UNIVERSITY OF GOTHENBURG
SCHOOL OF BUSINESS, ECONOMICS AND LAW

Master Degree Project in Finance

Driving Forces of the Investment Decision Process in a Technology Firm

A multifaceted understanding of the investment behaviour of individuals and the firm

Jenny Frisell and Louise Lorentzon

Supervisor: Stefan Sjögren
Master Degree Project No. 2015:86
Graduate School

Abstract

Every company has the goal to maximize shareholder wealth by allocating funds to the most profitable investments. A company's survival is dependent on its ability to stay competitive and maintain market share. In a company there is always a selection of potential investments, therefore the investment decision process is crucial. This thesis analyzes individuals' behavior in the investment decision process of an organization as well as investigating the synopsis view of finance and management as opposed to seeing them as opposites. The Bower-Burgelman process model was adopted in this study as a tool to investigate the investment decision process. A case study was conducted on a large technology firm with heavy R&D and long product horizon. From the findings, Company X has a primary focus on technology and financial objectives are less prioritized, since a majority of the employees have a technical background. The primary findings are forces such as individuals' behavior, principal-agent problem, overconfidence, over-optimism, self-attribution bias, and selection bias affect the investment decision process. Conclusively, the research confirms that there is a clear linkage between behavior, management, and finance that impacts the investment selection and shareholder wealth.

***Keywords**: Investment Decision Process, Forces, Behavioral Finance, Corporate Finance, Agency Theory, Bower-Burgelman Process Model*

Acknowledgements

We would like to thank our supervisor Stefan Sjögren for sharing his knowledge, and for helping us with issues that arose during the writing of this thesis. Also, we would like to thank our assigned supervisor and the interviewees at the investigated company for assisting us within each of their areas of professional expertise.

Jenny Frisell

Louise Lorentzon

Table of Contents

1. Introduction

This chapter has the aim to introduce and give a comprehensive view of the thesis.

The goal of all companies is to maximize profit by utilizing the available capital in such a way that generates most return. The company's main objective should be to increase shareholders' wealth, stay competitive, and grow in the market. Companies have limited resources and can only allocate funds to some investments. The chosen investments affect the cash flow and it is important to always evaluate and choose the best products, hence capital budgeting is of outmost importance.

As of today the previous literature has provided a thorough discussion on capital budgeting but the findings have been based on surveys. There is a gap in the literature since no one has gained access to all information from inside the company or conducted interviews with all of the persons involved in the decision making process; from managers to top management/Group. In this paper, we have gained access to all the above mentioned information and the aim is to contribute to the literature and give a comprehensive view of the investment decision process in a real world setting represented by Company X. In this report the term capital budgeting and investment decision process are used synonymously.

An investment in a product is a long-term commitment, which affects the company in an unforeseeable future and is not without difficulty reversible. In the last decades investment valuation tools have gained popularity and the most popular techniques are NPV, IRR and Pay Back period (Lumijärvi, 1991). In addition to these, the personal attachments such as commitment, incentives, and agenda to the specific product in the company have a significant impact. In the past, capital budgeting and product choice have been seen as solely financial decisions, but it is important to incorporate findings from psychology into corporate finance in order to acknowledge different perspectives, incentives, and objectives of managers at different levels.

In order to develop a product there are several steps the product needs to pass before the proposal reaches management for decision of continuation or termination. Before the product ends up at management there has been a long process of approval and commitment at lower levels by managers and experts. According to Clancy et.al (1982), it is generally accepted by management that when a product has passed several experts in their respective field, the product is proven to be of good quality with no reason to discredit the evaluation. It is evident that this could plausible cause a positive bias towards the products that have passed several

levels of approval, and this aspect is important to investigate at Company X, since it increases the risk of accepting bad products.

It is important to understand the evaluation process of a product, and if there is a general consensus on what makes a product good and profitable. This paper discusses and investigates communication gaps between top management and middle and lower managers. As well as the investment decision process, whether it is standardized or subjective i.e. based on the individuals own knowledge and experience. Also this paper investigates, if there exist discrepancies in the educational backgrounds of the managers that might cause them to use divergent evaluation methods. Further, the background of the managers is analyzed and the overconfidence theory (e.g. Lichentstein et al., 1982) is applied to evaluate whether managers overstress the importance of the parameters linked to his knowledge. Additionally, Finance/Accounting's role and support in the investment decision process is analyzed, mainly how or if the function can reduce the bias caused by personal incentive, expertise, or lack of knowledge.

Moreover, this study will evaluate the investment decision process by using the Bower-Burgelman process model that describes three processes and three forces that are necessary and essential in order to comprehend the investment decision process for Company X. The Bower-Burgelman process model extends the idea that an investment decision is solely based on financial parameters e.g. NPV to include behavior and communication. The findings in this paper is compared to Bower's (1970) study, which argues that all levels of the corporate organization affect the product selection with different forces; thus, managers on different levels take decisions concerning the investment from their own incentives and preferences. Due to forces discussed by Bower (1970) that affects the investment decision process, it is evident that the investment decision process is multifaceted and complex. Therefore, in order to make a more cohesive research of the evaluation process, we try to highlight the major forces that affect a product from a financial and managerial perspective. Finally, the similarities and differences between Company X as a technology firm with heavy R&D and the general firm is examined with the aim is to give a comprehensive assessment of the investment decision process and all the forces that affect the decision.

2. Problem Statement

This chapter has the goal to explain and present the purpose of this thesis by presenting what previous research has investigated and studied. Further, we state how we defined our problem question.

Bower (1970) stated that the investment decision process is a multilevel and multi-process activity where managers, top management, and the corporation all have different agendas to maximize their own utility; forces that affect the decision process. The investment decision process consists of identifying and analyzing potential investments, strategizing, investing in the product, production and monitoring of the selected products.

Experience from Bower's (1970) research has shown that there tends to be bias, from interviews, towards answers that indicates more correct procedures when a researcher investigates a firm, since the individuals know that they are under investigation. In order to remove this bias, relationships need to be formed and the amount of time spent on forming these are crucial and essential (Bower, 1970). In this thesis we have gained access to the full company structure and financial data; the access is due to a close relationship with management. In our thesis, the bias has been reduced since management aims to improve the decision making process. Hence, the management is motivated to highlight the investment decision process' issues and risks. The investment decision process is investigated from the lower managers until it reaches Group level. The reason why we investigate these levels of decision-making is due to their involvement and mandate in the investment decision process.

Kim et al (2009), argues that the agency theory states that the same individuals do not manage the ownership and management. Normally, managers that manage strategy and operations do not own company shares. A manager that owns shares in the company will then have incentive to maximize the shareholders' value. If the opposite is true, the manager will then maximize self-interest rather than shareholders' value. The agency problem shifts the decision-making process' focus from a long-term to short-term perspective. There is a tendency to reject long-term risky products, as they do not maximize managers' benefits in the short term (Psaros, 2009). As one of the forces impacting the decision, it is important to investigate if agency problems are present and impacting the investment decision process.

According to Lumijärvi (1991), managers own incentives to continue to invest in a product that leads to an emphasis on strategy and technology instead of revenues. Therefore, in investment decisions, the financial perspective is often less prioritized or neglected. The

financial perspective of the investment decision process can contribute to minimize failure that can be managed appropriately with strategies and financial decisions that drive growth as well as shareholder's objectives. The main cause for investment failure according to Ibarra (1995) is the lack of or poorly performed financial analyses such as free cash flow analysis, profitability ratios, growth indices, and risk assessment. Further, the financial perspective of the investment process is essential in assessing an investment's performance by monitoring financial strategic goals that enables the strategic investment process to operate efficiently and effectively.

Historically, capital budgeting has been seen exclusively as a financial decision. Bierman and Smidt (1966) stated that future cash flows are discounted by a specified discount rate to get the NPV. From a financial perspective, the investment with the highest NPV would be preferable. According to Bower (1970) this is theoretically correct, but the view is too simplistic; the financial analyses need to be extended with a managerial perspective. Nowadays, Bower argues that the opposite is true; capital budgeting in companies is mainly focused on management and strategy, which is not always in consensus with the financial perspective. The company strategy, structure, hierarchy, financial analysis, policy and manager's decision mandates are all important parts in the investment decision process. In order to optimize the investment decision process, it is important to realize the synergistic effects of incorporating the synopsis view of finance and management as opposed to seeing them as opposites.

The main inspiration of our thesis is Bower's (1970) book "Managing the Resource Allocation Process: A Study of Corporate Planning and Investment" on the resource allocation process in a large firm. Bower concluded that there is a lack of adequate models describing the process; referring to how the decision making for the company is done by the top management and then how the decision travels to the lower hierarchal levels and back. Furthermore, Bower (1970) argued that at different instances in the process, different manager levels are primarily responsible to handle and manage the decisions regarding the product. In extension to Bower's (1970) ideas and models, Noda and Bower (1996) evaluated the involvement of managers for two companies that belong to the same industry with the Bower-Burgelman process model. Additionally, the research used field-based data that proves the importance of managers' own strategy within the decision-making process. 'Selling of Capital Investment to Top Management' (Lumijärvi, 1991) is another research paper that motivated our thesis, as it examines the behavioral aspect of the decision-making process within a

company. This thesis focuses mainly on the management of the company. Lumijärvi (1991) states that the non-economic aspects of a decision are more important that what the actual economic analysis conclude, as decision-makers influence the decision-making process with social-economical values instead of economic facts. Lower level managers try to influence the decision makers by emphasizing or filtering economic, strategic, and technological data in formal or informal meetings. An investment is less likely to be rejected if the decision maker is committed to the product.

The main purpose of this thesis is to investigate the synopsis perspective of finance and management in the investment decision process. There is a lack in the literature according to Bower (1970) regarding the decision process and how strategy, managers' agendas and financial goals are linked in a company. This thesis will investigate the above with Bower (1970) and Lumijärvi's (1991) findings as a benchmark, what forces affect the investment decisions process. The thesis will contribute to the literature, as it is unique in the sense that we have gained full access to a firm's entire internal investment decisions process from the lower to top managers and worked closely with the executive board. Thereby, it will be an extension to the existing literature with an insight study of the internal decision process of how the different level of managers and forces impact the investment decision process in a technology based firm with R&D.

To achieve the objective of the study, the research question was formed:

"What forces influence the investment decision process in a large technology firm with heavy R&D, from a managerial and financial perspective?"

3. Method

This chapter aims to describe the process model that was used in this Master thesis.

3.1 Introduction

Due to the nature of this master thesis, the method itself is a unique process. The method varied throughout the different stages of the study due to a few obstacles concerning the focus of the thesis. Several focuses were in mind, but there existed a primary interest of a thesis within corporate finance with elements of investment and behavioral finance. After reaching out to several large companies expressing our interest and knowledge within finance, a project was signed with this specific company that had the motivation to investigate the internal investment decision process; this company will be referred to as Company X in this thesis. Company X is a large firm with heavy R&D investments, which we had to take into consideration when examining their organizational setting. Further, when the thesis project started, the company itself was aware of that there might be problems within their investment decision process. However, with the help of an external source and approach, this thesis would be the tool that the company needed to evaluate the potential problems in the investment decision process while contributing to the existing literature. The method procedure was performed by examining and evaluating previous research, the firm's investment process, interviews, and analytical theoretical model.

3.2 Previous Studies

Hemmingsen (1973) in his study of 6 companies regarding investment projects first observed the process within the company. Interviews with the employees and external resources such as consultants with relevant expertise were thereafter conducted. Hemmingsen (1973) then performed an internal analysis; reports and process. Also, an external analysis was conducted of the press. Another research was conducted by Ackerman (1970), also chose to use interviews and follow the same method as Hemmingsen (1973). Ackerman (1970) investigated several large multi-divisional manufacturing firms; the strategy, hierarchical levels, diversification, and transferring of information of the investment decision process. Ackerman (1970) was inspired by Bower's previous research on asset allocation process. Further, King (1975) did two case studies of large investments. King first observed the decision process from idea to completion. A scientific model was created by King to match and structure the findings.

3.3 Thesis Framework

The following sections will describe the outline and procedure of this thesis. It will include the primary sources, study of the investment decision process at Company X, interviews at Company X and analysis of previous literature. Further, the limitations of this thesis will be discussed.

3.3.1 Primary Sources

Research about previous studies and scholarly articles regarding capital budgeting and behavioral finance were the primary sources. It was of importance to get a broad and good understanding on how capital budgeting was conducted from a research point of view within different disciplines of finance. To gain access to the literature, search engines as Google Scholar, Jstore, and Gothenburg University Library (online) was used. While researching and reading articles, it was clear that there are many topics and issues that have been brought to attention concerning capital budgeting including behavior. We then summarized the issues and topics, in order to get an overview of what have been studied and what can further be investigated. It was noticeable that there has been an extensive research about financial methods such as DCF, NPV, and Real Options within the previous research. By narrowing down the already studied issues and topics, a model that brought our attention was the Bower-Burgelman process model, which deals with capital budgeting and managements' resource allocation. Previously the model, by Bower (1996), has been analyzed for a large company; although, no further research have been done from his perspective of how management and financial perspective intervene in an investment decision process. Due to this, the thesis is taking the approach on investigating the role of managers in the investment process in heavy R&D firms; hence, adding to the existing literature.

3.3.2 Study of the Investment Decision Process at Company X

After having completed an extensive research and understanding of capital budgeting and the Bower-Burgelman process model, we then needed to get the whole perspective of Company X's investment decisions process as well as their organizational structure. The internal investment decision process was easily accessible due to the close relationship with the executive management. The fundamental information about the investment decisions process was accessed through the internal website provided by Company X. There existed specific information of roles. The role's responsibilities and different phases of the investment decision process needed to be summarized. After summarizing the information, it was then easier to see the investment decision process in a larger picture. Each phase of the investment decision process has specific requirements that need to be fulfilled in order to proceed to the

next phase. The process itself can be viewed as an investment's life cycle, where the product is at the idea stage to later be established until it reaches the termination.

3.3.3 Interviews at Company X

After consulting with the supervisor assigned by Company X, it was decided that interviews of key people directly related to the investment decision process was necessary. The next step in the method process was to conduct interviews of the key people that were involved with the investment process. In order to minimize bias in answers from the interviews, Bower's (1970) approach was used. It is essential to build up a relationship with the interviewees; this so that the no one would feel that they were under the loophole of investigation. Therefore, relationships with the managers were established by informal and formal meetings in the environment of Company X. Additionally, to get a better perspective of the internal organizational structure of the company, interviews and relationships were also established with people from different units of Company X that had an indirect part or influence of the process. The units of the firm that were of interest to interview were the Group, Business Development, Finance, and the Product Areas; managers in these units that have roles in the investment decision process were interviewed.

From investigating the investment decision process, it was clear that the top managers and the Group level had an impact in decisions that concerned products that were large investments. Further, the middle managers and accounting were interviewed, as the investment decision process had objectives, financial prognosis, numbers, and ratios that needed to be fulfilled for a product to continue its travel through its investment process. Also, the lower mangers were interviewed to understand the process at each hierarchical level. To keep in mind, is that the managers and staff interviewed were directly related to decisions that potentially impact a product's investment decision from a managerial and financial perspective, thus it was important to get an understanding of their role and how it impacts the process from a managerial and financial perspective. The authors conducted the interviews and both were always present to reduce bias and a subjective view. Questions regarding the investment decision process were prepared to match the role of the interviewees. However, the interviews took different directions depending on what the interviewee wanted to discuss. There might be that the interviewees hid information that might badly reflect on himself or if he was in doubt of our security clearance and intentions. Moreover, after several informal and formal meetings with managers, staff, and other key people the answers were summarized. The summary of the interviews was further analyzed, as there seemed to be a pattern of issues and

discrepancy within the firm's investment decision process. These findings where then to be analyzed by the theoretical process model by Bower-Burgelman to see how managers and finance play an important role in the investment decision process for a firm with heavy R&D investments.

3.3.4 Analysis of Previous Literature

By using the information collected from interviews and pervious research, it was necessary to analyze how a large firm with heavy R&D investments can be connected with the existing research as well as with the Bower-Burgelman process model. The information was mainly analyzed from the theory of Lumijärvi (1991) and Bower (1970), where they discuss how different forces within a firm impact and influence the investment decision process. The analysis had to reflect the actual process of the firm to further see how it relates in a managerial and financial perspective. The Bower-Burgelman process model was used as foundation to summarize the financial and managerial forces in a table where the objectives, responsibility, and strategy of the firm were analyzed. From a financial perspective it was important to see how the financial objectives were managed, transferred, and performed; vice versa, from a managerial perspective. When we compared the literature with our findings, we discovered that Bower-Burgelman process model does not cover all phases in an investment decision process and fails to include all behavioral aspects. Therefore, in our analysis we added new phases and forces based on other literature than Bower in corporate and behavioral finance. From our analyses, conclusions could then be made based on our findings from interviews, the Bower-Burgelman process model, as well as from previous research.

3.4 Limitations

This thesis has the aim to investigate the investment decision process for Company X. Because of the confidentiality agreement; we are not allowed to publish the name of Company X. Although, the thesis has reached its aim, there were some limitations that were unavoidable. Due to the time limit, this research was conducted by only interviewing managers involved with the investment process and by obtaining information from the internal company website. Each interview was set up with individual meetings, where managers were interviewed one to three times depending on their availability. In order to generalize the findings for firms with heavy R&D investing will be difficult; ultimately, to make a generalization the research would need to include more firms. Another limitation is that during the interviews, bias could have occurred as the interviewees throughout the research became aware of the purpose of the thesis. For this reason interviewees could have

withheld information that might reflect negatively upon them. Further, the interviewees were also unaware of which level of security clearance and which information we had access to. Therefore, information that was company restricted could have been kept hidden.

4. Literature Review

This chapter aims to present previous research regarding investment decision processes from the different fields of finance.

The idea that psychology impacts investment decisions dates back to Smith (1776) that stated that individuals' tend overestimate their own ability, but neglect the risk of loss. For long, these ideas of behavior, as a factor in corporate finance, were neglected, and Modigliani and Miller's (1958) view of investment decision being solely affected by the financial markets was predominant. Furthermore, Modigliani and Miller (1958) stated that the firm's capital structure and dividend policy forced management to reduce their financial objectives (Dempsey, 2014). However, the awareness of the psychology factor had started to form in the late1950s by Simon (1955) and Margolis (1958). The primary finding from their research was that the individuals had their own agenda and biased view of investment decisions.

Capital budgeting is key to a company's success, and it has undergone a transition to incorporate the financial and management view. A company has limited resources and capital budgeting is the method used to determine which products should receive investment. Capital investment and budgeting should be taken seriously and emphasized throughout a corporation. The investment affects the corporation as a whole and cash flows long-term, thus the success of an investment for a corporation is crucial. The decision, which products should receive capital, should rationally be based on how much wealth they generate to the shareholders. Furthermore, the research has focused on the adaption of corporate finance theories instead of psychology as for example the Modigliani and Miller proposition. Dempsey (2014) argues in his research that the Modigliani and Miller proposition has influenced and shaped the majority of corporate finance decision processes to a more theoretical perspective that does not always reflect the reality. This in turn has influenced a disconnection between the two fields behavioral and corporate strategy finance as argued by Dempsey (2014).

Further, it is clear that from a manager's perspective the goal for a firm is to increase the shareholders' wealth by increasing the production and earnings per share. In order to increase

the shareholders' wealth it is of high importance that managers understand the whole complexity of the firm and the current environment of the firm (Dempsey, 2014). Two factors that need to be taken in consideration are the complexity of the firm and the individual performance of the firm's divisions as they make up the value of the firm. Due to the fact that they make up the value of the firm it is therefore important to identify synergies between these two factors (Dempsey, 2003). In the academic world, the idealized model of the firm is ignored, as it does not identify the complexity that underlies financial corporate decisions; whereas the literature within the field of management addresses this issue by examine the multiple challenges of production, strategy, cost, budgeting, and strategy.

Additionally, Keasey and Hudson (2007) states in their research that finance as a discipline can be further extended with the context of behavioral decision making that can be applied to financial and investment decision making. This because there are still much to learn within finance as elaboration of the theories and theoretical models is limited and there is a need to explain the actual actions of a firm. Hence, there is a need for actual internal investigation of firms and how theoretical models are applied in that kind of setting. Keasey and Hudson (2007) further argue that it is important from a financial perspective to take in consideration factors that can influence investment decision processes. Previous research have discussed such factors (Kennickell et al., 1997, Callan and Johnson, 2002, and Hanna et al. 2001) as gender, education, and age as they all seem to have a direct influence on capital budgeting and financial perspectives and processes in a firm. Hence, Kasey and Hudson (2007) state that it is important to see the financial perspective within a firm from a broader perspective where managerial and behavioral finance perspectives seem to play a role.

4.1 Behavioral Finance

Dempsey (2014) argues that in the past there has been a predominant emphasis in the literature on the justification of the NPV method and how it is generally seen as sophisticated tool in investment decisions; there exist a belief that the NPV method is efficient. Therefore, there has always been an underlying reason and interest to identify investments that produce a positive NPV. The NPV is nowadays a popular and on the surface objective method, however it is still affected by human bias as the cash flow prognoses are manually done and there are always more or less forecasting errors (Harvey, 2001). Dempsey (2014) claims in his multidisciplinary article "A Multidisciplinary Perspective on the Evolution of Corporate Investment Decision Making" that it is important to focus on both behavioral and corporate

finance. Further, the behavioral characteristics of managers affect the practice as they have their own expertise and knowledge.

4.2 Agency Theory

The *Agency Theory* describes the relationship between decisions and the participants' own incentives. The Agency problems are due to the fact that the principal and the agent have different objectives (Fama and Jensen, 1983). When a project is undertaken the principal will give the manager some decision-making authority, but still he is not in control of the assets. Managers are responsible for the success of the project and reaching the set goals, but he does not share the benefits of reaching the target. The aim is to always maximize shareholder value, but the managers do not have any motivating benefits to take on the most value-enhancing project (Jensen and Meckling, 1976). If a company suffers from agency problems, the company's market value will decrease, as the share price will be lower. The agency costs reflect a divergent view on decision making between the shareholders and the managers, hence the shareholders will suffer the losses, as their wealth will decrease with non-value maximizing decisions (Jensen and Meckling, 1976).

Agency costs are according to Jensen and Meckling (1976), monitoring costs, bonding costs, and residual loss. There are monitoring costs since the principal cannot be sure that the agent has a value maximizing view. The costs include measuring, controlling, and governing the agents' behavior and are initially paid by the principal. However, the cost will be transferred to the agent, as his salary will decrease (Fama and Jensen, 1983). Bonding costs are a result of the monitoring costs since it is the agent that pays in the end. A structure often in the form of a contract is set up that obliges the manager to perform in such a way that benefits the shareholders. The agents incur the bonding costs and these will only stop when it is no longer sufficient to decrease monitoring costs. The final cost is the residual costs. These occur since the objectives of the managers and shareholders will not be aligned even with monitoring and bonding. The management cannot create a contract that considers all aspects of a manager's behavior since this would cause too much bonding costs. The divergent views of the principal and agent cause losses since there are disagreements and not always a common goal (Jensen and Meckling, 1976). The agency cost can be reduced by the introduction of compensation packages, which give the manager an incentive to perform in the shareholders' best interest. If the principal-agent problem can be reduced by compensation packages, the firm value will increase (Lewellen et al., 1987) (Statman and Caldwell, 1987).

4.3 Overconfidence

Moreover, there are several factors that affect a manager's behavior and his objectives. It is fairly common that managers are *overconfident* in their ability to determine whether it is a good or bad investment (Lichentstein et al., 1982) (Russo and Schoemaker, 1992). An example of such phenomena, overconfidence bias, occurs when people tend to overestimate the reliability of their actual knowledge. Research has shown that when one is about 90 to 98 percent sure of a scenario or event to occur, it appears that one is actually at the most only 60 to 70 percent sure. Svenson (1981) states in his research, that overconfidence of automobile drivers in Sweden consider themselves "above average" when it comes to judging their own ability compared to other drivers. Comparable statistics and results have been proven to be correct in the field of finance. Hamberg (2004) showed with his study of 304 Scandinavian corporations that only 5 percent of the questioned CEOs believed with confidence that their corporation would have a negative growth rate for the next five years in comparison with other corporations in the industry.

In capital budgeting, there are many reasons that a manager could be overconfident. Investment decisions are multifaceted and there are many factors impacting the decision. Capital budgeting decisions require the manager to deal with many uncertainties when predicting costs and sales as well as when dealing with complex issues one is more likely to be overconfident. Another problem is that in capital budgeting, the investment decisions always have different properties. In order for a manager to learn, the same type of problem need to reoccur, but when it does not, the lessons from the previous investments are absent. The major investments are usually rare and the manger will not continuously face the same problems (Lovallo, 1993). When a project has been invested in, the lead-time before the result is available is often long, which makes the assessment of the outcome poor and non-sufficient. In addition to this, since the manager knows that each project is unique he tends to down-prioritize the critiques from previous project investments (Brehmer, 1980). Although, Heath and Tversky (1991), has found that the overconfidence in finance depends on the confidence that people have of their own prediction of the field they are working in. In other words, people that believe that they are experts in their field hold actual predicative skills of investment outcome constant.

4.4 Self-Attribution Bias

Another interesting aspect of overconfidence bias that the financial literature brings up is *self-attribution bias*; overconfidence becomes intensified when self-attribution is present. Self-

attribution bias is known as a bias where people take credit for success and blame failures on external factors. It is important to recognize that overconfidence bias consists of aspects of cognitive and emotional errors; however, the bias is classified mainly as emotional as the bias is primarily the result of emotion. It is problematic to correct for overconfidence, as it is difficult for a person to review and assess its own self-perception of knowledge in a sense of prediction and certainty of overconfidence. As both prediction and certainty of overconfidence have cognitive and emotional characteristics, which demonstrates that faulty reasoning is based on gut feeling and hope. Hope is reinforced when investment decisions are made in an overconfident state (Mokhtar, 2014).

4.5 Selection Bias

Overconfidence can also be due to the *selection bias*, and managers have on average a stronger belief in their ability than the general population. The first reason is that those who believe that they would make good managers are the ones that apply for the job. The manager role is a "higher position" than the average job and hence those who are offered the job see themselves as "selected". The managers that obtain the role often have a very good track record of past achievements, which make them more prone to receive promotions (Goel, Takor, 2008). Further, due to the strong belief in their own ability, the managers are more motivated due to their own perception that they have the ability to climb the promotion ladder. Motivated employees then perform better and therefore are more beneficial to the company (Heaton, Odean, 2009). Individuals are generally overly optimistic about future events and believe more good things will happen to them than to others (Kunda, 1987). Optimism for an investment project is based on that the decision-makers neglect future opportunities, past experience, and available statistics. Moreover, optimism also relates to personal expertise and experience that is related to the investment project. It has been proved that those who are moderately optimistic have reasonable financial behavior and realize the uncertainty of an investment, whereas those who are overly optimistic generally behave in an imprudent way when it comes to the finances of an investment project (Puri and Robinson, 2007).

4.6 Coffee-Room Effect

O.P. Lumijärvi (1991) found in his study "*Selling of Capital investments to Top Management"* that subordinates persuade managers on how good the project when selling the investment by emphasizing values such as employment, economic, strategic, non-economic arguments, and production technology in formal and informal settings. Indirect, subordinates

try to persuade the decision-makers to feel committed to an investment project through meetings and informal communications known as the *coffee-room effect*, this with an underlying fear of getting an investment project rejected. Lumijärvi argues that the calculated numbers of the investment is not as important or the major determinant; instead, informal meetings are the key to get an investment proposal approved. Further, Statman and Caldwell (1987) argue that managers' commitment to the product cause bias as the information is subjectively presented, thus bad products can be justified and accepted. Finance can support the manager with objective information as they are not committed to the project. Therefore, the positively biased forecast of a project can be reduced.

Moreover, a survey performed on a Scandinavian corporation shows that 90 percent of the participants find it important to marketing and sell their project to superior decision-makers. The marketing and selling of a project have the focus on committing the superior decision-maker so that he will support the project, encourage, and contribute to the approval; in other words, one can call this lobbying as it is important to "sell" and convince the superior decision-makers that the project is worth the time and money to invest. The persuasiveness of an investment project can create a bias, which in turn can result in overconfidence and overvaluation of the expected inflows or undervaluation of the out flows (Hogarth and Makridakis, 1981).

4.7 R&D

In a firm's investment decision process, it is important to have a set level of R&D spending. The level of R&D spending is decided by the top-management in technology-based firms (Hartmann, Myers, and Rosenbloom, 2006). Even though the level of R&D spending is covered in a firm's budget, it seems like the common budget practice fails in a way to reflect the revenue consequences of incremental changes in aggregated R&D spending. This failure further reflects on the investment decision process for the firm. Hartmann, Myers, and Rosenbloom states in their empirical research paper that it is very important for a firm within the technology industry to decide how much the firm is willing to spend on R&D as it is an important influence in a firm's investment decision process. Further, it is stated several studies have found a strong positive correlation between R&D and future revenue growth as well as that R&D investment enhances shareholders' value (Hartmann, Myers, and Rosenbloom, 2006). Hanna Silvola (2008) further argues from her study of 101 Finnish firms, that firms with high intensity of R&D have managers that take use of budget and strategic alliances within the firm. Another result from Silvola (2008) is that there is an indication that

firm's with heavy R&D investments use formal capital budgeting methods for both large and strategic projects. Sophisticated methods are also in investment decision process for heavy R&D firms; such methods includes the most common ones as Net Present Value (NPV) and Internal Rate of Revenue (IRR), where these methods increases with the intensity of R&D investment.

The capital budgeting decisions are very complex as there are many factors that have an impact. The financial method NPV is subject to biases since the cash flows are based on forecast, which always are subjective. The manager and shareholders have different incentives and objectives, which incur agency costs. Furthermore, the mangers are often overconfident and have a strong belief in their own capacity. Therefore the capital budgeting decisions are affected by financials, participant's behavior and management; hence it is of outmost importance to have a synopsis view.

4.8 Decision Process

In addition, the field of management research has tried to study and clarify how the different units within a company handle, manage, and tactically strategize investment decision process (Mukherjee and Henderson, 1987; Silvola, 2008). Nowadays, it is important to realize that a firm's investment process consist of both personal and political interests that are factors underlying the process. Therefore, an employee, who is involved with the investment decision process, has a doubtless incentive to gain support from others. Bower (1970) extends this thought, as negative responses are common in the investment decision process; hence, a new project that has gained a supporter with good reputation and if that person is willing to back the project: the project itself will be identified with that person's reputation. Moreover, the research result of Bower and Noda (1996) shows that top managers shape the incentives of managers in the organization. Also, the study (Bower & Noda, 1996) states that an early influence on starting new projects is due to middle managers enthusiasms along with that top managers have trust in the middle managers enthusiasm. One model that evaluates management influence is the Bower-Burgelman process model, which is a process where initiatives from the bottom-up strategy are threatened and have to compete for resources along with the attention from top managers' attention in order to survive in the corporate context. Additionally, Dempsey (2014) emphasize that within a firm there are two organizational structures that need to come together in order to approve division plans, investments, and budgets; all correlated to the investment decision process The first one is the bottom-up structure that is a reflection of how a division is built up in a firm (subordinate managers to

top management). The second one is how the top management controls the structure and transfer corporate objectives down in the organization. In the investment process it is important that these two organizational structures work as a unified system in order to deal successfully with investment proposals. The Bower-Burgelman process model combines these two structures and the model becomes a framework where one can link these managerial activities to organizational learning in the strategy-making process and investment proposals (Noda & Bower, 1996). In addition, Dempsey (2014) states that the investment proposal is seen as a reflection on the political influence or track record of the person that support or propose the project. McAulay (1996) extends this by observing and questioning the credibility of the managers involved in the investment process, where he states that managers are to be held as implementers in contrast as viewing them as the decision makers in the investment decision process due to their personal and political influence.

4.9 Bower-Burgelman Process Model

Bower (1970) stated due to the complexity of the companies' organizational structure, it is important to use a model to simplify and highlight the important parts of the investment process and created the Bower-Burgelman process model. Actors such as top management, middle managers, and lower managers all have an impact on the process. The Bower-Burgelman process model investigates actors' own agenda, knowledge, goals, attachment, and mandate. The company can choose which product to allocate assets; the motivation to choose one product is determined by several forces. The Bower-Burgelman has developed a conceptual model for the asset allocation process, where it is possible for one to analyze and structure a company's interconnected managerial and financial strategies through the organization. Bower used this model to investigate large manufacturing companies and their investments. Bower found in his studies (1970) that a companies' investment selection couldn't only be explained by which investment that is most profitable. Further, Bower found that the organizational structure including the top management control of the process affect the investment decision. Product selection is intertwined with the strategic investment process. Also, all the hierarchal levels take part in these decisions; each hierarchal level has a mandate in the process. Bower argues that each hierarchal level has their own agenda and incentives; the model emphasizes these forces.

In section 5, there is an extensive explanation of Bower's (1970) literature on the Bower-Burgelman process model. The model in section 5, also analyses Company X compared to Bower's literature and findings.

EXHIBIT 9-6

A PRESCRIPTIVE VIEW OF THE RESOURCE ALLOCATION PROCESS (REVISED)

	Process				
Level of Corporation	*Phase of Process*	*Definition*	*Impetus*	*Determination of Structural Context*	*Measure*
Corporate Group Division Area General Manager	Corporate Integrating	The choice of earnings objectives as well as global strategic considerations The review of modification of product-market plans to insure consistency and complementarity, and quality. The adjustment of corporate plans to take account of sub-unit limitation	The final approval of projects The selection of the best product-market opportunities for the investment of funds in facilities	The design of structural forms which will reinforce earnings goals and global strategy The design of sub-structure and procedure which facilitate planning and operation. Involved is the problem of coordinating sub-unit and corporate need	Return on Equity Return on Equity ↓ ↑ Strategic
Product-Market Group	Initiating	The formulation and implementation of "Strategic" product-market plans and facility definitions	The proposal of facility projects	The formulation of new structural arrangements to better meet sub-unit needs	Strategic

Picture 1: Example of the Bower-Burgelman Process Model (Bower, 1970)

5. Empirical Findings

The information from interviews and other sources at Company X are presented in this chapter with the goal to get an overview of the organizational structure, processes, as well as an insight of the interviews conducted. Firstly, the investment decision process is presented. Secondly, the interviewees are grouped by the organizational structure of Company X, this to get a better and easier understanding of how each actor of the process relates to one another.

5.1 Processes

The following model was specified by Company X and describes the investment decision process; the information was gathered at Company X's intranet. It is important to realize that there are different components within a decision process. The investigated company has three processes that are integrated, where the main process is the investment decision process (IDP). IDP is a policy on how the different steps should be managed, from idea to phase-out. Moreover, those in charge of the product decisions lower and middle managers use the IDP but it also contains specifications on other participants' role in the decision process.

Picture 2: Integrated processes for Investment Decision Process

There are two separate processes, a governance process where the executives overlook the different strategic steps and make the final decisions regarding investments. Executive board also reviewing the profitability, strategic fit and long term stakeholder goals. There is also a process below IDP that contains essential processes necessary in order to establish an investment. In this thesis this process is known as 'other' and contains R&D, M&S, Finance etc. The focus of this thesis is on IDP, but the parallel process will also be an essential part to understand the investment scheme.

5.2 IDP – Investment Decision Process

In the process there are 5 steps representing different phases of the IDP. Each phase of the process has the aim to assist and work as a control function in order to stay within the strategy set by the company. Throughout these phases there are different responsibilities that are assigned to the middle manager and lower manager. These different managers have different expertise and their roles are to support the process. The IDP effectively divides the tasks and responsibilities to the different managers in the different phases in order to optimize the general investment process. Moreover this chapter will explain the different steps and elaborate on their function in the process.

Picture 3: Product Life Cycle and Investment Decision Process

Step 1:

This is the first step where an opportunity has arisen, as there is a potential market demand and need for a new technology. An evaluation of this opportunity is conducted in order to establish whether it is in-line with strategy. If the opportunity fits the strategy an assessment whether it can be produced and at what cost as well as the profitability the product will generate. At this initial step of the IDP ideas and suggestions of new technology is transferred to the lower managers; there is no specific unit or individual that have the task to brainstorm and produce new technology. The lower manager initiate and welcome new ideas and possible new products as it are of interest of the company. It exists a motivation to expand within innovative technology ideas that are compatible with the existing technology as well as being in-line with the objectives from shareholders. These ideas are strategically evaluated from a technological perspective before decisions made on profitability are taken. Crossroads that have the aim to guide the investment process in the right direction makes up this sub-

process within this first step. For this process to function, the lower manager has the aim to make his staff a part of the process, as there will be incentives to contribute to the overall investment process and profitability of the company. An important factor in this step is to evaluate the market demand and need for the new technology. If the market is not ready the technology will be put on halt, while the investment process will be latent waiting on the market to strike. There is an emphasis in this stage that it is important to have latent processes, as developing every new technology that is not yet ready for the market will be costly and thereby burden the balance sheet for the company.

At a later point in time in Step 1, after the product has been on hold, the product is reevaluated. Following, an assessment of different aspects needs to be fulfilled for the product to be continued and established. The areas that are taken into consideration are strategic fit, market analysis, financial, as well as profitability and compatibility analyses. The different managers within the different assessment fields as well as the middle managers need to approve the product. The opportunity and the managers' information along with analyses then reaches the investment council consisting of executives with expertise in their respective area, the investment council makes a critical evaluation on whether it is a good investment. If the product does not meet the required needs for each of those steps the product will be put on halt or be terminated. The assessment of the different aspects is usually established through individual meetings, rather than an official meeting. The final part is to include the product in the product portfolio. An investment case and a plan are established as the product transfer into the next step of IDP.

Step 2:

In the next step of the IDP, the main task is to develop the product to meet the specific market demands and needs. The middle manager has the main responsibility for establishing the new product into the market with a defined strategy. The middle manager makes sure that that the product develops accordingly to the existing regulations and compliance policies along with the investment objectives of the company. Strategies concerning cost and time line are committed by the middle manager as a part of this step. Further, an investment case with an analysis of the financial performance of the product is conducted. Information from different areas are collected, executed, and analyzed in an investment case. Scenario analysis of the potential different outcomes is evaluated in regards to the knowledge of M&S, R&D, and Finance that the lower manager obtains from the different sub-unit of his assigned staff. This knowledge from the sub-units is collected from the parallel process known as 'other', as this

‘other’ process is an essential support function to the IDP. One function from the parallel process ‘other ‘ is to propose potential customers by doing a screening of the market. This screen of the market is then used in the investment case assessment in order to evaluate the potential volume that can be sold. Further, the investment case is reviewed by the investment board and stakeholders, where it will once again be reevaluated regarding the likelihood of a well estimated investment case and time line. It is clear that the governance process composed by the executives along with the ‘other’ process impact the IDP. Moreover, if the investment board will accept the product assessment, the product transfers into step 3.

Step 3:

This is the third step and the product is ready to be marketed. There is a business case developed in Step 2 and in Step 3 the information is updated. As the analysis and prognoses are always forward looking the new phase is determined to be T=0 in the prognoses. Lower managers, middle managers, and top managers reevaluate the product. A new assessment of different aspects is conducted and the product needs to meet the requirements in order to be continued. It is important that the analysis is still in line with the objectives. Even in this step, the investment case needs to be evaluated first on an IDP manager level, as well as from the Investment board. The process of overlooking executive is prominent in this step as well as the support to the PM in form of the ‘other’ process.

Moreover, the middle manager makes sure that market offers are created that contains the product with complimentary services and extras. A marketing strategy is set up and opportunities and threats are considered. The offers are marketed to the target customers that were established in Step 2.The lower manager evaluates how many of the potential customers in Step 2 can be real customers in Step 3. The markets response creates an opportunity to set a price based on demand and supply. It is a balance act between profit and an attractive price that will pull more customers. As there are customers the product needs to be developed from a “prototype” to a physical product that can be delivered. The products can be tailor made with different specifications depending on the customer need. The lower manager supervises the progress in order to make sure that it lives up to the set standards.

Step 4:

For step 4 the investment case is reevaluated once again with updated information and the main goal is to maintain the product on the market. In this phase there is more information about the product, since it has been developed and sold. Actual information obtained from M&S, R&D, and Finance is now available for the company in regard to price, cost, and

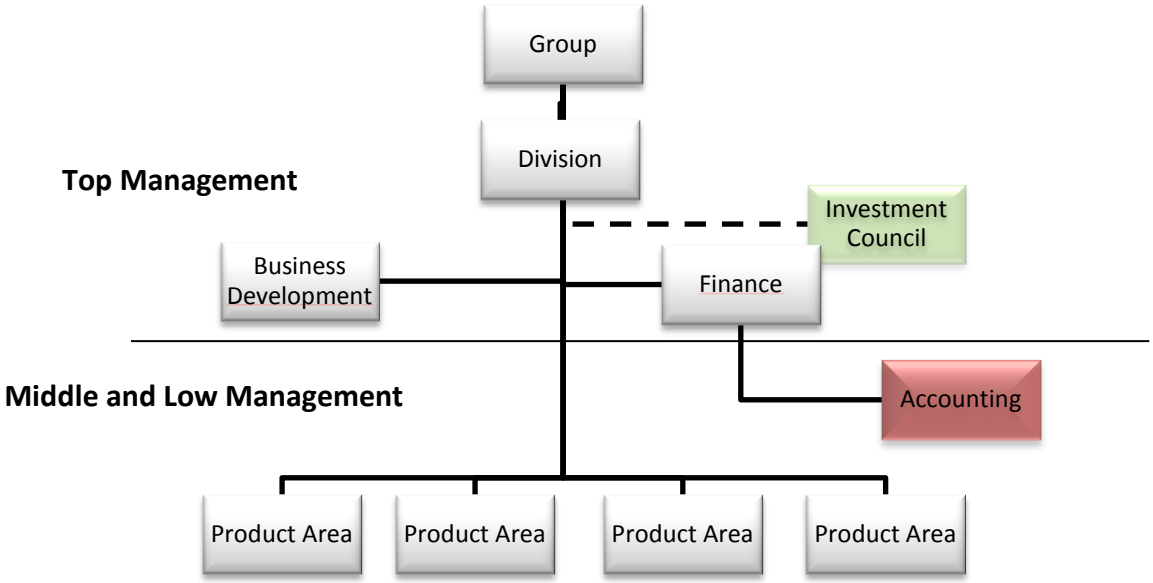
demand. The lower manager will in this step have the overall responsibility where he needs to update the strategic plans and the strategic fit of the portfolio. The updated investment case can now provide a good base of the future outcome of the product. The strategies can be managed and adjusted accordingly to maximize growth potential and profitability; the investment board will further review this. If the requirements are not fulfilled, a plan is established to terminate the product. In this step will also establish a plan for the life expectance of the product; when the product will be drawn back from the market.

Step 5:

In step 5 the aim is to draw back the product from the market and implement the phase out strategy. The middle manager is responsible for the communicating the termination of the product and manages the aftermath to executives and 'others'. The finals step in IDP is to implement the termination strategic plan and finalize the termination of the product.

5.3 Interviews

The investigated firm consists of a complex organizational structure. All corporate levels, from Group to Product Area, play an important role in the investment decision process as they participate at different phases of the process.



Picture 4: Corporate Structure

From interviews with key people from the different levels of management, it is evident that the Group level is in charge of the major investments decisions, whereas the division has the main say for investments that are below a set cut-off value. The division level consists of the main two units – Business Development and Finance. The business development has the

responsibility of profitability, management, and governance of the Division. On the other hand, Finance produces monthly, quarterly, and yearly reports of the balance sheet, income statement, as well as the books for the Division. The Business Development is directly involved with the investment decision process as well as transferring the objectives and strategies set by the stakeholders through management down to the Product Areas. The product areas contain different products that have similar characteristics. Additionally, the Product Area consists of two different levels of managers; middle and lower managers.

The middle manager is responsible for a product area that contains different products that have similar characteristics. The strategy from management is transferred through the middle manager to lower managers. Each lower manager is responsible for one specific product. The strategy that is communicated from the middle management is utilized and extended with a product specific strategy set by the lower manager. Each lower manager has several sub-lower managers that are responsible for all the products building up a product (see picture 5). The sub-lower managers report to the lower manager and the lower manager summarizes and analyzes the information that makes up the product.

5.3.1 Investment Council

The investment council is not part of the organizational scheme, but is a group that consists of management that receives and reviews the business cases from the lower managers. The investment council has access to the financial performance of all the products in the portfolio, whereas this information is restricted as the lower manager only has access to his own product. The people appointed to the investment council are managers from different area and have expertise that is useful when evaluating the business cases. Each one of these managers all has a mandate that is used to approve or reject a product. Usually, these managers have a long experience within the firm and have been directly involved with the investment process for a longer period of time; the managers have the optimal skills and knowledge in order to evaluate if the business case is good or not. The main purpose of the investment case is to evaluate the business case and reduce the over-optimism from the product managers. The key figures and perspectives that are evaluated are cash flow, IRR, NPV, Sales, COGS, and etc. Meanwhile, the scenario analysis based on the business cases is reevaluated. Further, this is the last review and evaluation stage that a business case will need to proceed within the Division of the firm. If the product would be a large investment that needed further review, then it would be transferred to the Group level. The Group level would then evaluate the product once again and finalize if the product is a good investment or not.

5.3.2 Finance

The top management in Finance's task is to review and approve the financial information. There are two CFOs in the Business Unit that have different focus areas. One of the CFOs has a short-term (CFOst)[1] view, while the other one has a long-term (CFOlt)[2] view.

The CFOlt has a role to evaluate, control, and questions the long-term investment forecasts. When the product proposals reach the CFOlt, a review of how the risks have been weighed in the calculations from the lower manager is considered. The primarily consideration is to evaluate how much risk the investment involves; these could be market or technology based. There is also an emphasis on the likelihood that the risks occur, which impacts the accuracy of the forecasts. The goal is to make as correct forecasts as possible. It is important to be aware of the product's profitability with as little error margin as achievable.

Further, cost, revenues, and accuracy of the forecast are considered, as it is important to be aware of the likelihood of the specified outcome, as these parameters are most important in order to achieve a good profit from the investment. According to CFOlt the accounting unit supports the Business Unit in financial reporting such as month end closing. There exists collaboration between the accounting and the lower managers. However, accounting does not consider the technology, which makes sense due to the fact that it is outside their scope of expertise.

In general the CFOlt states that there is no control or governance on the follow-up routine for investments. Furthermore, when the most likely forecast is calculated, there are rarely alternative forecasts if unexpected or hard to predict events occur. There is an underlying awareness that the lower managers are overly optimistic, since they put a lot of effort into the development and feel a personal commitment. The CFOlt argues that most products have a very long time-span and therefore a retrospective analysis is rarely undertaken. Learning from the past mistakes is therefore difficult, as old knowledge is not optimally transferred.

The CFOst has a short-term view and he reviews the financial information through a short-term perspective. He admits that follow-ups of the actual investment outcomes are not done properly, yet they are needed. The development of products is a complex long continuous process due to the size of the investment and R&D. There exist optimism from lower and middle managers and CFOlt argues that the forecasted revenue tends to be lower than expected.

[1] CFOst is short for CFO with a short-term view.
[2] CFOlt is short for CFO with a long-term view.

The investment revenue is the factor that can be targeted and aided with more marketing and sales, but costs are hard to change. The nature of the costs stems from the fact that the expertise the company holds in engineers cannot always be deployed effectively. If a product is doing badly and there is a need to cut costs, the engineers cannot be fired when necessary. Instead, of letting the expertise go when costs should optimally be cut, the engineers are employed in "excessive" R&D development and Company X shifts the focus towards technology rather than finance.

The CFOst states that the middle managers decide on what should go into a prognosis and that the controllers provide updated accounting information as well as prognoses; furthermore, CFOst state that accounting support the sub-lower managers not the lower managers. The CFOst primary goal since this is to maximize shareholder wealth.

Further, the top management (Finance) has targets but the lower managers' product's performance is not highlighted. The reason is that at this level the overall result is considered and as long as a good product covers a potential bad product and targets are reached, the lower managers are not held responsible if a product fails.

5.3.3 Accounting

Accounting stated in interviews that they are not a supporting function to the lower managers. Accounting further stated that the lower managers have a long track record; hence, they are enough qualified to make financial calculations and forecasts. When a lower manager has completed the financials, the information is sent to Accounting for confirmation. Accounting states that since they know that the lower manager would only send financials that are properly done, the financial are just confirmed without questioning the content. After this, the financials are sent to management. In an investment decision, there are many stakeholders that need to confirm that they are on board with the decision, accounting has the confirmatory role for the financials and believes that the lower managers would only put forward products that are good and therefore there is no need to doubt the ability. Additionally, accounting states that the product has reached so far in the process and a bad product would never get that far; therefore, accounting just signs off the product as approved from an accounting point of view.

The interviewees state that the lower managers need to have a solid knowledge in finance in order to have a better understanding of the financial calculations. Also, it is believed that the lower managers use their expertise and gut feel to make decisions. The controllers' suggested during the interviews that accounting and the lower managers should be integrated. Hence, a

person with financial expertise of analysis and prognosis could aid the product manager in the investment process and increase the profitability.

5.3.4 Middle Manager

From interviews, the middle manager is responsible for a product area in the organizational structure. The middle manager is the linkage between two levels as he reports to management and manages the lower manager's performance. The focus at this level is on the business strategy for the specific product areas' products and their unique specifications; hence a strategy is chosen on how sales can be increased.

Additionally, the middle manager has very clear numerical targets transferred from top management. The most important financials are those that are accessible to the shareholders in the annual report Sales, EBIT, and Cash Flow. The middle manager works closely with accounting, as he states that accounting is a part of the product's overall economic health. Moreover, the middle manager does not properly follow the IDP process. He states that his focus is not on the financials rather accounting is responsible. The middle manager gets his information from the lower managers. He states that the decisions are primarily based on a gut-feeling and previous experience. However, the middle managers argues that the financial targets are difficult break down to the lower managers in comparison to strategic and technology objectives.

The middle manager's view on personal responsibility:

"The lower managers have their own objectives for each product, but I will be honest and say that we do not really do follow-ups, as follow it up as personal goals for them, but rather use the material to see if the whole Product Area gets good enough results."

The middle manager's view on accounting's role in the investment process:

"If we had 'real' business controllers, they could control the profitability (product investment)"

An investment proposal before it reaches management has been confirmed in unofficial meetings. The middle manager believes that after these unofficial meetings, only 20 percent of the investment proposals remain and are therefore good proposals. When the investment proposals reach the top management they are most likely approved. In the middle manager's opinion, the Investment Council puts too much faith into the proposals originally prepared by the lower managers. Furthermore, products are rarely terminated and there is an over belief in how much R&D that can be used.

5.3.5 Lower Managers

Commonly, the lower manager is responsible for a specific product. In order to manage the product, he has support from several different units within the company; such as from the marketing area, technical area, and etc. These different units have the aim to help the lower manager to grow the investment and optimize the potential of the product. To evaluate investments the product manager prepares a investment proposal. From past knowledge the lower managers know approximately what each ratio needs to be in order for the investment proposal case to be approved by top management; however there are no set target goals that need to be achieved. A scenario analysis is included in each investment proposals, there are three potential outcomes: bad/medium/good outcome. The focus is on the medium and good outcomes, whereas bad case is neglected.

From interviews of the lower managers, it is clear that each one of the interviewees have their own view of the financial perspective of the investment process, which causes divergent financial analyses. The lower managers state that it is necessary to adjust the financial analysis to reach the target, and get the commitment and approval by the top management. However, there is no communicated objective from the middle or top management, thus there is no target goal that lower managers work towards.

Furthermore, the lower manager states that the financial objectives are vague and the technical background shifts the focus on the technical aspects and possibilities. The lower manager is committed to the product and hence wants to perform well for his own sake. He also has personal incentives for the product to perform well like reputation, promotions, and an increased salary. The financial targets he works towards are not set at a higher level, but by the lower manager himself. Another important finding is that the lowers managers mention that there exist informal meetings, the coffee room effect, with the middle manager where the investment proposal for the investment is the topic. The lower managers state that informal meetings function as foundation to build a commitment and emotional attachment to the product. A product that has been approved by the middle manager where he finds himself committed to the product will less likely be dismissed. An investment proposal is never brought to the investment council if there is not a commitment from the middle and lower managers. The sense for financial numbers and perspective are not as important as the commitment to the investment according to the lower managers.

5.3.6 Sub-Lower Managers

The products are built up by a sum of many projects and the sub-lower managers are in control of a project. The sub-lower manager states that accounting supports them.

6. Analysis

In this chapter the Bower-Burgelman process model will be explained. The findings from Company X will be compared to the model and other literature to identify resemblances and incongruities.

In this chapter Company X will be analyzed by using Bower-Burgelman process model. The goal is to compare theory to a real world setting. We will compare the formal guidelines and actual procedure of the investment decision process in Company X by using the Bower-Burgelman process model. Further, we will analyze Company X with the three processes *Definition*, *Impetus*, and *Context* along with the phases *initial*, *integrating*, and *corporate*.

6.1 Bower-Burgelman Process Model

Table 1 shows the framework of the Bower-Burgelman Process model and the table shall be interpreted as follows, vertically to the left is the hierarchical structure, and each of these takes part in the different processes, definition, impetus, and context. The process definition starts in the box lower manager-definition and works its way up the hierarchical level described by the arrows. This does not occur simultaneously but in a chronological order depending of the time-frame and complexity of the decision. In the next process, impetus, which occurs after the definition has taken place, again it starts at lower manager level and the box lower manager- impetus and continuous up to the top management level. The same goes for the context process. The decision moves up and down the hierarchical levels depending on which stage the process is in.

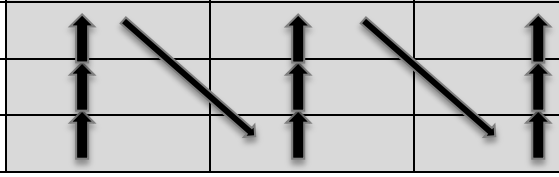
Level of Corporate	***Phase***	***Definition***	***Impetus***	***Context***	***Measure***
Top Manager	*Corporate*				
Middle Manager	*Integrating*				
Lower Manager	*Initiating*				
Hierarchal layers			*Processes*		

Table 1: Example of Bower-Burgelman Process Model

From the Bower-Burgelman process model, we did a step-by-step evaluation of the answers from the interviewees and placed them in one of the three processes. By doing this step-by-

step, it was clear what information was or was not in-line with the Bower-Burgelman process model. The hierarchal layers represent different levels of managers within the firm and during which phase they are involved in. The *Measure* column we used in order to get an overview of how and which objectives are transferred to and from the different levels of hierarchy; financial and managerial objectives. Below is a description and analysis of the processes and phases in the Bower-Burgelman process model.

6.2 Definition process

Bower defines the *definition* as the process where technical and economical characteristics of proposed investment product are determined. Throughout the process, the company identifies products to invest resources in. This part of the process is important in order for the company to accomplish its strategic objectives. Further, the product is defined in multiple measures that aim to communicate the product thru the organization. In Company X the lower managers are responsible for development; they in turn get ideas about new products from staff that is specialized in different areas. The staff prepares basic information about marketing, technology, and financials.

6.2.1 Initiating phase

The initiation phase has the purpose to outline the process of recognizing a product. Importantly, the initiation phase is the foremost essential part of the definition process. It is essential due to that products are most likely to be identified at the lower levels of a company; this because the lower levels are closer to the market and information necessary to make strategic investment decisions. The process starts with a product that has been initiated by the lower level that has identified a need for resources. In order to obtain resources the person who has identified the product needs to get his product approved by the division's general manager; therefore, the product will be defined in its attractive operational measures. For example, measures can be operational efficiency, market and technology competiveness, cost reductions, and good margins. Due to the discrepancy in the market the initiating process is initiated (Bower, 1970).

In Company X, the lower manager has a focus on developing new technology. The technical focus is a priority; although, the managers are aware that the investment needs be approved at a higher level it needs financially solid. At this initial step Company X starts to use their IDP, where ideas and suggestions of new technology is transferred to the managers; there is no specific unit or individual that have the task to brainstorm and produce new technology. In this phase it is clear that there exist a discrepancy, as the main focus is to develop new

products and idea, which shift focus from financial to a technical focus of the products. Moreover, in order to get the product accepted at a higher level the product manager gets information from the sub-unit managers; information about marketing and technology. The lower manager also gets financial information from the accounting controller before he delivers the investment proposal to the investment council. The investment council reviews the investment proposal and evaluates its fit in the Company X product portfolio. This is in accordance with Bower that states that lower level managers need to recognize products that are attractive to top managers in turns of investing in products that are compatibility of the company's investment portfolio and that can generate profit.

6.2.2 Integrating phase

The integrating phase has the goal to transfer information throughout the firm by using different measurements. Products are integrated through the firm by measures that transfer lower levels requirements and opportunities Bower (1970). In the integrating phase, the product is transferred from the bottom to the top management. In order to gain support from the top management a product needs to reflect the firm's objectives and mission in its measures. Therefore, lower level managers feel the pressure to only suggest products that have measures that are in-line with the financial objectives; if a product does not meet up to the financial objectives then the product will not be backed up in the integration phase by managers. Even in this phase there exist discrepancy due to that there is an conflict regarding the requirements and needs between the lower level managers and top management (Bower, 1970)

In Company X the integrating phase takes place in where the product manager communicates the product to the middle manager in order to gain support. The support from middle manager is important in order to get the product approved in the investment council. Before the investment council, the product manager and the middle manager need to make sure the product fits the Company X's objectives in turn of profitability and compatibility of investment portfolio. This is in-line with Bower that states that support from managers is given to products that are in line with the corporate objectives; financially and strategically. Bower emphasizes that measures need to be transferred from the top management to the lower level management in order to achieve the corporate objectives. In Company X, the middle manager is responsible for a business area in the organizational structure. As a product area owner is the linkage between two levels; the middle manager to management and manages the lower manager's performance. This is in accordance to Bower, that states that the manager in

this phase is the “man in the middle”, who is supposed to fill a gap between the lower and top management regarding the analysis and information of products and corporate objectives. Hence, Company X’s middle manager has the responsibility to transfers financial and strategy objectives of the product to both top and lower management. The Bower-Burgelman model only shows how information transfers in one direction from lower to top management. For Company X the middle manager is supposed to transfer the information in both directions. However, as the middle manager believes that financial objectives are difficult to transfer to the lower level management, the financial objectives are put on hold in this integrated phase and not transferred down in the organization. In contrast with the transferring of the strategic objectives, the financial objectives from the top managers are not properly transferred down to the lower level management. This is not in-line with Bower that states that the integrated phase should transfer the information about objectives and measures throughout the organization.

6.2.3 Corporate phase

The *corporate phase* has the goal to define how the top management is supposed to assess products. When assessing a product it is important to evaluate the measures of the products as well as identity which measure is the most important one. In order to assess the product in a financial perspective, the top management usually evaluates the product in financial measures such as cash flow; the top management does this in order to evaluate impacts that can affect the product negatively. There also exist a concern for external factors that can impact a product’s success and outcome such as government restrictions and policies. The concerns of the top management are the triggers that cause the discrepancy between the company and the environment the company is active in (Bower, 1970). In Company X, the product manager is assigned by the top management to collect and create an investment case. The investment case includes scenario analysis of the potential different outcomes of the product in terms of M&S, R&D, and Finance that the lower manager obtains from different units. Company X has chosen to use the investment council in order to control how products are evaluated in the organization. This is in-line with Bower that states that the top management needs to have a procedure to assess products, which Company X does with their investment council that acts like a control unit parallel to the IDP.

6.3 Impetus Process

Impetus describes the force that moves a product towards funding with several levels of approval. The word, impetus, is defined as “the willingness of a manager at a division level to

commit himself as a sponsor the product in council and before the division general manager (Bower, 1970).” An example of impetus is when a manager obtains and increases his success by being a sponsor to a new product, his reputation of good abilities as judgment and skills as a manager increase. This in turns leads to that superiors are more comfortable to allocate resources to product that he sponsors; whereas, his peers comply to his judgment. Additionally, a manager’s good reputation of judgment and abilities will make the subordinates believe that hard creative work will be worth it as they will be rewarded by obtaining resources necessary to implement their ideas. In Bower’s model, the manager is believed to be rational and approve products that are in line with his best interest, as he will then get awarded by top management (Bower, 1970).

In Company X, the lower manager is the first to commit to the product and he gathers impetus in order to establish an acceptance of the product that later leads to approval. Following, the product needs to be accepted by the middle managers and the final approval by the top management. In line with Bower, the managers are driven by incentives such as compensation and mandate, in addition to this an interest in developing exciting new technology.

6.3.1 Initiating phase

In the *initiation phase* of the impetus process, the lower managers generate ideas for new investments. The lower manager needs to commit to the investment as he presents the idea as a good opportunity to the middle managers. Although, he will only present the idea if he believes that he will receive compensation (Bower, 1970). The lower managers in Company X, in this phase, selects product that are believed to likely receive resources for an investment. The most critical part in this phase is for managers to get the middle managers approval. Once the product has been approved by the middle managers it is almost fail-proofed to be accepted by the top management. In order for the manager to get the middle manager’s commitment a persuasion process is started. The literature (Lumijärvi, 1991) has referred this to the *‘coffee-room effect’*. Managers persuade middle managers on how good the product is when the investment is presented by emphasizing values such as employment, economic, strategic, non-economic arguments, and production technology in formal and informal settings. Indirect, subordinates try to persuade the decision-makers to feel connected to an investment product through meetings and informal communications; this with an underlying fear of getting an investment product rejected.

In accordance with Bower, the lower managers at Company X also evaluate the personal benefits and risks if a product fails or succeeds; first the lower manager evaluates whether the investment is economically and strategically acceptable, second if it is in his best interest and he weighs the potential upsides and downsides of going through with the investment and how it will personally affect him. The lower managers have their own personal interest to make the product successful; incentives in form of an increase salary, bonuses, and promotions benefiting the personal wealth. Also, as Bower states, the Company X's lower manager will create impetus towards the product he deems as best in order to get the middle managers acceptance and support to move forward.

6.3.2 Integrating phase

In the *initiation phase* of the impetus process an idea has been established and the middle managers have accepted the idea as a good opportunity. The *integrating phase* serves to find funding to invest in the idea. The middle manager needs to get the approval of top management to receive financing, which is the most important phase in the impetus process, to receive funding in the integrating phase. The middle manager needs incentives and will only commit to a product if there is compensation. The middle managers make two types of valuations, first with the company in mind, whether the investment is economically and strategically attractive, second if it is in his best interest and he weighs the potential upsides and downsides of going through with the investment and how it will personally affect him. The middle manager's reputation stand and falls with his commitment to the product and hence he will only commit to products with a good reward. The middle manager will create impetus towards the product he deems as best in order to get their approval to move forward. The top management steer the direction of investments with benefits and consequences (Bower, 1970).

In this phase the Company X's middle manager has fully committed himself to the product. It can be concluded from the interviews that the middle manager is aware of the fact that the lower managers tend to be overoptimistic regarding their proposed investments; additionally, the fact that numbers can easily be changed in Excel to reflect a better outcome is a problem. To deal with this fact the middle manager adjusts the calculations to reduce the optimism. It is also believed that information from the top management trickles down to the lower manager's regarding the product's performance. The middle manager participates in unofficial meetings known as the coffee-room effect. After the meetings the proposals are narrowed down until the top 20 percent remain. The middle manager believes that these 20 percent are all good

investment and are in line with shareholder's objectives. The products that are left are brought by the middle manager to the investment council where he now has confidence in the products potential to succeed due to the personal evaluation of them. Additionally, these products reflect the middle manager's judgment and skills. Due to this the middle manager will be evaluated and the middle manager has incentives to receive funding, as it will have an effect on his compensation; this is in-line with Bower.

6.3.3 Corporate phase

At the *corporate phase* of the impetus process the top management has approved to and committed to the investment. Top management then presents the investment to the board that makes the final decision. The board represents the shareholders and bases their decision on whether the opportunity maximizes shareholder wealth. If the investment is in the shareholders best interest, it will be financed (Bower, 1970).

For Company X the top management commits and approves the investment in order to create shareholder wealth. In the final investment decision, the investment council along with other participants representing different fields have mandate to accept or reject funding. The investment proposal is presented to each one of the participants from the different fields of finance, technology, and marketing. Participants review the investment proposal in accordance with their field of expertise. When it comes to the financial evaluation of the investment proposal, it is not the finance from the top management that reviews the proposal, instead it is accounting from a lower level. The accounting approval of the investment proposal is bias, since the responsible business controller and the middle manager, whose investment decision is under evaluation, works closely with one another. The responsible business controller adds more bias to the financial evaluation as he consider the proposals from lower and middle managers to already be correct due to their expertise; therefore, no need of further correction or evaluation.

6.4 Context process

The context process is a set of forces that describes the set of organizational forces that influence *definition* and *impetus.* Bower (1970) states that there can be two different subsets of forces called: corporate (situational) structure and structural contexts. The corporate structure context is the formal organization of the firm, including managers that are associated with control systems to measure managers' performance. Structural context is a force based on the role of structure and actions of managers. Bower states that structural context is the

most important subset of forces as it shapes managers in accordance with the goals of the company; coloring the manager's focus and perspective. Hence, the top management can influence behavior during *definition* and *impetus* with control systems (Bower, 1970). Company X's organization structure (Picture 4, p.27) and IDP have been established by the top management in order to control the forces and participants in the decision process, which is in accordance with Bower.

6.4.1 Initiating phase

The *initiating phase* of the context process has the goal to recognize the incongruity between the strategy set by the company and the actual operational result. The discrepancy between the objectives of the firm and the control systems that influence lower-level managers' behavior initiate this phase (Bower, 1970).

Company X recognizes and controls the incongruity by using their follow-up data system. The data system allows different levels to submit their data. Different levels of managers have different level of accessibility in the data system; where the top management has the whole overview of the portfolio, whereas the lower management only gets access to their assigned product. This is in-line with Bower. Although, it seems that the top management do not properly control and govern since the lower managers do not have a formal incentive from the firm to take a full responsibility, as there are no consequences for actions impacting the product and the investment or any follow-ups. Not in-line with Bower (1970) since this aspect lacks proper control.

6.4.2 Integrating phase

The *integrating phase* of the context process has the objective to assess the discrepancy of the behavioral and structure of a firms control system. It is of high importance that this phase balances the complexity of the lower level managers' requirements along with the top management's control system. The follow-up data system is a good tool for top management to get a good idea of the profits and losses in the product portfolio. However, at lower levels they are rarely held responsible for the outcomes, and there is little feedback. There is no transparency in the follow-up data system and it is only top management that can make comparisons between products and draw conclusions. Even tough, Company X has a data system to control and recognize the discrepancy along with the IDP, the processes themselves nor together are sufficient to assess individual performances. The major determinant whether a manager is deemed as high or low performing is his reputation rather than actual present

outcomes. Therefore, Company X, as opposed to Bower, is not properly controlling behavior through their data system or IDP.

6.4.3 Corporate phase

The *corporate phase* has the aim to apply control systems in the firm set by the management. In this phase the management is the ones that describe and implement the framework for the control system, since they influence all the inputs to the system. Therefore, there is important to keep a good balance between the control system and the disagreeing needs of the organization *(Bower, 1970).* The top management at Company X has implemented the IDP and the data system to manage the overall control of information. Company X is in the process of evaluating the possibility of a new control systems designed by the top management, as there is an awareness of the lack of accountability.

6.5 Measures

The hierarchal levels focus on different *measures*; for example, measures can be strategy, operational efficiency, technology, or financial ratios. The objectives of top management might differ from middle and lower managers.

6.6 The Bower-Burgelman Process Model applied on the Findings

Level of Corporate	***Phase***	*Definition*	*Impetus*	*Context*	***Measures***
Top Manager	*Corporate*	*Top management uses investment council to assess products*	*Commitment by investment council and top management through evaluation and mandate. Bias is created by the lower manager mandate from Accounting.*	*Use IDP and data-system to control and move the organization towards the objectives. Awareness of lack of accountability in the hierarchal levels.*	*Strategic & financial objectives targeted to increase shareholder wealth (EBIT%; GM; Profit etc.)*
Middle Manager	*Integrating*	*"Man in the middle" transfer strategic objectives, although the financial objectives are not properly transferred.*	*Commit to the product in order to get investment council's approval to get funding (adjustment of investment proposals). Product will reflect on middle manager's skills and judgment.*	*Not properly controlling for behavior through control systems*	*Strategic objectives are transferred down to lower management; financial objectives (ex. EBIT%) are not properly communicated*
Lower Manager	*Initiating*	*Attractive products to top management are recognized; technique is the main focus (shift from finance; discrepancy)*	*Choose a product that is believed to get middle manager's support; coffee-room effect. Risk evaluation by lower managers (personal benefits and risk)*	*Top management recognizes the incongruity of strategy and operational results on this level*	Strategic and technical objectives are the goals for this level. Financial goals are GM%

Table 2: The Bower-Burgelman Process Model's Measures Applied on Company X

6.7 The Linkage between Empirical Findings and Literature

According to Fama and Jensen (1983), *agency problem* in a firm is due to the principal and the agent have different objectives. This is in accordance with our findings as the top management's goal is to maximize shareholders' wealth, whereas the middle manager prioritizes sales revenue and the lower manager focuses on new technology development. In Bower's Bower-Burgelman process model, the different hierarchal levels' objectives are divided in to measures in his matrix. In Bower's model, the participants in the same hierarchal level all have the same objectives. However, this view is too simplified, as findings from Company X shows that participants at the same hierarchal level have different objectives. The lower managers have different backgrounds in marketing and engineering, which creates a bias towards objectives that are reflecting the specific lower managers' expertise. This is consistent with Hanna et al. (2001) that states that factors such as background and knowledge affect individual financial objectives. There are agency costs in Company X, since top management does not believe that managers' act in the best interest of shareholders. The top management controls and reviews all information from the managers and restricts their access to the portfolio performance. This is in keeping with Jensen and Meckling (1976) and Fama and Jensen (1983) theories on the agency problem. From the interviews it is evident that managers are driven by incentives such as compensation and a motivating compensation package can reduce *principal-agent problem* according to Lewellen et al. (1987); however, this effect is hard to observe.

Lichtenstein et al. (1982) and Russo and Schoemaker (1992) state that managers are *overconfident* in their ability to judge if a product is a good or bad investment, which is in-line with findings of Company X. Managers have expertise in their field and therefore there is a tendency to overestimates the reliability of their actual knowledge. Lovallo (1993) argues that managers tend to *overestimate* their ability to predict cost and sales when complex investment decisions with many uncertainties. From interviews it is apparent that this is also the case for Company X. Due to the heavy and large R&D, investments are rare, this adds to the *overconfidence*. It is hard for the managers, as Lovallo (1993) states, to learn from investments as they all have their unique properties. Hence, the *overconfidence* goes unrecognized throughout the investment decision process in Company X. In addition to this, the long time span of an investment in a product makes the learning experience even harder. Usually, an investment can be relatively quickly evaluated whether it was successful or not, but with long time spans this is a difficult process. In Company X, a product takes decades before it is terminated and a proper assessment can be performed. Hence, the managers that

have been part of the initial investment, from idea to product, are rarely still involved during the entire lifetime and process of the investment. Further, due to rotation of positions in Company X, a manager's responsibility ceases to exist as soon as he or other governing managers switches positions. Brehmer (1980) states that long life-span investments along with frequent rotation of management tend to cause the down prioritizing of feedback from past investments.

According to Mokhtar (2014), managers take credit for success and blame failure on external factors, which is known as the *self-attribution bias*. Due to the complexity and large size of investment for Company X, the manager does not take full credit; instead, he sees it as a team effort. Failure and responsibility are spread throughout the organization, and no individual pays the price; failures can always be blamed on uncertainties and uncontrollable factors. The *self-attribution bias* is present in investment decision, since forecasts are often based on overconfident managers' gut feeling and hope, which is comparable to Mokhtar theory. Further, the managers are selected for their positions since they have a good track record according to Goel and Tackor (2008); known as the *selection bias*. *Selection bias* is created since the selected manager then believes that they have the trust from the organization in Company x, which in turn fuels the overconfidence. The lower and middle managers lack financial education, though they are still expected to perform financial analysis. From the interviews in Company X it is clear that different support units to the lower managers fuel the *selection bias*. It is apparent that in the final investment decision, accounting approves the finance mandate, but due to accountings strong belief that the financials already prepared by the managers are excellent because they have a good track record. However, the *selection bias* is created since accounting support lower and middle managers financial knowledge, even though they lack financial education. This feeds the lower and middle managers *overconfidence* in their ability to perform financial analysis, which greatly impacts the investment decision since it forms the basis for the evaluation. Also, the fact that the managers have proposed the investment and it has reached its final approval, accounting believes that it must therefore be a good investment, hence no need to revise or question. The accounting fuels the effect of *overconfidence* on investment decision and the selection bias of lower managers. Puri and Robinson (2007), argues that over optimism results in less focus on the finances of products, which is consistent with the findings at Company X, where the focus lays on technology.

The investment decision process is extremely complex and there are many forces affecting Company X. The Bower-Burgelman model gives a good overview of how a decision travels, and is finally approved at Group level. However, the investment of a heavy R&D technology company has its own unique characteristics. In Company X decision process IDP all the phases of the investment is covered; from idea to termination. It is also clear that top management plays a major part in the initial investment decision, but as time proceeds they take a more background-governing role. It is evident that technology companies with heavy R&D require a model that considers investments with longer horizons if the investment decision process is to be correctly understood. The Bower-Burgelman model is too simple in order to analyze a company with heavy R&D and products with long time horizons. The Bower-Burgelman model only describes the idea of an investment until the funding stage. However, there are more stages to take into consideration. To correct for the model's shortcomings more processes need to be added that describes the stages beyond funding such as market entry, re-investments, maintenance, and termination.

From the empirical findings, it is evident that there are other forces not included in the Bower-Burgelman model affecting the investment decision process. The behaviors of individuals in the investment decision process are forces affecting both the management and financial objectives and execution. These forces include the *coffee-room effect* and *agency theory* including *overconfidence; over-optimism; self-attribution bias; selection bias*. It is clear that there exist a synergy between corporate finance and behavioral finance. These forces can potentially have a negative impact on shareholder wealth as individuals have their own agenda. Hence, it is important to include this aspect in an investment decision process model.

Level of Corporate	***Phase***	*Definition*	*Impetus*	*Context*	*Measure*	***Other Forces***	***Additional Phases***	
Top Manager	*Corporate*	*Top management uses investment council to assess products*	*Commitment by investment council and top management through evaluation and mandate. Bias is created by the lower manager mandate from Accounting.*	*Use IDP and data-system to control and move the organization towards the objectives. Awareness of lack of accountability in the hierarchal levels.*	*Strategic & financial objectives targeted to increase shareholder wealth (EBIT%;GM%; Profit etc.)*	*Agency Theory Principal-agent problem*	*Mainten-ance*	*Termin-ation*
Middle Manager	*Integrating*	*"Man in the middle" transfer strategic objectives, although the financial objectives are not properly transferred.*	*Commit to the product in order to get investment council's approval to get funding (adjustment of investment proposals). Product will reflect on middle manager's skills and judgment.*	*Not properly controlling for behavior through control systems*	*Strategic objectives are transferred down to lower management; financial objectives (ex. EBIT%) are not properly communicated*	*Overconfidence Self-Attribution Coffee-room effect*	*Re-Investments*	
Lower Manager	*Initiating*	*Attractive products to top management are recognized; technique is the main focus (shift from finance; discrepancy)*	*Choose a product that is believed to get middle manager's support; coffee-room effect. Risk evaluation by lower managers (personal benefits and risk)*	*Top management recognizes the incongruity of strategy and operational results on this level*	*Strategic and technical objectives are the goals for this level. Financial goals are GM%*	*Selection bias Overconfidence Self-Attribution*	*Market Entry*	

Table 3: The Bower-Burgelman Process Model's applied on Company X with additional forces and phases.

7. Conclusion

This chapter aims to summarize the findings and analysis.

Every company has the goal to maximize shareholder wealth by allocating funds to the most profitable investments. A company's survival is dependent on its ability to stay competitive and maintain market share. In a company there is always a selection of potential investments, therefore the investment decision process is crucial. From our research we can draw the following conclusions:

Firstly, the following findings at Company X are in-line with Bower-Burgelman process model. The definition process at Company X includes the definition of the process and recognition of the product, the transfer of the information through the organization, and the top management accessing the product. The impetus process at Company X includes how lower managers generate ideas for new investments, middle manager commit to the

investment, and the top management approves the investment. The context process at Company X includes to recognize and assessing the discrepancy between strategy and operational results, along with the application of control system by top management. However, what is not in accordance with the Bower-Burgelman process is the integration phase in the definition process, where the information from top management is not properly transferred throughout the organization. There is a gap in the Company X's control system as it does not control and assess individuals' performance.

Secondly, the Bower-Burgelman model is incomplete when assessing individuals' behavior that impacts the investment decision process. Our research has shown that behavior influences the financial objectives. It is evident that there exists a principal-agent problem with the different objectives throughout the organization. Individuals have their own agenda to improve their own wealth and minimize personal risk in the decision-making. Further, managers' overconfidence and over-optimism creates bias. This in turn impacts the financial forecast of NPV, IRR, Cash Flow, and Payback period. It is important to control for bias as individuals behavior can cause the wrong products to be selected. To reduce the bias, a governing finance function is beneficial in order to support managers and reduce the over-optimism in the investment decision process. In Company X, it can be concluded that this function does not exist. A governing finance function is a positive force that aids the financial analysis in connection to strategy and execution of an investment decision process.

Thirdly, the Company X is a technology firm with heavy R&D; therefore, a majority of the employees have a technical background. In this context, there is a shift in focus from finance to technical, which affect the objectives. Another distinction that separates a heavy R&D firm from the general firm is the products' long time horizons. The Bower-Burgelman process model neglects this aspect. There are other processes that need to be added such as market entry, re-investments, maintenance, and termination.

To conclude, there are similarities and differences between Company X as a technology firm with heavy R&D and the general firm. What is unique for Company X is the focus on technology objectives and long product horizons impacting the investment decision process. Further, due to the heavy R&D that adds to the complexity and size of the investment there needs to be a focus beyond funding as there are several reinvestments at future points in time. However, the research confirms that most findings can probably be applied to companies in various fields. All companies are affected by individuals' behavior, principal-agent problem,

overconfidence, over-optimism, self-attribution bias, selection bias, and these forces always affect the investment decision process; therefore, behaviors are inseparable from the process. In the investment decision process these forces influence the objectives and execution by managers and top-management. To summarize, the research confirm that there is a clear linkage between behavior, management, and finance that impacts the investment selection and shareholder wealth in a technology firm with heavy R&D, although the findings might be applicable to most firms.

8. Further Research

Too few studies have been conducted on the topics discussed in this paper, even though this study contributes to the literature, no general conclusions can be drawn without adding studies from more companies. A suggestion for further research is to conduct more studies on individual's behavior in the in the investment decision process of an organization as well as investigating the synopsis view of finance and management as opposed to seeing them as opposites.

9. References

Ackerman, R. (1970). *Influence of Integration and Diversity on the Investment Process.* Administrative Science Quarterly, 15(3), p.341.

Bierman, H. and Smidt, S. (1966). *The Capital Budgeting Decision*. 2nd ed. New York: Macmillan.

Bower, J. (1986). *Managing the resource allocation process*. Boston, Mass.: Harvard Business School Press.

Brehmer B. (1980), *In One Word: Not from Experience*, Acta Psychologica, 45(1-3), pp.223-241.

Callan VJ., Johnson M. (2002), *Some Guidelines For Financial Planners In Measuring And Advising Clients About Their Levels Of Risk Tolerance*, Journal of Personal Finance, 2002-1, pp.31-44.

Dempsey, M. (2014). *The Modigliani and Miller Propositions: The History of a Failed Foundation for Corporate Finance?* Abacus, 50(3), pp.279-295.

Donald K. Clancy, Frank Collins, and Robert Chatfield. (1982). *Capital Project Selection: The Behavioral Aspects*, Cost and Management 9(12): pp.28-32.

Fama E. F. and Jensen M. C. (1983), *Separation of ownership and Control*, Journal of Law and Economics, XXVI(6).

GERVAIS, S., HEATON, J. and ODEAN, T. (2011). *Overconfidence, Compensation Contracts, and Capital Budgeting*. The Journal of Finance, 66(5), pp.1735-1777.

Goel, A. and Thakor, A. (2008). *Overconfidence, CEO Selection, and Corporate Governance*. The Journal of Finance, 63(6), pp. 2737–2784.

Graham, J.R. and C.R. Harvey (2001), *The Theory and Practice of Corporate Finance: Evidence from the Field*, Journal of Financial Economics, 60, pp. 187–243.

Hamberg M. (2004), *Strategic financial decisions*, 2nd ed. Malmö: Liber AB.

Hanna, S.D., Gutter, M. S., & Fan, J. X. (2001). *A measure of risk tolerance based on economic theory*, Financial Counseling and Planning, 12(2), pp.53-60.

Hartmann G.C., Myers M.B and Rosenbloom R.S (2006), *Planning Your Firm's R&D Investment*, Research Technology Management, 49(2), pp.25-36.

Heath C. and Tversky,A. (1991), *Preference and belief: Ambiguity and competence in choice under uncertainty*, Journal of Risk and Uncertainty, 4, pp.5–28.

Hemmningsen, S. (1973). *Studier af nogle danske virksomheders investingsadfaerd*. Erhvervsokonomisk tidsskrift, 37, pp.121-143.

Hogarth RM and Makridakis S (1981), *The value of decision making in a complex environment: an experimental approach*, management Science, 27(1), pp93-107.

Ibarra, L. (1995). *Credibility of trade policy reform and investment: the Mexican experience*. Journal of Development Economics, 47(1), pp.39-60.

Jensen, M.C. and W.H. Meckling (1976), *Theory of the Firm: Managerial Behaviour, Agency Costs, and Ownership Structure*, Journal of Financial Economics, 3, pp. 305–360.

Kahneman D., Lovallo D. (1993), *Timid choice and bold forecasts: A cognitive perspective on risk taking*, Management Science, 39, pp. 17–31.

Keasey, K. and Hudson, R. (2007). *Finance theory: A house without windows. Critical Perspectives on Accounting*, 18(8), pp.932-951.

Kennickell, AB. (1995), *Analysis of Nonresponse Effects in the 1995 Survey of Consumer Finances, Proceedings of the Section on Survey Research Methods*, 1997 Joint Statistical Meetings, Anaheim, CA

Kim, H. and Cheonsik, P. (2009). *The Effect Of Managerial Overconfidence On Leverage*. International Business & Economics Research Journal, 8(12).

King, P. (1975). *Is the Emphasis of Capital Budgeting Theory Misplaced?*. Journal of Business Finance & Accounting, 2(1), pp.69-82.

Kunda, Ziva. 1987, *Motivated Inference: Self-Serving Generation and Evaluation of Causal Theories*, Journal of Personality and Social Psychology 53:4, 636-647.

Lewellen, W., C. Loderer, and K. Martin (1987), *Executive Compensation Contracts and Executive Incentive Problems: An Empirical Analysis*, Journal of Accounting and Economics, 12, pp. 287-310.

Lichtenstein, Fischhoff, Philips. 1982. *Calibration of probabilities: The state of art to 1980. In Judgment under Uncertainty: Heuristics and Biases*, D. Kahneman, P.Slovic, A. Tversky (eds.). Cambridge University Press, Cambridge, England.

Lumijärvi, O. (1991). *Selling of capital investments to top management*. Management Accounting Research, 2(3), pp.171-188.

Margolis, J. (1958). *The Analysis of the Firm: Rationalism, Conventionalism, and Behaviourism*. Journal of Business, 31(3), pp.187-199.

McAuley, J (1996). *Business Ethics and Business Behaviour*. In Ethical issues in the management of change. Thomson Business Press.

Modigliani, F. and Miller, M. (2015). *The Cost of Capital, Corporation Finance and the Theory of Investment*. The American Economic Review, XLVIII(3), pp.261-297.

Mokhtar R., Absalan M. (2015), *Effect of organizational learning on human resource development (case study: Payam Noor University in Fars province)*, Journal of Scientific Research and Development, 2(4), pp. 168-172.

Mukherjee, T.K. and Henderson, G.V. (1987), *The Capital Budgeting Process: Theory and practice,* 17(2), pp.78-90.

Noda, T. and Bower, J. (1996). *Strategy making as iterated processes of resource allocation.* Strat. Mgmt. J., 17(S1), pp.159-192.

Psaros, J. (2009). *Australian Corporate Governance: A Review and Analysis of Key Issues. Sydney: Pearson Education 2009*. J Acc & Organizational Change, 6(2), pp.284-288.

Puri, M. and Robinson, D. (2007). *Optimism and economic choice*. Journal of Financial Economics, 86(1), pp.71-99.

Russo J. E., Schoemaker P. J. H (1992). *Managing overconfidence*. Sloan Management Review, 33, pp. 7 – 17.

Silvola, H. (2008). *Capital budgeting methods, management control systems and the R&D intensity of the firm*. IJAF, 1(2), p.168.

Simon, H. A. (1955). *A behavioural model of rational choice*. The Quarterly Journal of Economics, 69(1), pp.99-118.

Smith, A. (1776). *Wealth of Nations*. 1st ed. London: W. Strahan and T. Cadell.

Statman, M. and Caldwell, D. (1987). *Applying Behavioral Finance to Capital Budgeting: Project Terminations*. Financial Management, 16(4), p.7.

Svenson, O. (1981). *Are we all less risky and more skillful than our fellow drivers?* Acta Psychologica, 47(2), pp.143-148.