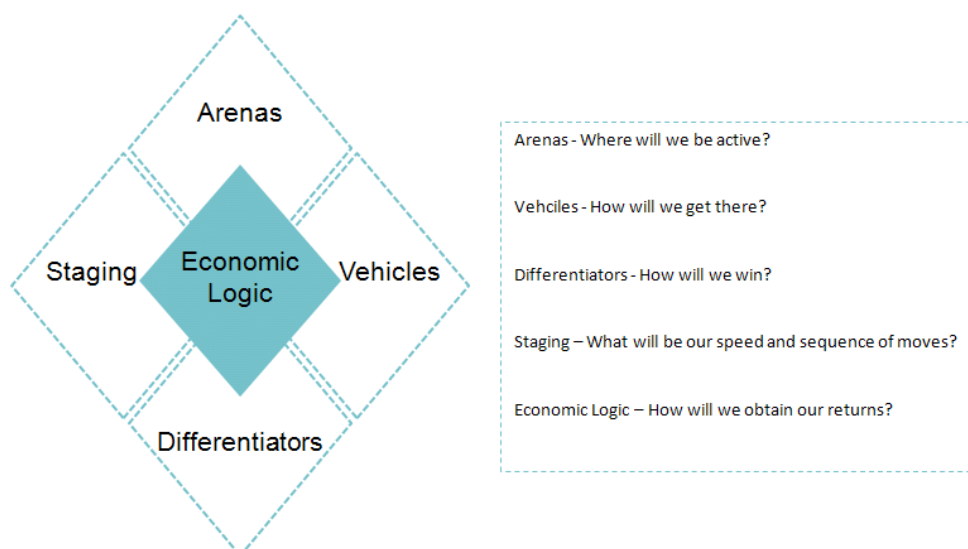
Figure 2.1.2 *The Five Elements of Strategy (Adapted from Hambrick & Fredrickson 2001)*

The first element of strategy is arenas. Arenas –element answers to one of the most fundamental questions in the making of a strategy which is: where, or in which arenas, the business will be active? It is important to be specific in articulating the arenas. This element is not only about making geographical decisions. Arenas includes decisions about product categories, market segments, geographic areas, core technologies, product design, manufacturing, selling, services and distribution. (Hambrick & Fredrickson 2001, p.53.)

When a strategist has decided where to be active, he also needs to decide how to get there. This element is called vehicles. If a company for example wants to expand its product range in a certain segment, it needs to decide whether it will accomplish that by internal product development or perhaps by some other vehicles – such as joint ventures or acquisitions for example. (Hambrick & Fredrickson 2001, p.54.)

The third element of strategy is called differentiators. When it is specified where a company wants to be active (arenas) and how to get there (vehicles), it also needs to be specified how the company will win in the marketplace. In other words, how it will get customers to come its way and how it will outperform the competitors. The differentiation can be based on e.g. superior quality, unparalleled service or lowest prices on the market. Hambrick & Fredrickson also emphasize that it is not necessary for a company to be at the extreme on one differentiating dimension to be a successful differentiator. Sometimes a combination of differentiators gives the best marketplace advantage. (Hambrick & Fredrickson 2001, p. 55.)

Arenas, vehicles and differentiators define the substance of a strategy. However, a fourth element called staging is also needed. Staging defines the speed and sequence of

major moves to take. Staging decisions are driven by a number of factors in an organization and one of these factors is resources. It is not often possible to fund and staff all the proposed actions immediately. Also some actions may be more urgent than others and other factors like willingness to be the first in market may affect the staging decisions. (Hambrick & Fredrickson 2001, p. 56.)

The last element which ties it all together is called economic logic. When making a strategy, there must be a clear vision of how the profits will be generated. An economic logic must also define the costs and how much profits will be generated. A basis for an economic logic can be for example a difficult-to-match product which enables premium pricing.

2.1.3. Defining product strategy

In order to define product strategy, the word product has to be defined first. In daily life the word 'product' often refers to physical products or goods. However, some of the definitions for product are very broad and take many other than physical aspects into consideration. Kotler & Keller (2006, s.372) for example state that a product is anything that can be offered to a market to satisfy one's want or need. According to this definition products include physical goods as well as services, experiences, events, persons, places, properties, organizations, information and ideas. However in this study it is not meaningful to define the word product as broadly as Kottler & Keller defines it. A convenient definition for this study can be found in literature by Saaksvuori & Immonen (2008, s.1). They have made a clear definition for product in their book on product lifecycle management and the same definition can be used in this study as well. They state that a product can mean three different things: a tangible and physical product, a service or intangible products such as software.

There are many different definitions of product strategy. Some of the definitions have differences with each other, but for the most part they fit together well. Below are some commonly accepted definitions of product strategy.

Steinhardt (2010, p. 50) states that product strategy is a set of decisions that enhance products to fit market needs and describe how to build competitive advantage for products. Product strategy is a part of the product management process. Steinhardt also excludes the current state analysis from the product strategy process as well as Hambrick & Fredrickson (2001) did in their definition for strategy.

Lehmann & Winer (1994, pp. 205-206) also keep the current state analysis excluded from product strategy but they suggest that those two should be considered tightly together. Lehmann & Winer state that the most important purpose of product strategy is to provide product managers with the direction to follow in managing a business. A

successful product strategy must help to achieve coordination between different perspectives on how to make a product successful. A product strategy should also define how resources are to be allocated inside the organization. It is also important that a product strategy shows how products can be lead to a superior market position.

A slightly older definition for product strategy by Handscombe (1989, p.23) states that a product strategy needs to define the business that the product group represents. It needs to provide a framework for individual product decisions, marketing strategies, strategies for specific products, product development plans and the development of manufacturing plans. A product strategy also needs to identify market priorities in order to allocate resources for the most important products, market segments and territories.

McGrath (2001, p.3, 118) has a more broad definition for product strategy. He suggests that a product strategy begins with a core strategic vision that states where the whole company wants to go. Product strategy flows from the strategic vision to the platform strategy and then to the product line strategy and finally to the new product development. However Saaksvuori & Immonen (2008, p.208) suggest that a product strategy does not always need to derive from the core strategy of a company. According to them, in some cases it can also be the other way around. Figure 2.1.3 illustrates the product strategy structure by McGrath (2001).
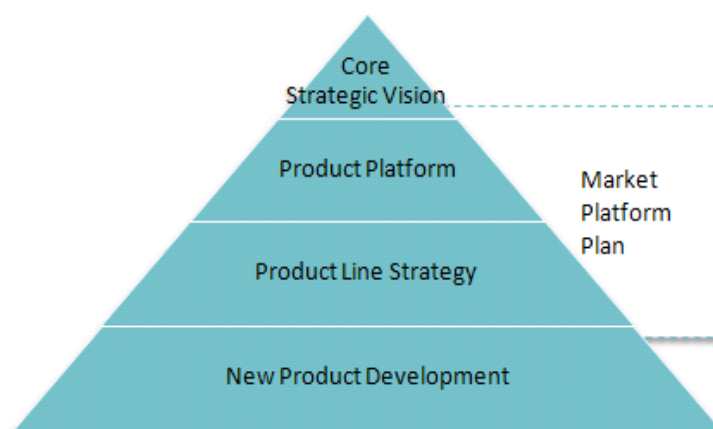
Figure 2.1.3 *The product strategy structure. (Adapted from McGrath 2001)*

As discussed earlier, McGrath (2001, p.118) suggests that the core strategic vision is the basis of the product strategy. The core strategic vision determines the answers to the strategic questions: Where are we going? How will we get there? Why will we be successful? However, the two other questions introduced by Hambrick & Fredrickson (2001) which are related to staging and economic logic can also be considered as core strategic questions. Product platform strategy is derived from the core strategic vision. If the core strategic vision aims at for example a cost leadership advantage, it suggests a low-cost product platform strategy. The third level, the product line strategy, defines the time-phased product offerings for a particular product platform. The final level, the new

product development, defines the functionalities for new product offerings that fit the product line strategy.

There is also a market platform plan tightly connected to product platform strategy and product line strategy. Market platform plan translates platform plan into an action plan for target markets. Market platform plan consists of measuring the market, analyzing customers and defining differentiation. (McGrath 2001, pp.119-120.) In other words, market platform plan covers roughly the same matters as the current state analysis that is often discussed in strategy and product strategy literature.

Although the definitions may slightly differ from each other, there are commonalities between all of them. All the definitions state that product strategy is a set of decisions or processes that aim at making the product successful. They also state that product strategy should take the market and current state of the company in consideration when making the decisions. The product strategy should also define the offering and make plans for the offering in future. All the definitions also show that there should be a close link between product strategy and the top level corporate strategy.

Lastly, a product strategy is a management process. If good results are wanted the process must also be planned well. A product strategy process cannot be dependent on individual manager's know-how; it must become an institutionalized way of working. Thus, product strategy process must be integrated well with the other processes of the organization too.

2.2. Product management

Sometimes organizations may only have one product and sometimes they have several. Products can actually be thought to be like small businesses inside a larger business. Thus the management of a product actually involves the same functions as the management of a company. The objective of product management can be defined to be increasing the profits of products in short and long term (Handscombe 1989, p.1). The role of product manager varies in every company but in general it can be said that a product manager is in charge of the research and development (R&D), manufacturing and the sales of a product. Whether a product manager is focusing more on one area than another depends on the product manager's role in a company as well as on the life cycle of the product (Lehmann & Winer 1994, Pp. 12-13).

In the case company of this research, the product managers have mostly concentrated on the sales and marketing support of a product and less on the manufacturing and R&D of a product. In companies where the product manager's role is as broad as described in the previous paragraph, the product manager is often a senior manager in the company. However, in the case company the product manager's role is not necessarily a senior

manager's role. This in part explains why product managers of the case company have been in a somewhat passive role in the past.

A product manager has basically two important responsibilities. First, broadly speaking, the product manager is responsible for the planning activities of a product or a product line. This, of course, involves analyzing the market and the competitors and turning the information into product's strategy. The second objective for the product manager is to get the organization to support the recommendations and actions in his plans. This means that the product manager has to interact with many other areas of the organization as well. (Lehmann & Winer 1994, Pp.1-2.) Figure 2.2 illustrates the product manager's interaction within and outside of a company (figure 2.2).

Figure 2.2 The Product Manager's Interactions (Adapted from Kotler 1991, p.693)

As said earlier, a product manager has to interact with different areas within and outside of a company he is working in. As can be seen in figure 3.4, a product manager has to interact in his daily routines with many stakeholders like the marketing department, R&D department, suppliers, sales department, and manufacturing department to name a few. It is said that product management is an excellent training ground for young executives because it involves them in nearly every area of a company's operations (Kotler 1997, p. 69). The management tools developed in this research are designed especially for product managers.

2.2.1. Product lifecycle management

In literature the product lifecycle management (PLM) often refers to a product's information management (see for example Eigner & Nem 2010; Rosen 2010; Danesi et al. 2007). However, in this thesis a much wider significance of the term is adopted. The term PLM refers to the activity of managing a product throughout its lifecycle from the beginning to the very end (Stark 2006, p.17). PLM is a holistic business activity consisting of many different components. The goal of PLM is to maximize the value of the product portfolio in present and in future for both customers and shareholders (Stark 2007, p.115).

The lifecycle of a product is often divided into four phases: introduction, growth, maturity and decline. The product strategies often emphasize different things when products are on different phases on their lifecycles. On the earlier phases the emphasis is on different things than on the later phases. On the introduction stage product strategies often emphasize a buyer focus. This means that the development of the product is seen important as well as advertising and increasing the purchasing frequency of the product. In the growth stage of a product, more emphasis is put on making the marketing and production more efficient. On this phase the strategic market segments of the product often get clearer. The performance of the product, as in filling the needs of the customer, is crucial in the growth stage. (Anderson & Zeithaml 1984.)

The third phase on the product's lifecycle is the maturity of a product. A lot of studies about the maturity phase strategies have been made since the introduction of the product lifecycle model (see for example Hamermesh et al. 1978; Hall 1980; Buzzell & Wiersema 1981). To sum the results of the researches up, the key tasks in the maturity phase are usually improving the efficiency in processes, further differentiation from competitors, more specific target market segmentation, and reducing the product costs, marketing costs, and distribution costs. The last phase on the product's lifecycle is the decline. Harrigan (1979) states that the typical strategies used on the decline phase depend very much on the industry and the nature of competition. The life cycle on the decline phase can be extended if the profits are good compared to competitors' or the relationships with customers are strong. Depending on this kind of factors, product strategies vary in the decline phase from immediate exit to extending the lifecycle.

Businesses are always interested in finding better ways to grow the profits from the sales of products. Consistent and sustainable revenue streams over the life cycle of a product are often best way to maximize the profits (Steinhardt 2010). Different products might have a very different economic logic over their lifecycles. Some products generate all of the revenues when they are sold and some products generate more income in the later phases of their lifecycle when they are in use. It is very important to have an overall view of the lifecycle profits in a company like Glaston Oyj where the Machines and Services business segments are separated. Different business

segments often tend to have different interests which may lead to cannibalization of the company's overall profits.

2.2.2. Product portfolio management

Product portfolio management is closely related to product strategy. Product portfolio management aims at making strategic decisions about the markets, products and technologies where the company should be active in. It consists of allocating resources the right way and selecting the right projects and products to concentrate on. (Cooper et al. 1999.) In other words, product portfolio management is about achieving the optimal product offering.

As said earlier, product portfolio management is about making strategic decisions. It is a way for management to operationalize the chosen business strategy: Where are we going? How will we get there? Why will we be successful? The choices management makes on portfolio management determine what the products and the business will be like in five years. Cooper et al. have also published a formal definition for product portfolio management in their study: "Portfolio management is a dynamic decision process, whereby a business's list of active new product (and R&D) projects is constantly updated and revised. In this process, new projects are evaluated, selected, and prioritized; existing projects may be accelerated, killed, or deprioritized; and resources are allocated and reallocated to the active projects. The portfolio decision process is characterized by uncertain and changing information, dynamic opportunities, multiple goals and strategic considerations, interdependence among projects, and multiple decision-makers and locations." (Cooper et al. 1999, p. 335.)

The product portfolio management process consists of many decision making processes within the business. These processes include for example systematic reviewing of the current product portfolio, making go/kill decisions on projects and developing the new product strategy for the business (Cooper et al. 1999). A proper management of the product portfolio helps to ensure the strategic alignment, resource planning and the long term maximization of product portfolio profits (Oliveira & Rozenfeld 2010, p.1339).

Oliveira & Rozenfeld (2010) have constructed a process model which they call the ITP method. The ITP method stands for integrated technology roadmapping and portfolio management method. The model consists of 13 activities which are described in this chapter. Figure 2.2.2 illustrates the ITP method showing the different activities and the interrelationships between them.
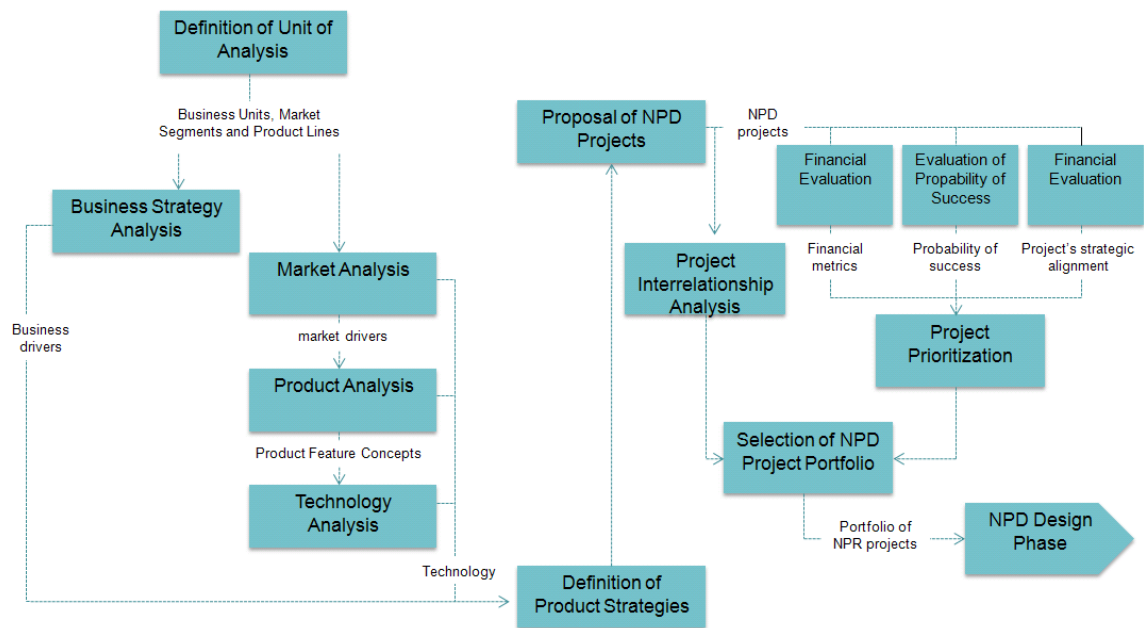
Figure 2.2.2 *The ITP Method (Adapted from Oliveira & Rozenfeld 2010 p. 1345)*

The model begins with the definition of unit of analysis. This activity sets the boundaries for the whole process. This means making decisions in terms of business units, market segments, product lines, and product groups. The next step is the business strategy analysis –activity, which identifies the business drivers that establish the directions and targets of the process. Based on the decisions made in the definition of unit of analysis, a group of business drivers (for example growth of market share) will be identified here.

The next phases are market analysis, product analysis and technology analysis. These activities aim at clarifying the current overall situation and defining the drivers for markets, the features of the products, and how they fit together. Also different technologies are analyzed, for instance, what technologies are available now, and what technologies would be needed in the future. The combination of market analysis, product analysis and technology analysis can be compared to the current state analysis discussed earlier in this thesis.

After the analysis phase, the next step is to define the product strategies. The product strategies are based on the information created in the previous activities. Business, market, product and technology information are stated in this phase. The outcomes of this phase are clarified in a product roadmap. After defining product strategies, the next phase is to propose new product development (NPD) projects. In this phase the new product concepts are defined. These concepts must be planned to fit the upper level, for example the product line, strategy. The proposals must be backed up with the needed information to support the decision making. This information can be e.g. market

segments, estimated prices for products, product components, and product life cycle planning.

Once the NPD projects have been defined, it is time to evaluate the proposed projects. The evaluation activities consist of financial evaluation, evaluation of probability of success and evaluation of strategic alignment. In the financial evaluation the NPD project is analyzed in a financial aspect. Information like estimated market share, price of the product, investments needed, and product life cycle are needed as the sources for financial calculations. Evaluation of probability of success is an activity in which the risks relating to the NPD project are evaluated. The risks may be technical or commercial risks. Davis et al. (2001) have discussed the evaluation activity in a detailed way and suggested practical tools for the activity in their study about a project's probability of success. Finally the strategic alignment of the NPD project is evaluated. This means evaluating how the strategy of the individual product fits the core strategy of the company. Criteria for this decision can be found for example in NPD or strategy literature (Cooper et al. 1999; McGrath 2001).

The next activity, project prioritization, ranks the proposed development projects based on the information prepared in the evaluation activities. A standardized way of prioritizating different proposals should be developed in organizations. It is also very beneficial if the evaluation processes are standardized so that the outcomes are more reliable. The project interrelationship analysis examines the interrelationships among the proposed projects and how they may affect the portfolio selection. Oliveira & Rozenfeld (2010) suggest that four interrelationships should be analyzed among projects: technical, utilization of resources, benefits of project, and timing of projects.

The last activity in the ITP method is the selection of the NPD project portfolio. In this activity the NPD projects that will be included in the ongoing product portfolio will be chosen. In other words, the NPD projects that will be allowed to go to the design phase will be selected. The criteria for the selection process should be well defined. Oliveira & Rozenfeld (2010) suggest that the portfolio should satisfy four goals: strategic alignment, maximization of the value, balance of the portfolio and resource allocation. For the balancing of the portfolio, Cooper (2008) suggests that the net present value of each project and the probability of success will be used as criteria and the projects are illustrated in a bubble diagram.

However, Oliveira & Rozenfeld (2010) state that as the model they introduced is only a reference model, the ITP method must be customized to meet the requirements of every individual organizations.

2.2.3. Stage-gate system

A stage-gate system is commonly used for making product management processes more systematic in companies (Cooper 1983; Cooper 1995; Phillips et al. 1999). Robert

Cooper (1995) introduced a stage-gate model in his well-known book, Winning at New Products, which is presented in this chapter. The system is designed especially for new product development processes but it can be adjusted to fit the product portfolio management and product strategy processes for present products also. Anderson (1993) states in his study that the stage-gate model is often tailored to satisfy different needs in companies and usually the number of stages differs from three to ten. The original stage-gate system has five stages and gates but only the first three of those is needed to discuss in this thesis (Figure 2.2.3). The last phases that focus on developing, testing, and launching the product can be disregarded in this thesis as the focus here is the management of the product offering.
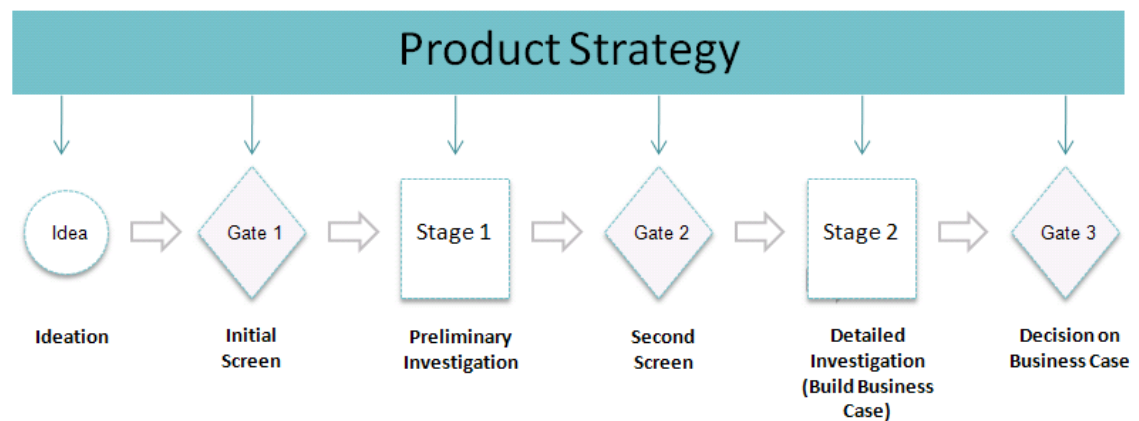
Figure 2.2.3 *A Stage-gate system (Adapted from Cooper 1995).*

The stage-gate system breaks the company's processes into a series of stages. Between these stages is a series of gates which are quality and cost control checkpoints. Each project must meet the criteria in order to pass through a gate and go to the next stage. (Anderson 1993.) In other words, each gate is a go or kill decision point. The further a product goes on the system, the more money is committed to it. The first stages are inexpensive and demand only a little resources compared to the latter ones (Cooper 1995).

The whole process begins with an idea of a new product or a present product development project. Once the ideas are born, they proceed to the first gate which is called the initial screen. The initial screen –gate is a light version of the second screen. At this gate set of key criteria for the product is set. The criteria often deal with strategic alignment of the product, project feasibility, magnitude of opportunity, market attractiveness, and differential advantage (Cooper 1995).

The first stage is called the preliminary investigation for the product which is a quick scoping of the project. At this stage a preliminary market assessment is done and it includes for example literature research, contacts with key customers and other stake holders depending on the characteristics of the business. Also a preliminary technical

assessment is carried out, involving a quick appraisal of the proposed product. The purpose of this is to assess the development and manufacturing times and costs and possible risks. (Cooper 1995.) Thus, the first stage provides market and technical information in a comparatively short time. This information is needed as an input to the gate 2 for the first financial analysis.

The second gate is called the second screen. This gate is basically a repeat of the first gate in the sense that the project is re-evaluated in the light of the new information provided by the first stage. Also the financial return of the project is calculated in a quick and simple way. After the second gate is the second stage. This stage is called building the business case. A business case is a standardized presentation of a proposed development project created by using a standardized methodology (Saaksvuori & Immonen 2008, p.199). This stage involves detailed investigation of the product and the attractiveness of the project. Building the business case includes elements like target market definition, specification of product positioning, product features specification and competitive analysis (Cooper 1995).

The last phase of the stage-gate system that is discussed in this thesis is the third gate where the decision about the business case is made. At this gate it is reviewed that all the needed activities were undertaken in building the business case and that the quality of execution is good. Also the financial results of the business case are reviewed and the decision is made. If the project gets a go –decision, the organization commits to the proposed project and product. (Cooper 1995.) After the third gate, the project goes to development phase.

2.3.   Management tools in strategy work

Management tools for strategy (sometimes also named strategy tools) are methods, models, techniques, frameworks and methodology used to facilitate and illustrate strategy work (Stenfors 2007, s.3). Management tools are needed to support management's decisions and actions (Phaal et al. 2006). A large number of management tools and frameworks have been developed by managers, consultants and academics to support the product strategy creation process (e.g. Fleisher & Bensoussan 2002; Schilling 2008; Phaal et al. 2006). Since every company differs from each other, it is necessary to find the best tools for each case. The tools discussed in this chapter have been selected from strategy literature with the guidance and approval of interviewees and the project team in which the researcher worked. The tools selection process has been an iterative process including reading up on literature, orientating to organizations business activities and interviewing the personnel. The interviews, meetings, and benchmarking with other companies are discussed more in the research method and material chapter.

2.3.1. Bubble diagram for portfolio management

It is common to use bubble diagrams for portfolio management to support the selection of R&D projects in companies. Such as this approach is widespread because of its visual simplicity. However, to get the most value from such tool, it is important to customize the tool to fit the organizations needs. (Phaal et al. 2006, p.342). Cooper & Edgett (2008) suggest that the most used variation of bubble diagram is a risk-reward bubble diagram (figure 2.3.1).
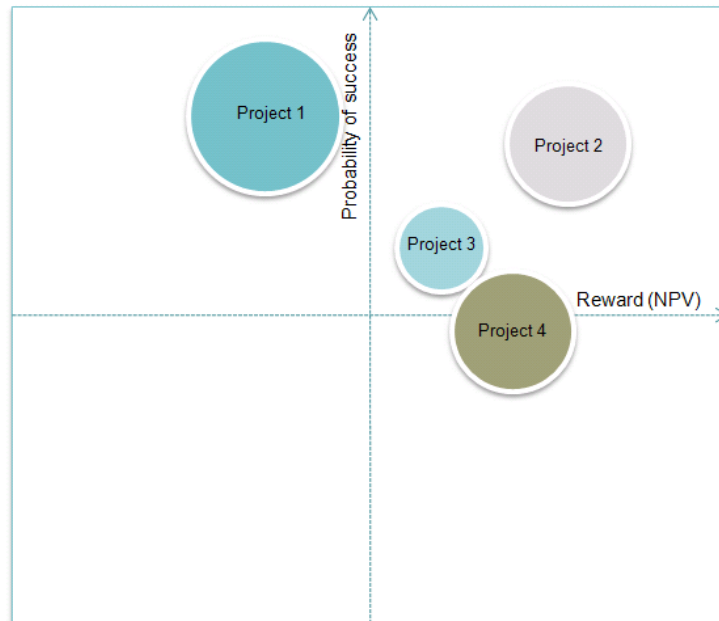
Figure 2.3.1 *bubble diagram of NPD project portfolio (Adapted from Cooper & Edgett 2008)*

In a risk-reward bubble diagram the probability of success for a project is illustrated on the y-axis and the forecasted reward for the project is illustrated on the x-axis. Different product development projects are shown as bubbles and the size of the bubble illustrates the amount of resources needed for the project. This kind of graphical illustration of the projects gives a fast overview of all the projects under evaluation.

It is also possible to add a third dimension, time, to the graph. This way it is possible to see what kind of projects are under development now, and what kind of possibilities are there in the future. Adding time to the diagram may help in securing the long term competitiveness of the product portfolio.

2.3.2. Product positioning

There is no product in the world that does not have a position. Product positioning is about visibility and recognition and what the product represents for a buyer (Ostaseviciute et al. 2008). Companies use positioning strategy to differentiate their

products from those of competitors in the minds of potential buyers (Boone & Kurtz 2001). Kotler (2006) describes product positioning as the act of designing the company's offering so, that it occupies a valued position in the customer's mind. A common model for product positioning is the STP-model (Grancutt et al. 2004; Kotler 1991). The model is divided into three different phases and the letters STP stand for segmentation, targeting and positioning (Figure 2.3.2.1).
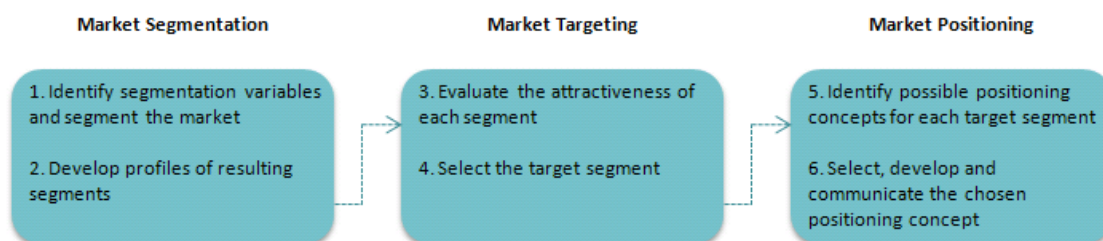
Figure 2.3.2.1 *STP-model (Adapted from Kotler 1991, p.263)*

The first step of the STP-model is market segmentation. This means dividing the market into different groups of buyers who might require different products. The second step is market targeting. This phase means evaluating the attractiveness of each segment and selecting one or more segments to enter. The third step, market positioning, is the act of establishing a competitive positioning for offering in each target segment.

Segmentation can be made based on different characteristics depending on the product and markets. However, usually when segmenting business-to-business markets the most commonly used characteristics are industrial sector and organization's size as well as the geographical location (Ennew & Waite 2006, Pp. 155-156).

When evaluating the market segments, a company wishes to find one or more segments to enter. A decision must be made about which and how many market segments to enter. In general a company can consider five different options in target market selection: single-segment concentration, selective specialization, market specialization, product specialization and full coverage (figure 2.3.2.2) (Kotler 1991).
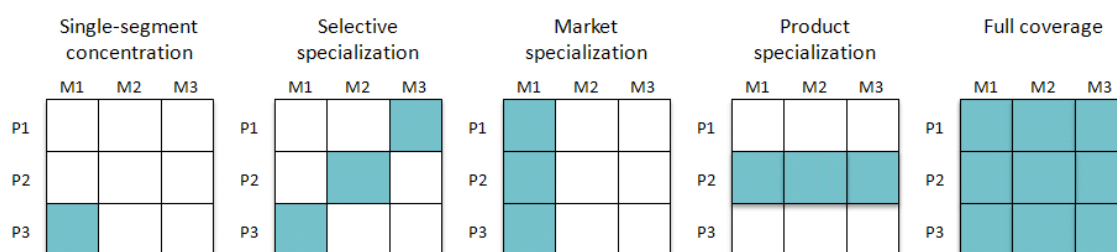
Figure 2.3.2.2 *Patterns of target market selection (Adapted from Kotler 1991, p. 281)*

One framework for illustrating product's positioning on the market is a framework by Michael Porter (1980). This framework illustrates the generic competitive strategies for

outperforming other companies: differentiation, cost leadership, differential focus and cost focus (Figure 2.3.2.3).
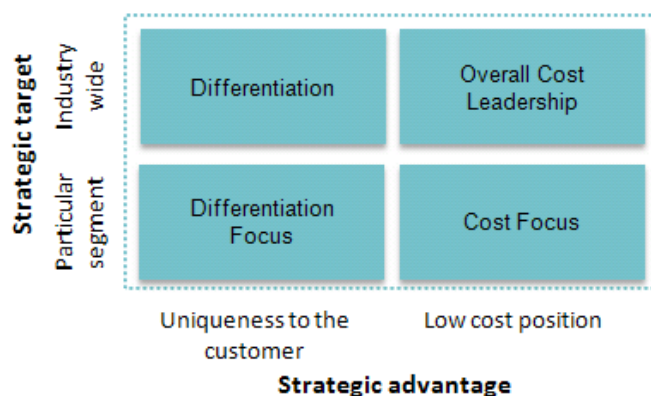
Figure 2.3.2.3 *Generic strategies (Adapted from Porter 1980, p.39)*

Once a company has selected the target segments where it wants to be active in with its product portfolio, it must decide which strategic advantage to use. There are two generic choices for strategic advantage for a company. The product of a company can either be unique to the customer or it can be the cheapest one. The uniqueness to the customer can be achieved by for example design, technology, customer service, dealer network, brand or some other feature. Saaksvuori & Immonen (2008) have listed some elements on which a company can base its competitive advantage.

A cost leadership position can be achieved by a narrow product portfolio and high volumes in production. The competitive advantage for cost leadership position is the low price for the customer. Differentiation focus, however, can be achieved by a superior product or by the best technology used. The competitive advantage for this position is based on the most wanted features on the market. Differentiation position can be achieved for example by being a service leader on the market. The competitive advantage in this case can be achieved with the broadest service portfolio, the most valued services or the high quality of the services provided. The last strategy option, cost focus, can be achieved for example with superior operations management. Most efficient processes, process innovations, and efficiency in supply chain can help to achieve this position. (Saaksvuori & Immonen 2008.)

2.3.3. Roadmapping

Roadmap is a tool that is widely used to support strategic and long-range planning. Roadmapping provides a graphical way to communicating between evolving and developing markets, products and technologies over time (Phaal et al. 2003, s.5). Roadmaps are deceptively simple in terms of their format, but the developing of a roadmap is a more challenging process. When designing a roadmap, it is important to understand the strategic context in terms of focus, scope and aims of an organization

(Phaal et al. 2009, p.41). A product roadmap shows the main development initiatives on a timeline for several years into the future (Cooper 2008). In other words a product roadmap illustrates forecasts and plans for the future in a visually simple, yet powerful way. A roadmap can also be thought as a compact visual method of summarizing and communicating the key business decisions that are made (DeGregorio 2000). Thus, a product roadmap is the result of a product strategy process, which illustrates the strategic decisions made.

Probert et al. (2003) state that there are three primary business processes that are closely related to product roadmapping. These processes are the strategy formulation, innovation and operations processes. The strategy formulation process aims at developing the overall direction and plans for the future of the business. It is clear that the product roadmaps must be aligned with the strategy formulation process. The second primary business process is the innovation process. This process ensures the stream of new product to sustain the continuity of the business. One of the main objectives of roadmapping is to show when new products and updated products are expected to reach the market. The third primary business process related to roadmapping is operations process. This is the process of getting the current products to the market. Efficiency in operations is often the key to profitable performance and customer satisfaction.

2.3.4. Life cycle analysis

Product life cycle (PLC) model claims that as all living organisms, a product too has four phases in its lifecycle: introduction, growth, maturity, and decline. The product life cycle analysis aids management to understand the market dynamics and it also works as a framework for product management to understand and illustrate the life cycle phases for different products (Fleisher 2002). The lifecycle phases are illustrated in the figure 2.3.4 below.
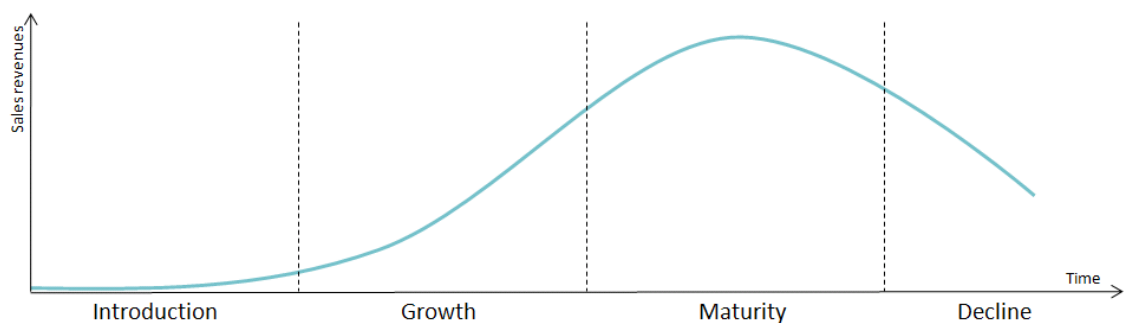
Figure 2.3.4 *The product lifecycle phases (Adapted from Steinhardt 2010, p.70)*

The products that are on the earlier stages on their lifecycles often aim at different goals than the products that are at the end of their lifecycles. On the early stages on the lifecycle the strategic actions often aim at gaining stronger market position. These

actions may be for example aggressive pricing, building capacity, and heavy marketing expenditures. For the products on the later stages on their lifecycles, the emphasis is more on extending the product's lifecycle with actions like developing sales channels and broadening the number of product variations. (Hambrick et al. 1982)

Product lifecycle management can help in analyzing the maturity stages of the product, industry, and the technology. To ensure the cash flow of a company in the long run it is important that a company offers products that are on different phases on their lifecycles (Saaksvuori & Immonen 2002, p. 191). The mature products are often the ones that create most of the cash flow for the company. However, the products that are on early phases on their lifecycles are the ones that make the growth in market share possible and are often the ones that create the cash flow in the future. Thus, offering products that are on different phases on their lifecycles is needed to ensure the long term continuity of a business.

2.3.5. SWOT analysis

SWOT is an acronym for strengths, weaknesses, opportunities and threats. It is a simple and comprehensive tool which has made it one of the most popular models in strategic management (Fleisher 2002). SWOT analysis gives an overlook of organization's situation which is thought as one of the key elements of strategy formulation. Situation analysis consists of both an internal and an external analysis. The goal of environmental analysis is to scan the environment to identify positive and negative trends in present and in future. A SWOT analysis table is illustrated in the figure 2.3.5 below.

Figure 2.3.5 SWOT analysis table (Adapted from Fleisher 2002)

The internal and external forces are divided into positive and negative. Internal forces are related to things that can be influenced inside the company. These can be related for example to the resources of a company. Positive internal forces are called strengths and negative internal forces are called weaknesses. External forces are matters that are not only in the hands of a single company. These factors can be related to the competitors

and the market of the company. The positive external factors are called opportunities and the negative external factors are called threats. Since SWOT analysis is such a well known tool and has been taught around the world in management schools for over 30 years, there is no need for more introduction in this thesis.

2.4.   Synthesis of theory: systematic model for product strategy and offering development

Since this thesis is carried out as a case study the above-mentioned theory should be adjusted to the needs of the case company. Research problems in case studies are always individual and it is rare that an all-embracing theory to cover the whole problem is found. In this paragraph the above-mentioned theory is pulled together and a systematic process model for the product strategy and offering development is introduced. The process model is designed especially for the needs of the case company but it also contributes to the academic literature since an extensive process model for product strategy is rather hard to find in literature. The goal of the model is to provide the organization with the information needed to carry out a product strategy and offering development process. The information consists of the sub-processes, the sequence of events and the content of the sub-processes.

The usual problem with annual or any systematic process models is the lack of flexibility in the models. Ideas for new products for example may come up at any time of a year or customers may come up with new needs at any given time. In order to act fast in developing new products or to react fast to the changing needs of the market, the new information needs to be taken into consideration right away in the strategy process. This is why the model proposed in this study contains three layers which are quarterly, daily and as needed. Figure 2.4 illustrates the three layers of the systematic model.
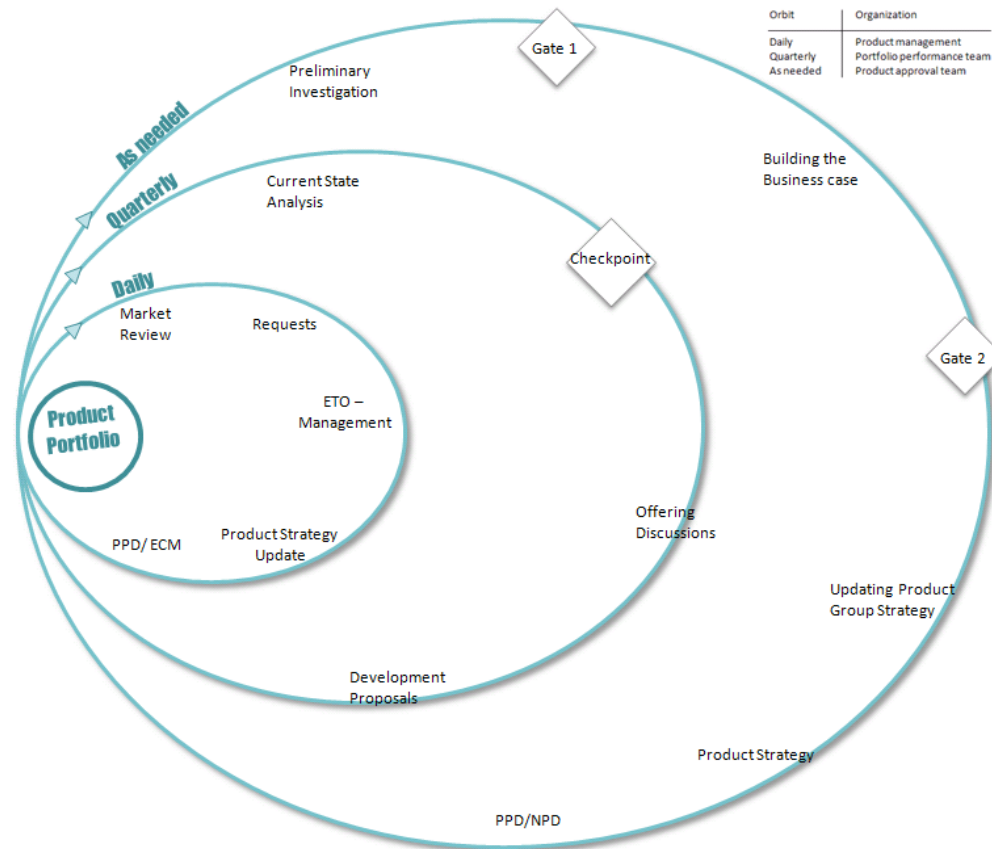
Figure 2.4 *The systematic model for product strategy and offering development*

In the centre of the model is the product portfolio of a company. The ellipses around the product portfolio are called orbits. These orbits illustrate series of processes. All of the three orbits have an effect on the product portfolio. The innermost orbit is the daily orbit which portrays the daily routines of product management function. The first processes in this orbit are market review and product requests. These processes are related to the constant monitoring of the market situation and adjusting to customers' needs. The next phase in the daily orbit is called engineering to order (ETO) management. A customer may for example request a new option for product or a new size of an existing product, which leads to further examination. If it is decided that the new size of the product will be manufactured, the product strategy of the particular product must be updated. The last process of the daily orbit is the present product development (PPD) / engineering change management (ECM) process. Here the development of the new size or option of a product truly begins.

The orbit in the middle is called the quarterly orbit. This orbit describes the systematic collaboration between the product line and the sales management. The product line and sales management are here called the portfolio performance team (PPT). The quarterly orbit aims at adjusting the product portfolio to fit the needs of the customer. The first phase of the quarterly orbit is the analysis of the current state. This includes analyzing the competitive situation and the markets. The analysis will be performed by the product

line and the sales management together in a tight co-operation. The next phase is a checkpoint. This means comparing the current state and the realized sales numbers to the forecasts made by sales earlier and the objectives set in the past. The next phase in the quarterly orbit is the product offering discussion. This task will also be performed by sales and product line personnel together. Sales and product line discuss together about the current product portfolio of the case company and evaluate how the specification and cost of products fit the needs of customers. The purpose of sales here is to work as a voice of the customer. The last phase on the quarterly orbit is the development proposals. In this phase new development projects are proposed based on the findings and analysis made earlier.

When new product ideas are proposed by PPT or if a customer requests a new kind of product, the outermost orbit will be ran through. The tasks on this orbit are performed by the product approval team (PAT) which is a selected group of people consisting of product management, product line management and sales management. This orbit is called the 'as needed' orbit. The first phase of the orbit is to make a preliminary investigation of the proposed development project. This preliminary investigation is a quick scoping of the project. The preliminary investigation provides market and technical information about the project in a comparatively short time. After the preliminary investigation is done, the next phase is the first gate. The proposed development project is now evaluated in the light of the preliminary investigation. In this phase the development project can either get a go or a no-go decision. If the development project passes the first gate, the next phase on the orbit is to build a business case. This phase is a more detailed study of the feasibility of the proposed project. The attractiveness of the product as well as the technical specification and financial estimates are investigated in a more detailed way. After building the business case there is a second gate. If the development project gets a go –decision from the second gate as well, the next phase is to create a product strategy. In this phase, a product strategy is created using a standardized template and methodology. After the product strategy is created, the product group strategy must be updated. This is also done by updating a standard template which will be described more later in the results chapter of this research. The last phase on the orbit is the beginning of the NPD or PPD process. That is when the development of the product actually begins.

3. RESEARCH METHOD AND MATERIAL

In this chapter the research process is described in a detailed way. The research methods are explained and the interviews and survey are introduced to the reader. Also the research material and the ways to analyze it are explained. Explaining the research process gives more reliability to the research and allows the reader to make his own mind about the trustworthiness of the study.

3.1. Research methods used in this study

In this thesis more than one method for collecting material was used, which means this thesis is a multiple methods research. In the first stage of research, material was gathered by qualitative methods but quantitative methods were also used later in this study. A research choice in which both qualitative and quantitative methods are used is called a mixed-method approach. When qualitative and quantitative methods are used either at the same time or one after the other but they are not combined, the research is called a mixed-method research. (Saunders et al. 2009, p. 151.) Figure 3.1.1 illustrates the research choices made in this thesis.
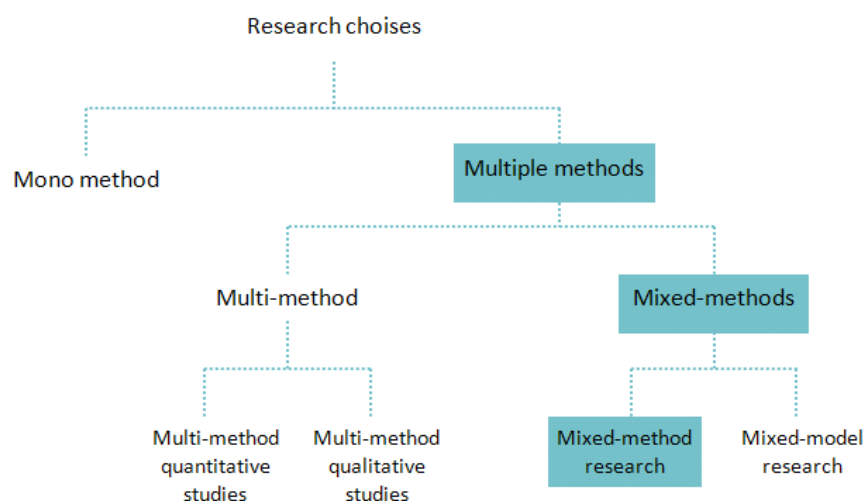
Figure 3.1.1 *Research choices (Adapted from Saunders et al. 2009)*

The empirical research material for this study was gathered by interviews at the beginning of the research process. During the thesis process, a series of semi-structured interviews were held with different decision makers. Qualitative interview method was chosen because of the nature of the topic in this study. The knowledge of the case company's workers had a significant role in adjusting the theories to fit the company's needs. The strategy tools and processes were designed specifically for the product

management function of the case company. Also, the emphasis of the research in the first stage was to understand the needs of the case organization instead of testing an existing model. According to Ghauri et al. (2005, s.110) that suggests a qualitative method should be used.

The role of the researcher was to participate in the development of organizations practices. Thus, the research method can also be described to resemble action research method where the researcher takes part in the organizations practices (Herr & Anderson 2005). The first part of the thesis project can be described as an iterative action research process where the researcher studied literature and the current processes in the organization and selected the best theories and tools together with the employees of the case company to make a framework for the results of this thesis. The second part of the research process was a semi-structured interview round with the employees of the case company. The goal of these interviews was to investigate the information needs and to gather ideas about the product strategy practices and tools. After the first round of semi-structured interviews a quantitative survey was held to a selected sample of the case company's employees to measure how important the different elements of product strategy was considered by different business segments. An interview round was also held with the product managers of different business segments of the case company to gather information about how the proposed set of tools fits the needs of the product managers. The objective of these interviews was to validate the proposed models with the product managers who in future will be the persons using the results of this thesis and also to gather more ideas for further development. Figure 3.1.2 illustrates the four parts of the research process described above.
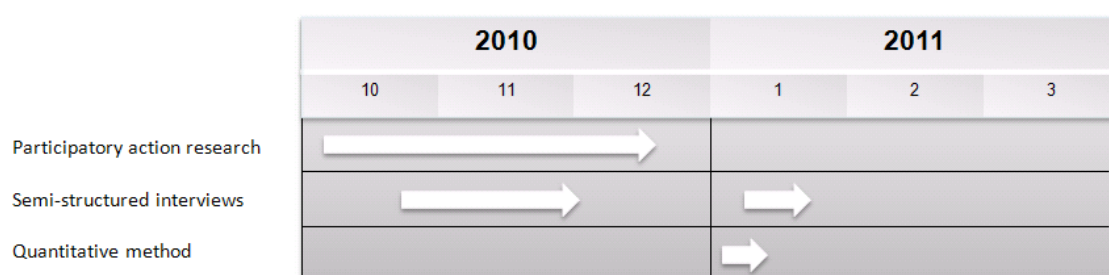
Figure 3.1.2 Research process and the different research methods used

The different phases in the research process are described in a more detailed way below. However, as the action research methods are already discussed in chapter 1.3 (Research approaches and methodology), we begin with going through the interviews held as a part of this research.

3.2. Semi-structured interviews

The interview method used in this thesis was a semi-structured interview. A semi structured interview proceeds according to the interview themes that are decided before the interview but it also allows other conversation (Koskinen et al. 2005, p.108). The interview structure was designed so that the first questions are warm-up questions, the broadest questions are in the middle-section and in the end the interviewee gets to bring out other opinions or aspects. The research philosophy behind semi-structured interviews is social constructivism which means that the interests of the interviewees affect the results of the interviews and that the researcher constantly takes part in the research process (Koskinen et al. 2005, p.34). This has to be taken into consideration when analyzing the results of the interviews.

3.2.1. First interview round

In the first interview round 13 different employees of Glaston's organization were interviewed. The interviews took approximately from one and a half hours to two hours each. List of held interviews in the first round can be found in Appendix 1. The interview structure was based on the themes that can be seen in figure 3.2.1.
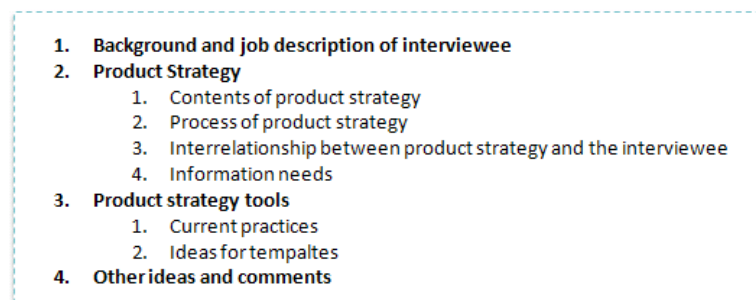
1. **Background and job description of interviewee**
2. **Product Strategy**
    1. Contents of product strategy
    2. Process of product strategy
    3. Interrelationship between product strategy and the interviewee
    4. Information needs
3. **Product strategy tools**
    1. Current practices
    2. Ideas for tempaltes
4. **Other ideas and comments**

Figure 3.2.1 The structure of interviews in the first interview round

The first theme in the interview structure was about the interviewee's background and job description. The objective of this theme was to get to know the interviewee, understand the interviewee's position in the organization and to warm him up for the following questions. In the next theme the conversation moved on to the main theme of the interview, product strategy. The interviewee was asked to explain what he thinks product strategy consists of and what should be taken into consideration when creating a product strategy. Also the process of creating a product strategy and the information needed in creating a product strategy were discussed. In the third theme the interview moved on to the tools and methods that can be used in creating and illustrating the product strategies. The interviewee was asked to talk about the current practices used in product strategy related tasks and to give ideas for the product strategy templates that would be created by the thesis researcher. In the last theme the interviewee could bring out all other ideas about product strategy related issues.

In the first round of the semi-structured interviews the main goal was to gather information on what the interviewees think should be included in product strategy and how it relates to their work. Other goals for the researcher were also to get a better understanding of the case company's organizational structures, to get to know personnel and to engage the personnel with the thesis project.

3.2.2.   Second interview round

The second interview round was more a validation round for the proposed templates. The researcher had a set of templates that were prepared based on the results of the first interview round, the quantitative surveys, literature, benchmarking, and the research of the current practices in the case company. The templates were sent to the interviewees approximately a week before the interviews and they were asked to go through the material before the interview process. In the interview process the templates were discussed and the product managers of different business segments were asked to tell their opinions about the templates and how they fit the needs of the different business segments and product groups.

First the templates were presented to the Heat Treatment and Services Segment product managers of the organization in Finland, who had been participating in the development process of the templates in a more active way than product managers of other parts of Glaston's organization. The second interview was held to the product managers of the Software Solutions business segment in Germany. The third interview was held to the pre-processing product managers from Italy and to one product manager from China. The last interview was held to a Brazilian product manager of heat treatment and pre-prosessing machines. The interviews within Finland's organization were held as face to face interviews and the rest of the interviews were carried out as video conferences.

3.3.   Quantitative survey

A quantitative method was used after the interview round to get more information about which elements of product strategy are seen as the most important ones and to get reasons for selecting the final toolkit for the templates. Using a survey method, it was also possible for many people to take part in the selection process in a relatively short period of time. Also, by using a survey, the differences in the influence of strong and weak individual personalities were evened out.

In the survey, all the elements of product strategy that had come up in the interview process were listed. A seven point numeric rating scale was used in the survey and only the end categories were labeled. Number one was labeled as "Not important at all / should not be a part of product strategy" and number seven was labeled as "Extremely important part of product strategy". The survey was sent to 30 employees of the case company and they were given a week to fill the survey and return it to the researcher.

The survey consisted of 23 different matters that were gathered from the first interview round, literature, and benchmarking. The different elements suggested in the survey sheet are listed in the figure 3.3.

Scale from 1 to 7
(1 = not important at all / should not be a part of product strategy)
(7 = extremely important part of product strategy)

1 Compatibility with corporate strategy
2 Setting objectives
3 Analysis of curren situation (markets,competitors,products)
4 Customer needs
5 Image of Glaston, Glaston Brand
6 Modularization of products
7 Environmental aspect
8 Life cycle analysis
9 Market segmentation
10 Target marketing
11 Differentiation from competitors
12 Collaboration with different Business Units
13 Financial projections
14 Technical competitor analysis
15 Sales argumentation for products
16 Cost reduction plans
17 Product roadmapping
18 Comparison of possible R&D projects
19 Long-term technology trends
20 Risk analysis
21 Customers' customers' needs
22 Roadmap for products
23 Stage-gate system in strategy process

Figure 3.3 The survey sheet.

In addition to the survey sheet, other instructions were given to the respondents about filling the sheet and returning the sheets to the researcher. The list of respondents of the quantitative survey can be seen in Appendix 2.

3.4.   Research material

The researcher was an employee of the case organization for the time this research was made and worked in the product management function at the head office of the case company. Thus, it was possible to gather a very rich qualitative research material by interviews, observations and informal interaction with other employees. The participatory role of the researcher not only gave access to the current practices and methods used in the case company but also enabled the researcher to get familiar with the culture and knowledge of the organization. The held interviews and benchmarks were naturally documented and the researcher kept a log of the matters that came up in more informal discussions. Quantitative material was also gathered later on the research process.

The formation of the sample used in this research could be described as a snowball sampling method. This means that the researcher first discussed the research inside the case organization with the supervisor of the thesis and got a list of possible interviewees. When going through the first list of interviews more names came up and the sample kept on growing like a snowball rolling downhill. The benchmarks held to support this thesis were arranged with the help of connections of the supervisor of this research and other employees of the case company.

The qualitative material of this research is analyzed in a narrative way. In the results chapter of this thesis the most important matters that came up in the interviews are pulled together and the interviews are discussed. The quantitative materials are analyzed as a whole sample and by dividing the sample into smaller sections and analyzing the differences. The quantitative results are illustrated in different charts.

4. RESULTS

Based on the findings from literature and the results of the first interview round, a list of product strategy elements was gathered. The list was sent to a selected sample of Glaston's personnel as a survey and the results were used in reasoning the selection of the final version of the templates. Also other findings came up when analyzing the results of the survey. At the beginning of this chapter the results of the interviews and survey are discussed briefly. After that, the set of templates developed in this research project are introduced. However, it is not sensible examine all of the templates on a detailed level due to the multiplicity of the templates. The academically important outcome of this research is to describe the development process of the product strategy model and to give understanding of the elements that had an impact on the development process. We discuss the templates on a general level in this chapter and the final versions of selected set of the templates can be found as attachments to this research.

4.1. Results of the semi-structured interviews

The researcher worked daily at the head office of the case company in Tampere, Finland. Glaston manufactures machinery for the heat treatment product line in Tampere and the Services segment is also present in Tampere. Thus, it was convenient and most logical for the researcher to begin the research process by interrogating the needs of those businesses that are present in Tampere. Also, the supervisor of the thesis researcher was the director of the heat treatment product line which meant that plenty of information about the heat treatment business was available for the researcher. The most important findings that came up in the first interview round are briefly discussed in this chapter in a narrative way.

Once the researcher had begun to have interviews inside the case company, it came clear in a short time that almost everyone emphasized the significance of the matters that were related to their fields of work. This could of course be expected and the researcher's task was to get a general view of the situation as a whole. Yet, some things were seen important by almost everyone who was interviewed. One of these things was that the organization should be transformed into more customer-driven. The senior vice president of the Services business segment among others stated: "*The needs of the different markets should be recognized and the whole business should be driven by the markets*". The product development director of the Machines business segment also said that: "*The market needs should be discussed together in systematic product offering discussions between the sales and the product line employees*". In product strategy, the customer-driven way of thinking should be taken into consideration especially when

planning the product portfolio and developing new products. Many interviewees also suggested that when designing products and their strategies, it would be beneficial to think from the customer's point-of-view. For example, what kind of market does the customer have for the end product and what kind of end product quality will satisfy the end customers. A product manager of the Services business segment said "*It could be beneficial to investigate for example the waste, the quality costs, the production costs and the profits of a customer more carefully*". It was stated by many interviewees that the sales and marketing management should take part in the offering discussions more often.

The target marketing was brought up by many interviewees. The product development director for example stated: "*Different markets need different products*" and the senior vice president of the Services business segment stated as well that: "*The market segments have different needs and modularization should be used more efficiently to customize the products*". The target market segments of the current product portfolio were also seen unclear by a few interviewees. It was stated, that different industries and especially different geographical markets need different kind of products and it is sometimes unclear which products are targeted to which segments. However, this statement received counter-arguments by another interviewee who claimed that due to the flexibility of some products they can be used in many different purposes in many kinds of businesses and industries.

Majority of the interviewees pointed out that the current practices are very unclear and should be more systematic. It was seen as a problem that all the business units have their own way of creating business cases and strategies for products. This problem shows off especially when comparing the different business cases and product strategies with each other. The financial estimates of the business cases can for example be calculated in a different way which makes it hard to compare them. It was also stated that some kind of a stage-gate system would be very useful in the process.The vice president of sourcing stated: "*Filters and stoppers are needed in the process. A business case must qualify certain requirements to get a GO-decision.*" He also stated that "*The system must be based on calculations and it must be unbribable*". Especially R&D personnel spend a lot of time making calculations and business cases for all the product proposals. The research and development director stated: "*The R&D department has to spend a lot of time and resources in making calculations based on the market requests. Better ways to filter the number of the requests are needed*". It was suggested that some kind of a system would be needed in order to filter the best proposals from the weak ones with less effort. When asking about ideas for the templates, the majority of the interviewees emphasized the simplicity and the ease of use for the templates.

It also came up in many interviews that the whole lifecycle of each product should be taken into consideration when planning the product strategies. The senior vice president of the Services business segment claimed: "*A heat treatment machine is often the most*

expensive machine the customer has and therefore it is important that maintenance and other services are offered through the whole lifecycle of the product". Also, different upgrades can be used to lengthen the life cycles of products and the products can be updated to new versions to keep them interesting in the eyes of the customers. A few interviewees stated that the product strategy should also take into consideration the estimated sales numbers of the product and how the sales numbers evolve in the different phases of the product's life cycle.

The majority of the interviewees on the first interview round stated that it is crucial for the product strategy process that an extensive analysis of the current situation is generated. In order to plan the strategies, information about the markets and competitors is needed. Engineering and technology transfer manager stated in an interview that: *"The sales should gather market and customer information more systematically and the information should be stored and analyzed"*. Also different business drivers should be followed in order to predict the demand on different markets. It was emphasized by three different interviewees that the product strategies should be based on facts and the possible influence of humane mistakes and attitudes should be minimized. It was also suggested that the current situation analysis should analyze the current product portfolio and compare it with competitors' portfolios.

A few interviewees also stated that the most important thing in product strategy is to define the basis of differentiation. It has to be made clear how an individual product is going to outperform the products of competitors. The differentiation can be achieved for example by design, technology, customer service network, brand, or the best price-quality ratio. The vice president of sourcing stated: *"The products should not be seen only as physical goods since the differentiation is hard to be achieved with simply the best hardware nowadays"*. The product and the competitors' products must be positioned by the chosen differentiation criteria in order to get an overview of the current situation. If the basis of differentiation for each product is not clear for the employees of the case organization, it can be really hard for the sales management to communicate the differentiation from competitors to the customer.

Some of the interviewees pointed out that it would be beneficial to follow the long-term technological trends and forecasts. It could be beneficial to systematically follow the development of new technologies and think of ways to utilize the technologies in product development. The vice president of sourcing suggested *"A closer cooperation with universities could be used to get knowledge about the latest technologies and the possible dominant designs of the future"*. However, some of the interviewees claimed that it is not relevant to waste resources on following the long-term technological trends.

During the first round of interviews, four of the interviewees pointed out the importance of setting objectives for the product strategies. These objectives should be financial objectives, business objectives, and technical objectives for product development. The

vice president of sales stated out: "*The most important things in product strategy are to decide in which businesses we want to be in and to set goals for the future*". It was also stated that there's no point in setting objectives if the realization of the objectives is not followed. It was proposed that the financial objectives should be derived from the company level objectives and the business objectives could be set individually for each product. These business objectives could be for example market share in two years or a target for sales growth in a certain market.

As the second interview round was more a validation round for the proposed templates and several iterative development rounds were already held inside the project team and with the case company's supervisor of the thesis, not that much feedback was expected. The researcher had managed to develop the templates in such a universal level, that most of the proposed templates fitted the needs of all the different business segments. All of the interviewees were satisfied with most of the templates. However a couple of problems came up because of the differences between the business segments. First of all, the life cycles of the software products are a lot shorter than for example some of the heat treatment products'. Thus, it was seen as problematical to use some of the templates with the software products. Another problem showed up with the segmentation of the customer groups. Some of the pre-processing products are not as bound to industries or customer segments as the heat treatment machines for example. The same pre processing product can be used in many different industries and customer segments without changes in the product. However, the observations that came up on the second interview round were not seen as big problems by the researcher and were solved with slight changes in the templates.

4.2. Results of the quantitative survey

The survey was sent to 30 employees of the case company. The employees were given a week to send their answers to the researcher. The researcher sent a reminder to the ones who hadn't replied one day before the deadline. However, only 21 of the employees sent their answers to the researcher before the deadline. The figure 4.2.1 illustrates the sample to which the survey was sent.

Table 4.2.1 Survey sample

	Survey was sent to	Replied	Replied (%)
Machines	12	9	75 %
Services	3	2	67 %
Software	9	5	56 %
Sales	6	5	83 %
TOTAL	30	21	70 %

The survey was sent to 30 employees of which 12 works in the Machines- , three works in the Services- and nine works in the Software Solutions business segment. The survey was also sent to six inductivesales managers. The sales managers had the best reply percentage (83%) and software personnel had the worst (56%). The nine respondents of the Machines business segment can be divided into sub segments as illustrated in the graph 4.2.2 below.
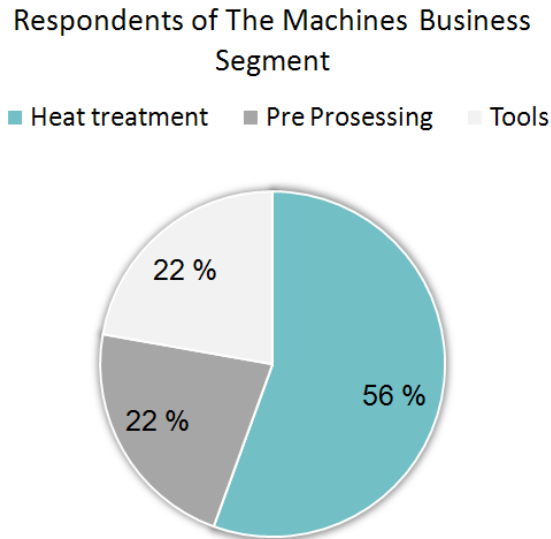
Figure 4.2.2 *Respondents of Machines business segment*

Five of the respondents of Machines business segment are heat treatment employees, two are pre processing employees and two work with tools. The job descriptions of all the respondents can be found in appendix 2.

The results of the survey were pretty even and none of the elements were considered needless or unnecessary by everyone. Still, interesting conclusions can be found from the results. It can be seen that different people appreciate different things in product strategy but already in a sample of 21 persons the differences between individuals become even. The average results of the whole sample are illustrated in the figure 4.2.3 below. The results of the survey as well as the variance of the results can be seen more precisely in a table form in appendix 3.
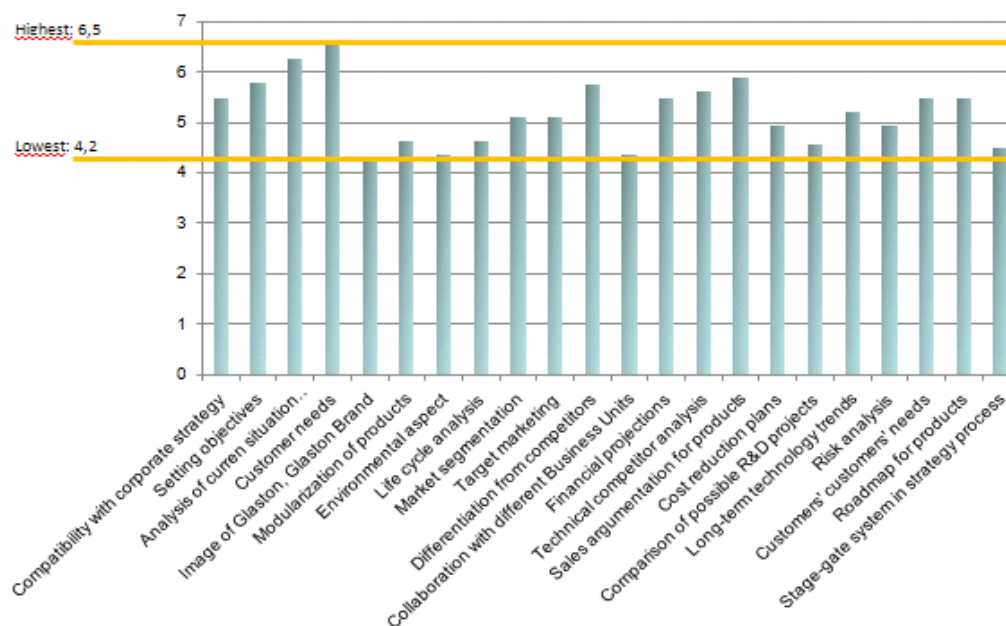
Figure 4.2.3 *Whole sample, average values*

When examining the whole sample of 21 respondents, customer needs gets the highest average value of 6,5 in a scale of one to seven. 17 respondents out of 21 gave customer needs the value 7 which is the highest possible value. Three people rated the importance of customer needs with a grade of 4 and one respondent gave the value of 6. Despite the fact that many interviewees stated in the semi structured interviews that the organization should be more customer driven, the organization excluding three respondents clearly has a customer driven mindset. It is well known that the customer aspect should be considered when making strategies for products but still the interviewees complain that the lack of customer orientation has been a problem. This might be a consequence of old firmly established practices or a consequence of a lack of systematic customer oriented practices.

The image and brand of the case company was considered the least important thing in product strategy when examining the whole sample of the survey. The average value of image and brand got the average value of only 4,2 points out of seven. Nine respondents rated the image and brand with a grade of 5, six with a grade of 4 and four with a grade of 3. In addition one number 6 was given by a sales manager and one number 2 by a machines segment worker. Still, the grades given to the image and brand of Glaston were dispersed less than average. The variance of the values given to the image and brand of Glaston was 1,0 as the average of all the variances was 1,5 (see appendix 3). Still, the case company is one of the biggest players in the industry and it has traditionally competed with the technological quality of the products and with its comprehensive services network. The pricing of the products has not traditionally been the source of competitive advantage for Glaston. Analysis of the current situation got the second highest score (6,2) in the survey and sales argumentation for products was

ranked third with the average score of 6. Other highly ranked elements were differentiation from competitors (5,8) and setting objectives for product strategies (5,8).

Environmental aspects (4,4) and collaboration between different business units of the case company (4,3) were seen least important after the image of the company. The grades given to the collaboration between different business units were mostly threes, fours, and fives but the grades given to the environmental aspects dispersed heavily from 2 to 7. The variance of the grades given to the collaboration between different business units was 1,1 and the variance of the environmental aspects was 1,4. It came clear in the interviewing process that the environmental values have not been very important to the customers of Glaston in the past. However, since bigger and bigger savings in electricity costs can be made with energy efficient and environment friendly solutions, the environmental aspect can be used as a sales argument for all the clients.

It can be roughly generalized that the variance of the most valued elements and the least valued elements was smaller than the ones in the middle. This means that the respondents were quite unanimous about the most important elements as well as the least important elements and that the elements in the middle were more controversial. This can be seen in the table in appendix 3.

It is also possible to examine the different business segments individually to make observations about the differences between them. The templates designed as a result of this research are built as a universal tool for all the business segments to use. The graph 4.2.4 illustrates the results of the Machines business segment.
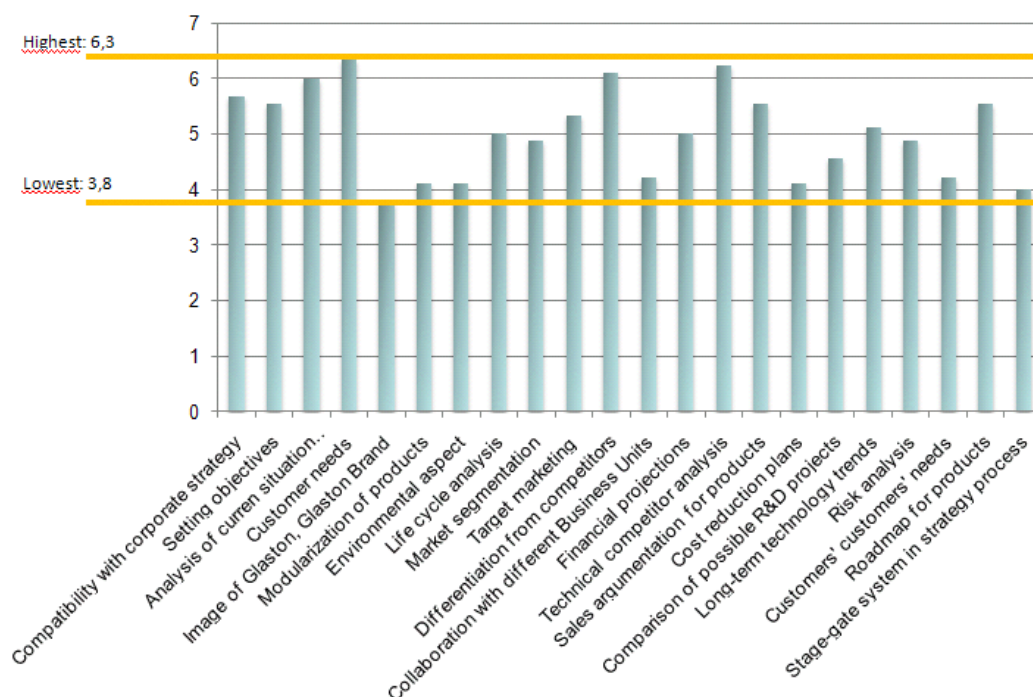
Figure 4.2.4 Machines business segment, average values

As we can see in the figure 5.2.4 the Machines business segment also thought that the most important thing relating to product strategy creation process is that the customer needs are taken in consideration. Customer needs got the highest score with the average score of 6,3. Also the least valued element was the same as in the survey results for the whole sample of the case company. The importance of Glaston's image and brand got overall average of 3,8 points. The average results graph of Machines business segment is for the most parts in same shape as the graph for the whole sample. In the total sample of the survey 12 respondents out of 30 were Machines business segments employees which means that the Machines business segment is weighted most also in the results of the whole sample. This may have an effect to the similarity of the two graphs Next we examine the results of the employees of Software business segment which are illustrated in figure 4.2.5.
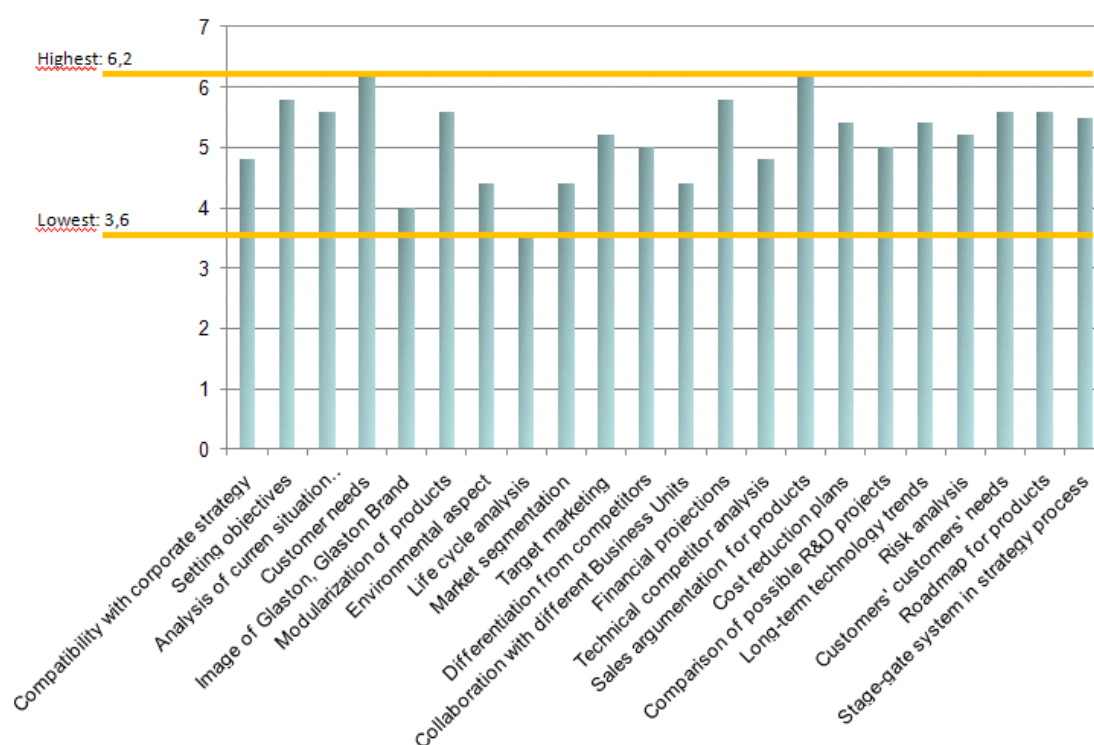
Figure 4.2.5 *Software business segment, average values*

Once again, the recognition of customer needs is valued most in the product strategy creation process. However, sales argumentation for the products got exactly the same average score as the customer needs. Financial projections and setting of objectives for product strategies got the second highest scores by the Software business segment. The life cycle analysis of products got the lowest average score of all. The life cycles of software products differ strongly from the life cycles of for example heat treatment products. The life cycles of software products are short compared to machinery and the software products are continuously updated systematically. Considering Glaston's brand and image in the product strategy creation process was thought to be not important by the Software business segment also. However, the modularization of products got much

higher scores from Software business segment than from others. Software products are often retailed for individual customers needs and modularization of different components makes the process much more efficient.

Figure 4.2.6 illustrates the average values of the answers by the Services business segment. Only two persons of the Services business segment responded to the survey which means the average values are not as extensive as other business segments'. Still, both of the respondents are product managers who were familiar with the master's thesis project before the survey. Thus, it can be assumed that the opinions are considered.
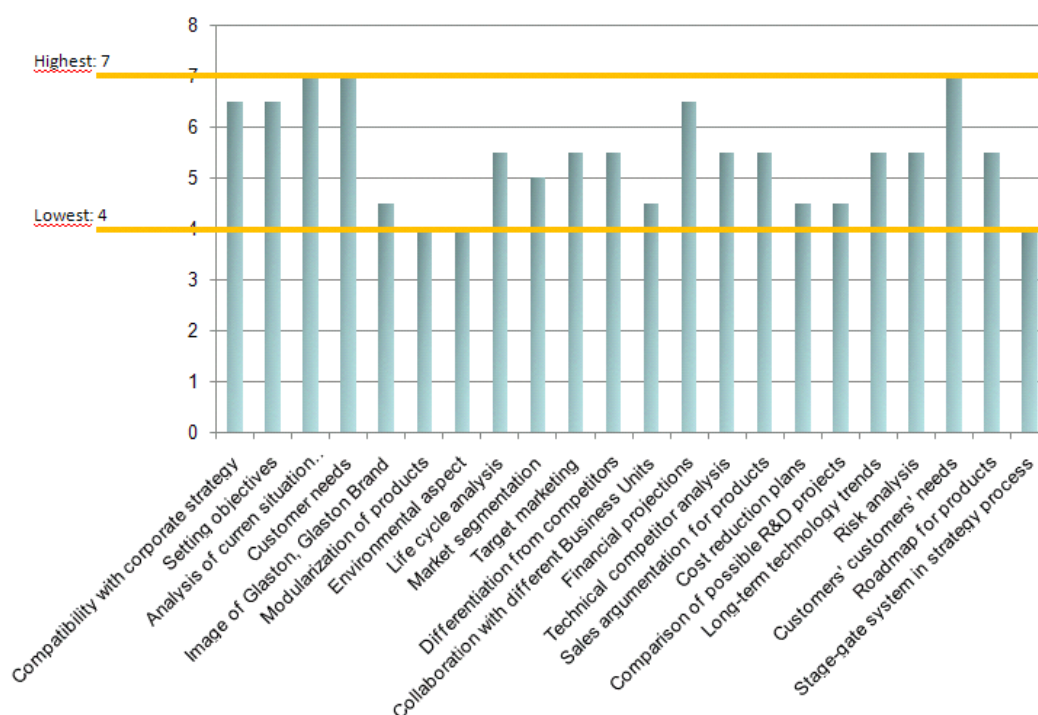
Figure 4.2.6 Services business segment, average values

Customer needs, the analysis of the current situation, and customers' customers' needs were seen as the most important elements of the product strategy creation process by the Services business segment. The product strategy's compatibility with the corporate strategy, financial projections, and setting objectives in product strategy got the second best average scores (6,5) for importance. Modularization of products, environmental aspects, and using a stage-gate system for new products' strategy creation process were seen the three least important elements by the Services business segment.

The last graph (figure 4.2.7) illustrates the average scores of the answers by the sales management who responded to the survey. Five persons of the sales management replied to the survey and all the different regions are included in the sample.
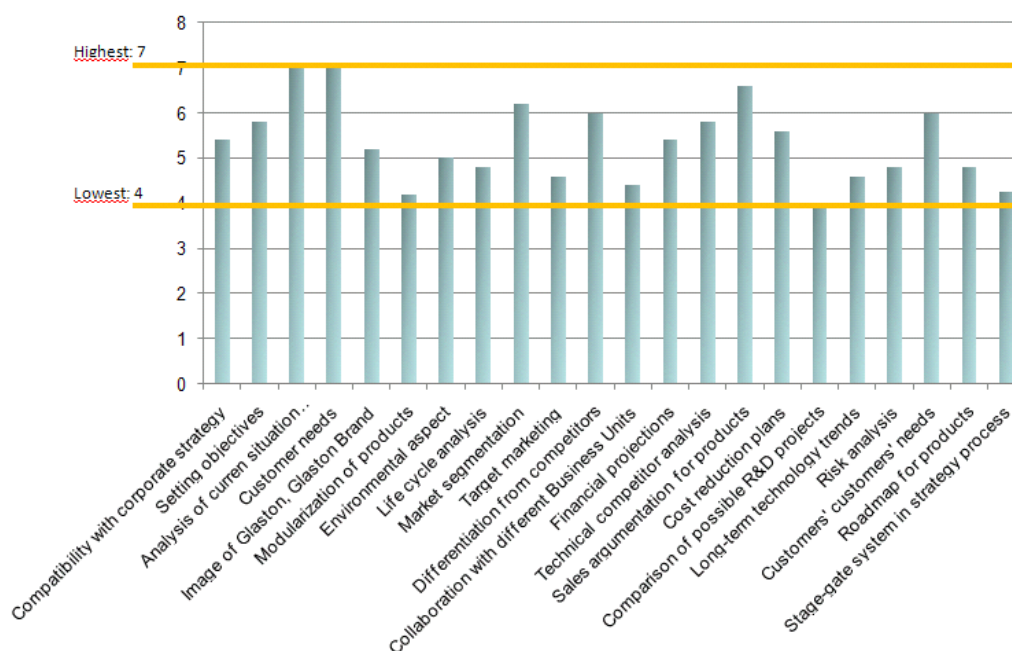
Figure 4.2.7 Sales management, average values

The sales management also valued customers' needs and analysis of the current situation the most. Sales argumentation for products was seen the second most important element in product strategy creation process. Comparison between possible research and development projects was seen as the least important element when considering product strategies. Modularization of products got the second lowest average scores from the sales management. Perhaps modularization is not that familiar concept with everyone in the sales management and for example the time of delivery would had been thought as a more important element.

4.3. Templates for the product management process

In this chapter the templates that were developed in this research are discussed on a general level. The purpose of all the templates is to create a systematic way to examine the feasibility of proposed projects and to function as guidelines for creating business plans for the future. However, the templates must also work in visualizing the studies and plans to decision-makers. In other words, the purpose of the templates is to help in the processes of product management and to illustrate the key points of the studies and strategies in a compact and standardized way.

The templates are developed to be used in the processes described in the systematic model for product strategy and offering development. The templates that are discussed

here are very universal so that they can be used in all of the different business units of the case company. In the beginning of this chapter the three orbits of the systematic model are introduced as process charts and the templates relating to the processes are specified. The figure 4.3.1 illustrates the daily orbit of the process model.
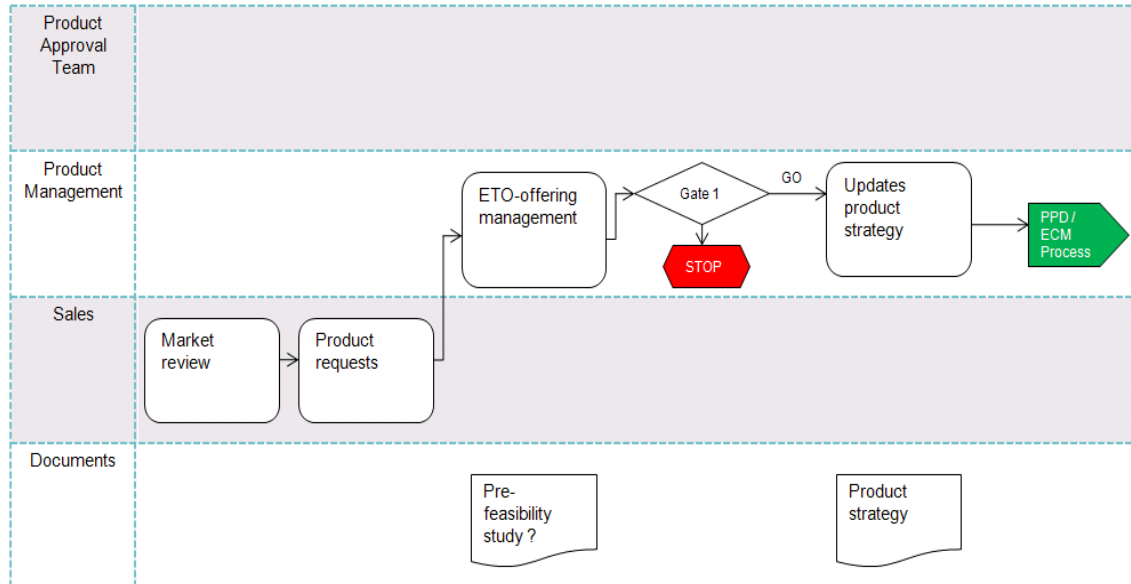
Figure 4.3.1 *The process chart of the daily tasks*

The processes in the chart are the same as discussed in chapter 3.4 synthesis of theory. The first process is the continuous market review performed by sales and the second process is requesting non-standard products from product management. The first template that is introduced here is related to the ETO-offering management process. This template is called the preliminary investigation template. The same template will also be used in the as-needed orbit in the preliminary investigation phase.

The purpose of the preliminary investigation template is to investigate the feasibility of a proposed project in a relatively short time and to visualize and give information about the results of the study in a systematic way. The most interesting outcomes of the preliminary investigation for the decision-makers are often the financial estimates. If a development project will be executed, how much does it cost, how much money will it make and when? However, it is not that simple to make accurate financial estimates for product development projects.

First of all, the target market for the product must be defined. It has to be made clear to whom the product is intended. Glaston produces machinery for different industries which have different needs. For example an automotive glass processing company needs a different kind of processing machine than an architectural glass processing company. Based on the decision about the target segment, the competition can be analyzed. There might be many competitors acting on the same segment that is chosen. Next phase of the preliminary investigation is to position the competitors. Competitors

will be positioned by different characteristics such as performance and cost. When comparing the proposed product's position to the competitors products' it can be seen how much competition the product really has. The product under evaluation should also be positioned inside the case company's product group. This way it can be easily communicated if there is overlapping with other products and what does the overall product group portfolio look like.

The key technologies and selling points of the product also have to be discussed in the preliminary investigation. These can be for example the capacity and price of the product as well as highlights from the product specification. This way the basis of differentiation for the product is made clear. The goal of listing the selling points is to answer the question: How does the product outperform the competitors' products? It also gives perspective to how easily the product can be sold to customers.

The assembly costs of the product should be estimated already in the preliminary investigation on a rough level in order to make estimates about the profitability. These costs can be estimated for example by comparing the product to a similar product which actual costs are known. Often products belonging to the same product group are composed of similar sub-assemblies. This way it is possible to compare the costs of sub-assemblies and suggest cost reductions for the new product. Of course same sub-assemblies also can and sometimes should be used in different products. It also needs to be taken into consideration that the assembly costs may vary in different geographic locations due to differences in supply-chain, workforce and freight costs.

Once the assembly costs of a product are roughly known, the sales volumes need to be forecasted. This must be done in a close co-operation with the sales management of different regions. Also the average price levels for the product must be set. The price of the product can also vary in different regions due to competitive situation in different markets and differences in the manufacturing and other costs. Based on the estimated costs and price levels an estimated gross margin percentage can be calculated by dividing the difference of sales price and the costs of the product by the sales price. The yearly gross profit should also be calculated for the different regions. These financial estimates are accurate enough for the preliminary investigation phase. The decision-makers should be able to make the go or no-go decision based on these figures. The preliminary investigation template can be seen in Appendix 6.

Figure 4.3.2 illustrates the quarterly orbit in a form of a process chart. The three processes on the quarterly orbit all aim at the same outcome which is filling the current state analysis template. The first task on the process chart is to analyze the current state of the markets and competitors which is the first part of the current state analysis template. Second part is to analyze the current product offering of Glaston. The last part of the current state analysis is to make proposals for new development ideas for product portfolio.
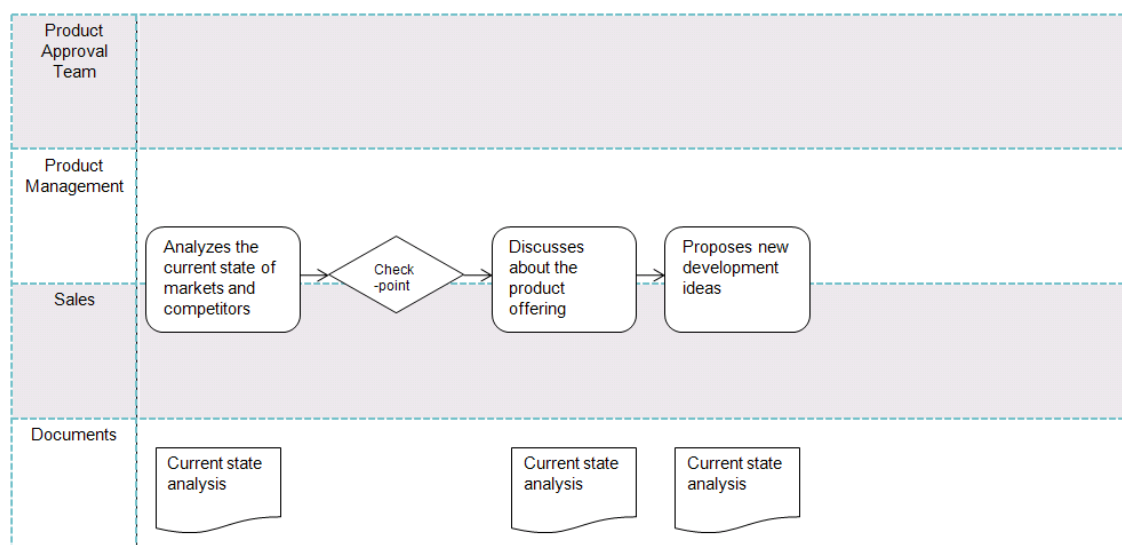
Figure 4.3.2 *The process chart of the quarterly tasks*

The current state analysis examines the current situation of a product group. As said earlier the current state analysis consists of three parts and the first part concentrates in analyzing the current state of markets and competitors. First an overview of the overall market is described shortly. This includes describing the maturity and sizes of the markets on different industries and regions, describing the market share of Glaston on different markets and forecasts for the development of different markets. The markets also have different kind of business drivers that have to be considered. For example changes in legislation, economic growth and architectural trends may have an effect on the development of the markets. These business drivers have to be broken down to at least regional level. Also a SWOT-analysis must be carried out in order to help in analyzing the market situation. This way the portfolio performance team has to go through Glaston's weaknesses and strengths on the market and the possible opportunities and threaths.

The top competitors must be listed and their main weaknesses and advantages compared to Glaston must be evaluated. Also the likely moves of the competitors have to be discussed so that it is possible to think of counter actions and to prepare for the future. Since the current state analysis is done on a product group level, there is no need for specific technical comparison of the competitors' products in the template. However, the competitor companies must be positioned by their overall level of performance and price to see which competitors are the most direct ones and to what direction are they likely to move in the future. The positioning can also be carried out with other characteristics than price and performance depending on what is suitable for the product group. Also the target segments of the competitors must be selected. In the current situation analysis template this is done in one table where it is clearly illustrated with different colors that in which segments each competitor is present. It can also be

illustrated with colors that does the competitor have a leadership role in the segment or not. This way it is clear and simple to communicate to others also.

Between the first and the second part of the current state analysis there is a checkpoint. In practice this means that the objectives set earlier and the forecasts made by sales are compared with the current state and the actual sales numbers. By doing this it is possible to get the sales personnel responsible for their forecasts. In long term it can be seen if the forecasts are accurate or if there is a systematic error in the forecasts. It is also important to see if the objectives that were set earlier have been met. If the objectives however have not been met it is important to analyze the reasons.

The second part of the current state analysis is the analysis of the current product portfolio of the case company's product group. The target segments of the products can be illustrated with the same table that was described earlier in the competitor analysis. The product group's offering can also be positioned by the price level and the number of customers for the product. It was found out that most of the products of Glaston's different business units can be positioned by the price of the product and the number of customers in the same way: The higher the price of a product, the fewer potential customers exist. Another way to examine the current offering of a product group is to position them on their life cycle. Usually a product's life cycle follows a similar path of phases which are development, introduction, growth, maturity and decline. All the products of the product group can be positioned to the phase of life cycle they are on. This way it can be made clear that which products are about to be introduced, which are mature, and which are about to be removed from the portfolio.

The third phase of the current state analysis is the proposal of new development projects. In this phase also business objectives for the future are set. These objectives might be for example gaining more market share in a particular segment or going to a new market with an existing or a new product. It is also important that the realization of these objectives is measured systematically. Based on the analysis, new development projects are proposed. The proposals are a list of short descriptions about the development projects. The projects are then placed on a bubble diagram where the size of the bubble indicates the magnitude of opportunity and the bubbles are placed on the diagram by their possibility of risk and the time to launch. In this graph it can be seen what kind and how many development projects are under consideration. It also needs to be made clear is the project new product development or present product development project and is the innovation new to market or just new to Glaston. The current state analysis template can be found in Appendix 8.

The process chart of the 'as needed' orbit can be seen in figure 4.3.3. The whole process chart begins with a development idea and the idea is evaluated first with the help of the preliminary investigation template. The template is the same as introduced earlier when discussing the ETO offering management process. After the preliminary investigation is

prepared a preliminary decision is made about the project. If a green light is shown to the project the next phase is building a business case. To help in this process a template is designed for this process also.
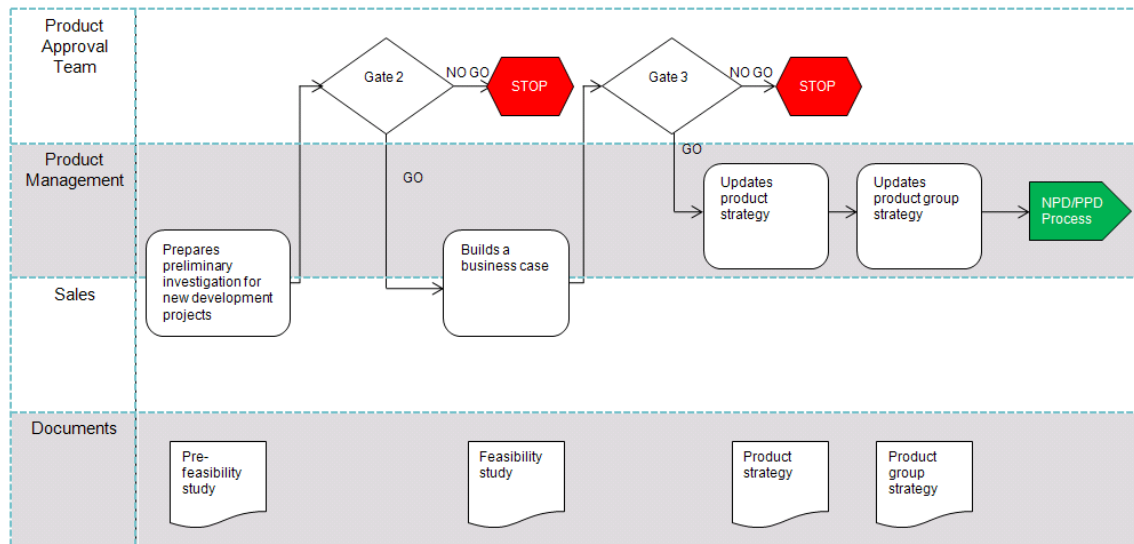
Figure 4.3.3 *The process chart of the 'as needed' tasks*

The business case template is a more specific version of the preliminary investigation template. The business case template is prepared also by the portfolio performance team which consists of product management and sales management. The first part of the business case template is similar to the preliminary investigations target market and competitor positioning methods described earlier. The information can be derived from the preliminary investigation templates and updated if needed.

However the technology and product concept are discussed much more detailed in the business case template. The business case is often built by comparing alternative product concepts. The alternative concepts are introduced and the key negative and positive points about the concepts are discussed as well as the estimated unit costs of the product concepts. The selection of the product concept is made on the basis of the comparison process. Once the product concept is selected, it is described in a more extensive way. This means that the technologies used and the most important technical and performance related specification are discussed. Also the main selling points of the product concept are specified on a company level and on a product level argumentation. Company level sales arguments are a list of the values and the strengths of the company that are represented through the individual product. The product's sales arguments are a list of how the product differentiates from the competition.

Next, the standard features and the optional features of the product are listed. Often the products of Glaston can be sold as a standard version but they can also be tailored to the

needs of the customer with optional features. Also the different versions like different sizes of the product that are planned to offer must be listed in one table. As stated earlier, in the business case template the top competitors' products are analyzed in a more specific and technical way as in the preliminary investigation. This can be done in a technical competition matrix where the competitors and the key characteristics of their products are listed. Same kind of matrix can be done with the case company's product group offering to give an overall view of the product portfolio and the performance capabilities of different products.

Once the technology of the product is discussed, it is time to go through the business model related to the product under evaluation. The first step here is explaining the sales channels of the product. The products can be distributed by using external distributors, through the case company's own sales network or by combining the previous alternatives. Also the installation and commissioning model for the product must be discussed. This covers for example the decision about will Glaston take care of the whole installation process of the product or will it be left for the distributor. It also needs to be decided which organization provides the possible installation personnel and supervisor for different regions. The after sales business must also be described in the business case template. This includes the decisions about which options will be sold and by which organization they are sold on different regions.

The marketing strategy for the product will also be discussed in the business case template. First of all, the branding of the product must be defined. Glaston has different brands for products due to acquisitions. For example the flat tempering products are branded under Tamglass or Uniglass names. Of course it is also possible to create a new brand for a product if needed. Also the launch of the product must be planned in the business case template in case of a go-decision for the product is made. This includes the estimated dates for the product launch in different regions and the launching events.

The resource requirements of the development project must also be discussed in the business case template. It needs to be specified what kind of organization is needed for the design process and how much the design costs would be. It is also important to examine if the product will be developed by an individual business unit or in collaboration with others. A gant chart can be added to the template to illustrate the whole design process.

Financial estimates are an important part of the business case template. The thesis researcher prepared spreadsheets to help in making the financial calculations and the outputs of the calculations will be presented in the business case template. However, it would be irrelevant to introduce the spreadsheets on a detailed level on this research so only the outcomes and results of the financial estimates are discussed. The financial estimates begin with an overview of the costs break down. This, in other words, is a list of the different costs that will be allocated to the product in different regions. These

costs include for example the product's component costs, assembly costs, freight, installation supervision, support engineering, and spare parts. Also the target price of the product must be stated as well as the gross margin of the product in different regions. The next phase is to forecast the sales volumes in different regions in the future. The time period of the forecasts can be adjusted depending on the estimated lifetime of the product in question. These forecasts need to be done in a close collaboration with the sales management. Once the sales volumes and prices are known, the order intakes and net sales in the future can be calculated.

The next phase is to calculate the profitability of the sales by using the estimated sales revenues and costs. However, the internal cannibalism between the case company's products must be taken into account here. The launch of a new product can lower the sales amount of existing products which lowers the total profits of the case company. The total profits of the case company can be calculated by deducting the estimated profitability losses from the calculated profits of the product under evaluation. The needed investments for the development project are also analyzed in the business case template. By deducting the depreciated investments and the fixed costs from the gross margin, the annual earnings before interests and taxes (EBIT) can be calculated. By setting a discount rate, it is possible to calculate a net present value with the annual EBIT values. If the net present value is positive, the decision on the product can be seen as a worthwhile decision. The last phase in the financial calculations is a sensitivity analysis. In sensitivity analysis it can be estimated how much a change in sales price or sales volume would affect the net present value in a long run. The last task in the business case template is to do a risk analysis for the project. The risk analysis includes production, product development, technology, sales, marketing, and product management risks. The business case template can be seen in Appendix 7.

 If the business case gets a go-decision from the product approval team the next phase is to create a product strategy for the product with the help of the product strategy template (see figure 5.3.3). Product strategies are also updated for existing products systematically The product strategy template begins with a brief introduction of the product and explanation of the competitive advantage of the product. Will the product outperform the customers' product with for example low price, best technology or with some other feature of the product? After the introduction, there is a same kind of market overview as in the business case and preliminary investigation templates. The market overview is repeated in the different templates because it is really important that the latest information is used and the target market and the market estimates may change and get more precise on the way. Also the upper management may only see the product strategy template, which makes it important that all the most important plans and facts about the product are illustrated there. The competitor analysis and positioning are also the same as in the previous templates.

Since product strategy is updated systematically for present products also, it is necessary to make a cost reduction plan for the future and set cost targets for the product. The ways to reduce product costs are explained here and the reasons for achieving the cost targets are discussed. The manufacturing and installation requirements must also be discussed in the product strategy template. This includes the decisions about where the products are manufactured now and in the future, what kind of delivery times and installation times can be achieved and which product variants (sizes for example) are offered. Next the financial estimates are presented. This includes illustrative graphs of the sales volume estimates for the future as well as the evolution of product costs in the future and the estimated gross margin. The sales estimates should also be broken down to regional levels.

Nest phase is the introduction of the development projects for the product. These development projects may be for example related to the cost reduction plans or development of a new feature or version of the product. The projects are positioned on a bubble diagram by the size of the opportunity, the perceived risk related to the development project and the estimated time frame of the project. The last phase in the product strategy template is a roadmap, which sums the whole product strategy together. The roadmap illustrates the phases of the product on a five year time frame. These phases are for example the R&D phase, the pilot release, the limited release, and the full release phase of the product. The planned version updates of the product as well as the removal from the product portfolio will also be illustrated in the product roadmap. The roadmap provides a simplified overview of the future plans for the product. The product strategy template can be found in Appendix 9.

The final template discussed in this research is the product group strategy template. The product group strategy is a common strategy for a product group which is for example flat tempering products at Glaston's Machines business segment. The product group strategy illustrates in a brief way what products are included in the current product portfolio, what kind of development projects are going on, and what is the plan on outperforming the competitors.

The product group strategy begins with positioning the whole product group offering by the products' performance level and the price level. This way it is easy to get an overall understanding of the whole product portfolio and the difference between the products that are offered. Next the target segments of each product in the product group as well as the top competitors' products are illustrated in a table. The market is divided into six major segments which are architectural, appliances, solar, automotive, stone, and other segments. These customer segments are further divided into smaller sub-segments. The target segments of each product are marked with different colors illustrating the market presence and market share of the product. Next all the major development projects are illustrated with a same kind of bubble diagram described earlier when discussing the product strategy template. The bubbles are in different colors which illustrate the major

customer segments that the development projects are related to. Next to the graph there is a table where the projects are explained in a brief summary and the schedule of the projects are also presented as well as the information about is the project new to the market or just new to Glaston. In the end of the product group strategy template there is a roadmap of all the product group's products. The roadmap illustrates the same information as the roadmap of an individual product but with all the products in the product group. The product group strategy template can be seen in Appendix 10 of this thesis.

4.4.   Discussion and evaluation of the research

The most important contribution of this research was to produce beneficial tools and practices for the case company. The results of this research are maybe slightly insignificant for further academic use since the research process was executed as an action research process in one particular company. However, the theory chapter of this thesis offers more extensive material for the reader about different perspectives on product strategy that could be found in the earlier research material. The results of this research may also give ideas for further research. The research methods used in this research are also explained in this study so that the research process could be replicated in another setting.

The research process itself went well but the success of the results and the true payback of the project will be seen only in the future. The first time the processes and templates are used in the whole company will reveal the true pros and cons of the results. However, these risks were minimized by taking the employees as a part of the development project since the beginning. For example all the product managers had the chance to influence in the results of this research. This should ease the implementation process since the product managers are the ones who will be using the tools developed in this research.

Due to the relatively broad topic of this research the researcher had to examine the different subject matters only by scratching the surface. It was not possible to examine all the different subjects discussed in this research in a detailed way and keep the research in the dimensions of a master's thesis. However, since the topic of this research is related to strategy it is acceptable to discuss matters on the higher level and not to get tangled up with the details. It was seen more important by the researcher to get a general view of the theme than to go to the details in only narrow fragment of the topic.

Reliability and validity usually come up in research methodology at the point when it is needed to evaluate if the research and the results of the research can be trusted (Koskinen et al. 2005). Validity as a term refers to how precisely a statement or a result of the research corresponds to the research question it is aiming to answer. Whereas reliability refers to the extent of how similar the results of the research would be if the

research was made in different settings. In other words, reliability refers to the repeatability of the research.

First of all, it needs to be taken into consideration that the research questions of this research were closely related to the needs of an individual company. Thus, the results of interviews and surveys held at the case company had such a big role as the research material. Mixed methods were used including gathering of qualitative and quantitative research material, which can generally be thought to make the quality of a research better. The research material was gathered from literature, inside the case organization and by benchmarking the practices of two other companies.

The research process and the methods used are discussed in a detailed way which gives the reader a chance to understand what has been done during the research process and makes it possible to repeat similar research process in other settings. However, when it comes to the reliability of this research, it needs to be understood that this research was carried out especially for the needs of one individual company. Thus the research process could not be repeated precisely in a similar way and the results would most likely be different in another company and in another time. The reliability and the validity of this research are discussed in a more specific way below.

Stability reliability (sometimes also called test re-test reliability) refers to measuring the same thing many times over time. In this research the quantitative survey was only done once, so the stability reliability of this research is poor in that sense. However, since this research was carried out as a mixed method research it is possible to compare the qualitative results of the interviews to the quantitative results of the survey since some of the interviewees were also respondents of the quantitative survey. Four interviewees of the first round answered also to the quantitative survey. Appendix 4 illustrates a table where the elements that were mentioned by the interviewees are highlighted with green color and the ratings given by the same interviewees are shown with the value from 1 to 7. One of the interviewees was left out of the stability reliability testing because he was the supervisor of the master's thesis researcher and all of the different elements were discussed with him in the interview processes. This way it can be seen that the elements that were seen as important parts of product strategy and were mentioned in the interviews were also rated with an average of 6 in a scale from 1 to 7 by the same employees. Most of the values given to the specific elements were sevens and sixes but there were also two fives and two fours. These results communicate that the stability reliability of the research is quite good but still the overall stability reliability can be commented only poorly since the sample of this examination was only three employees.

Internal consistency is another way to examine the reliability of a research. Internal consistency determines how all the items on the test relate to the other items on the same test. Since the suggested elements of product strategy are not necessarily connected to each other the researcher did not see it useful to make mathematical

calculations (e.g. cronbach's alpha) about the internal consistency. However, in the original survey there was a check question. This means that the same element was described twice in a slightly different form. One of the elements in the original survey was 'Product roadmapping' and in the same survey there was an element called "Roadmap for products" By comparing the results of these two check questions it can be seen if the respondents have been concentrating when responding to the survey and it gives a clue if the results are consistent and logical. Everyone who responded to the survey gave the same value to these two questions or left another one of them empty. Thus, it can be said that the respondents have not been completely inconsistent when filling the survey sheet.

Interrater reliability refers to the extent to which two or more individual researchers agree. Interrater reliability can be tested e.g. by using two different observers. As this research was carried out as an action research it was recognized that the presence of the researcher can influence the results of the research and especially the interviews. Also, the interviews were semi-structured which means that all of the subjects of the conversations were not decided in advance. Thus, it would be hard to test the interrater reliability of the qualitative interviews. However, statistical methods can be used to test the interrater reliability of the quantitative research material of this research.

Fleiss' kappa is a statistical method used to evaluate the interrater reliability of a data set. Fleiss' kappa assesses the reliability of agreement between the respondents when using categorical rating system which was used in the quantitative part of this research. (Fleiss 1971.) As a result the Fleiss' kappa scores the research data with a number between 0 and 1. Landis & Koch (1977) published a scale for evaluating the values of the Fleiss' kappa to use as a guideline. The scale table published by Landis & Koch is illustrated below in the table 4.4.1.1.

Table 4.4.1.1 *Evaluation scale for values of kappa (Landis & Koch 1977, p. 165)*

Value of Kappa	Strength of Agreement
<0,00	Poor
0,00-0,20	Slight
0,21-0,40	Fair
0,41-0,60	Moderate
0,61-0,8	Substantial
0,81-1,00	Almost Perfect

The results of the quantitative survey were put into a form used with Fleiss' method and the value of the kappa was calculated. The calculations for Fleiss' kappa method can be seen in appendix 5. The value for Kappa with the quantitative results of this research is only 0,07, which indicates that there is only slight strength of agreement between the

respondents of the quantitative survey. However, it was stated earlier in this research that the respondents were more unanimous with the subjects that got the best and the worst average ratings (Appendix 3). Also, it was known even before the quantitative results that some of the subjects in the survey are closely related to particular respondents' field of work than others and that there are disagreements between the respondents.

While reliability concentrates on measuring the accuracy of the measuring instruments and procedures used in a research, validity refers to measuring how well the results of a research respond to what was attempted to measure. The validity of a research is often divided into internal and external validity. The external validity of a research refers to the generalizability and the transferability of the research. The internal validity on the other hand refers to the design of the study. (Koskinen et al. 2005.)

There are also various ways to assess the validity of a research. One of these ways is the criterion related validity of a research. Criterion related validity refers to testing the accuracy of a research or procedure by comparing it with another valid research method. (Carmines & Zeller 1979.) As this research was carried out as a case study in a case organization with specific needs and an individual organizational culture it would be hard to compare the research process to another valid research. However, the research strategies and methods used in this research such as action research, semi-structured interviews, and quantitative survey are commonly accepted methods that are often used in valid researches. In this kind of inductive research where new theory is build the two benchmarks held at other companies could also be thought as assessing the validity of the results of this research by comparing the best practices of other companies to the case company's practices. It was also stated earlier that the interviewees that were also respondents of the qualitative survey all emphasized the same subjects on both rounds.

Another way to assess the validity of a research is called the content validity. Content validity of a research depends on the extent to which the used methods and results reflect to what was intended to measure. (Carmines & Zeller 1979.) In other words, do the results answer to the research questions and are all the research questions answered. The main research question of this thesis was introduced in the following form: What elements are included in the product strategy creation and product portfolio management? This was divided into two sub-questions and the first one was: What kind of annual processes should be established in order to manage the product portfolio of the case company? This sub question is answered mostly in the synthesis of theory chapter where the systematic process model for product strategy and offering development are introduced for the first time. The second sub-question in this research was: What kind of tools should be used in the case company to create and illustrate product strategies? The answer to this question is discussed in the results chapter where the templates that were developed during this research are introduced in a brief way.

The templates can also be found attached to this research. Thus, it can be said that the research questions of this thesis are answered by the results of this thesis.

However, as the goal of this thesis was to create standard and shared tools and processes for all the business segments of the case company it also needs to be discussed how well all the business units participated in the research process. All the business segments of the case company took part in the research process and in total 29 employees of the case company were interviewed, took part in the qualitative survey, or both. Still, it needs to be stated that although all the business segments were taken into consideration during this research, the Machines business segment and especially the heat treatment product line had without a doubt the most significant role in the qualitative parts of this research. This was due to the facts that the researcher worked mostly with the personnel of the heat treatment product line organization and the supervisor of the thesis was the head of the heat treatment product line. This means that the results of the research may have been skewed to fit the needs of the Machines business segment best. The possibility for skewed results decreases the level of the content validity of this research.

Another matter that might have affected the content validity of this research is the fact that everyone who took part in the quantitative research had not taken part in the research process as actively as some others. This might cause differences in understanding some of the terms used in the quantitative survey. Also, some of the employees that were interviewed were contacted only via video conferences due to the long geographical distances. The probability of misunderstandings and not noticing all the tacit knowledge and gestures can be thought to be higher in video conferences than in face to face interviews.

Construct validity of a research relates to the agreement between a theoretical concept and the methods and results of a research (Carmines & Zeller 1979). Strategy as a concept was defined in this thesis with the help of the five elements of strategy –model by Hambrick & Fredrickson (2001). The five elements in the model are arenas, vehicles, differentiators, staging, and economic logic. How are these elements present in the results of this research?

The figure 4.4.1.2 below illustrates how the different parts of the templates and processes relate to the five elements of strategy.
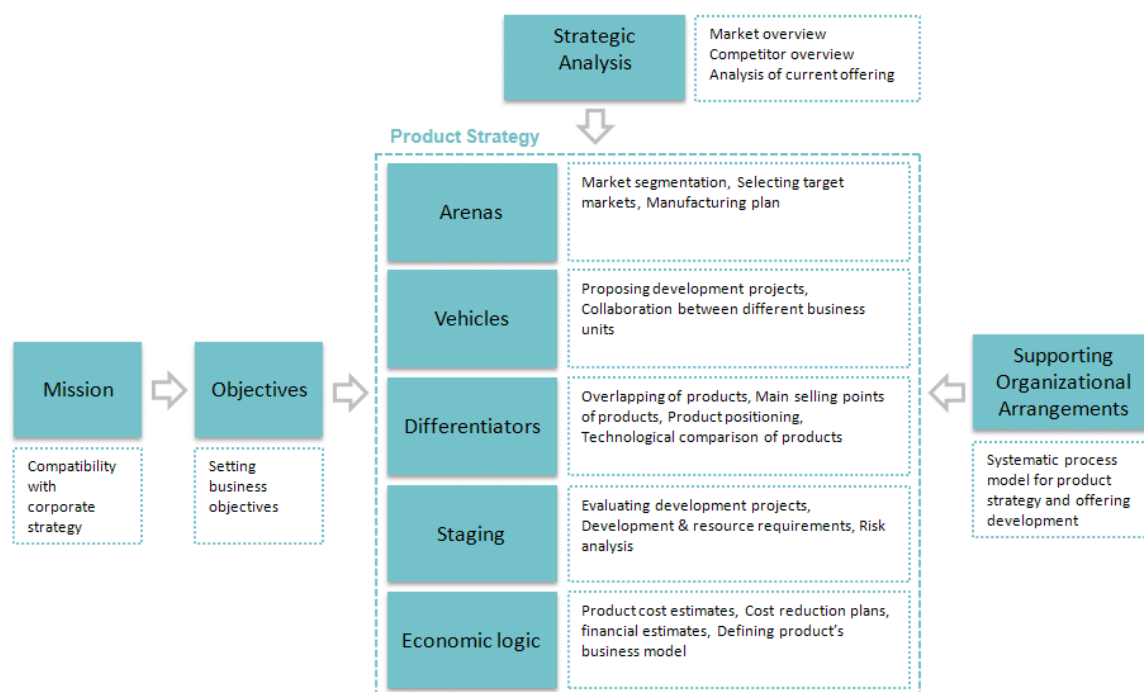
Figure 4.4.1.2. The results of the research in a theoretical framework by Hambrick & Fredrickson (2001)

As stated earlier in the theory chapter 3.1.2 (Five elements of strategy) a company's mission, objectives, strategic analysis and other supporting organizational arrangements are not parts of the strategy itself but they are closely related to the strategy making process. Since the goal of this research was to create tools and practices for product strategy creation and product portfolio management for the case company, it is also relevant to take into consideration the parts that are excluded from the strategy itself.

The mission of the company is taken into consideration in the product strategy and offering development model by making sure that the product strategy is compatible with the corporate strategy. Business objectives for product strategies are also set in the current state analysis template together with development proposals. The current state analysis template also provides strategic analysis for the strategy creation process in terms of competitor analysis, market analysis, and current offering analysis. The process model that has been created for product strategy creation and offering development is a critical part of the product strategy creation process and therefore can be considered as a supporting organizational arrangement.

The product strategy itself can be divided into the same five elements than strategy. The arenas -element is taken into account when segmenting the market and selecting target

markets for different products in terms of geographical regions and customer segments. This clearly answers to the question: where will we be active. Manufacturing plan of the products is also a way to discuss the arenas where to be active with selected products. The next element of strategy is vehicles. The vehicles -element is considered in product strategy by proposing development projects and discussing the collaboration between different business units. These are ways to get to the chosen arenas with products. The overlapping of the products can be considered as part of the differentiators –element. By minimizing the overlapping of products internally and externally (with competitors) the differentiation is easier to achieve in the minds of customers. Making the main selling points of the products clear also helps in piecing together the true differentiation from competitors' offering and makes it easier to communicate it to the customers. The basis of differentiation is also covered more specifically by technical/technological comparison of products.

The staging –element defines the speed and sequence of moves towards the chosen arenas. The evaluation between proposed development projects is a way to define the priorities between projects. The project with the highest expected profits usually gets the highest priority. Risk analyses can also be thought to be related to the staging – element. If a project has a high risk of failure it is probable that it will be at least postponed. Another task that is related to staging is the definition of the development and resource requirements. The estimates of product's costs and financial figures as well as the cost reduction plans are focused on the economic logic –element. The definition of product's business model in the feasibility study template is also closely related to the economic logic –element.

Some of the elements of strategy are considered more closely than others in the model developed in this research. However, all of the elements are taken into consideration and thus it can be stated that the results of this research are suitable with the theoretical framework for strategy used in this research and that the construct validity of this research was good.

5. CONCLUSIONS

5.1. Summary of the results of the research

A successful product strategy is often a key success factor for a technology company. A successful product strategy is easier to achieve once there are systematic ways and practices for creating product strategies. However, competitive advantage cannot be gained just by having the best practices and tools for the organization. The purpose of the templates and processes is to help in creating a strategy but the responsibility is still on the shoulders of the management of a company.

The main objective of this research was to develop new systematic practices for the specific needs of the case company. However the practices had to be developed in such a universal way that they could be adapted for use in all the different business segments of the case company. These goals were achieved by reconciling the needs of the organization with the best practices and frameworks found in literature. The process model and the templates were validated in all the business segments and accepted by the steering group of the development project.

So what was gained by developing a systematic process model and the templates for product strategies and product portfolio management? Firstly, the standardized form of performing the tasks assures that all the essential elements are taken into consideration when creating for example the product group strategy. At the same time the standard form makes the results more reliable. For example when the profitability calculations of a proposed product's feasibilities are calculated with the same spreadsheet, there is stronger possibility that no mistakes occur and that the results are comparable together. Another advantage in using a systematic model is that the outcomes of the processes are illustrated in a similar form. This saves time from the upper management who has to make decisions between many proposed projects and has to examine the strategies of several products. Also the organization can transform itself into a more customer driven after the co-operation between the sales and the product management functions becomes an established practice. Maybe the biggest advantage can be seen after the processes and tasks become parts of the organization's culture.

The process chart that was developed has three layers, or orbits as they are called in this thesis. The most inner orbit portrays the daily routines of the product management function. The orbit in the middle binds the process model to annual schedule and describes the systematic tasks that need to be done quarterly to analyze the current situation. The outer orbit gives the model flexibility and is run through only as needed.

The processes on the outer orbit cannot be bound on a calendar year since speed is a crucial variable when trying to achieve a competitive advantage.

Many interviewees stated that the organization should be more customer-driven. However, almost everyone rated the customers' needs as the most important factor in the entire product strategy. It seemed like it was understood what needs to be done, but it could not be necessarily achieved consistently. It may be that the rapid changes in the business environment due to the increase in competition especially with prices of the products have changed the needs or preferences of customers and it has become more difficult to fill such needs than before. Also, recovering from the financial crisis has taken longer than expected and thus the investments still remain low. None of the elements of product strategy that were suggested in the questionnaire were considered unnecessary by the respondents. Thus, all of the elements suggested were taken into consideration when developing the templates.

The researcher believes that the process chart could be implemented in other product management organizations and companies with only slight changes. At least in companies which are approximately the same size as the case company and produce investment goods. Also the templates could be utilized in different companies as guidelines for developing a customized set of practices and tools.

5.2.   Recommendations for the future

It is recommended for the case company to invest time and effort in implementing the developed model. Especially the first time the model is used in different parts of the case company's organization it is important that the employees are given the needed help and directions. When it comes to filling out the templates the first time requires a lot more work than the updating of the templates in the future. Once the groundwork is done its easier to keep the templates up to date. Thus, it is important that the first time goes well and that the results are reliable. It is also crucial for the future that the filling of the templates leaves a good impression for the product managers and that the developed model is seen as a useful tool instead of a mandatory task.

It is really important that the upper management of the different business segments is committed to the implementation process especially in the parts of the organization where the researcher has not been to in person. Although the employees in question were able to take part in the development project, there is a chance that the developed model will not be accepted if the upper management is not committed. The next step in taking the developed model into use is to tailor the templates and process model for the needs of different product groups. For example different price levels should be set for the competitor positioning graph. This should be done by the product managers themselves and it can be done in pursuance of using the model for the first time.

In the long run it is important that the model will be continuously improved by the people using it. It would be naive to claim that the templates and the process model are fully complete after a few iterative cycles performed by the researcher. The researcher believes that already after the first time the templates are used there will be many proposals for improvement by the product managers in different business segments. It must be also realized that changes in the business environment or new products may cause the templates to become outdated. Therefore it is important that some if not all of the product managers are responsible for keeping the tools continuously up to date.

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APPENDICES (10 pieces)

APPENDIX 1: List of Interviewees in the first interview round

APPENDIX 2: List of respondents of the qualitative survey

APPENDIX 3: Results of the survey

APPENDIX 4: Stability reliability of the research

APPENDIX 5: Fleiss' kappa method

APPENDIX 6: Preliminary investigation template

APPENDIX 7: Business case template

APPENDIX 8: Current state analysis template

APPENDIX 9: Product strategy template

APPENDIX 10: Product group strategy template

APPENDIX 1: LIST OF INTERVIEWEES IN FIRST INTERVIEW ROUND

Interview no.	Job Description
1	Product Manager (Flat tempering)
2	Project manager
3	Product Development Director
4	Product manager (Bending, bending & tempering)
5	ERD Director
6	Product manager (Services)
7	Manager, Electric and Automation Engineering
8	Manager, Marketing Communication
9	Senior Vice President, Services
10	Finance director, Machines
11	Vice President, Sales
12	Vice President, Sourcing
13	Manager, Engineering & Technology Transfer

APPENDIX 2: LIST OF THE RESPONDENTS OF THE QUALITATIVE SURVEY

Job Description
1.Product Manager (HT)
2.Product Manager (HT)
1.Product Manager (Services)
2.Product Manager (Services)
1.Product Manager (PP)
2.Product Manager (PP)
Product Manager (Software)
1.Technical Product Manager (Software)
2.Technical Product Manager (Software)
1.Strategic Product Manager (Software)
2.Strategic Product manager (Software)
Tools Sales Support
Tools Manufacturing & Technology Management
Area Sales Manager, EMEA
Key Account Director
Engineering Manager
ERD Director
Vice President, Sales & Service, SAME
Vice President, Sales & Service, ASIA
Product Development Director
Business Development Director

	Machines									Software					Services			Sales Management						
	Product Development Director	1. Product Manager (HT)	ERD Director	2. Product Manager (HT)	Tools Manufacturing & Technology	Tools Sales Support	1. Product Manager (PP)	2. Product Manager (PP)	Engineering Manager	1.Technical Product Manager	2. Technical Product Manager	Product manager	1. Strategic Product manager	2. Strategic Product manager	1. Product Manager	2. Product Manager		Key Account Director (HT)	Area Sales Manager (HT)	VP, Sales & Services (SAME)	VP, Sales & Services (ASIA)	Business Development Director	Average	Variance
Customer needs	7	7	7	7	7	7	4	4	7	7	6	7	7	4	7	7		7	7	7	7	7	6,5	1,2
Analysis of curren situation	6	7	3	7	7	7	5	5	7	5	5	6	6	6	7	7		7	7	7	7	7	6,2	1,2
Sales argumentation for products	6	6	3	4	7	7	6	6	5	6	6	6	6	7	5	6		7	7	7	6	6	6,0	1,0
Setting objectives	6	6	3	7	5	5	6	6	6	5	6	5	6	7	7	6		7	4	5	6	7	5,8	1,1
Differentiation from competitors	6	7	6	5	7	7	5	5	7	5	6	5	5	4	5	6		7	7	7	2	7	5,8	1,7
Technical competitor analysis	6	5	6	6	7	7	6	6	7	5	4	6	5	4	5	6		7	6	5	6	5	5,7	0,8
Compatibility with corporate strategy	5	7	3	7	6	6	5	5	7	5	5	7	4	3	6	7		7	4	7	4	5	5,5	1,9
Financial projections	5	6	6	3	5	5	5	5	5	5	5	7	6	6	7	6		6	5	5	5	6	5,4	0,8
Roadmap for products	7	5	6	7	5	5	4	4	7	4	6	7	5	6	4	7		4	5	5	5	5	5,4	1,2
Customers' customers' needs	6	4	3	6	2	2	4	4	7	7	5	5	6	5	7	7		7	7	6	4	6	5,2	2,7
Target marketing	6	4	3	6	6	6	5	5	7	3	5	7	5	6	5	6		6	4	6	2	5	5,1	1,7
Market segmentation	4	4	3	6	6	6	4	4	7	3	6	6	4	3	4	6		6	7	7	6	5	5,1	1,9
Long-term technology trends	6	4	6	7	3	3	5	5	7	5	7	6	5	4	5	6		2	7	4	4	6	5,1	2,1
Risk analysis	5	4	3	6	6	6	5	5	4	4	4	7	6	5	5	6		3	5	5	5	6	5,0	1,1
Cost reduction plans	6	4	3	5	3	3	4	4	5	7	3	5	6	6	3	6		5	6	5	6	6	4,8	1,7
Life cycle analysis	7	3	3	7	6	6	4	4	5	3	4	2	4	5	5	6		4	6	5	3	6	4,7	2,0
Comparison of possible R&D projects	6	5	3	6	4	4	4	4	5		5	6	4	5	3	6		4	2	5	4	5	4,5	1,2
Modularization of products	5	4	6	5	3	3	3	3	5	7	6	5	4	6	3	5		2	5	5	2	7	4,5	2,3
Stage-gate system in strategy process	4	5	7	3	3	3	4	4	3		5	7	4	6	4			2		5	5	5	4,4	1,9
Environmental aspect	4	3	3	4	4	4	5	5	5	4	5	6	4	3	3	5		2	7	5	5	6	4,4	1,4
Collaboration with different Business Units	5	4	3	4	3	3	5	5	6	5	3	4	3	7	4	5		4	4	4	5	5	4,3	1,1
Image of Glaston, Glaston Brand	5	2	3	5	3	3	4	4	5	4	4	5	4	3	4	5		5	6	5	5	5	4,2	1,0

Average of variances: 1,5

APPENDIX 4: STABILITY RELIABILITY OF THE RESEARCH

	Product Development Director	1. Product Manager (HT)	1. Product Manager (Services)
Customer needs	7	7	7
Analysis of curren situation	6	7	7
Sales argumentation for products	6	6	
Setting objectives			
Differentiation from competitors	6	7	
Technical competitor analysis	6		
Compatibility with corporate strategy			6
Financial projections		6	7
Roadmap for products		5	
Customers' customers' needs	6		7
Target marketing	6		
Market segmentation			
Long-term technology trends	6		
Risk analysis			
Cost reduction plans			
Life cycle analysis	7		5
Comparison of possible R&D projects	6		
Modularization of products			
Stage-gate system in strategy process	4		
Environmental aspect			
Collaboration with different Business Units			4
Image of Glaston, Glaston Brand			
Average	6	6	6

Green color indicates that the element was mentioned in the qualitative interview

APPENDIX 5: FLEISS' KAPPA METHOD
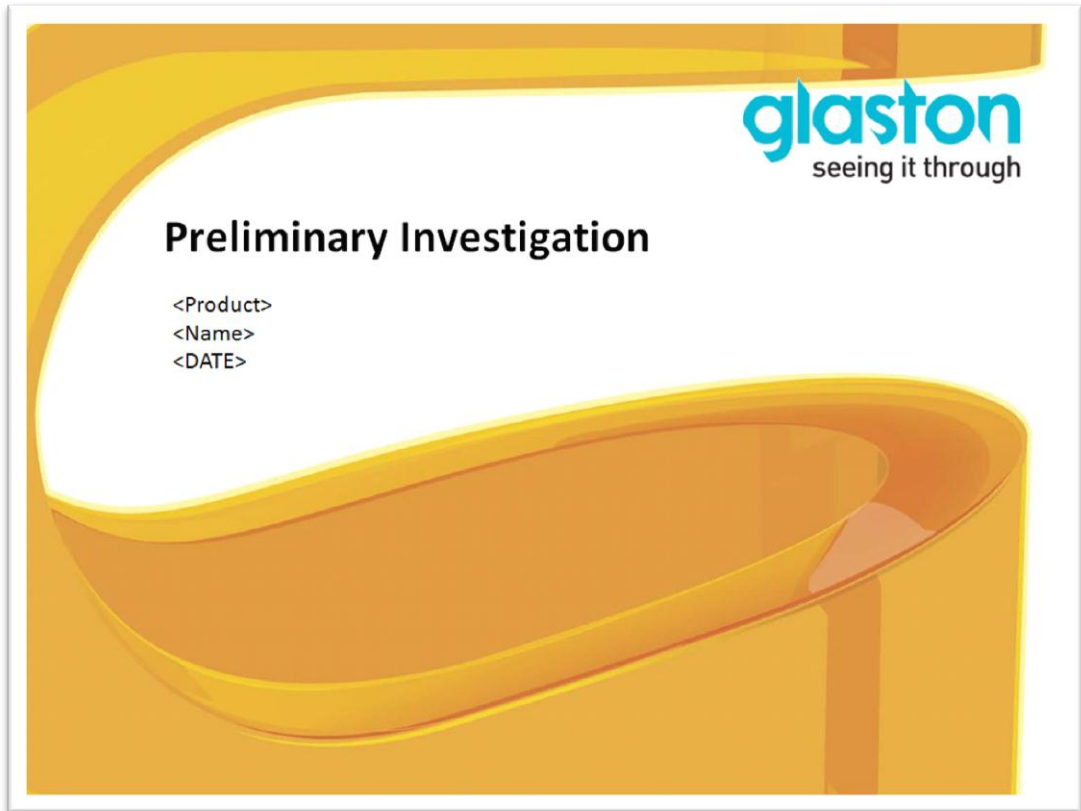
	Categories							P
	1	2	3	4	5	6	7	
1	0	0	0	3	0	1	17	0,66
2	0	0	1	0	4	4	12	0,37
3	0	0	1	1	2	11	6	0,34
4	0	0	1	1	5	9	5	0,27
5	0	1	0	1	7	4	8	0,26
6	0	0	0	2	6	9	4	0,28
7	0	0	2	3	6	3	7	0,20
8	0	0	1	0	11	7	2	0,37
9	0	0	0	5	8	3	5	0,24
10	0	2	1	4	3	5	6	0,17
11	0	1	2	2	6	8	2	0,22
12	0	0	3	6	1	8	3	0,23
13	0	1	2	4	5	5	4	0,16
14	0	0	2	4	8	6	1	0,24
15	0	0	5	3	5	7	1	0,21
16	0	1	4	5	4	5	2	0,16
17	0	1	2	7	7	4	0	0,23
18	0	2	5	2	7	3	2	0,18
19	0	1	4	8	5	1	2	0,21
20	0	1	4	6	7	2	1	0,20
21	0	0	5	7	7	1	1	0,25
22	0	1	4	6	9	1	0	0,27
Total	0	12	49	80	123	107	91	5,72
p	0,00	0,03	0,11	0,17	0,27	0,23	0,20	Average P 0,26
pe	0,21							

Subjects

Kappa = 0,07

APPENDIX 6: PRELIMINARY INVESTIGATION TEMPLATE (1/5)

CONTENTS

Executive Summary

1. Introduction
2. Market Environment and Target Market
   1. Target Market
   2. Positioning

3. Competitor Overview
   1. Top competitors
   2. Positioning
   3. Installed base

4. Technology and Product Concept
   1. Segmentation
   2. Product group offering
   3. Life cycles

5. Product Cost Esimates

6. Financial Calculations

glaston
seeing it through

---

1. Introduction to Pre-Feasibility Study

<briefly describe the product, segmentation, market needs>

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APPENDIX 6: PRELIMINARY INVESTIGATION TEMPLATE (3/5)

2. Market Environment and Target Market

TARGET MARKET

Market segment	
Architectural	X
Automotive	
IG	
Solar	
Appliance (furniture)	

<Define target market segments>

<Describe estimated market sizes in target regions>

<Overlapping / Cannibalization>

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2. Market Environment and Target Market

PRODUCT POSITIONING – PRODUCT FAMILY OFFERING

High — Product 1 — Price level 4

Performance / Value — Mid — Product 2 — Price level 3

Product 3 — Price level 2

Basic — Product 6 — Price level 1

Number of customers

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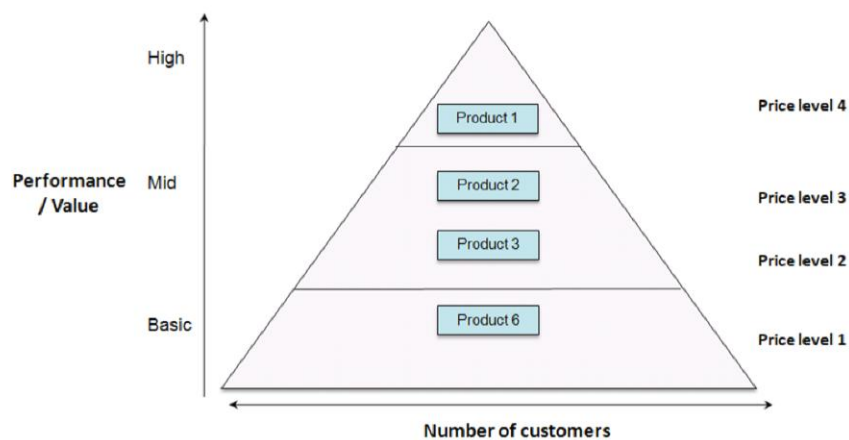
APPENDIX 6: PRELIMINARY INVESTIGATION TEMPLATE (4/5)

3. Competitor Overview

<Competitors' intellectual property>

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4. Technology and Product Concept

MAIN SELLING POINTS

DESIRED PRODUCT SPECS	Size, capacity, price etc.
PRODUCT ARGUMENTS	Features, options, and highlights from specification

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APPENDIX 6: PRELIMINARY INVESTIGATION TEMPLATE (5/5)

5. Product Cost Estimates

Sub Assemblies	Reference product	Estimated cost (new concept)	Difference in costs	Explanation
Sub assembly 1	X€	Y€	%	How are costs reduced?
Sub assembly 2				
Sub assembly 3				
Sub assembly 4				
Sub assembly 5				
Sub assembly 6				
Sub assembly 7				
Sub assembly 8				
TOTAL	Actual total	Reference total	Total difference	

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6. Financial Estimates

Price	Year1	Year2	Year3	Year4	Year5
EMEA					
ASIA					
SAME					
NAME					

GM-%	Year1	Year2	Year3	Year4	Year5
EMEA					
ASIA					
SAME					
NAME					

Volume	Year1	Year2	Year3	Year4	Year5
EMEA					
ASIA					
SAME					
NAME					

GM / €	Year1	Year2	Year3	Year4	Year5
EMEA					
ASIA					
SAME					
NAME					

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Business Case Study

<Product>
<Name>
<DATE>

Executive summary

<Key point 1 >

<2>

<3>

<4>

CONTENTS

Executive Summary

1. Introduction
2. Market Environment and Target Market
   1. Target market
   2. Product positioning
   3. Product positioning - product family offering
3. Technology and Product Concept
   1. Product concept alternatives
   2. Selected concept & Technology highlights
   3. Main selling points
   4. Product range
4. Competition
   1. Competitor benchmark
   2. Technical comparison matrix
   3. Internal comparison matrix
5. Business Model
6. Development and Resource Requirements
7. Financial Calculations
8. Risk Analysis

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---

1. Introduction

<briefly describe the product>
<segmentation>
<market needs>

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2. Market Environment and Target Market

TARGET MARKET

Market segment	
Architectural	X
Automotive	
IG	
Solar	
Appliance (furniture)	

<Describe the target customer groups for new product>

<Describe estimated market sizes in target regions>

<Overlapping & Cannibalization>

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2. Market Environment and Target Market

PRODUCT POSITIONING

Performance: High / Mid / Basic

<Price level 1> <Price level 2> <Price level 3> <Price level 3> <Price level 4>

Price of product

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2. Market Environment and Target Market

PRODUCT POSITIONING – PRODUCT FAMILY OFFERING

3. Technology and Product Concept

PRODUCT CONCEPT ALTERNATIVES TO MATCH THE TARGET OF THE FEASIBILITY STUDY:

1. <Describe product concept 1>
2. <Describe product concept 2>
3. ...

MAIN POINTS FROM THE ANALYSIS BETWEEN CONCEPT ALTERNATIVES

1. Product concept 1 (+ / -)		2. Product concept 2 (+ / -)		3. Product concept 3 (+ / -)	
+	-	+	-	+	-

ESTIMATED UNIT COST OF EACH SOLUTION

<estimated unit cost of product concept 1>	<estimated unit cost of product concept 2>	<estimated unit cost of product concept 3>

3. Technology and Product Concept

SELECTED CONCEPT AND USED TECHNOLOGY HIGHLIGHTS

Module 1	
Module 2	
Module 3	

seeing it through

3. Technology and Product Concept

MAIN SELLING POINTS

GLASTON LEVEL ARGUMENTS	
PRODUCT ARGUMENTS	
HIGHLIGHTS FROM THE PRODUCT SPECIFICATION	

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3. Technology and Product Concept

PRODUCT RANGE: PRODUCT SIZES AND OPTIONS AVAILABLE

Standard features	Optional features

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4. Competition

COMPETITOR BENCHMARK:

Main Findings :

Characteristic 1	
Characteristic 2	
Characteristic 3	
Characteristic 3	
GENERAL	

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4. Competition

TECHNICAL COMPARISON MATRIX

	Competitor 1	Competitor 2	Competitor 3	Competitor 4	Glaston
Product Type					New Product
Characteristic 1					
Characteristic 2					
Characteristic 3					
Characteristic 4					
Characteristic 5					
Characteristic 6					
Characteristic 7					
Characteristic 8					
Characteristic 9					
Characteristic 10					
Characteristic 11					
PRICE LEVEL					

4. Competition

INTERNAL TECHNICAL COMPARISON MATRIX

	Glaston Product Series				
	New Product	<Product 1>	<Product 2>	<Product 3>	<Product 4>
<Characteristic 1>					
<Characteristic 2>					
<Characteristic 3>					
<Characteristic 4>					
<Characteristic 5>					
<Characteristic 6>					
<Characteristic 7>					
<Characteristic 8>					
<Characteristic 9>					
<Characteristic 10>					
<Characteristic 11>					
<Characteristic 12>					
PRICE LEVEL					

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5. Business Model

SALES CHANNEL:

PROJECT, INSTALLATION AND COMMISSIONING MODEL:

AFTER SALES:

BRANDING:

MARKETING:

PRODUCT LAUNCH:

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6. Development and Resource Requirements

<Design organization required>

<Design costs>

<Project Schedule>

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7. Financial Calculations

- OVERVIEW OF COST BREAK DOWN & AVERAGE PRICE LEVEL
- SALES VOLUMES (PCS/a)
- SALES VOLUMES (kEUR/a)
- PROFITABILITY (GM1, kEUR)
- PROFITABILITY PER SALES REGION (GM1, kEUR)
- INVESTMENTS AND CASH FLOW
- NET PRESENT VALUE
- SENSITIVITY ANALYSIS OF NPV
- PRODUCT FAMILY SALES ESTIMATES

<source: feasibility study.xls>

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8. Risk Analysis

PRODUCTION RISK ANALYSIS

PRODUCT DEVELOPMENT RISK ANALYSIS

SALES, MARKETING AND PRODUCT MANAGEMENT RISK ANALYSIS

TECHNOLOGY RISKS

SUMMARY OF RISKS

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APPENDIX 8: CURRENT STATE ANALYSIS TEMPLATE (1/7)

Current State Analysis

\<Product\>
\<Name\>
\<DATE\>

Executive summary

\<Key point 1\>

\<2\>

\<3\>

\<4\>

CONTENTS

Executive Summary

1. Market Overview
   1. Market overview
   2. Business drivers
   3. SWOT

2. Competitor Overview
   1. Top competitors
   2. Positioning
   3. Installed base

3. Current Product Offering
   1. Segmentation
   2. Product group offering
   3. Life cycles

4. Setting Objectives

5. Development Project Proposals

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---

1. Market Overview

MARKET OVERVIEW

<Describe the market:
<industries>
<markets geographically>
<market size>
<market share>
<market development forecast>

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APPENDIX 8: CURRENT STATE ANALYSIS TEMPLATE (3/7)

1. Market Overview

BUSINESS DRIVERS

<e.g. Economic growth, float glass production/demand, legislation, trends in applications>

EMEA:

ASIA:

SAME:

NAME:

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1. Market Overview

SWOT

Strenghts:
<Describe Glaston's strenghts on the market>

Weaknesses:
<Describe Glaston's weaknesses on the market >

Opportunities:
<Describe new opportunities>

Threats:
<Describe possible external threats>

APPENDIX 8: CURRENT STATE ANALYSIS TEMPLATE (4/7)

2. Competitor Overview

TOP COMPETITORS

Competitor	Competitor's main advantages	Competitor's main weaknesses	Competitor's likely moves in future
Competitor 1			
Competitor 2			

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2. Competitor Overview

COMPETITOR POSITIONING

\<Position top competitors by e.g. performance and price\>

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APPENDIX 8: CURRENT STATE ANALYSIS TEMPLATE (5/7)

2. Competitor Overview

INSTALLED BASE

Installed base

Competitor	EMEA		ASIA		SAME		NAME	
	Units	%						
Glaston								
Competitor 1								
Competitor 2								
Competitor 3								

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3. Current Product Offering

SEGMENTATION

| Customer segments	profile	Product 1	Product 2	Product 3	Product 4	Product 5	Competitor 1					
Architectural*	Insulated glass											
	Doors and windows											
	Facades											
Appliances*	Furniture											
	Electrical appliances											
	TV screens											
	Showers											
Solar	Photovoltaic											
	CSP											
Automotive	OEM											
	Replacement											
Stone	All											
Other	TBA											
	<other>											

🟩 Present, with leadership role 🟥 No presence, but interesting
🟨 Present, but without clear leadership role ⬜ No presence, not interesting ⬜ Technology not relevant

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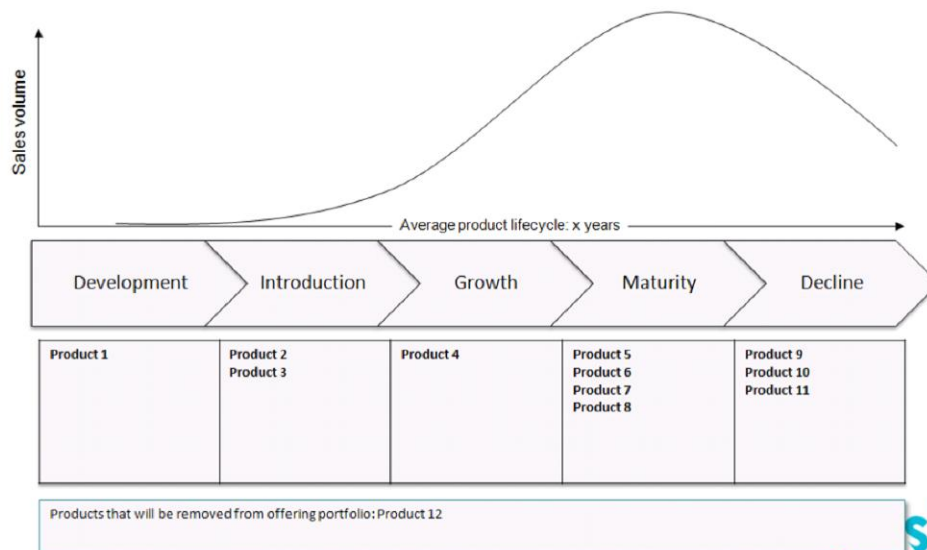# APPENDIX 8: CURRENT STATE ANALYSIS TEMPLATE (6/7)

3. Current Product Offering

PRODUCT GROUP OFFERING
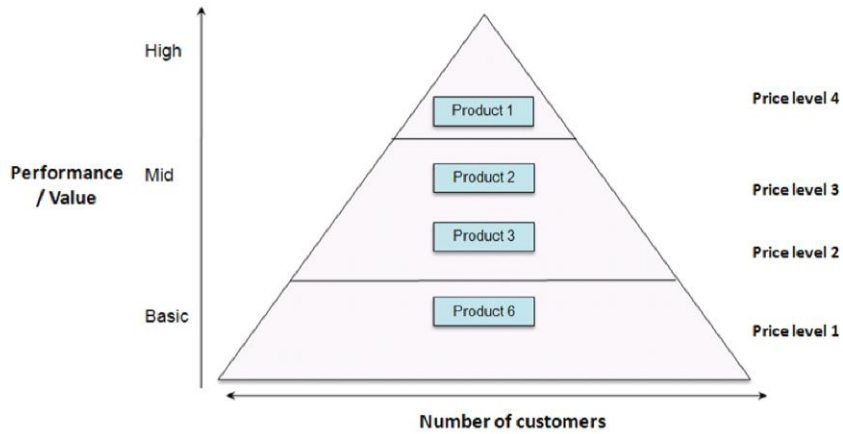
3. Current Product Offering

LIFE CYCLES

APPENDIX 8: CURRENT STATE ANALYSIS TEMPLATE (7/7)

4. Setting Objectives

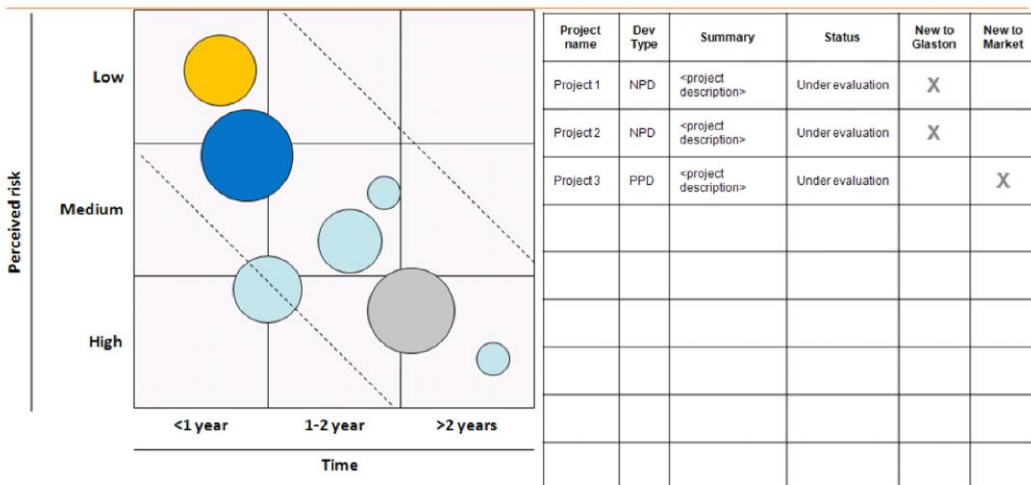**Business objectives**

- Goal 1
- Goal 2
- ...

Year
- 201x
- 201x

Development Proposals

- Project 1
- Project 2
- Project 3

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5. Development Project Proposals

Project name	Dev Type	Summary	Status	New to Glaston	New to Market
Project 1	NPD	<project description>	Under evaluation	X	
Project 2	NPD	<project description>	Under evaluation	X	
Project 3	PPD	<project description>	Under evaluation		X

Perceived risk: Low, Medium, High
Time: <1 year, 1-2 year, >2 years

Customer segments
- Architectural
- Automotive
- Appliances
- Solar
- Area indicates magnitude of opportunity

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APPENDIX 9: PRODUCT STRATEGY TEMPLATE (1/7)

Product Strategy Template

<Product>
<Name>
<DATE>

CONTENTS

Executive Summary

1. Introduction
2. Market Overview
   1. Target Market
   2. Positioning

3. Competitor Analysis
   1. Top competitors
   2. Technical comparison matrix
   3. Competitor positioning

4. Cost Reduction Plan

5. Manufacturing and Installation

6. Financial Calculations

7. PPD Proposals

8. Product Roadmap

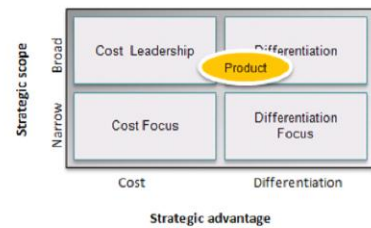# APPENDIX 9: PRODUCT STRATEGY TEMPLATE (2/7)

Executive summary

<Key point 1 in product strategy>

<2>

<3>

<4>

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1. Introduction to Product Strategy

* <Describe the product>

		Cost	Differentiation
Strategic scope	Broad	Cost Leadership	Differentiation
	Narrow	Cost Focus	Differentiation Focus

Product

Strategic advantage

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APPENDIX 9: PRODUCT STRATEGY TEMPLATE (3/7)

2. Market Overview

Market Description:

<Describe the market>
<industries, markets geographically, market size, market share, market development forecast...>

Market segment	
Architectural	X
Automotive	
IG	
Solar	
Appliance (furniture)	

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3. Competitor Analysis

TOP COMPETITORS

<Describe the current competitive situation>

Competitor	Competitor's main advantages	Competitor's main weaknesses	Competitor's likely moves in future
Competitor 1			
Competitor 2			

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APPENDIX 9: PRODUCT STRATEGY TEMPLATE (4/7)

3. Competitor Analysis

TECHNICAL COMPARISON MATRIX

	Competitor 1	Competitor 2	Competitor 3	Competitor 4	Own Product
Product Type					
Characteristic 1					
Characteristic 2					
Characteristic 3					
Characteristic 4					
Characteristic 5					
Characteristic 6					
Characteristic 7					
Characteristic 8					
Characteristic 9					
Characteristic 10					
Characteristic 11					
PRICE LEVEL					

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3. Competitor Analysis

COMPETITOR POSITIONING

<Position top competitors by e.g. performance and price>

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APPENDIX 9: PRODUCT STRATEGY TEMPLATE (5/7)

4. Cost reduction plan
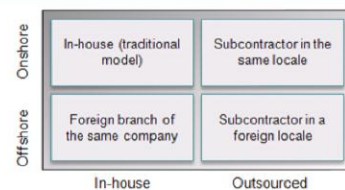
<Cost Reduction Plan >

Example sources: idea bank, workshops, sourcing strategy etc.

Sub Assemblies	Current cost	Target cost	Cost reduction (%)	Explanation
<Sub assembly 1>	X€	Y€	Z%	How are costs reduced?
<Sub assembly 2>				
<Sub assembly 3>				
<Sub assembly 4>				
<Sub assembly 5>				
<Sub assembly 6>				
<Other costs 1>				
<Other costs 2>				
TOTAL	<Current total>	<Target total>	<Total reduction>	

5. Manufacturing/Installation

<Where are products manufactured now and in the future>

<Product variants>
<delivery times>
<installation time>
<turn key offering>

	In-house	Outsourced
Onshore	In-house (traditional model)	Subcontractor in the same locale
Offshore	Foreign branch of the same company	Subcontractor in a foreign locale

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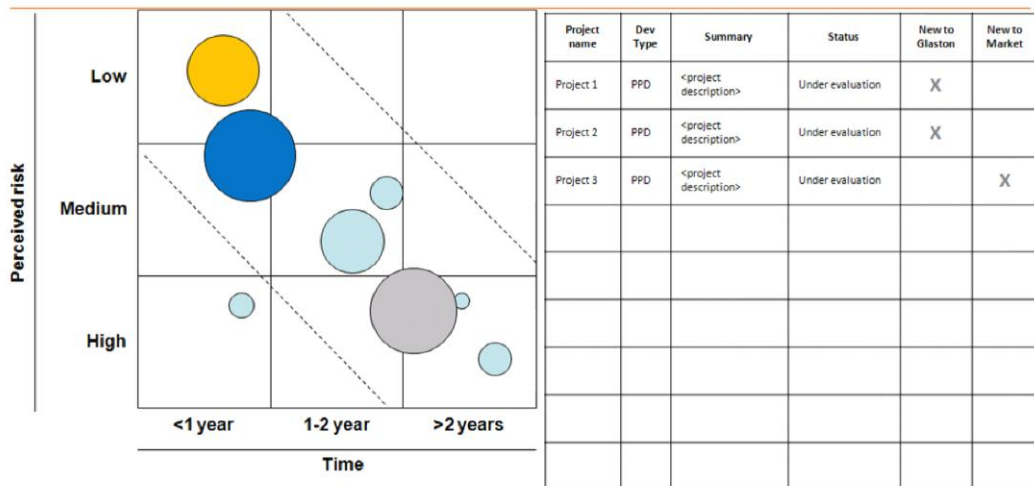## 6. Financial Calculations

- SALES BY SIZES (VOLUME, PCS/a)
- SALES BY SIZES (GM, kEUR)
- UNIT COSTS BY SIZES (kEUR)
- REGIONAL SALES VOLUMES

<5 year forecast>

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7. PPD Proposals

Project name	Dev Type	Summary	Status	New to Glaston	New to Market
Project 1	PPD	<project description>	Under evaluation	X	
Project 2	PPD	<project description>	Under evaluation	X	
Project 3	PPD	<project description>	Under evaluation		X

Customer segments

Architectural | Appliances
Automotive | Solar

Area indicates magnitude of opportunity

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APPENDIX 9: PRODUCT STRATEGY TEMPLATE (7/7)

APPENDIX 10: PRODUCT GROUP STRATEGY TEMPLATE (1/3)

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Product Group Strategy Template

<Product>
<Name>
<DATE>

CONTENTS

1. Product Offering

2. Target Segments

3. Development Projects

4. Product Roadmap

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APPENDIX 10: PRODUCT GROUP STRATEGY TEMPLATE (2/3)

APPENDIX 10: PRODUCT GROUP STRATEGY TEMPLATE (3/3)

3. Development projects

Project name	Dev Type	Summary	Status	New to Glaston	New to Market
Project 1	NPD	\<project description\>	Started: 2010 Launch: 4/2011	X	
Project 2	NPD	\<project description\>	Started: 2010 Launch: 9/2011	X	
Project 3	PPD	\<project description\>	Started: 2010 Launch: 11/2011		X

Customer segments: Architectural, Appliances, Automotive, Solar. Area indicates magnitude of the opportunity

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4. Product Roadmap